Geotechnical

STRATEGY FOR REMEDIAL AND PREPARATORY WORKS

Land off Woolley Colliery Road, Darton (Northern Site Area)

For Gleeson Homes

Date: April 2026

Report reference: C10128N/RS

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REPORT TABLES

APPENDIX A DRAWINGS

Drawing No.	Title	Scale
C10128/01	Site Location Plan	1:25,000 @ A4
C10128/02	Site Features Plan	Not to Scale
10701-HBL-XX-XX-DR-C-5301 Rev P03 (HBL)	S38 Agreement Plan	1:500 @ A1
10701-HBL-XX-XX-DR-C-5205 Rev P01 (HBL)	Cut and Fill Assessment	1:750 @ A1

1. Introduction

Sirius Geotechnical Ltd (Sirius) was commissioned by Gleeson Homes to produce a Remediation Strategy required to facilitate development of the northern site area of land off Woolley Colliery Road, Darton, Barnsley (the "site"). Sirius has previously undertaken site investigations on a wider area of land, comprising separate northern and southern site areas. The overall site location is shown on Drawing No. C10128/01, and the relative locations of the northern and southern site areas are shown on Drawing No. C10128/02; copies of both drawings are included in Appendix A.

It is understood that development proposals for the site include the construction of 72 No. houses with private gardens, as well as new access roads and an attenuation basin, as shown on HBL Drawing No. 10701-HBL-XX-XX-DR-C-5301 Rev P03, dated 16.03.26, a copy of which is included in Appendix A.

The Cut and Fill Assessment (HBL Drawing No. 10701-HBL-XX-XX-DR-C-5205 Rev P01, dated 04.11.25 (a copy of which is included in Appendix A) shows that, in order to reach an assumed formation level of 600mm below finished ground level, levels are to be raised from existing in the majority of the site, typically by up to c. 2 – 3m, but locally by up to c. 4m. Levels are to be locally cut from existing, including by up to c. 4m in the northern end of the site, to form the attenuation basin.

Retaining walls are proposed to facilitate the level changes, including a wall of up to 3.5m height between the housing and the attenuation pond, as well as several lower walls. The design of the retaining walls is not known at the time of writing.

If the proposed site layout or finished ground levels are revised significantly from those described above, this Remediation Strategy will require review and possible revision.

The site has been subject to site investigation work by Sirius, as reported in the following documents:

- Geoenvironmental Appraisal Report – Land off Woolley Colliery Road, Darton – Ref. C10128. Dated July 2024.
- Woolley Colliery Road, Darton – Ground Gas Risk Assessment Report – Letter Report, Ref. C10128/AL/10648, dated September 2024.
- Woolley Colliery Road, Darton - Supplementary Ground Investigation Letter Report, Ref. C10128A/AL/11205, dated April 2026.

The above documents are the principal source of information used in the preparation of this Remediation Strategy and should be read in conjunction with this report.

The main aims of this Remediation Strategy are summarised as follows:

- To satisfy the Local Planning Authority (LPA) environmental health department and other appropriate bodies, that the remedial works will provide a site suitable for the proposed development;
- To minimise the impact to the environment and human health whilst undertaking the works; and,
- In the interests of sustainability, to reduce requirements for excavation, off-site disposal and promote the use of existing site-won materials providing they are suitable for the proposed end use.

A Method Statement should be prepared, in order to detail how the objectives will be achieved. The Method Statement should be accompanied by a Designer's Risk Assessment in accordance with the current CDM Regulations. The Method Statement and Risk Assessment should be submitted to, and approved by, a suitably qualified geoenvironmental consultant.

2. Site Details and Description

For a detailed description of the site's historical development, published geology, hydrogeological and environmental setting, proven ground conditions and soil, groundwater and ground gas contaminant concentrations, etc., refer to the above-referenced reports. A brief overview is given in Table 2.1.

Table 2.1 - Site Overview

National Grid Reference	431190, 410780.
Site Description	The north of this area slopes gently down towards the west, from c. 82m above Ordnance Datum (AOD) to c. 76m AOD. Further south, the site is relatively flat lying; however, the southwest is raised by c. 2m, and the centre / west of the site slopes up towards the west, to a maximum elevation of c. 87m AOD. This area is disused, with the majority surfaced with grass, or with trees / bushes (especially towards the west and southwest of the site). The centre and part of the south is surfaced with concrete. In the centre of the site there is an area of mounded material, plus an area of concrete boulders.
Site History	The site remained undeveloped until the 20th Century, with a watercourse present. By 1907, railway lines associated with the adjacent Woolley Colliery were present, with spoil heaps shown on site by the 1930s. Further spoil heaps were shown on site in the 1950s, which were further extended by the 1990s.
Ground Conditions	No natural topsoil is present. Locally, a thin layer of made ground topsoil was present at surface, comprising friable clay with gravel of sandstone, mudstone, brick, etc. A concrete slab, up to 0.4m thick, is present at surface locally, extending beneath made ground within the southwest of, the site, with further made ground present below the concrete, up to a depth of 2.7m below ground level (bgl). Made ground is present across the whole site, to depths of between 0.6m and 9.4m bgl, with the thickest material being present adjacent to the western boundary, and with up to 6.5m of made ground present in the far north of the site, considered likely to represent backfill to localised crop workings of the Barnsley Coal seam (see 'Coal Mining', below). The made ground was mostly granular, comprising gravel of mudstone, sandstone, coal, ash, brick, and locally slag, and locally including fragments of wood and metal. Locally, the granular made ground was recorded to be black with a significant proportion of gravel sized fragments of ash and coal. Where cohesive made ground was present, this generally comprised slightly sandy gravelly clay, with gravel of sandstone, mudstone, coal, brick, concrete, etc. Boulders of sandstone and concrete were locally present within the made ground, leading to slow excavation through that material. Alluvium, associated with the former watercourse, comprising 1.1m to 1.45m of soft to firm, low to medium strength clay, was recorded locally, within TP311N and WS311N, at depths of 1.6m and 2.5m bgl, respectively. Natural residual soils present beneath the made ground, and overlying competent bedrock, mostly comprised firm to stiff, medium to high strength slightly sandy gravelly clay, with gravel predominantly comprising sandstone, mudstone and coal. Competent bedrock comprising mudstone, sandstone and coal was encountered at depths typically ranging between 1.4m and 5.3m bgl, with the exception of the western area, where competent bedrock was encountered between 6.5m and 9.0m bgl.

Coal Mining	Although there are recorded coal mine workings in both the Top Haigh Moor Coal and Low Haigh Moor Coal beneath the site, there is sufficient rock cover above these seams to mitigate any residual instability within workings within them. The Barnsley Coal seam outcrops within the north of the site, and dips to the east / northeast. Within this area, the Barnsley Coal seam has been locally found intact, in thicknesses of up to 4.0m, although generally ranging in thickness between c. 1.5m and 2.0m, and extending to depths of up to 7.5m bgl within the site. Informal crop workings (i.e., areas of made ground resulting from historical small-scale opencast extraction of coal) have been identified within the Barnsley Coal seam in the northern end of the site, extending to depths of up to 6.5m bgl. There are no recorded mine entries within the site. However, there are recorded mine workings at depth beneath the site and therefore the possibility of encountering unrecorded mine entries cannot be discounted. It is therefore recommended that all excavations are inspected for mine entries / features. If a mine entry, mine workings or ground disturbance is suspected, advice regarding treatment / foundation precautions should be sought immediately from a suitably qualified engineer.
Groundwater	Groundwater seepages have been recorded at depths ranging between 3.4m and 8.0m bgl during site investigation works. Subsequent groundwater monitoring has recorded standing groundwater levels ranging between 0.89m and 16.51m bgl.
Ground Contamination	The recorded concentrations of arsenic, lead, genotoxic polycyclic aromatic hydrocarbons (PAH) and naphthalene within the various types of made ground present at the site (including thin, localised topsoil) have been determined to present an unacceptable chronic risk to human health via dermal, ingestion and dust inhalation pathways where present within garden and soft landscaped areas following development. Furthermore, the recorded concentrations of naphthalene within made ground were considered to present an unacceptable risk to human health via potential vapour inhalation pathways.
Asbestos	Fragments of asbestos cement drain pipes were noted on the ground surface adjacent to the current site entrance off Woolley Colliery Road (see indicative location on Drawing No. C10128/02). Asbestos cement fragments were identified within the made ground in the localised backfilled coal crop workings in the north of the site, within TT404, from 2.6 to ≥ 3.0m bgl, and TT404C, from 3.3m to ≥ 3.6m bgl. Furthermore, the made ground soil matrix from TT404 within which the asbestos-containing materials (ACMs) were noted, was also recorded to contain asbestos, in the form of chrysotile fibre bundles, with quantitative analysis giving the concentration of asbestos within the soil as 0.006%.
Ground Gas	The Ground Gas Risk Assessment determined that the site falls within Characteristic Situation 2 (CS2), requiring basic ground gas protection measures and verification. No radon protective measures are required for the development.
Shallow Coal	Thick coal (up to c. 4m) has been encountered at shallow depth in the north, associated with the Barnsley Coal seam. Inert clean cover will be required in gardens and landscaped areas which are underlain by naturally occurring coal at depths of 1m below finished level, to mitigate the risk of combustion from e.g. bonfires. Where services (e.g. electricity cables) pass through coal, a corridor of inert material will be required to mitigate against potential combustion of the coal from heating.

3. Remediation Strategy And Objectives

The primary objective of the remediation works is to mitigate the transient and long-term risks to human health receptors from potential contaminants (arsenic, lead, genotoxic PAH, naphthalene and asbestos) within made ground.

In brief, the risks to human health from exposure to contaminated soils will be mitigated by remedial earthworks and provision of a clean cover system, and provision of ground gas protection measures.

Where the works involve re-use of site-won made ground and / or importation of clean naturally derived soils from another development site, it is recommended that this be undertaken under a Materials Management Plan (MMP) produced in accordance with the CL:AIRE Development Industry Code of Practice[1] (DoWCoP). Any MMP will need to be reviewed and declared to CL:AIRE by a Qualified Person prior to commencement of remedial and preparatory works.

The main requirements of the remediation works are given below in the approximate sequence of works. Pertinent elements of the works are discussed in greater detail in subsequent sections of this document.

It is anticipated that the remediation works would include the following:

Table 3.1 - Remedial Objectives

Remedial Objectives	Required Remedial Measures
ENABLING PHASE ACTIVITIES:	
Objective 1: Decommissioning of redundant groundwater and gas monitoring wells	All pre-existing ground gas / groundwater monitoring wells should be decommissioned by backfilling with bentonite and removal of the headworks.
Objective 2: Management of ACMs and soils potentially impacted with asbestos	Removal of localised visible ACMs from the ground surface in the east of the site, followed by removal from site to a suitably licenced waste facility. Localised excavation of asbestos-impacted made ground in the north of the site, to form the attenuation basin, followed by removal of visible ACMs from the site. Sampling and laboratory analysis of residual made ground soil matrix of ACM impacted soils, to determine suitable management options, to either retain on site, or dispose off site.
Objective 3: Earthworks to form a development platform	Cut and fill earthworks to achieve proposed formation levels, in accordance with an agreed Earthworks Strategy (to be produced by Sirius). To include exposing and breaking out of the intact concrete slab that lies at the surface in parts of the site and underlies made ground in the southwest of the site. Suitable excavated materials to be processed to for re-use as engineered fill. Concrete and other suitable hard materials to be processed to form secondary aggregates.
Objective 4: Management of previously unidentified contamination	An appropriate procedure to enable unexpected contamination to be identified and assessed should be in place prior to remedial works being undertaken on site. Should unexpected contamination be encountered during the course of Objectives 1-3, the GE should assess the potential risks and advise on remedial measures.

[1] CL:AIRE, 2011. *The Definition of Waste: Development Industry Code of Practice.*

Remedial Objectives	Required Remedial Measures
	Should any previously unidentified contamination be identified which would require a significant amendment to this Strategy, then this should be agreed with the LPA prior to implementation on site.
Objective 5: Waste and Resource Management	Implementation of appropriate procedures and measures to manage materials for re-use and waste disposal in accordance with industry best practice and current legislation.
CONSTRUCTION PHASE ACTIVITIES:	
Objective 6: Placement of Clean Cover System	To protect future residents from exposure to made ground contamination by metals, PAHs and asbestos fibres, it is proposed that a validated clean cover system is installed during the construction phase in gardens and in areas of soft landscaping, where made ground remains present. This shall comprise 600mm (minimum) of suitable topsoil and subsoil in gardens, and 450mm in soft landscaped areas. Where residual asbestos fibres with concentrations >0.001% are present within made ground, a hard dig layer or a high visibility warning / marker geotextile should be placed at the base of the clean cover system.
Objective 7: Provision of Ground Gas Protection Measures	Installation and verification of ground gas protection measures in new buildings by suitably qualified personnel, to manage risks from hazardous ground gases and naphthalene within existing made ground.

4. Geoenvironmental Engineer

A suitably experienced and qualified Geoenvironmental Engineer (GE) should be appointed for the works, to supervise and advise on relevant matters.

The GE shall attend site as required, as requested by the client, to ensure that the requirements of this Strategy are complied with. The responsibilities of the GE shall include, but not be limited to, the following:

- Liaison with the client and statutory bodies in relation to the remedial works;
- Supervision and quality control of the remedial works;
- Implementation of contingency measures if unexpected contamination, unrecorded mining features and / or buried substructures are found during the works;
- Advising on the correct handling of materials and conditions encountered;
- Soil sampling and organisation / interpretation of laboratory analysis, where required by the Remediation Strategy;
- Review of site records and test results as they become available and making comment and acting upon those results accordingly;
- Production of the initial verification report, covering the general remedial earthworks and remediation of the identified contaminant impacts;
- Verification of clean cover placement within garden and soft landscaped areas; and
- Verification of ground gas protection measures within buildings.

5. Site Clearance / Preparation

5.1 Services

Prior to site works commencing, the position and depth of all services shall be determined and clearly identified on site by the contractor. The locations should be confirmed on site by appropriate investigation and observations. The following should be undertaken:

- Service providers shall be contacted by the contractor to determine any precautions, safe working distances etc., relating to services, both underground and overhead.
- Copies of a consolidated services location drawing should be retained and displayed in the contractor's office.
- Cable avoidance tool (CAT) scanning of areas where works are to be carried out.
- Hand-dug trial holes to expose service locations shall be undertaken where possible.
- Physical marking out on the site of service routes on the ground and appropriate lay-offs / easements using paint, pegging, bunting etc.
- Where services are being re-routed during the works, both the drawings and site markings must be kept up to date.
- When works commence on a new area of the site, the site manager or relevant foreman must brief all operatives on the location of services in this area.
- Method statements / risk assessments must be read by all relevant personnel and their understanding of them confirmed in writing.
- If coloured sands, service ductwork or services are exposed during operations then work must cease until the site manager has confirmed it is safe to continue.
- All manholes and inspection chambers to remain should be located and clearly identified on site to prevent damage. The location, overall depth and diameter of each manhole, and the size and depth of all connections, shall be recorded.

5.2 Tree Protection

Any trees to be retained should be identified and protected in accordance with an approved arboricultural method statement.

5.3 Protected Species

Any works required to mitigate disturbance to protected species during the remediation / enabling works should be undertaken by suitably qualified contractors in accordance with an approved method statement(s).

5.4 Invasive Plant Species

Where any invasive plants are identified by a suitably qualified ecologist, these should be removed / treated in accordance with their recommendations.

5.5 Site Clearance

Following removal / treatment of any invasive plants and implementation of any required tree protection / protected species measures, all remaining vegetation shall be stripped / cleared and stockpiled on site for re-use (where applicable) or removal from site.

6. Remediation Strategy

This Strategy includes measures required to achieve Remedial Objectives 1 to 7, as outlined in Table 3.1.

6.1 Remedial Objective 1 – Decommissioning of Redundant Groundwater and Gas Monitoring Wells

Pre-existing groundwater and gas monitoring wells are present within the site boundaries, with their co-ordinates recorded on the borehole logs within the above-referenced Sirius site investigation reports. These should be decommissioned by backfilling with bentonite and removal of the headworks.

Decommissioning records, including a photographic record, shall be kept to document the decommissioning of each monitoring well.

Should further investigations fail to locate any monitoring well(s), then records detailing the investigation works shall be kept to demonstrate this.

6.2 Remedial Objective 2 – Management of ACMs and Soils Impacted with Asbestos

Asbestos cement fragments were noted on the ground surface adjacent to the site entrance off Woolley Colliery Road. These, and any other visible fragments of non-friable ACMs, should be carefully hand-picked by trained Non-Licensable Work with Asbestos including Non-Notifiable Licensed Works operatives, double bagged and placed into a secure area for subsequent disposal to an appropriately licensed waste facility.

Site investigation works have locally encountered ACMs (fragments of cement) within made ground within the north of the site. Chrysotile asbestos fibre bundles were also recorded within the surrounding made ground soil matrix, at a concentration of 0.006%.

Based on the proposed cut and fill drawing, it is likely that these ACMs and asbestos fibre impacted made ground would require excavation to form the attenuation basin.

Where encountered, and where practicable to do so, visible fragments of ACMs should be carefully hand-picked from the soil matrix by trained Non-Licensable Work with Asbestos including Non-Notifiable Licensed Works operatives, double bagged and placed into a secure area for subsequent disposal to an appropriately licensed waste facility. Within the attenuation basin area, visible ACMs should be removed to a suitable depth beneath the proposed base of the basin and associated headwalls and pipework, to avoid the risk of encountering asbestos impacted soils during drainage construction and maintenance works. The proposed basin construction includes an impermeable membrane within the base and sidewalls. This will effectively prevent future release of asbestos fibres, and therefore, a formal clean cover layer is not required within the basin itself.

Following hand picking of visible ACMs, the excavated made ground soil matrix should be sampled and analysed for asbestos fibre presence / absence at a UKAS accredited laboratory. If asbestos is present, quantitative asbestos analysis should then be undertaken. The results of testing should be assessed by the GE.

If no asbestos is detected or quantification testing returns asbestos concentration results <0.001%v/v, then the underlying soils can be treated as per other made ground on the site and placed either below hard standing, or below a clean cover system, as detailed within Section 7.

If asbestos is detected and the results of the quantification testing return results of >0.001%v/v but <0.1%v/v, then the soils could be re-used on site subject to certain criteria to negate any possible future risks to groundworkers and end-users, i.e., below hardstanding areas but not within highways or areas where service / drainage runs will be excavated. These soils may also be relocated below gardens or areas of soft landscaping,

below a clean cover system incorporating a basal hard dig layer or geotextile separator, as detailed within Section 7.

Any excavated soils containing visible ACMs, and / or asbestos fibres in concentrations >0.1% are not suitable for retention on site and should be temporarily stored on site under controlled conditions and transported by a licensed waste carrier for off-site disposal to a suitably licensed waste facility as hazardous waste.

High risk / significant asbestos contamination (e.g., fibrous ACMs such as thermal pipe lagging, damaged insulation board or loose fibrous materials) has not been identified to date. However, if identified, these shall only be removed by a suitably qualified specialist asbestos removal contractor, in accordance with a detailed method statement including provision for (but not limited to) suitable control measures, operative and plant access routes, establishment of safe working areas, decontamination and emergency procedures. The excavation and handling of such asbestos-contaminated soils may comprise notifiable non-licenced work. If this applies, the Health and Safety Executive (HSE) should be notified. Reference should be made to the CL:AIRE CAR-SOIL guidance[2] to determine whether the work is notifiable.

All personnel working on-site should be trained in the identification of ACMs and the risk associated with asbestos impacted soils. Excavation and movement of soils impacted by ACMs and asbestos fibres should be completed in accordance with a detailed method statement and by suitably qualified and experienced operatives, ensuring no potential for fibre release into ambient air. If deemed necessary by the GE, reassurance background and personal air monitoring should also be undertaken by a UKAS accredited analyst in accordance with the HSE's Control of Asbestos Regulations 2012 and HSG248 Asbestos: The Analysts Guide for Sampling, Analysis and Clearance Procedures. The purpose of the reassurance air monitoring being to confirm the effectiveness of the control measures employed during ACM removal works and to ensure human health receptors are not put at an unacceptable risk. In accordance with current guidelines, and based upon the control measures to be implemented, the recorded exposure limit should be below the accepted control limit of 0.01 fibres per cubic centimetre, as specified within the Control of Asbestos Regulations 2012.

6.3 Remedial Objective 3 – Earthworks to Create a Development Platform

Earthworks are required to achieve proposed formation levels. A separate Earthworks Strategy document will be prepared for the site by Sirius; all earthworks and associated works should be in accordance with the Earthworks Strategy.

The volume of soil to be imported to / exported from the site is to be determined following completion of cut and fill calculations. Raising of ground levels will require creation of new retaining structures and slopes. The earthworks designer will need to assess the stability of slopes during, and following, earthworks.

The existing intact concrete slab, as well as other sub-surface man-made obstructions and features encountered within excavations, such as relict foundations, voids, redundant utilities, etc, will be removed.

Excavated materials will be processed to remove deleterious, oversize, or other unsuitable material and reused on the site where required. Suitable oversize material will also be processed for re-use as a secondary aggregate.

Any fill placed within the footprint of proposed structures should be compatible with the proposed founding solution(s).

The contractor shall undertake appropriate earthworks control testing, as specified within the Earthworks Strategy.

[2] CL:AIRE, 2016. *Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance*. CL:AIRE, London.

6.4 Remedial Objective 4 – Management of Previously Unidentified Contamination

Excavations during the remediation / enabling works phase should be carried out under the supervision of the GE with appropriate photographs and engineers records to be kept of ground conditions together with any visual or olfactory evidence of contamination.

In the event that significant additional unrecorded contamination (such as brightly coloured, stained, odorous, fibrous, etc soil or liquids) is suspected or identified, works should be halted and the following measures implemented:

- Appropriate sampling and laboratory analysis of potentially contaminated materials to assess the extent and nature of any suspected previously unidentified contamination, and delineate where appropriate / practical;
- Comparison of results against appropriate screening criteria; and,
- Liaison with the Local Authority to agree appropriate investigation or corrective actions to address any potentially unacceptable risks.

6.5 Remedial Objective 5 – Waste and Resource Management

Careful management of soil arisings across the site, including segregation of different material types, to avoid potential entrainment of unsuitable materials during handling, will be required. This shall include stockpiling under supervision of a GE, surveying of resulting stockpiles immediately following excavation or importing and subsequently at appropriate intervals during development as material is re-used, with careful record keeping. Stockpiling shall be at locations convenient to the Developer, but should be protected to avoid cross-contamination with construction wastes during subsequent phases of work.

With reference to the Waste Hierarchy, where possible to do so, it is recommended that site-won soils should be retained and re-used on site as far as practicable. If re-use is an option, it must be demonstrated by the waste producer that the soils are not a waste and there is certainty of use. This should be done using an MMP in accordance with the DoWCoP.

Any surplus natural, uncontaminated soils have the potential to be transferred to other development sites, subject to meeting the requirements of the DoWCoP. Contaminated soils and made ground can only be re-used on the site of origin if suitable for use. Where soils are to be re-used under an MMP, a formal Remediation Strategy (agreed in writing with the Local Authority) Verification Plan and subsequent Verification Report will be required. It is recommended that consideration of re-use of soil is undertaken as early as possible in the planning process to ensure that the most cost efficient and sustainable options for soil re-use can be determined.

It is noted that alternatives to an MMP are available, such as an Environmental Permit, however an MMP is typically the most suitable option for a residential development.

Any surplus soils which are not intended to be re-used in the development may be classed as a waste and should be disposed of in accordance with current UK Waste Legislation and Duty of Care requirements. Classification of any waste soils should be undertaken in accordance with the latest version of EA Technical Guidance Document WM3. Further sampling and testing of waste soils, once identified, is likely to be required. Depending on the outcome of waste classification there may also be a requirement to undertake Waste Acceptance Criteria (WAC) testing.

Records of any waste soils being disposed of / transferred under the DoWCoP should be kept for a minimum of six years and included within the Verification Report.

6.6 Remedial Objective 6 – Placement of Clean Cover System

Works to satisfy this requirement shall be carried out during the construction phase under the supervision of a suitably qualified and experienced GE appointed by the Developer, with appropriate photographs and engineer's records to be kept to ensure satisfactory verification can be completed.

To break contamination linkages from residual contaminants following completion of remedial and preparatory earthworks, a clean cover system should be installed in private gardens and areas of soft landscaping where made ground is to be present at shallow depth following preparatory earthworks. These areas will be recorded during the main phase of preparatory earthworks. Following placement, the clean cover system should be verified by a suitably qualified GE, maintaining a detailed photographic log of the works.

The clean cover system requirements, including verification, are detailed in Section 7 of this Strategy.

6.7 Remedial Objective 7 – Provision of Ground Gas Protection Measures

The previous Sirius Ground Gas Risk Assessment Report identified that all new houses and garages at the site require passive protection measures within the ground floor construction to mitigate the risks from hazardous ground gases, as well as naphthalene via indoor vapour inhalation pathways.

A gas protection design will be required for the development which details how the requirements of CS2 will be met within the building construction. This should be a stand-alone document prepared by suitably experienced specialists and may require input from structural engineering and geoenvironmental consultants. The design report should be prepared in accordance with BS8485[3] Section 8.3 and guidance given in NHBC NF94[4] and must be submitted to and agreed with the Local Authority, prior to the start of development.

A ground gas verification plan prepared in accordance with BS8485 Section 8.3.3 and CIRIA Report C735[5] will also be required for the site and must be submitted to and agreed with the Local Authority, prior to the start of development.

6.8 Adoptable Highways

Where applicable, the details of remedial / enabling works undertaken within the footprint of adoptable highways should be agreed in advance with the adopting Local Authority.

6.9 Control of Waters

The contractor shall ensure that potentially contaminated waters and leachate from excavations or stockpiling areas do not reach watercourses, surface water drains, etc., or discharge onto ground outside of the site.

All such waters will be treated on site as necessary for subsequent disposal to the foul sewer or alternatively removed from site by tanker to a suitable disposal facility.

The contractor will be responsible for obtaining all necessary permits, licenses and consents for disposal to foul sewers.

[3] BS8485:2015+A1:2019, *Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings*.
[4] NHBC, *Hazardous Ground Gas, An essential guide for developers NF94*. 2023.
[5] CIRIA Report C735, *Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases*. 2014.

Contaminated waters pumped from excavations should be stored appropriately and subject to appropriate chemical analysis prior to disposal. Any discharges to foul sewer should be recorded in relation to date, time, quantity and quality. All records should be maintained at all times and be made available for inspection upon request.

7. Clean Cover System Requirements

7.1 Introduction

Where made ground remains present at shallow depth in gardens and areas of soft landscaping, this should be overlain by a suitable clean cover system.

The makeup of the required clean cover system shall be as shown in Table 7.1.

Table 7.1 - Required Clean Cover Layer Makeup

	Minimum Thickness (mm)			
	Subsoil	Topsoil	Total Soil Cover Thickness	Additional 150mm Granular Hard Dig Layer or High Visibility Geotextile Separator Required at Base?
Private gardens (front and rear)	450	150	600	Only where asbestos-impacted made ground (asbestos concentration >0.001%) is present
Soft landscaped areas	300	150	450	

Where made ground is absent following preparatory earthworks, and where only uncontaminated natural ground remains, a formal cover system is not required, only placement of a growth medium comprising clean topsoil and subsoil.

7.2 Topsoil and Subsoil

Topsoil and subsoil shall be placed by the contractor responsible for the construction phase of the works. It shall be ensured that topsoil / subsoil material is of an appropriate quality and that concentrations of contaminants do not exceed the maximum concentrations stipulated in tables provided within Appendix B for garden areas or soft landscaped areas, as applicable.

Existing topsoil on the site is not chemically suitable for re-use within garden areas, and should either be placed beneath the clean cover layer in garden areas, or at depth below piled plots (where calculations show that this would not cause unacceptable settlements).

Any excess site-won natural subsoil (not including coal or weathered coal) proposed for use as clean cover materials shall be placed in stockpiles for future placement by the contractor responsible for the development works.

Any materials used within the clean cover / growth medium shall be tested in accordance with the guidance given in the YALPAG document *Verification Requirements for Cover Systems,* Version 4.1, dated June 2021, included in Appendix C, and as summarised in Table 7.2, below.

Table 7.2 - Sampling and Testing for Clean Cover System Materials

Type	Number of Samples (Per Material Type and Source)	Testing Schedule	Assessment Criteria
Virgin Quarried Material	1 or 2 depending on the type of stone used.	Standard metals / metalloids (As, Cd, Cr, Cr(VI), Cu, Hg, Ni, Pb, Se, Zn)	As per Appendix B (Tables 1 and 2, for gardens and soft landscaped areas, respectively)
Crushed Hardcore, Stone, Brick (excluding asphalt)	Minimum 1 per 500m³.	Standard metals / metalloids (as above) PAH (16 USEPA speciation) Asbestos Total TPH	
Greenfield / Manufactured Soils	Minimum of 3. Dependent on source, between 1 per 50 m^3 and 1 per 250m³.	Standard metals / metalloids (As above) PAH (16 USEPA speciation) Asbestos pH and soil organic matter	
Brownfield / Screened Soils	Minimum of 6. Dependent on source, between 1 per 50 m^3 and 1 per 100m³.	Standard metals / metalloids (As above) PAH (16 USEPA speciation) TPH (CWG banded) Asbestos pH and soil organic matter Any additional analysis dependant on the history of the donor site.	

The analysis should be undertaken at a UKAS accredited laboratory, with MCERTS accredited analysis used where available.

In general, the soils would be considered suitable for use within the clean cover when all recorded contaminant concentrations are less than the concentrations stated in Tables 1 and 2 within Appendix B, for garden / landscaped areas, respectively. Where a minority of samples tested contain contaminant concentrations greater than the relevant threshold values stated in Appendix B, consideration can be given to undertaking statistical analysis to determine the suitability of the material as a whole, in accordance with current CL:AIRE guidance[6].

For imported soils, the test results shall be made available to the GE, and their acceptance given in writing, prior to any material being delivered to site.

7.3 Hard Dig Layer / Geotextile Separator

Where made ground containing asbestos fibres in concentrations greater than 0.001% are to be present at shallow depth within proposed garden and soft landscaped areas, the clean cover system should include either

[6] CL:AIRE, 2020. *Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration.* CL:AIRE, Buckinghamshire.

a 150mm thick hard dig layer of coarse suitable clean crushed concrete, brick and / or stone, or a high visibility geotextile separator, such as Lotrak Alarm 18, at its base.

7.4 Placement

The surface of any existing made ground should be levelled and compacted to reduce the risk of intermixing with the clean cover soil materials.

The clean cover subsoil and topsoil materials (and hard-dig layer, where used) shall be lightly compacted following placement to limit future settlements.

It is envisaged that the clean cover / growth medium shall be placed towards the end of the development programme. This will act to minimise the potential for disturbance of the cover soils / growth medium and physical destruction of topsoil structure e.g., via plant trafficking following placement.

7.5 Verification

Verification of the depth of topsoil and subsoil shall be carried out by a suitably qualified GE by excavation of trial pits following placement.

Where an additional hard-dig layer or geotextile separator has been placed at the based of the cover system, these should also be exposed by the trial pits. Alternatively, verification of these items could be undertaken by taking photographs during their placement, which clearly show the plots within which they are constructed.

Verification trial pits shall be spaced on a minimum of a 25m grid for landscaped areas (minimum of one verification trial pit per individual area, two pits for areas between 20m^2 and 50m^2 in area, and three pits for areas greater than 50m^2).

For gardens, verification trial pits shall be excavated at a rate of 1 in 4 plots, in rear gardens.

Evidence for verifying placement of the clean cover layer, shall accord with the YALPAG document, *Verification Requirements for Cover Systems*, Version 4.1, included in Appendix C.

Turf, fencing, planting, etc., should not be placed until the GE has given confirmation that the soils meet the requirements of this Remediation Strategy.

Should any excavation of foundations, drainage or services, etc., extend below any placed 'clean' capping layer, and therefore encounter underlying made ground materials, then there is a potential for cross-contamination. This should be avoided where possible. Detailed Risk Assessments and Method Statements outlining the soil management for the site shall be provided for this work by the developer and their specialist sub-contractors.

8. General Site Requirements

8.1 Introduction

The contractor shall comply at all times with this Strategy, the Conditions of Contract and all relevant health and safety requirements. Site works will be supervised by a GE appointed by the client.

The contractor shall prepare and submit a programme for the works to the client prior to the commencement on site.

8.2 Health and Safety

The remediation and earthworks shall be undertaken in accordance with all relevant legislation including, but not limited to:

- The Health and Safety at Work etc. Act, 1974;
- The most current Construction (Design and Management) Regulations (CDM Regulations);
- The Control of Substances Hazardous to Health (COSHH) Regulations, 2002; and
- The Control of Asbestos at Work Regulations, 2012 and the associated HSE's *Approved Code of Practice and Guidance*.

Contaminated soils are present on the site. During the remediation and construction, it will be necessary to protect the health and safety of site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document '*Protection of Workers and the General Public during the Redevelopment of Contaminated Land* (HS(G)66)'.

In summary, the following measures are suggested to provide a minimum level of protection.

- All ground workers should be issued with high visibility clothing, hard hats, safety glasses, protective footwear and impermeable heavy-duty gloves. Personnel should be instructed in their correct use;
- Hand washing and boot cleaning facilities shall be provided;
- No smoking on site other than in designated areas, if any are present on site; and,
- Good practices relating to personal hygiene shall be adopted.

Before site operations are commenced, the necessary COSHH Assessment, Method Statements and Construction Phase Plan should be completed and issued by the contractor in accordance with The CDM Regulations.

All site personnel shall undergo a site-specific health and safety induction prior to starting work on site.

If an excavation meets the definition of a 'confined space' within the Confined Space Regulations 1997, entry must be undertaken in accordance with a safe system of work meeting the requirements of the HSE's *Safe Work in Confined Spaces - Confined Spaces Regulations 1997: Approved Code of Practice and Guidance* (Third Edition, 2014).

8.3 Fuel

Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with The Control of Pollution (Oil Storage) (England) Regulations 2001, (The Oil Storage Regulations).

Specifically, any fuel storage tanks should:

- Be situated within an oil-tight secondary containment system such as an impermeable bund;
- The secondary containment must provide storage of at least 110% of the tank's maximum capacity;
- Be located within a secured area; and
- All taps and valves should be fitted with a lock and be adequately secured when not in use.

Contractors shall provide a fuel spill kit, to be kept on site in an accessible place near to the designated refuelling area.

Waste oil, hydraulic fluid etc., should not be tipped directly or otherwise discharged onto site. Such materials shall be stored separately in a secure bunded area for off-site disposal. Waste oil is a Hazardous Waste, and disposal shall be undertaken by a registered carrier in accordance with the Waste (England and Wales) Regulations (2011).

8.4 Asbestos

Construction workers involved in the groundworks and construction during the site redevelopment and during future works (e.g., maintenance or replacement of underground services) should be vigilant and adopt a safe system of work, including use of appropriate personal protection equipment (PPE), hygiene precautions and good working practices (e.g., wetting of soils etc).

The contractor must ensure that all relevant personnel working on site are aware of the possible risk associated with the potential presence of asbestos within soils at the site and be vigilant during works. If visual evidence of additional ACMs is encountered during the works, advice should be sought from an appropriately qualified asbestos specialist and an appropriate strategy developed for the safe remediation of the material.

All groundworks contractors who could potentially come into contact with such materials shall be required to submit appropriate method statements and risk assessments clearly stating how any such risks will be managed.

During earthworks (i.e., excavation, sorting and placement of potentially asbestos-impacted made ground), made ground soils should be assumed to be potentially impacted by asbestos and therefore all reasonable measures should be put in place in order to minimise, as far as practicable, dust generation and therefore the potential release of asbestos fibres (if present). Appropriate management of all excavation arisings and other works shall be considered to ensure asbestos within excavated materials does not present a risk to site workers or result in cross contamination of other areas of the site, or clean imported / site-won soils.

8.5 Dust Control and Monitoring

Appropriate measures shall be implemented at all times during the remediation works, to minimise any dust / asbestos fibre emissions.

Any haul roads shall, where practical to do so, be constructed of crushed hardcore products. These haul roads shall be maintained for the duration of their use to minimise any build-up of mud, loose spoil, etc. Mobile water bowsers and sprayers shall be made available to dampen unpaved haul roads and working areas. An adequate accessible supply of clean water shall be maintained at all times to allow dust suppression to be carried out at short notice.

Traffic both entering and working on the site shall obey an appropriate maximum speed limit to minimise dust generation.

Regular inspections of the public highway adjacent to the site entrance shall be carried out by the contractor. If deemed necessary, the highway shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or departing the site, and a wheel wash provided for exiting vehicles, if required. If the contractor

considers that significant amounts of any detritus have been deposited on the public highway, then operations shall be temporarily suspended until appropriate cleaning operations have been undertaken.

Any wagons that are to be used for the haulage of potentially contaminated material from the site shall be sheeted to prevent the release of fugitive dust.

When works involving potential disturbance of asbestos are undertaken, dust control mitigation (and where deemed necessary, monitoring) should be undertaken, in accordance with the Control of Asbestos Regulations 2012.

8.6 Noise

The requirements of BS 5228-1:2009+A1:2014 *'Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise'* shall be adhered to at all times.

All machinery shall be fitted with effective silencers and shall be serviced at regular intervals. No items of plant shall be operated with engine covers raised.

The location of any crushing plant shall take into consideration the location of neighbouring properties and other noise sensitive receptors and shall be located away from these areas and located adjacent to proposed stockpile locations, where possible and practicable.

8.7 Fires

No fires shall be permitted on site, unless previously agreed with the Local Authority.

9. Verification and Reporting

The GE shall ensure that the requirements of this strategy are complied with. On satisfactory completion of all remediation works, the GE will provide a verification report, comprising relevant site records and act as certification that the remedial and ground preparation works have been carried out in accordance with this Strategy.

The verification report shall include the following:

- A description of the works undertaken;
- Records of the works;
- Progress photographs;
- Waste transfer notes / hazardous waste consignment notes;
- Laboratory test results;
- As built surveys, including base of excavation and final level survey, base and top of made ground;
- Drawing showing where clean cover layers are required, and where this should include a geotextile separator layer / hard dig layer (if required);
- A statement that the works have been undertaken in accordance with the agreed Strategy.

Submission of a suitable Verification Report is a strict requirement for works undertaken under the CL:AIRE DoWCoP.

Following the main phase of remediation earthworks, further verification reporting would be required, including the following:

- Verification of placement of clean cover layers, in accordance with Section 7, Appendix B and Appendix C of this Strategy.
- Verification of ground gas protection measures, in accordance with a Ground Gas Protection Measures Verification Plan, produced by a suitably qualified person and agreed in advance with the local authority.

10. Regulatory Approval

A copy of this specification should be forwarded by the client or their appointed planning agent to the Local Planning Authority and other parties as appropriate (e.g., the building warranty provider) for their approval prior to the works.

Detailed method statements from the Earthworks Contractor and any nominated sub-contractors may also be required to be submitted and approved in writing by the LPA prior to commencement of these works. Sufficient time should be allowed for regulatory approval to be obtained during the redevelopment programme.

APPENDICES

APPENDIX A
Drawings

Reproduced from the Ordnance Survey 1:50,000 scale Landranger® map with the permission of The Controller of Her Majesty's Stationary Office, © Crown Copyright. All rights reserved.Sirius Geotechnical Ltd, Suite 2, Russel House, Mill Road, Langley Moor, Durham DH7 8HJ. Licence No. 100042005

NOTES

Site Location

REVISION	
0	For Information
A	>>
B	>>
C	>>
D	>>

SIRIUS GEOTECHNICAL LTD
4245 Park Approach, Thorpe Park, Leeds
LS15 8GB
www.thesiriusgroup.com
TEL: 0113 264 9960
FAX: 0113 264 9962

CLIENT	DRAWING NO.	REVISION NO.
Gleeson Homes Ltd	C10128/01	0
SITE: Woolley Colliery Road, Darton	DRAWN BY: AL	APPROVED BY: AL
DRAWING TITLE: Site Location Plan	DATE: June 2024	SCALE: 1:25,000 — A4

1. View along northern site boundary showing drainage ditch.

2. View across north of site, showing standing water.

3. View west towards western site boundary.

4. View west showing mounded spoil.

5. View south across north of site.

6. Fly-tipped rubbish near to site entrance.

7. Concrete slabs and ecological exclusion area.

8. View south showing concrete slabs.

9. View west from northern site boundary.

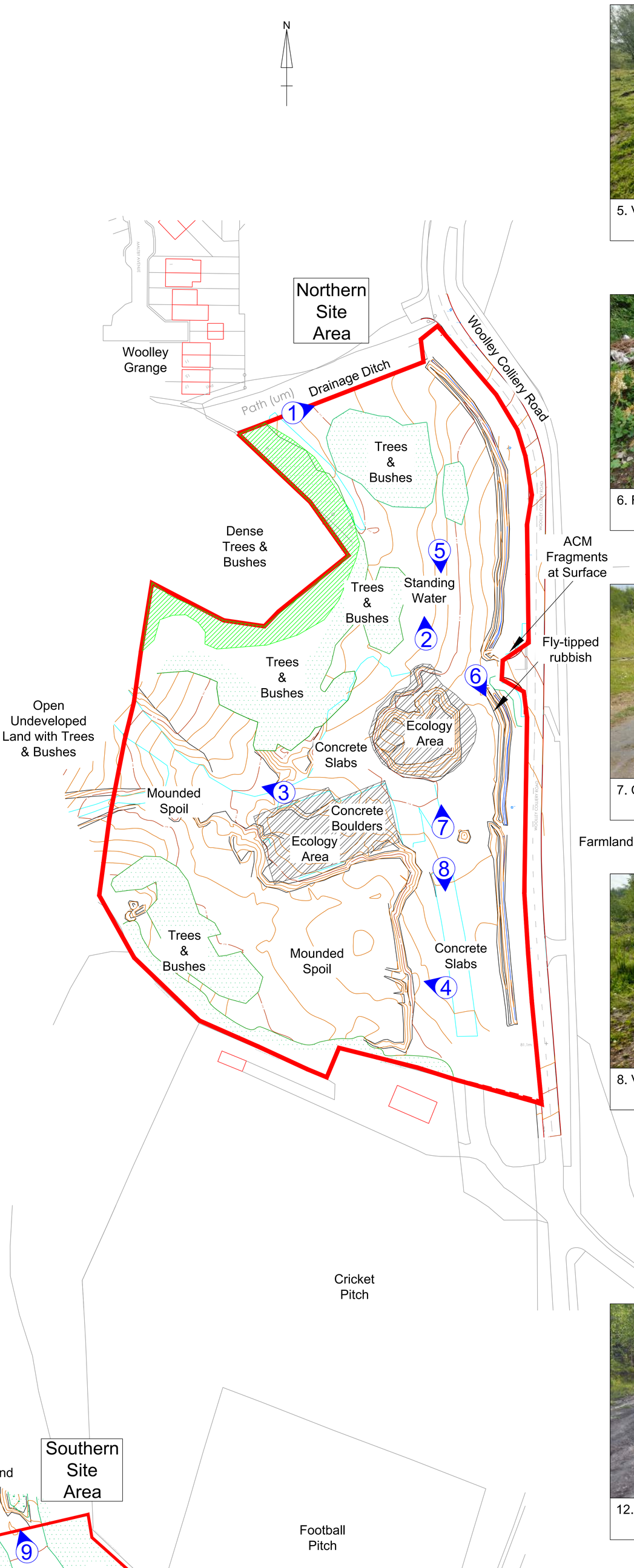
10. Standing water within southern site area.

11. Steep slope adjacent to western site boundary.

12. View southwest, showing central track and mounded spoil.

13. Mounded colliery spoil and trees on southern site area.

14. View across eastern end of southern site area.



NOTES

Notes

1. This drawing should not be viewed in isolation from the accompanying report.
2. All marked site features (including historical features, mining features (i.e., opencast boundaries and mineshafts), potential contaminant constraints, and any other potential constraint or feature of note) shown on this drawing are given for indicative purposes only. This drawing should not be underlaid in isolation to determine proposed development layouts. Reference should be made to the accompanying report for commentary on the potential location of these features including coordinates if available and any further works required to locate features if required.

REVISION		BY	DATE
0	For information	AL	26.06.24
A	>>	>>	>>
B	>>	>>	>>
C	>>	>>	>>
D	>>	>>	>>

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CLIENT

Gleeson Homes Ltd

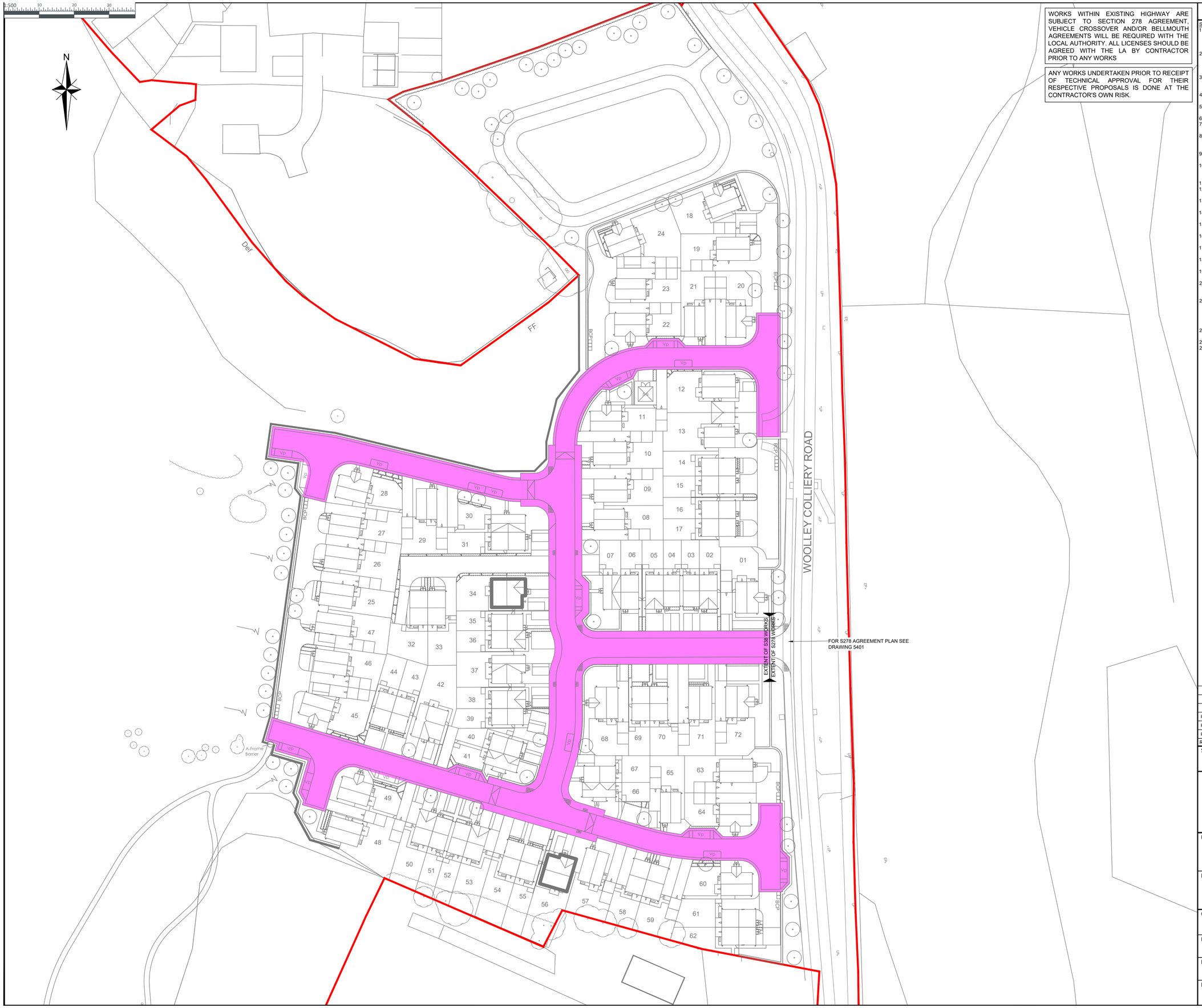
SITE

Woolley Colliery Road, Darton

DRAWING TITLE

Site Features Plan

DRAWING NO.	REVISION NO.
C10128/02	0
DRAWN BY: AL	APPROVED BY: AMG
DATE: June 2024	SCALE: NTS / PAPER SIZE: A0



WORKS WITHIN EXISTING HIGHWAY ARE SUBJECT TO SECTION 278 AGREEMENT, VEHICLE CROSSOVER AND/OR BELLMOUTH AGREEMENTS WILL BE REQUIRED WITH THE LOCAL AUTHORITY. ALL LICENSES SHOULD BE AGREED WITH THE LA BY CONTRACTOR PRIOR TO ANY WORKS

ANY WORKS UNDERTAKEN PRIOR TO RECEIPT OF TECHNICAL APPROVAL FOR THEIR RESPECTIVE PROPOSALS IS DONE AT THE CONTRACTOR'S OWN RISK.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER HBL DRAWINGS ISSUED FOR THIS PROJECT

SECTION 38 NOTES:

1. ROADS AND FOOTWAYS TO BE ADOPTED UNDER SECTION 38 OF HIGHWAYS ACT 1980 SHALL COMPLY WITH THE ADOPTING LOCAL AUTHORITY HIGHWAY DESIGN GUIDELINES FOR NEW DEVELOPMENTS AND BE IN ACCORDANCE WITH THE HIGHWAYS AGENCY DESIGN MANUAL FOR ROADS AND BRIDGES.
2. ALL WORKS WITHIN PUBLIC HIGHWAY TO COMPLY WITH CURRENT HEALTH AND SAFETY STANDARDS AND ALL SIGNING SHALL COMPLY WITH CHAPTER 8 TRAFFIC SAFETY MEASURES AND SIGNS FOR ROADWORKS AND TEMPORARY SITUATIONS OF THE TRAFFIC SIGNS MANUAL
3. A COVENANT WILL BE PROVIDED TO THE BENEFIT OF THE LOCAL AUTHORITY ENSURING THAT NO PLANTING OR STRUCTURE GREATER THAN 600MM IN HEIGHT TO BE PERMANENTLY SITUATED WITHIN ANY PRIVATE VISIBILITY SPLAYS
4. REAR OF VISIBILITY SPLAYS TO BE DELINEATED WITH A CONTINUOUS 50 X 150 PC CONCRETE TYPE EF SQUARE EDGING SET AT A LEVEL TO ENABLE THE GRASS (IF ANY) TO BE CUT.
5. HAND LAYING OF BITUMINOUS MATERIALS IS NOT PERMITTED ON ADOPTABLE CARRIAGEWAY
6. TARMAC ROAD CONSTRUCTION TO COMPLY WITH BS.EN.130108
7. ALL SUBSTRATA STRUCTURES AND UNCONSOLIDATED MATERIAL, WITHIN THE CONSTRUCTION WIDTH OF THE HIGHWAY, ARE TO BE REMOVED.
8. WHERE TWO OR MORE WATER SERVICES BOUNDARY BOXES ARE SITUATED TOGETHER MULTI-METER BOUNDARY AS SPECIFIED BY THE SEWERAGE UNDERTAKER ARE TO BE INSTALLED
9. STOPCOCK AND METER COVERS SHALL NOT BE LOCATED WITHIN THE VEHICULAR CROSSING CONSTRUCTION
10. HINGED GULLY GRATE AND FRAME TO BS EN 124, GRADE D400, NON-ROCKING WITH CAPTIVE LEFT HAND END HINGE. MINIMUM WATERWAY AREA 900CM SQUARED. FRAME DEPTH 100MM. BLACK COATED DUCTILE IRON.
11. ALL GULLY POTS TO BS5911 OR BS 65 MINIMUM SIZE 900MM X 450MM
12. ALL TRENCHES WITHIN THE ADOPTABLE AREAS WILL BE BACKFILLED WITH TYPE 1, OR MATERIALS SPECIFIED IN CLAUSE 6.17
13. IN DRAINAGE EASEMENT AREAS NO BUILDINGS, WALLS OR OTHER PERMANENT STRUCTURES AND NO PLANTING OF TREES, OR SUBSTANTIAL SHRUBS/ HEDGES.
14. ALL EXISTING DRAINAGE LEVELS, DIAMETERS & LOCATIONS NEED TO BE CHECKED ON SITE AND ANY DISCREPANCIES NEED TO BE REPORTED BACK TO THE ENGINEER.
15. MANHOLE COVERS AND GULLY GRATES TO BE ADOPTED SHALL BE KITEMARKED AND TO BS EN124. CLASS D400. GULLY GRATES 450MM SQUARE.
16. MANHOLES LOCATED WITHIN TURNING AREAS OF JUNCTION TO HAVE COVERS TREATED WITH AN ANTI-SLIP COATING.
17. COVER LEVELS FOR MANHOLES ARE APPROXIMATE ONLY AND SHOULD BE ADJUSTED TO MATCH SURROUNDING LEVELS
18. IN BLOCK PAVED AREAS 'INFILL' TYPE COVERS SHOULD NOT BE USED, AND FRAMES MUST BE 150MM DEEP.
19. ALL GULLY AND CHANNEL GRATING IN SHARED SURFACES AND FOOTWAYS TO BE PEDESTRIAN FRIENDLY
20. ALL ADOPTABLE PIPE WORK FOR HIGHWAY DRAINS TO BE MINIMUM CONCRETE CLASS 120 TO BS5911 OR CLASS 120 CLAY OR 28KN/M CRUSHING STRENGTH IF 150MM Ø TO BSEN295-1 AND LAID ON CLASS S GLRANULAR BED UNLESS SHOWN OTHERWISE
21. WHERE HIGHWAY DRAINS HAVE LESS THAN 1.2M COVER UNDER ROADS AND 0.9M COVER UNDER DRIVES AND GARDENS THE PIPES ARE TO BE SURROUNDED WITH 150MM OF CLASS ST4/C20 CONCRETE WITH FLEXIBILITY OF JOINTS MAINTAINED AS STATED IN CLAUSE 4.2.28 OF THE WATER SERVICES ASSOCIATION GUIDE. ANY CONCRETE BED AND SURROUND TO PIPE WORK TO BE SULPHATE RESISTING CEMENT.
22. THE PROVISION OF A CCTV SURVEY OF ANY HIGHWAY DRAINAGE, AT THE DEVELOPERS EXPENSE, IS REQUIRED PRIOR TO LAYING THE WEARING COURSE.
23. ALL CONNECTIONS TO HIGHWAY DRAINS MUST BE MADE VIA FACTORY MADE JUNCTIONS.
24. ALL WORKS TO SEWERS/ MANHOLES BEING OFFERED FOR ADOPTION OR ON EXISTING PUBLIC SEWERS SHOULD BE IN ACCORDANCE WITH "DESIGN AND CONSTRUCTION GUIDANCE" AND THE SEWERAGE UNDERTAKERS RECOMMENDATIONS.

KEY - PLAN

- SITE BOUNDARY
- EXISTING HIGHWAY BOUNDARY *TO BE CONFIRMED*
- AREAS OF S38 ADOPTION

REV.	DATE	DRAWN	DESCRIPTION	CHKD	APPRD
P03	06.03.26	RJ	REVISED FOR S38 APPROVAL	RJ	RJ
P02	16.11.25	RJ	REVISED TO SUIT LAYOUT CHANGES	RJ	RJ
P01	06.11.25	MS	TENDER DRAWING	MS	RJ

STATUS DESCRIPTION: FOR TECHNICAL APPROVAL

STATUS: S4

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Consulting Civil & Structural Engineers

PROJECT: WOOLLEY COLLIERY

DRAWING TITLE: S38 AGREEMENT PLAN SHEET 1

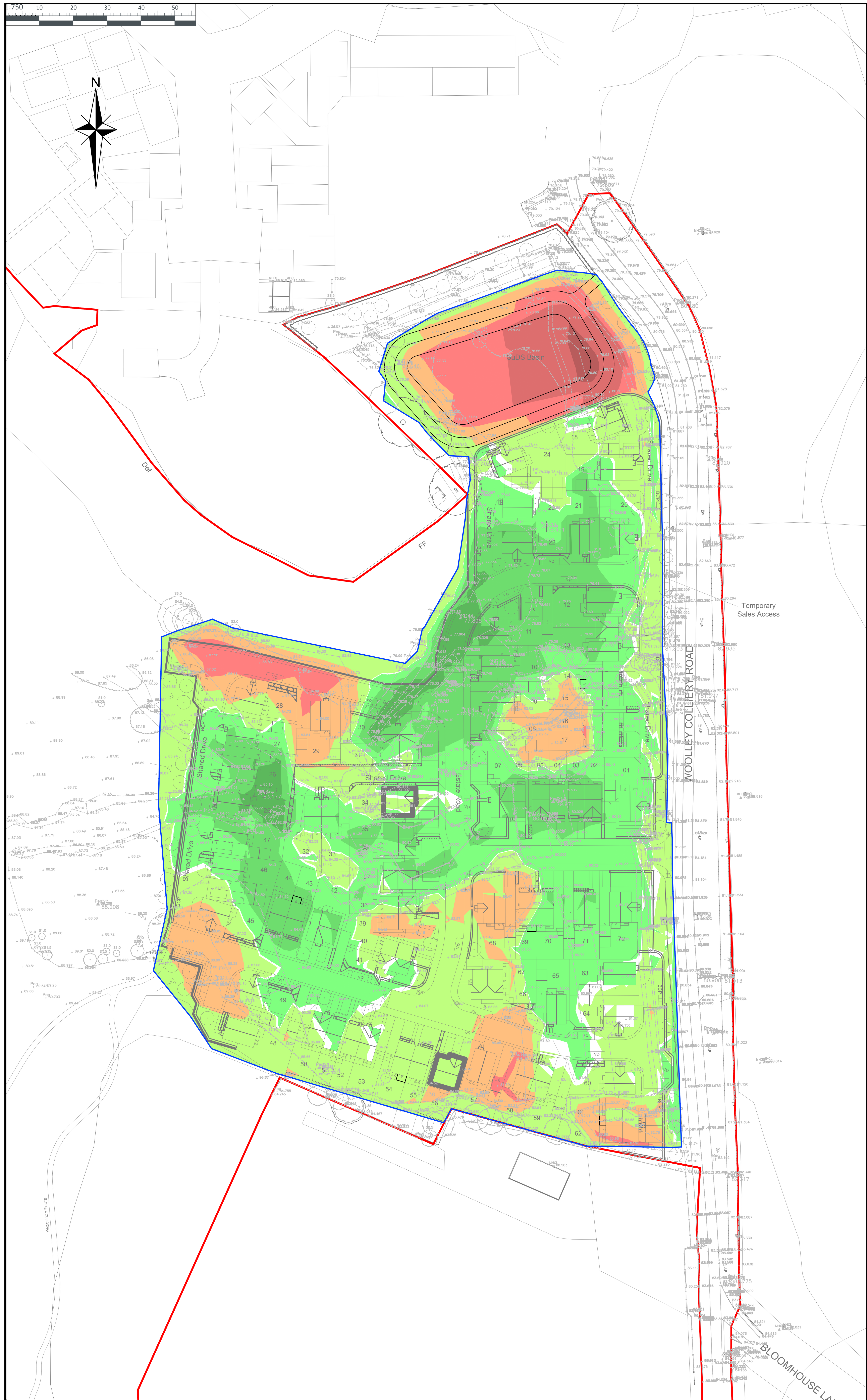
CLIENT: MJ GLEESON

HBL REF.	DATE	SCALE(S)	
10701	06.11.25	1:500	A1

DRAWN	CHECKED	APPROVED
MS	RJ	RJ

DRAWING No.: 10701-HBL-XX-XX-DR-C-5301

REV.: P03



INSET 1 NORTH
1:750

INSET 2 SOUTH
1:750

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH
ALL OTHER HBL DRAWINGS ISSUED FOR THIS PROJECT

GENERAL NOTES:

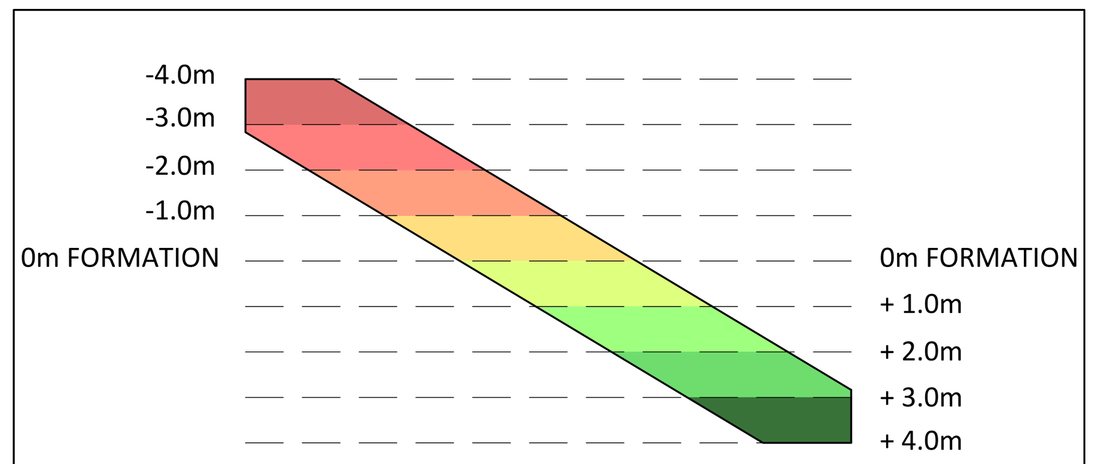
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERING AND ARCHITECT'S DETAILS.
2. THE DESIGN DETAILS PRESENTED MUST BE REVIEWED IN CONJUNCTION WITH THE WIDER SITE INFORMATION AND SITE CONSTRAINTS WHICH MAY NOT BE EVIDENT ON DRAWING AND MUST BE REQUESTED IF NOT ALREADY PROVIDED. THIS INCLUDES, BUT NOT LIMITED TO, GROUND CONDITIONS (GEOTECHNICAL AND GEO-ENVIRONMENTAL), GROUNDWATER LEVELS, BURIED SERVICES, REMNANT OBSTRUCTIONS, ECOLOGY, TREE PROTECTION AND TOPOGRAPHY.
3. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, IN WRITING, SHOULD ANY ERRORS OR DISCREPANCIES BE FOUND PRIOR TO THE COMMENCEMENT OR CONTINUATION OF ANY WORKS.
4. ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND NHBC STANDARDS.
5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXECUTE THE WORKS AT ALL TIMES IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THE HEALTH AND SAFETY AT WORK ACT 1974, AND THE C.D.M. REGULATIONS 2015. THE CONTRACTOR WILL BE DEEMED TO HAVE ALLOWED FOR FULL COMPLIANCE, INCLUDING FULL LIAISON WITH THE CDM CO-ORDINATOR, WITHIN HIS RATES.
6. ANY EXISTING DETAILS WHICH ARE SHOWN ON THIS DRAWING ARE FOR GUIDANCE ONLY AND ARE TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY VARIATIONS ARE TO BE RECORDED AND REPORTED TO THE ENGINEER IMMEDIATELY.
7. BEFORE WORK COMMENCES CONTRACTOR SHOULD CONSULT THE ENGINEER AND THE SI REPORT REGARDING ANY CONTAMINATION ISSUES. ALL NECESSARY HEALTH AND SAFETY MEASURES TO BE TAKEN

KEY - PLAN

SITE BOUNDARY

CUTFILL BOUNDARY EXTENTS

+ 78.50 EXISTING TOPO
S10840-3D - Woolley Colliery Road, Darton, Barnsley



GENERIC CUT AND FILL BANDING INFOGRAPHIC

SURFACE LEVEL DATA

NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	VOLUME
1	-5.00	-4.00		24m3
2	-4.00	-3.00		431m3
3	-3.00	-2.00		1872m3
4	-2.00	-1.00		6068m3
5	-1.00	-0.05		15439m3
6	0.05	1.00		8851m3
7	1.00	2.00		2342m3
8	2.00	3.00		134m3

EARTHWORKS ASSESSMENT NORTH

CALCULATION ASSUMPTIONS

SITE AREA 122,750m²
NORTHERN DEVELOPABLE AREA 27,500m²

EXISTING SURFACES
TOPSOIL DEPTH ASSUMPTION TAKEN FROM *C10128 GA Report - July 2024 final*
TOPSOIL AND VEGETATION CLEARANCE WILL BE REQUIRED FOR DEVELOPED LAND.
ESTIMATED TOP SOIL STRIP (27,500m²) -100mm

PROPOSED FORMATION SURFACES
PROPOSED SITE LEVELS TAKEN FROM *10701-HBL-XX-XX-DR-C-5201-5208_P01_EXTERNAL WORKS SHEET,* MODELED IN 3D TO FINISHED GROUND LEVELS, WITH SURFACES ADJUSTED TO SUIT ASSUMED CONSTRUCTION DEPTHS.

IN THIS EARTHWORKS ASSESSMENT A 600mm REDUCTION TO FORMATION LEVELS HAS BEEN TAKEN TO ACCOUNT FOR GENERAL SITE ARISING ACROSS THE FULL SITE

DEVELOPABLE AREA (27,500m²) -600mm

GENERAL ALLOWANCES

EARTHWORKS CALCULATIONS ARE NOT EXACT AND SHOULD BE USED AS GUIDANCE ONLY. FACTORS WHICH MAY IMPACT THE ACCURACY OF THE CUT AND FILL VOLUME COULD BE;
- ACCURACY OF THE SURVEY DATA
- +0.050/-0.050m BAND EXCLUDED FROM CUTFILL COLOURING AS DISCREPANCIES
- CONSTRUCTION TECHNIQUES
- MATERIAL BULKING
- MATERIAL COMPACTION
- THICKNESS OF EXISTING SURFACE OR TOPSOIL

CUT AND FILL CALCULATIONS

DEVELOPABLE AREA 27,500m²

EXISTING TOPSOIL STRIP 2,750m³
(TOPSOIL ORGANIC MATTER TO BE STOCKPILED AND TESTED FOR SUITABLE REUSE)

PROPOSED CUT 15,200m³
PROPOSED FILL 10,900m³

NET MATERIAL MOVEMENT 4,300m³ EXPORT

EARTHWORKS ASSESSMENT SOUTH

CALCULATION ASSUMPTIONS

SITE AREA 122,750m²
SOUTHERN DEVELOPABLE AREA 13,600m²

EXISTING SURFACES
TOPSOIL DEPTH ASSUMPTION TAKEN FROM *C10128 GA Report - July 2024 final*
TOPSOIL AND VEGETATION CLEARANCE WILL BE REQUIRED FOR DEVELOPED LAND.
ESTIMATED TOP SOIL STRIP (13,600m²) -100mm

PROPOSED FORMATION SURFACES
PROPOSED SITE LEVELS TAKEN FROM *10701-HBL-XX-XX-DR-C-5201-5208_P01_EXTERNAL WORKS SHEET,* MODELED IN 3D TO FINISHED GROUND LEVELS, WITH SURFACES ADJUSTED TO SUIT ASSUMED CONSTRUCTION DEPTHS.

IN THIS EARTHWORKS ASSESSMENT A 600mm REDUCTION TO FORMATION LEVELS HAS BEEN TAKEN TO ACCOUNT FOR GENERAL SITE ARISING ACROSS THE FULL SITE

DEVELOPABLE AREA (13,600m²) -600mm

GENERAL ALLOWANCES

EARTHWORKS CALCULATIONS ARE NOT EXACT AND SHOULD BE USED AS GUIDANCE ONLY. FACTORS WHICH MAY IMPACT THE ACCURACY OF THE CUT AND FILL VOLUME COULD BE;
- ACCURACY OF THE SURVEY DATA
- +0.050/-0.050m BAND EXCLUDED FROM CUTFILL COLOURING AS DISCREPANCIES
- CONSTRUCTION TECHNIQUES
- MATERIAL BULKING
- MATERIAL COMPACTION
- THICKNESS OF EXISTING SURFACE OR TOPSOIL

CUT AND FILL CALCULATIONS

DEVELOPABLE AREA 13,600m²

EXISTING TOPSOIL STRIP 1,360m³
(TOPSOIL ORGANIC MATTER TO BE STOCKPILED AND TESTED FOR SUITABLE REUSE)

PROPOSED CUT 9,900m³
PROPOSED FILL 1,200m³

NET MATERIAL MOVEMENT 8,700m³ EXPORT

REV.	DATE	DRAWN	DESCRIPTION	CHKD	APPRD
P01	04.11.25	MS	INITIAL ISSUE	MS	RJ

STATUS DESCRIPTION: FOR INFORMATION
STATUS: S3

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Consulting Civil & Structural Engineers

PROJECT: WOOLLEY COLLIERY

DRAWING TITLE: CUT AND FILL ASSESSMENT

CLIENT: MJ GLEESON

HBL REF.	DATE	SCALE(S)	
10701	04.11.25	1:750	A1

DRAWN	CHECKED	APPROVED
MS	MS	RJ

DRAWING No.: 10701-HBL-XX-XX-DR-C-5205
REV.: P01

APPENDIX B
Clean Cover Guidance Values

The Sirius Group
Stage 2 Threshold Concentrations for Clean Cover Material for Use in Gardens of Private Residential Properties

Parameter	Threshold Concentration (mg/kg, unless otherwise stated)			Comment
	1% SOM*	2.5% SOM	5% SOM	
Metals/Metalloids				
Arsenic (inorganic)		37		
Cadmium		18		Soil pH 6-9
Chromium (III)		910		
Copper		200		Based on phytotoxic effect
Lead		200		
Mercury (inorganic)		40		
Nickel		130		
Selenium		250		
Zinc		450		Based on phytotoxic effect
Other Inorganics				
pH		<5 or >9		Must be in range 5-9
Water-Soluble Sulphate		0.5 g/l		
Organics				
PAHs**				
Total 16 PAHs	***100***	***100***	***100***	Professional judgement
Benzo(a)pyrene	4.9	4.9	4.9	Genotoxic surrogate
Naphthalene	1.0	2.3	4.6	
TPH†				
Sum of TPH fractions EC5-35	***500***	***500***	***500***	Professional judgement
Aliphatic EC 5-6	24	41	68	
Aliphatic EC >6-8	53	110	210	
Aliphatic EC >8-10	13	31	61	
Aliphatic EC >10-12	62	150	300	
Aliphatic EC >12-16	510	1200	2300	
Aliphatic EC >16-35	41000	70000	90000	
Aromatic EC >5-7	53	110	200	
Aromatic EC >7-8	100	240	460	
Aromatic EC >8-10	20	48	94	
Aromatic EC >10-12	63	150	290	
Aromatic EC >12-16	140	320	570	
Aromatic EC >16-21	260	540	840	
Aromatic EC >21-35	1100	1500	1700	
TPH Hazard Index (no units)	<1	<1	<1	
BTEX‡				
Benzene	0.130	0.27	0.50	
Miscellaneous Organics				
Phenol	110	190	330	
Other Parameters				
Asbestos		Unsuitable if any fibres present		

Based on sandy soil at a range of soil organic matter contents and assuming a standard residential with gardens land use. Alternative criteria may be specified for other soil types and SOM contents, for soils placed at depth, or for other land uses.

Notes:

* Soil organic matter; %SOM = 1.724 * %TOC.

** Soils must meet the specified criteria for each component AND the sum of 16 PAHs. The total is specified to prevent unsuitable materials being placed as cover. Where an individual PAH is not shown, then its criterion is greater than that for the sum or it is a genotoxic PAH assessed by using benzo(a)pyrene as a surrogate marker.

† Soils must meet the specified criteria for each component and the Hazard Index for TPH must be <1.0. The sum of TPH fractions must also be met to prevent unsuitable materials being placed as cover. Where an individual TPH fraction has a criterion greater than that for the sum of TPH fractions, the value is solely provided for the calculation of the Hazard Index.

‡ Components other than benzene are not genotoxic carcinogens and therefore assessed as part of the TPH mixture.

Soils must have no visual or olfactory evidence of contamination.

The Sirius Group
Stage 2 Threshold Concentrations for Clean Cover Soils for Use in Areas of Soft Landscaping

Parameter	Threshold Concentration (mg/kg, unless otherwise stated)			Comment
	1% SOM*	2.5% SOM	5% SOM	
Metals/Metalloids				
Arsenic (inorganic)		79		
Cadmium		220		Soil pH 6-9
Chromium (III)		1500		
Copper		200		Based on phytotoxic effect
Lead		630		
Mercury (inorganic)		120		
Nickel		230		
Selenium		1100		
Zinc		450		Based on phytotoxic effect
Other Inorganics				
pH		<5 or >9		pH to be in range 5-9
Water-Soluble Sulphate		0.5 g/l		
Organics				
PAHs**				
Total 16 PAHs	***100***	***100***	***100***	Professional judgement
Benzo(a)pyrene	10	10	10	Genotoxic surrogate
TPH†				
Sum of TPH fractions EC5-35	***500***	***500***	***500***	Professional judgement
Aliphatic EC 5-6	520000	550000	570000	
Aliphatic EC >6-8	560000	580000	600000	
Aliphatic EC >8-10	12000	12000	12000	
Aliphatic EC >10-12	13000	13000	13000	
Aliphatic EC >12-16	13000	13000	13000	
Aliphatic EC >16-35	250000	250000	250000	
Aromatic EC >5-7	55000	55000	55000	
Aromatic EC >7-8	55000	55000	55000	
Aromatic EC >8-10	5000	5000	5000	
Aromatic EC >10-12	5000	5000	5000	
Aromatic EC >12-16	5000	5000	5000	
Aromatic EC >16-21	3800	3800	3800	
Aromatic EC >21-35	3800	3800	3800	
TPH Hazard Index (no units)	<1	<1	<1	
BTEX‡				
Benzene	140	140	140	
Miscellaneous Organics				
Phenol	440	440	440	440mg/kg is the skin irritation threshold
Other Parameters				
Asbestos		Fibres present		

Based on sandy soil at a range of soil organic matter contents for areas of vegetated landscaping in residential or commercial land uses. Alternative criteria may be specified for other soil types and SOM contents, for soils placed at depth, or for other land uses.

Notes:

* Soil organic matter; %SOM = 1.724 * %TOC.

** Soils must meet the specified criteria for each component AND the sum of 16 PAHs. The total is specified to prevent unsuitable materials being placed as cover. Where an individual PAH is not shown, then its criterion is greater than that for the sum or it is a genotoxic PAH assessed by using benzo(a) pyrene as a surrogate marker.

† Soils must meet the specified criteria for each component and the Hazard Index for TPH must be <1.0. The sum of TPH fractions must also be met to prevent unsuitable materials being placed as cover. Where an individual TPH fraction has a criterion greater than that for the sum of TPH fractions, the value is solely provided for the calculation of the Hazard Index.

‡ Components other than benzene are not genotoxic carcinogens and therefore assessed as part of the TPH mixture.

Soils must have no visual or olfactory evidence of contamination.

APPENDIX C
YALPAG Guidance

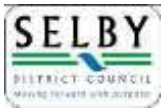
VERIFICATION REQUIREMENTS FOR COVER SYSTEMS

Technical Guidance for Developers, Landowners and Consultants

Yorkshire and Lincolnshire Pollution Advisory Group

Version 4.1 – June 2021

The purpose of this guidance is to promote consistency and good practice for development on land affected by contamination. The Local Authorities in Yorkshire, Lincolnshire, the North East of England, East Anglia, Greater Manchester and St Helens who have adopted this guidance are shown below:



Contents

Disclaimer

This guidance is intended to serve as an informative and helpful source of advice. YALPAG will review this guidance every three years, but readers must note that legislation, guidance and practical methods are inevitably subject to change and therefore should be aware of current UK policy and best practice. This note should be read in conjunction with prevailing legislation and guidance, as amended, whether mentioned here or not. Where legislation and documents are summarised this is for general advice and convenience, and must not be relied upon as a comprehensive or authoritative interpretation. Ultimately it is the responsibility of the person/company involved in the development or assessment of land to apply up-to-date working practices to determine the contamination status of a site and the remediation and verification requirements.

Acknowledgments

YALPAG would like to thank North Lincolnshire Council, Leeds City Council, City of Bradford Metropolitan District Council, Barnsley Metropolitan Borough Council, Rotherham Metropolitan Borough Council, Wakefield Council, and Tameside Metropolitan Borough Council, for producing this guidance.

YALPAG would also like to acknowledge Liverpool City Council's Contaminated Land Team, Coopers Consulting Engineers for allowing us to use their guidance document and photographs and WSP Environmental Ltd for also donating photographs.

Consultation

39 Local Authorities and 6 Environmental Consultants were consulted over a four week period in 2010 during the production of the initial guidance. At that time, consultation comments were considered by the review panel and a number of revisions were made to the guidance to reflect these comments.

49 Local Authorities and 25 Environmental Consultants were consulted in 2021, during the production of this version [4.1] of the guidance. Consultation comments were considered by the review panel and a number of revisions were made to the guidance to reflect these comments.

Introduction

This guidance has been produced to help developers ensure that they can demonstrate that material brought onto a development site for gardens or areas of soft landscaping are suitable for use and do not present harm to people, the environment and/or property. It is intended to improve the quality of reports submitted to Local Authorities on this matter and to give contractors/consultants a point of reference to obtain approval for such work from their client. This guidance does not cover the geotechnical suitability of soils or materials, chemical suitability that does not affect human health e.g. sulphates, or importing soils contaminated with invasive (or injurious) plants.

The verification of cover systems should be an integral part of the remediation project and agreed between developers and regulators at an early stage in the project.

UK guidelines for remediation verification are set out within Land Contamination Risk Management[1] (LCRM) and the document on Verification of Remediation of Land Contamination[2]. This guidance note should be considered as supplementary advice in conjunction with these documents.

This guidance relates to the remediation of land contamination by using cover systems; however, the verification of the quality of imported material is equally important in other situations, such as raising levels for flood prevention or general landscaping works. This guidance could also be used in such instances.

The Process of Verification

Implementation plans for remedial works should always be site specific. Where a cover system and potentially, excavation, is the main remedial method or a component of an overall site remediation, specific goals will need to be set that are linked directly to the risk management strategy for the site in question.

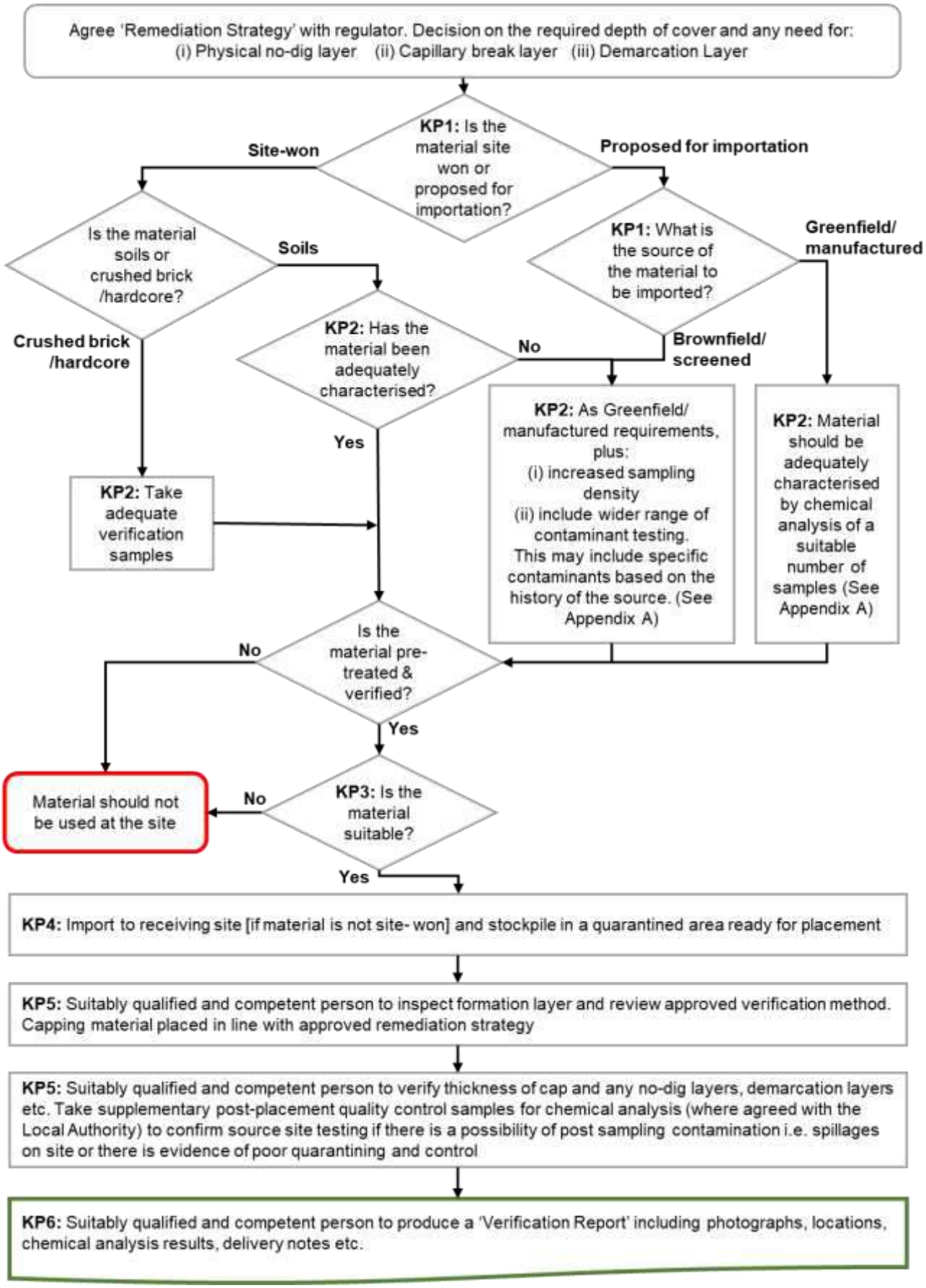
For cover and containment systems, verification will normally depend upon the provision of defensible measurements, observations and records. Critical factors to be considered are:

- What should be measured?
- When should they be measured?
- Where measurements need to be taken, what is the appropriate monitoring regime i.e. number and frequency of samples?
- Statistical constraints on sampling.

National Planning Policy Framework (NPPF) states that “planning policies and decisions should ensure that after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990”. The Verification Report is a key document to demonstrate compliance with NPPF, and the responsibility rests with the developer/applicant to submit the required Verification Report to complete the remediation and to discharge any planning conditions.

[1] Land Contamination Risk Management, Environment Agency, Oct 2020
[2] Verification of Remediation of Land Contamination. Environment Agency, Feb 2010

Overview Flowchart



Key Points

KP1: Source of Material

Material can be sourced from site won material i.e. crushed brick/hardcore or site-won soils from existing open or landscaped areas. In the interest of sustainability, Local Authorities promote the use of such site-won material providing that they are suitable for the intended end use of the site.

Alternatively, material can be sourced from other developments and commercial companies. Dependent on the source of the material it can be classified as either from a 'Greenfield/Manufactured' or 'Brownfield/Screened' source.

Broadly speaking material can be classified as follows:

Greenfield – Where documentary evidence is provided confirming that the source site has not been developed and that no past contaminative uses have occurred. Should evidence not be provided or approved by the Local Authority, please note that the source would be expected to be assessed as though it were a brownfield source.

Manufactured – from a commercial company who manufacture material by mixing or blending mineral soils (subsoil or sand) with an organic amendment (compost). If other soil component sources are used, documentary evidence should be provided confirming that the source site has not been developed and that no past contaminative uses have occurred. Should documentary evidence not be provided or approved by the Local Authority, please note that the source would be expected to be assessed as though it were a brownfield source.

Brownfield – material from a donor site that has previously been developed

Screened – material from a company who deal with skip/demolition waste which is screened for unsuitable material i.e. bricks, wood, plastic etc.

KP2: Characterisation of Material

It is essential that material is suitable for its intended use. Documentary evidence of the source of the material should be provided to the Local Authority. This may include desk study or site investigation reports. A defensible method is required to ensure the verification proposals are site specific and that the level of sampling reflects the need to ensure that imported material are suitable for their intended use.

Due to the diminishing supply of suitable Greenfield topsoil sources it has been found that the chemical quality of Greenfield sources is less reliable in certain areas. As a result the recommended analytical rate for the intended use of the development may vary between Local Authorities [see **Appendix 1a**].

When should this be done?

Sampling of material should be undertaken as early as possible i.e. prior to placement [for site won material] and prior to importation [for imported material]. This is to avoid the costly exercise of re-excavating unsuitable material and the possibility of cross contamination. Where the assessor has confidence that the material is of sufficient quality (i.e. tested by supplier, used previously) it is acceptable to test the material on site. Although, if it is deemed unsuitable it would have to be either removed off site or pre-treated at the cost and time of the developer. It is recommended that some verification samples are also taken once this material has been delivered to site to confirm suitability for use. Soils can become contaminated during transportation or when stockpiled on site.

What about certificates from commercial suppliers?

Where the material is provided by a commercial company, certificates or other industry Quality Protocol compliance i.e. WRAP, DoWCoP, will normally be accepted. This is on the proviso that it: (i) relates to the actual material being imported to the site and the type and amount of analysis is in line with what is prescribed in Appendix 1a; and, (ii) the certificates are less than two months old.

It is recommended that some additional verification samples are taken once this material has been delivered to site. Soils can become contaminated during transportation or when stockpiled on site.

Extreme caution should be given to importing material that has been recycled from demolition or skip waste as they could easily be contaminated e.g. asbestos containing materials. Please refer to "questions you should be asking your supplier" in **Appendix 1b** and include the responses in your report.

British Standard

Imported soils should be as specified in BS 3882:2015 for topsoil and BS8601:2013 for subsoil as 'suitable for their intended purpose'. Both British Standards relate mostly to nutrient content of topsoil and phytotoxic contamination and they do not consider contaminants that pose a risk specifically to human health. Soils should be tested for contaminants that are considered to pose a risk to human health in addition to those specified in the relevant British Standards to ensure that they are suitable for their intended use.

Initial screening

A visual / olfactory inspection of the material should be carried out by a suitably qualified and competent person to ensure that:

- It is a suitable growing medium;
- It is free from obvious contamination i.e. staining/free product etc.;
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants, as specified by the Environment Agency, are suspected to have been growing;
- It is not odorous (could be considered a statutory nuisance);
- It is free from unsuitable material i.e. bricks, brick ties, timber and glass etc.); and,
- There are no visible signs of asbestos containing material (ACMs).

Testing schedule & number of samples

Chemical testing will normally be required on any materials that are to be used as cover material, even where this includes first generation quarried material. This should be carried out by a suitably qualified and competent person.

Appendix 1a explains in detail the sampling and testing requirements for a typical residential development. These are only guidelines and it may be necessary to deviate away from them depending on local and site-specific factors. It is recommended that the developer discusses any deviation with the Local Authority.

The following criteria sets out the requirements for sampling and testing:

- **Virgin Quarried Material** sampling needs to be 1 or 2 samples depending on the type of stone utilised, to confirm the inert nature of the material. Testing to include standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn).

- **Crushed Hardcore, Stone, Brick (excluding asphalt)** a minimum of 1 sample per 500m^3. Testing to include standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).

- **Greenfield/ Manufactured Soils** a minimum of 3 samples or, dependent on source and receptor, between 1 per 50m^3 and 1 per 250m^3. Testing to include standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).

- **Brownfield/ Screened Soils** a minimum of 6 samples or dependent on source and receptor, between 1 per 50m^3 and 1 per 100m^3. Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).

The assessment criteria need to be UK based, e.g. LQM S4ULs, Defra C4SLs or other similarly derived GACs.

KP3: Suitability of Material

Based on the characterisation of material above, the material should be either deemed suitable or unsuitable. Obviously unsuitable material should not be used (unless it is treated to reduce levels of contaminants below agreed target levels i.e. bioremediation – this would have to be agreed and included within the Remediation Strategy) and an alternative source of material should be sought by the developer. If the material is considered suitable it can be imported (if not site won) and stockpiled in a suitably quarantined area [refer to **KP4**].

KP4: Stockpiling & Quarantining of Material

It is essential that the 'suitable' material is either placed in its intended area straight away i.e. soft/landscaped areas or stockpiled in a suitable quarantine area to prevent on-site contamination.

In the event that an assessor finds material has been stored in an unsuitable area, samples should be taken to confirm that no cross contamination has occurred (including a visual/olfactory check of the material). The material should then be suitably quarantined or placed at its intended location immediately.

KP5: Verification of Required Depth

In line with the agreed Remediation Strategy, it is important to establish that the required depth has been achieved and is consistent across the site. There are two main ways to achieve this:

Depth testing in situ – small trial pit excavated to allow measurement of its depth by standardised tape measure or measuring staff.

Topographical surveys – accurate survey of the base and final formation layer height to establish the depth of cover.

Specific Local Authority Policy

Please check with the local Contaminated Land Officer to establish:

- Which type of method for testing depth is accepted; and,
- The number of verification areas per property, plot, landscaped area or garden area (some Local Authorities recommend at least 2 per plot for residential developments).

Important Note: Where demarcation, physical no-dig and capillary break layers exist they should be verified for their thickness and presence during the time of their installation. Details of the demarcation layer should be agreed with the Contaminated Land Officer prior to placement. This will include the design, type and strength of the geotextile separator or visual warning membrane. The verification of depth and confirmation of such layers should be carried out by a suitably qualified and competent person.

KP6: Reporting

The purpose of verification documentation is to provide transparent reasoning why the remediation was required, a methodology about how it was to be undertaken and proof that the specified works have been undertaken and to provide confirmation that the site is "suitable for its intended use".

The document is utilised not only to satisfy conditions of planning permissions but also is to be kept on record by the Local Authority should queries be raised during the lifetime of the development and to confirm to future purchasers that the site is suitable for use.

National Planning Policy Framework (NPPF) states that "planning policies and decisions should ensure that after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990". The Verification Report is a key document to demonstrate compliance with NPPF, and the responsibility rests with the developer/applicant to submit the required Verification Report to complete the remediation and to discharge any planning conditions.

It is also essential that other supporting documentation is included within a report carried out by a suitably qualified and competent person e.g. laboratory analysis results, delivery tickets for material, certificates for imported material (or if unavailable, documented evidence of the source of the Greenfield material), trial pit logs etc. A checklist has been included in **Appendix 2** to give an idea on what information should be recorded.

Additionally, any reporting should include details of any measures required to maintain the cover system integrity in the future e.g. successive construction phases (management plans) and longer term (restrictive covenants on title deeds).

Photographic evidence for validating the depth of cover

The Local Authority ideally would recommend the following programme of photographs to be taken of the placement of inert cover:

- Photographs of any stockpiles and quarantine areas
- Proof that the depth of inert cover has been installed
- Proof of the quality of the material to be used as inert cover
- Proof there is a geotextile separator and visual warning membranes if used between the underlying material and suitable for use soils.
- Proof of the method of placement and different layers if appropriate
- Proof of the completed project
- Inclusion of background features which will aid locating the photograph
- Inclusion of site identification boards within the photos which show the date, position taken i.e. corner of plot 3 and the site name.
- Inclusion of photographs of site stockpiles and quarantine areas.

The presence of good quality photographs is essential to prove beyond doubt that the remediation has been done as specified both by method and position, and that the images have been taken from the specific area stated.

Refer to **Appendix 3** for examples of good photographic evidence.

Appendix 1a – Sampling & Testing Matrix

Type	Number of Samples	Testing Schedule	Assessment Criteria
	Please note that these guidelines apply to a typical residential development, and relaxation of the guidelines or more stringent requirements may apply dependent on local and site specific factors. Therefore, <u>all parameters need to be agreed with the Local Authority</u>.		
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material.	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)	The assessment criteria need to be UK based, e.g. LQM S4ULs, Defra C4SLs or other similarly derived GACs.
Crushed Hardcore, Stone, Brick (excluding asphalt)	Minimum 1 per 500m^3	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	
Greenfield/ Manufactured Soils	Minimum 3 Dependent on source and receptor, between 1 per 50m^3 and 1 per 250m^3	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).	
Brownfield/ Screened Soils	Minimum 6 Dependent on source and receptor, between 1 per 50m^3 and 1 per 100m^3	Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	

Appendix 1b – Questions to Ask Your Soil Supplier Relating to Soil Quality

- What is the source of the material (refer to KP1)? If the source is Greenfield, can they provide evidence of this?
- Will all of the material be coming from the same source?
- Are you satisfied that the material is a suitable growing medium for the proposed end use?
- Has the supplier used an appropriate sampling protocol to ensure a representative sample is analysed? What volume of soil is represented by the analysis and does it comply with Appendix 1a?
- Does the testing include analysis of contaminants identified in Appendix 1a?
- Does the laboratory conducting the analysis have UKAS and MCERTS accreditation for the tests they are carrying out?
- Does the material comply with relevant waste regulations?
- Can I have a copy of the whole analysts report and does it include an interpretive section?
- Will the provided certificate be dated within the last 2 months?

Appendix 2 – Checklist for Verification Reports

Example only. Not to be considered as typical minimum requirements. Additional information should be included for non-cover systems aspects of the remediation i.e. gas protection measures etc.

Site Details	
Site Name / location	
Developer name	
Development use	
Plot No / description of landscaped area (inc plan of inspection areas)	
National Grid Reference	
Inspection visit date	
Supporting Evidence	
Description of remediation (as per agreed Remediation Method Statement including depths / thickness checks, topographical readings)	
Material tracking information (including way tickets etc.)	
Name of groundwork's remediation contractor	
Name of supervising environmental consultant	
Site Specific chemical analysis results	
Verification Photographs (inc. remarks)	
Recommendations	
Pass/fail	
If material fails, how will this be managed i.e. removed, treated	
Detail any further remedial works and/or inspection	
Signed off	

Failure to provide any of the above information may prevent planning conditions from being discharged.

Appendix 3 – Examples of Good Quality Photographs

© Coopers Consulting Engineers

Photograph 1:
Depth check of inert cover within area of public open space. Physical break layer and topsoil visible.

© WSP

Photograph 2:
Depth check of inert cover with Site & Location Information Board.

© Coopers Consulting Engineers

Photograph 3:
Depth check of inert cover within areas of front gardens.

© Coopers Consulting Engineers

Photograph 4:
Depth check of inert cover within areas of front gardens.

© Coopers Consulting Engineers

Photograph 5:
Depth check of inert cover within rear gardens. Taut string line spans across excavation.

© Coopers Consulting Engineers

Photograph 6: Depth check of inert cover within rear gardens. Taut string line spans across excavation.

© Coopers Consulting Engineers

Photograph 7: Shows the spatial location of the verification pit.

© Coopers Consulting Engineers

Photograph 8: Excavation within public open space and verification pit showing the presence of a remediation break layer at the base, a crushed sandstone inert fill overlain by topsoil.

© Coopers Consulting Engineers

Photograph 9: Inert crushed sandstone being delivered. The spatial area of the remediation can be observed from these photographs (old terrace housing).

© Coopers Consulting Engineers

Photograph 10: Inert crushed sandstone being delivered with visible remediation break layer. The spatial area of the remediation can be observed from these photographs (traffic lights).

© Coopers Consulting Engineers

Photograph 11:
Shows the remediation of the rear garden, with a significant depth (1.0m) of inert cover. This photograph has been stitched to form a panoramic photograph and hence there is slight distortion

© Coopers Consulting Engineers

Photograph 12:
Shows the remediation of the rear garden, with a significant depth (1.0m) of inert cover. Remediation break layer visible at the base of the excavation.

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