LITHOS

Earthworks Specification

Land at Roslyn Avenue, Netherton

For Harron Homes

Report no: 5080/2

Date: January 2025

CONTENTS

APPENDICES

Appendix A : Drawings

Drawing	Revision	Title
5080/1	-	Site Location Plan
5080/3	-	Site Features
5080/6	-	Exploratory Hole Locations
EE100008-012	-	Drainage Strategy Plan - No Boundary Retaining Option (Elston Engineering)
EE100008-014	-	Cut and Fill Plan - No Boundary Retaining Option (Elston Engineering)

Appendix B : Protocol for Importation & Use of Soil Cover (Capping)

EARTHWORKS SPECIFICATION
for land at
ROSLYN AVENUE, NETHERTON

1 INTRODUCTION

1.1 The commission and brief

1.1.1 Lithos Consulting Limited has been commissioned by Harron Homes to prepare an Earthworks Specification for land off Roslyn Avenue, Netherton.

1.1.2 Lithos has already issued the following reports:

- Geoenvironmental Appraisal: Land at Roslyn Avenue, Netherton . Report No. 5080/1, dated July 2024.

1.1.3 The above-referenced report was produced on behalf of KCS Developments, but it is understood that Harron will have reliance on it by purchase of the site.

1.1.4 The appointed Earthworks Contractor will need to familiarise themselves with the above Reports, and comply with **all** relevant recommendations contained therein.

1.1.5 This Specification is intended to be used in connection with the construction of low-rise buildings which **will not** derive direct support from the engineered fill. It is emphasised that clay fills can be at least as susceptible to settlement or heave due to climatic, vegetation or other effects, as naturally occurring cohesive soils.

1.1.6 This specification is for contracts which are designed and supervised by Lithos Consulting Limited.

1.1.7 Note should be taken of the requirements of the Construction (Design and Management) Regulations:1994 to the extent that they may be relevant to the works.

1.1.8 This specification has been prepared by Lithos Consulting Ltd based on the suitably modified "Model Specification for Engineered fills to Support Low Rise Structures", written by N A Trenter and J A Charles, Paper 10819, Proceedings of the Institution of Civil Engineers, Geotechnical Engineering, October 1996.

1.2 The proposed development

1.2.1 The proposed residential development comprises detached, semi-detached and terraced houses, forming a total of 68 new dwellings, as shown on Elston Engineering's Drainage Strategy Plan (Ref. EE100008-012; copy presented in Appendix A).

1.2.2 The new houses are likely to be founded on standard strip or deepened trench fill foundations.

1.2.3 A surface water attenuation tank is proposed in the south of the site.

1.2.4 Access to the development will be from Roslyn Avenue to the east.

2 BACKGROUND

2.1 Site description & history

2.1.1 Site details are summarised below:

Detail	Remarks
Location	4.5 km southwest of Huddersfield town centre
NGR	SE 120 130
Area	3.5 ha (8.6 acres)
Known live services	Underground & overhead electric

2.1.2 The site location and current salient features are shown on Drawings 5080/1 and 5080/3 in Appendix A.

2.1.3 The site comprises a single agricultural field containing tall grass, accessed via Roslyn Avenue to the east.

2.1.4 In the far-east of the site, a small area of land containing a greenhouse and some general farming/gardening materials and equipment is present, segregated from the majority of the site by a dry-stone wall but still within the provided site boundary.

2.1.5 The site slopes gently towards the west; a steep drop/cliff is present immediately beyond the northern boundary.

2.1.6 The cliff face to the north resides within an area of mapped (historical OS maps) sandstone quarrying and comprises exposures of sandstone bedrock. This sandstone appears to have been quarried into the cliff face with some local depressions on the ground surface that have likely been infilled. Mounds of overburden and spoil from the quarrying process were noted in the woodland, adjacent to the cliff faces.

2.1.7 Most of the large quarry mapped immediately to the north-east now comprises woodland and a relatively flat, well-maintained, grassed playing field.

2.2 Ground investigation

2.2.1 Ground investigation, comprising 28 machine-excavated trial pits and 10 window sample boreholes was undertaken in June 2024, as detailed in Geoenvironmental Appraisal 5080/1.

Made Ground

2.2.2 Made ground was encountered in one trial pit (TP06; see Drawing 5080/6) to a depth of 2.4m; this made ground comprised of:

- **Reworked Natural:** Cobbles and Boulders of Sandstone with a matrix of gravelly Sand. The cobbles of sandstone were not uniform and were of different colours and shapes; the excavation was also very unstable and no 'structure' could be seen in the sidewall, as would be expected in weathered bedrock.

2.2.3 Trial pits TP25 to TP27 were excavated adjacent to TP06 in attempt to delineate the made ground, however, all three found shallow bedrock at c. 1m depth.

2.2.4 It is possible that this made ground represents a localised area of small-scale quarrying or a borrow pit.

2.2.5 Possible Reworked Natural, comprising of very loose sandy Gravel of Sandstone, was also encountered in WS03 and WS06 to depths of 1.8m and 1.9m respectively.

Natural ground

2.2.6 Natural ground was encountered in all of the exploratory holes, and typically comprised:

- **Topsoil:** gravelly silty Sand was identified across the site to a typical depth of 300mm.
- **Granular Residual Soil:** encountered in all trial pits and the majority of window samples (excluding WS03 and WS06) to around 1.5m depth (min. of 1.0m; max. of 2.5m). Comprises of gravelly Sand, sandy Gravel and/or Cobbles with occasional boulders and a matrix of sand and gravel.
- **Rough Rock Flags – Sandstone:** encountered in all 28 trial pits from depths of between 1.0m and 2.5m (ave. encountered depth of 1.5m). Comprising of weak orangish brown medium grained Sandstone. Recovered predominantly as cobbles with occasional boulders, gravel and sand.

2.2.7 Particle size distribution analysis undertaken on 6 samples of the Granular Residual Soil indicates it typically conforms to the grading requirements for Class 1A (well-graded granular) or Class 2C (stony cohesive) general fill, as defined in Series 600 of the National Highways Specification for Highway Works (SHW Series 600).

Groundwater

2.2.8 No significant inflows or seepages of groundwater were encountered during the investigation.

2.2.9 Gas and groundwater monitoring wells have been installed in 10 window sample boreholes across the site, to a maximum depth of 1.9m. Monitoring is ongoing, but no groundwater has been recorded during any of the 6 visits undertaken to date.

Stability

2.2.10 Stability of excavations within the Granular Residual Soil was generally poor due to overbreak in the cobbles

Hazardous gas

2.2.11 The site lies in an area where between 3% and 5% of homes are estimated to be above the radon action level. Basic radon protection measures will therefore be required in all new dwellings.

2.2.12 A former refuse tip is present immediately beyond the north/north-eastern boundary. Infilled quarries are also present within 250m to the east and west.

2.2.13 A hazardous gas risk assessment will be provided on completion of monitoring, around April 2025.

Contamination

2.2.14 Chemical testing of fifteen topsoil samples and one sample of made ground (reworked natural) has not recorded any contaminant concentrations of concern.

3 EARTHWORKS LEVELS, REGRADE & ANTICIPATED FOUNDATIONS

3.1 Earthworks levels

3.1.1 Geoenvironmental Appraisal 5080/1 indicates shallow strip or deepened trench fill footings will be the most suitable foundation solution for two or three storey houses constructed at the site. Footings will be founded in Granular Residual Soils (Sand, Gravel and/or Cobbles) or competent bedrock (Sandstone).

3.1.2 As highlighted in Section 1.1, Lithos understands that proposed foundations will not derive direct structural support from the engineered fill. Consequently in areas of made ground or engineered fill, foundations will need to be taken down into the underlying natural soils of adequate bearing capacity.

3.1.3 Current cut / fill proposals are shown on Elston Engineering Drawing EE100008-014, a copy of which is presented in Appendix A.

3.1.4 This indicates up to 2m of cut in the centre of the site, with up to 2.5m of fill mainly in the south of the site.

3.2 Site regrade

3.2.1 Regrade of the site is required to facilitate the proposed housing layout.

3.2.2 The earthworks modelling undertaken by Elston Engineering (see Drawing EE100008-014; copy presented in Appendix A) indicates that the site strip will generate approximately 13,700m^3 of topsoil, of which approximately 5,000m^3 will be re-used in gardens and soft landscaped areas on site.

3.2.3 This leaves a surplus of c. 8,500m^3 of topsoil, which is considered suitable for export and re-use on other development sites.

3.2.4 In terms of textural classification, the topsoil falls into the 'sandy loam' class. However, within two of the three samples tested, the percentage of gravel exceeded the maximum permissible level. This is likely associated with the underlying natural granular soils, comprising sand, gravel and cobbles – from which the topsoil has likely been derived by weathering.

3.2.5 It seems likely that the topsoil may require screening to reduce the gravel content, prior to re-use in proposed gardens.

3.2.6 The earthworks modelling also indicates that the earthworks cut will generate c. 12,000m^3, of which c. 9,000m^3 will be re-used as fill.

3.2.7 Taking into account drainage (but not, at this stage, foundation) arisings, overall the site will generate a surplus of 8,500m^3 of natural subsoil / weathered rock. This includes an allowance for drainage arisings but not foundation arisings, so the overall surplus will be greater still.

3.2.8 The surplus subsoil is also considered suitable for export and use on other development sites, subject to screening to remove oversize rock fragments.

4 EARTHWORKS SPECIFICATION (GENERAL)

4.1 Aims

4.1.1 The aims of the earthworks are to:

- Provide a stable development platform (to agreed levels and gradients) for subsequent construction of the proposed development and associated infrastructure
- Satisfy the requirements of the Local Planning Authority and warranty provider

4.2 Overview

4.2.1 The following works are required:

- General site clearance of surface materials & vegetation
- Regrade of site to levels specified by Harron, with placement of suitable engineered fill in accordance with the requirements of this Specification
- Where fill is to be placed in areas of POS or large rear gardens, with no significant infrastructure (footpaths, equipped play areas, drainage etc), it is expected to be placed in a similar manner to the engineered fill, but is not required to achieve the same performance criteria (see Section 5.9).

4.3 Site set-up, organisation and safety

4.3.1 Site cabins and welfare facilities are to be established at a location to be agreed with Harron. All welfare facilities must be established in accordance with relevant health & safety statutory requirements. Provision should be provided on site for car parking for all site employees.

4.3.2 All site personnel should undergo a site-specific health and safety induction prior to commencement of work on site.

4.3.3 Access into excavations etc. must be controlled and undertaken in accordance with the CDM Regulations 2015, most notably Regulation 22, to mitigate risk of collapse or asphyxiation.

4.3.4 All visitors to site must enter and register at the main site office.

4.4 Contractor's responsibilities

4.4.1 Prior to the commencement of any works the Contractor, in agreement with Harron, should:

- Comply with any requirements of Harron's contract documentation
- Establish the boundaries of the site and the working areas
- Undertake a dilapidation survey of site boundaries, adjacent properties and highways, via dated photographs or video footage
- Liaise with the Local Authority regarding working hours, noise/dust control, and protected trees
- Complete a full services search and liaise with all relevant utility companies regarding work in close proximity to their apparatus
- Prepare a detailed Method Statement outlining how the objectives of this Earthworks Specification will be achieved (and obtain approvals)
- Prepare the necessary COSHH statements and Health & Safety Plan in accordance with CDM regulations

4.4.2 The Contractor should satisfy the Health & Safety Executive with regard to all matters concerning the health, safety and welfare of persons on the site.

4.4.3 The Contractor should ensure that:

- Personnel, plant, materials and other equipment related to the contract are confined within the boundaries of the site where possible.
- Any live services lying within the site boundary are marked and protected, or appropriate arrangements made to truncate them.
- Good practices relating to personal hygiene are adopted.
- Suitable precautions are implemented at all times to prevent off-site migration of airborne dust.
- Suitable precautions are taken to prevent the spread of mud and debris on public highways.
- Refuelling of mobile plant is undertaken in a designated area of hardstand as soon as is practicable. Above ground oil storage tanks should comply with the requirements of
- Pollution Prevention Guideline PPG2. A spill kit should be kept on site, adjacent to the designated refuelling area. (Lithos are aware that some of the EA PPG documents have been withdrawn from the gov.uk website. However, PPGs provided a summary of current UK guidance; the principles are still relevant and provide a useful, concise overview).

4.5 Materials Management Plan

4.5.1 This project will involve the re-use of site-won natural fill soils, and export of surplus materials off site. Therefore, a Materials Management Plan (MMP), in accordance with the CL:AIRE Code of Practice (v2, March 2011), is not strictly necessary.

4.5.2 However, Harron and/or the Contractor may find it useful to prepare a MMP in order to help them manage soils.

4.5.3 The MMP would document how all of the materials are to be dealt with. In summary the MMP should provide:

- Details of the parties that will be involved with the implementation of the MMP
- A description of the materials in terms of potential use and relative quantities of each category
- The specification for use of materials against which proposed materials will be assessed, underpinned by an appropriate risk assessment related to the place where they are to be used
- Details of where and, if appropriate, how these materials will be stored
- Details of the intended final destination and use of these materials
- Details of how these materials are to be tracked
- Contingency arrangements that must be put in place prior to movement of these materials
- Verification Plan

4.5.4 The MMP should include consideration of the following factors:

- Any risks posed by the excavated materials to both human health and the environment
- Suitability for use
- Certainty of use
- Anticipated quantities of materials

4.5.5 The MMP should also detail how materials will be tracked throughout the earthworks in order that the subsequent Verification Report can provide an auditable trail. The tracking system must include:

- Annotated plans of the site(s) identifying different excavation areas, stockpile locations, treatment areas (if applicable) and placement locations
- Inspection procedures
- Registered waste carrier and non-waste haulier
- Tracking form / control sheets
- Treatment results (if applicable)
- Delivery tickets for non-waste materials (if moving from one site to another)
- Acceptance procedures for non-waste materials

4.5.6 Finally, the MMP should set out a Verification Plan that identifies how the placement of materials is to be recorded and the quantities of material to be used. It will contain a statement on how the use of the materials relate to the remediation or design objectives.

4.6 Engineering supervision and verification

4.6.1 Site works should be supervised as necessary by a suitably qualified Engineer, who will report to a Project Manager. The exact requirements for engineering supervision will be determined after consultation with the Highway Adopting Authority and warranty provider.

4.6.2 The responsibilities of the Engineer should include, but not be limited to, the following:

- Supervision of the earthworks
- Advising on the correct handling of materials and conditions encountered
- Supervision of the retrieval of soil samples & the subsequent scheduling of appropriate laboratory analysis to enable verification of various aspects of the works, and to advise the Project Manager of progress
- Overseeing in-situ laboratory testing as necessary
- Liaison with statutory authorities as required

4.6.3 The Engineer will maintain records of the works to include the following:

- Daily record sheets to include a summary of the day's activities
- Date and weather conditions
- Plant, personnel and visitors present
- Aspects relating to Health and Safety, Environmental Control, or non-compliance with either this Earthworks Specification or the Contractor's Method Statement
- Test results

4.6.4 On satisfactory completion of all the works the Engineer should prepare a Verification Report for the earthworks. Copies of the Verification Report will be issued to Harron, the Local Planning Authority and warranty provider.

4.6.5 The Verification Report will stand as certification that the ground preparatory works have been carried out in accordance with this Earthworks Specification.

4.6.6 The Verification Report will include:

- A summary of the preparatory works undertaken, including any works associated with unforeseen ground conditions
- Geotechnical test results associated with placement of engineered fill
- Copies of any correspondence with regulators relating to specific aspects of the earthworks
- Reference to the MMP and associated tracking system, including alterations made and why

4.6.7 The Verification Report will also provide recommendations with respect to:

- Foundation solution(s)
- Gas protection measures
- Placement of soil cover
- Handling of any contaminated soils

4.6.8 The above recommendations will take account of the actual earthworks undertaken and may differ from recommendations originally presented in the site investigation report.

EARTHWORKS SPECIFICATION (SPECIFIC OBJECTIVES)

5.1 Contingency for unknowns

5.1.1 Even after an appropriate preliminary investigation and ground investigation, with exploratory holes on a closely spaced grid, a geoenvironmental appraisal is typically based on inspection of the ground underlying less than 0.5% of the total site area (and much less at depths in excess of about 3.5m). Consequently, there is always a possibility that unanticipated ground conditions will be encountered during the earthworks.

5.1.2 If unanticipated ground is encountered during the works, the Contractor should immediately seek further advice from the Engineer.

5.2 Site clearance

5.2.1 Any trees currently under a preservation order should be identified and agreed with relevant authorities prior to the commencement of the works. All trees subject to a TPO should be clearly identified and protected by fencing in accordance with BS5837: 2012.

5.2.2 The site should then be cleared of all residual debris and vegetation as instructed by Harron.

5.2.3 Topsoil, typically 300mm thick, is present across the entire site. Testing suggests this material should be chemically suitable for re-use on site.

5.2.4 Given the nature of the topsoil present on this site it would be expected to be suitable to support plant growth. However, no testing in accordance with BS3882:2015 Specification for Topsoil (N-P-K, clay content etc) has been undertaken to date.

5.2.5 Topsoil should be stripped and placed in a temporary stockpile.

5.2.6 Topsoil is best stripped using tracked plant, and should be undertaken in the driest conditions possible. Wheeled plant (e.g. dumpers required to move the stripped topsoil across the site) should only be allowed on areas from which the topsoil has already been removed.

5.2.7 Topsoil should not be stripped during or after periods of heavy rainfall, when there are pools of water on the surface, or when the ground is frozen or covered by snow.

5.2.8 Care should be taken to avoid mixing of topsoil with the underlying subsoil.

5.2.9 The Engineer may instruct analysis (pH, metals, asbestos ID & speciated PAH) of further samples from the topsoil stockpile in order to confirm its suitability for re-use.

5.2.10 In order to manage surface water and silt it is recommended that a phased approach is taken to site clearance and construction; prior to construction, topsoil and vegetation form a natural barrier and limit surface water (and silt) run off.

5.2.11 This is a large site, and it would be prudent to retain topsoil and vegetation until construction is due to commence in any given sub-area (other than along the line of proposed roads & sewers).

5.2.12 It would be prudent to prepare both a silt and surface water management plan (SWMP).

5.3 Topsoil stockpiling

5.3.1 Topsoil stockpiles should be located in areas of the site where the material can be left undisturbed and it won't interfere with site operations. Unnecessary double-handling of the soils should be avoided where possible.

5.3.2 Stockpiles should not be positioned within the root or crown spread of retained trees, or adjacent to watercourses, ditches or existing or future excavations.

5.3.3 Stockpile locations should first be cleared of any vegetation, development waste etc.

5.3.4 The soil should be tipped in a line of heaps to form a windrow, starting at the furthest point in the storage area and working back towards the access point.

5.3.5 Adjacent windrows should be placed sufficiently apart to allow tracked plant to gain access between them, so that the soil can be heaped up to the maximum height.

5.3.6 Topsoil stockpiles should not be greater than 2.5m in height. In large stockpiles adequate oxygen supply is unlikely to penetrate more than 1m from the surface; stockpiles should therefore be as low and narrow as possible so that the core material is within 1m of the surface.

5.3.7 Stockpile surfaces should be firmed and re-graded to form a smooth gradient, using tracked plant, to prevent rainwater ponding and infiltration.

5.3.8 A maximum side slope of approximately 1 (vertical) in 2 (horizontal) is recommended.

5.3.9 Stockpiles should be fenced off to prevent any disturbance or contamination by other construction activities.

5.3.10 If the soil is to be stockpiled for more than 6 months, the surface of the stockpiles could be seeded with a grass/clover mix to minimise soil erosion and to help reduce infestation by nuisance weeds that might spread seed onto adjacent land.

5.3.11 Management of weeds that do appear should be undertaken during the summer months, either by spraying to kill them or by mowing or strimming to prevent their seeds being shed.

5.3.12 The site should be managed so as to keep soil storage periods as short as possible.

5.4 Preparatory groundworks

5.4.1 Localised areas of made ground (see Section 2.2) should be excavated, and the materials assessed to determine suitability for re-use as engineered fill (see Section 5.6).

5.4.2 Where the underlying natural ground profile is sloping, the sub-grade shall be benched, with the maximum vertical height of each bench not to exceed 500mm.

5.4.3 Where the area to be filled comprises an existing excavation, the excavation shall be inspected and subsequently monitored by the Contractor, to ensure that there is no danger of its collapse during the works with consequences for safety, for existing buildings or for other construction adjoining.

5.4.4 Any existing foundations, ledges of hard rock, roots of trees or redundant services present at the base of the area to be filled shall also be removed and replaced with compacted fill. The fill shall be compacted to the same specification as adopted for subsequent filling works.

Note: No roots greater than 5mm diameter, no root balls and no masses of fibrous roots shall remain at the base of the excavation.

5.4.5 The base of the area to be filled shall be proof rolled with a dead weight roller, and any soft spots or materials shall be removed and replaced with compacted fill. The fill shall also be compacted to the same specification as adopted for subsequent filling works.

5.4.6 Soft spots are defined as areas where the exposed surface comprises cohesive material with an undrained shear strength when measured using a Hand Shear Vane (HSV) of less than 50kPa.

5.4.7 The sub-grade surface should be surveyed prior to placement of any fill.

5.4.8 Drainage grips or trenches shall be excavated, as necessary, uphill of the area to be filled to prevent the area becoming flooded. Surface water shall be removed from any depressions within the area to be filled, prior to filling.

5.4.9 Any drains or watercourses running across or adjacent to the site should be adequately protected to prevent contamination from surface water run-off.

5.5 General excavation

5.5.1 Any excavated material that needs to be stockpiled temporarily should be placed in areas agreed with Harron.

5.6 Acceptable fill material

5.6.1 The fill should comprise natural or reworked natural soils conforming to the requirements of Class 1 or 2 fill material as defined in SHW Series 600.

5.6.2 Alternatively, fill could comprise natural gravel or crushed rock conforming to the requirements for Class 6F2 fill material as defined in SHW Series 600.

5.6.3 The fill shall not include:

- Cohesive soils having a liquid limit in excess of 90% or Plasticity Index in excess of 65%
- Chalk having a fine fraction (<400µm) in excess of 10%
- Any material containing topsoil, wood, peat or lignite
- Any material containing biodegradables or putrescible waste
- Any material containing scrap metal
- Frozen or waterlogged substances
- Material with unsuitable moisture contents (given the proposed import from several sites, acceptable moisture contents shall be determined on a case-by-case basis)
- Material defined as unsuitable by the Engineer because of its type or level of contamination (see also Section 5.6.7, below)
- Material which, by virtue of its particle size or shape, cannot be properly and effectively compacted (e.g. oversize material, tabular gravels etc)
- Expansive steel slag
- Materials containing minerals hostile to the built environment such as pyritic shales, gypsiferous clays, burnt colliery discard, pulverised fuel ash, spent oil shale or incinerator waste etc

5.6.4 It is considered likely that sufficient suitable fill will be generated on site, such that import is not required. However, importation of other materials may be deemed acceptable, subject to appropriate chemical testing and risk assessment.

5.6.5 Fill should not have been sourced from an area within 7m laterally, or 3m vertically, of Japanese Knotweed plants, and not contain any Japanese Knotweed fragments (rhizomes, leaves, stems etc).

5.6.6 In order to ensure that the fill will pose no risk to the environment or human health, and given the generally greenfield history of the site, contaminant concentrations should not exceed the threshold criteria detailed in Appendix B.

5.6.7 Review of ground investigation information for any source site(s) may be adequate to assess the fill material's suitability for use, but where this information is unavailable or inadequate additional chemical testing will be required (in accordance with the requirements of the Protocol presented in Appendix B).

5.6.8 Only suitable topsoil and subsoil, conforming to the requirements of the Protocol presented in Appendix B, should be placed within 450mm of the finished ground surface in gardens and soft landscaped areas.

5.7 Control of water

5.7.1 Groundwater should be controlled in accordance with CIRIA report 113 "Control of Groundwater for Temporary Works".

5.7.2 Arrangements should be made to prevent ponding in any excavation "hollows"; the Contractor should ensure that ground levels are of sufficient gradient to enable the collection of surface water run-off in sumps or grips.

5.7.3 The Contractor should make all necessary arrangements to prevent off-site migration of sediment via surface water run-off.

5.7.4 A Surface Water Management Plan should be prepared by the Contractor, describing the mitigation measures that will be put in place to intercept direct run-off from any disturbed areas, stockpiles etc, thereby preventing any potential impact of adjacent land and nearby watercourses. Surface water run-off will probably require treatment to allow settlement of fines prior to consented discharge.

5.8 Field compaction trial

5.8.1 Prior to placement of any engineered fill, it is recommended that a field compaction trial be undertaken to demonstrate that the required level of compaction can be achieved with the chosen compaction plant and method.

5.8.2 Separate compaction trials should be undertaken for each source/ type of material.

5.8.3 Good quality crushed product derived from screening and crushing of rock (not argillaceous rock), conforming to the requirements of SHW Series 600 for Class 6F2 material, may not require a site-trial to confirm the method specification for its compaction, subject to the approval of the Engineer.

5.8.4 The fill compacted beneath adoptable highways is required to achieve the following end-product requirements:

- In-situ dry density to be at least 95% of the maximum dry density recorded from laboratory compaction tests (2.5 kg compaction method)
- Air voids content to be less than 10%
- California Bearing Ratio (CBR) at highway formation to be at least 2.5%

5.8.5 For coarse-grained soils, the in-situ dry density should achieve 95% relative compaction based on the vibrating hammer laboratory compaction test or, where the material is too coarse for laboratory compaction testing, the maximum density achieved during site trials.

5.8.6 Sufficient material shall be obtained from the proposed source to form an approximately 10m by 4m trial pad at least 0.5m thick.

5.8.7 The trial pad shall be formed on a previously rolled horizontal area of the site, and any soft spots in the sub-grade beneath the trial pad shall be removed and replaced with compacted fill.

5.8.8 The trial shall be conducted using the same compaction plant as is proposed for the main compaction works. A guide to the size and type of plant that may be suitable, along with the recommended layer thickness and number of passes, is given in SHW Series 600 Table 6/4.

5.8.9 Bulk density (sand replacement method) and moisture content determinations shall be carried out at different locations after 4, 6, 8 and 10 passes of the roller.

5.8.10 A graph of dry density / moisture content against the number of passes of the roller shall be drawn, and the number of passes required to achieve at least 95% of the maximum dry density (as determined from the laboratory compaction test; 2.5 kg compaction method) with less than 10% air voids shall be determined.

5.8.11 As a guide, the number of passes should be equal to or greater than the number derived from SHW Series 600 Table 6/4. The number of passes derived from the site trial shall form the method specification for site compaction of that type of material at the in-situ moisture content.

5.8.12 If it is shown that the required level of compaction cannot be achieved during the site trial, then the trial shall be repeated with different conditions, i.e. heavier or different type of roller and/or increased/decreased moisture content and/or thinner layers.

5.8.13 If the source for the fill material changes during the works, then a further compaction trial will be required to confirm the new material's suitability.

5.9 Placement of fill material

5.9.1 Engineered fill shall be placed and compacted in near-horizontal layers in accordance with the method specification determined from the field compaction trial.

5.9.2 If the compacted fill demonstrates significant rutting, roller 'bow-waving' or other soft behaviour then it shall be deemed unsuitable.

5.9.3 Only the following types of compaction plant shall be used for compaction of fill within 2m of a structure:

- Vibratory roller, mass per metre width of roll not exceeding 1,300 kg and total mass not exceeding 1,000 kg
- Vibrating plate compactor, mass not exceeding 1,000 kg
- Vibro-tamper, mass not exceeding 75 kg

5.9.4 As far as is practicable, the fill shall be brought up at a uniform rate such that all parts or particular sections of the site reach finished (formation) level at the same time.

5.9.5 Where several different types of fill material (all meeting the requirements of Section 5.6 of this Specification) are to be employed, they shall be deposited in such a way that all parts or particular sections of the site receive roughly equal amounts of a given material, in roughly the same sequence, thus ensuring a uniform distribution of fill types over the whole fill thickness.

5.9.6 The Contractor shall take all necessary steps to ensure that the fill is placed at the moisture content necessary to achieve the specified level of compaction and shall, where necessary, add water to or dry the fill in order to obtain this value. Where it is necessary to add water, this shall be done as a fine spray and in such a way that there is time for the water to be absorbed into the fill before being rolled by the plant.

5.9.7 If weather conditions are such that the specified moisture content and density values cannot be achieved, the Contractor shall cease work until such time as the fill can be placed and compacted to meet the specification requirements.

5.9.8 Cobbles, boulders or rock fragments, the largest dimension of which is greater than two-thirds of the compacted layer thickness, shall not be incorporated into the fill.

5.9.9 No fill shall be placed and left uncompacted at the end of the working day. Compacted fill shall be graded to falls to ensure free run-off of rainwater without ponding.

5.9.10 Compaction plant and compaction method shall be selected having regard to the proximity of existing trenches, excavations, retaining walls or other structures and all work shall be performed in such a way as to ensure that their existing stability is not impaired.

5.9.11 Where, because of the method of working, previously engineered fill placed during the current works has to be benched to allow new fill to be placed adjacent to it, then the benches shall be cut to be 0.5m high by 1.0m wide.

5.9.12 If the results of compliance tests (Section 5.10) indicate that the fill is being placed and compacted in such a way that the desired level of compaction is not being achieved, the Contractor shall further compact or, if necessary, shall excavate the affected work and replace with new fill, compacted to meet the Specification requirements.

5.9.13 If the results of the compliance tests indicate that antecedent weather conditions (such as frost or heavy rain) have caused deterioration of finished work such that the work no longer meets with the Specification, the Contractor shall, at his or her own cost, take such steps as are necessary to bring the fill to Specification requirements.

5.9.14 Where fill is to be placed in areas of POS or large rear gardens, with no significant infrastructure (footpaths, equipped play areas, drainage etc, the underlying fill shall be selected, placed and compacted in the same way as the engineered fill, unless otherwise directed by the Engineer.

5.9.15 Where some relaxation of the specification for fill compaction underlying garden / landscaped areas is permitted, there shall be a transition zone between the fill underlying the garden / landscaped area and the engineered fill. The dimensions of the transition zone will depend on the degree to which fill compaction was relaxed. The location and extent of fill placed to a reduced standard of compaction shall be recorded by survey.

5.10 Compliance testing

5.10.1 The engineered fill beneath highways (including non-adoptable roads & shared private drives) is required to achieve the following end-product requirements:

- In-situ dry density to be at least 95% of the maximum dry density recorded from laboratory compaction tests (2.5 kg compaction method)
- Air voids content to be less than 10%
- CBR value at highway formation to be at least 2.5%

5.10.2 For coarse-grained soils, the in-situ dry density should achieve 95% relative compaction based on the vibrating hammer laboratory compaction test or, where the material is too coarse for laboratory compaction testing, the maximum density achieved during site trials.

5.10.3 The Specification requirements shall be controlled by in-situ and laboratory testing as follows:

- Moisture content, Atterberg Limits, particle size distribution & particle density (BS1377: Part 2: 1990)
- Laboratory compaction test; 2.5 kg hammer method (BS1377: Part 4: 1990)
- In-situ density test (sand replacement method, SRDs), plate load test & in-situ CBR test (BS1377: Part 9: 1990)

5.10.4 Where plate load tests are utilised to determine the CBR value at formation, equivalent CBR values shall be derived using the method detailed in Section 7.14 of the Highways Agency Interim Advice Note 73/06 Revision 1 (2009).

5.10.5 If a Nuclear Density Meter (NDM) is used to determine the bulk density and moisture content, then the NDM shall be calibrated by undertaking NDM tests adjacent to SRD tests, at a frequency of at least 1 SRD: 10 NDMs.

5.10.6 This testing is required to ensure the consistency of the material(s) utilised, and to demonstrate the continued effectiveness of the compaction method.

5.10.7 In-situ compliance testing (i.e. density tests) shall be undertaken on a minimum of 3 samples per material source/ type and a nominal frequency of 1 test per 500m^3 of placed fill.

5.10.8 Laboratory compliance testing shall be undertaken on a minimum of 6 samples per material source/ type, with 1 additional test per 1,000m^3 of placed fill.

5.10.9 CBR values should be determined at highway formation level at nominal 25m intervals, with test locations staggered across the width of the highway to ensure the whole highway area is assessed.

5.10.10 Where different sources/ types of fill material are utilised, it may be necessary to undertake laboratory testing on samples obtained from the same location as the in-situ tests, in order that the data can be correlated.

5.10.11 The Contractor shall allow for testing to be undertaken at the locations required by the Engineer and shall stop works in the test areas as required to facilitate the testing.

5.11 Supervision

5.11.1 The Contractor will be responsible for ensuring that the works are undertaken in accordance with the requirements of this Specification, and that the necessary end-product requirements are achieved.

5.11.2 However, Harron may request that the filling works are also subject to supervision by Lithos.

5.11.3 All placement of material to an engineering specification (in particular beneath adoptable roads), including field compaction trials, should be carried out under the supervision of Lithos.

5.11.4 The Contractor is to provide a competent full-time site supervisor for the duration of the works, to ensure that the works are undertaken to the required standard and to liaise with Lithos and Harron.

5.11.5 Unless otherwise agreed, the Contractor will be responsible for provision of all geotechnical compliance testing required to demonstrate, to the satisfaction of the Engineer, the engineered fill's suitability for use and that the required end-product specification has been achieved (see Section 5.10).

5.11.6 The Contractor shall ensure that only suitable topsoil and subsoil, conforming to the requirements of Protocol presented in Appendix B, are placed within 450mm of the finished surface in gardens and soft landscaped areas.

5.12 Surveying

5.12.1 The Contractor should arrange for the following survey work as directed by Harron:

- All setting out necessary to allow the works to proceed
- Recording of the base and extent of all excavations
- Recording the locations and volumes of all stockpiles of suitable materials left on site for Harron's use during the development works
- As-built survey of the finished surface on completion of the contract

5.12.2 The Contractor should supply the results of this survey work to the Engineer for inclusion in the Verification Report.

APPENDIX A
DRAWINGS

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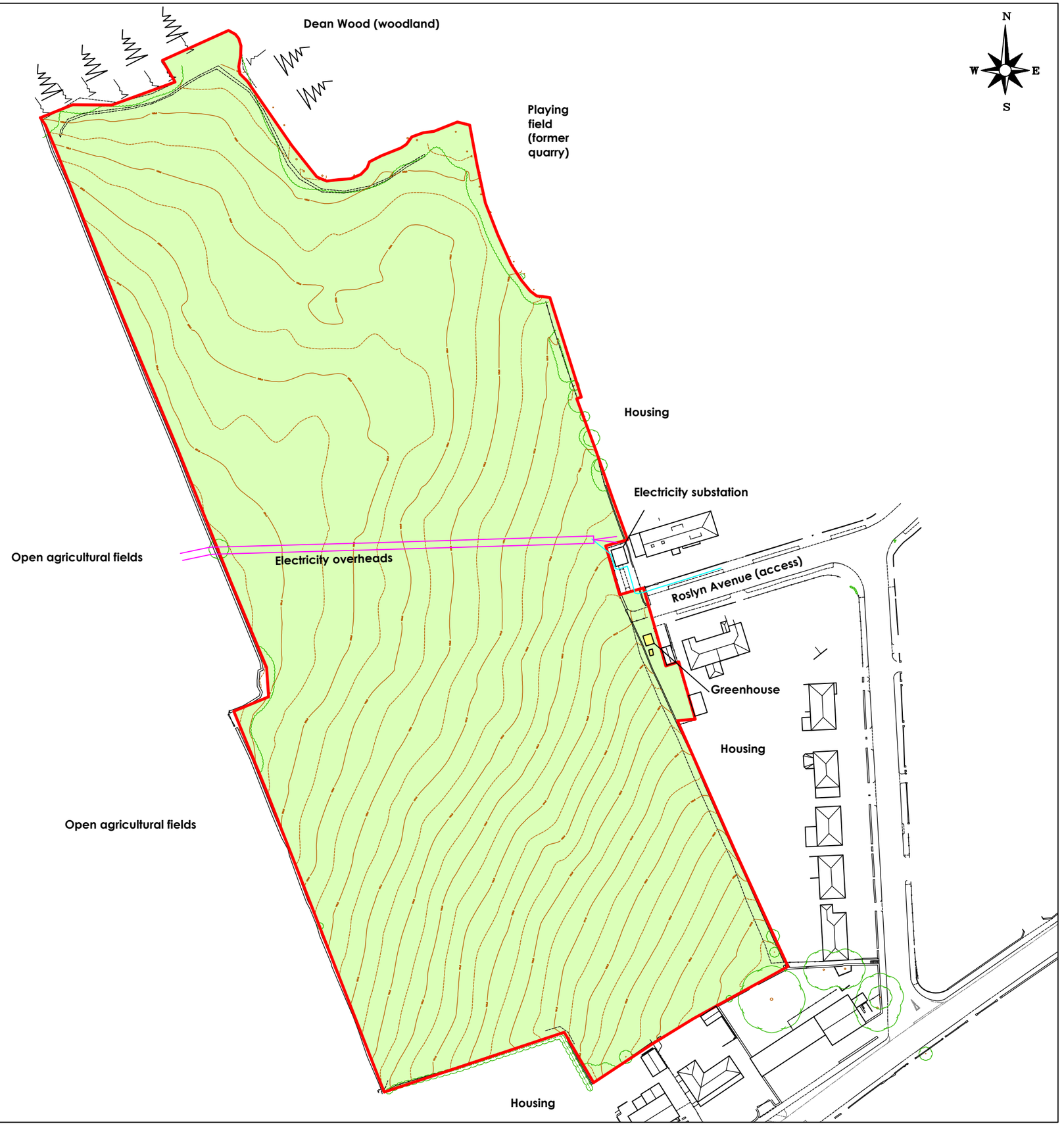
Tel 01937 545330

CLIENT	KCS DEVELOPMENTS LTD
JOB TITLE	ROSLYN AVENUE, NETHERTON
DRAWING TITLE	SITE LOCATION PLAN
DRAWN	LB
DATE	13/06/2024
CHECKED	AG
DATE	13/06/2024
STATUS	FOR COMMENT ☐ DRAFT ☐ FOR APPROVAL ☐ FINAL ☑
SCALE	1:25,000
SHEET	A4
DRAWING NO.	5080/1
REVISION	



NOTES

- GRASS & OVERGROWN AREAS
- BUILDING
- LINE OF ELECTRICITY OVERHEADS
- LINE OF UNDERGROUND ELECTRIC
- APPROXIMATE SITE BOUNDARY

REV.	DESCRIPTION	DATE

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CLIENT

KCS DEVELOPMENTS LTD

JOB TITLE

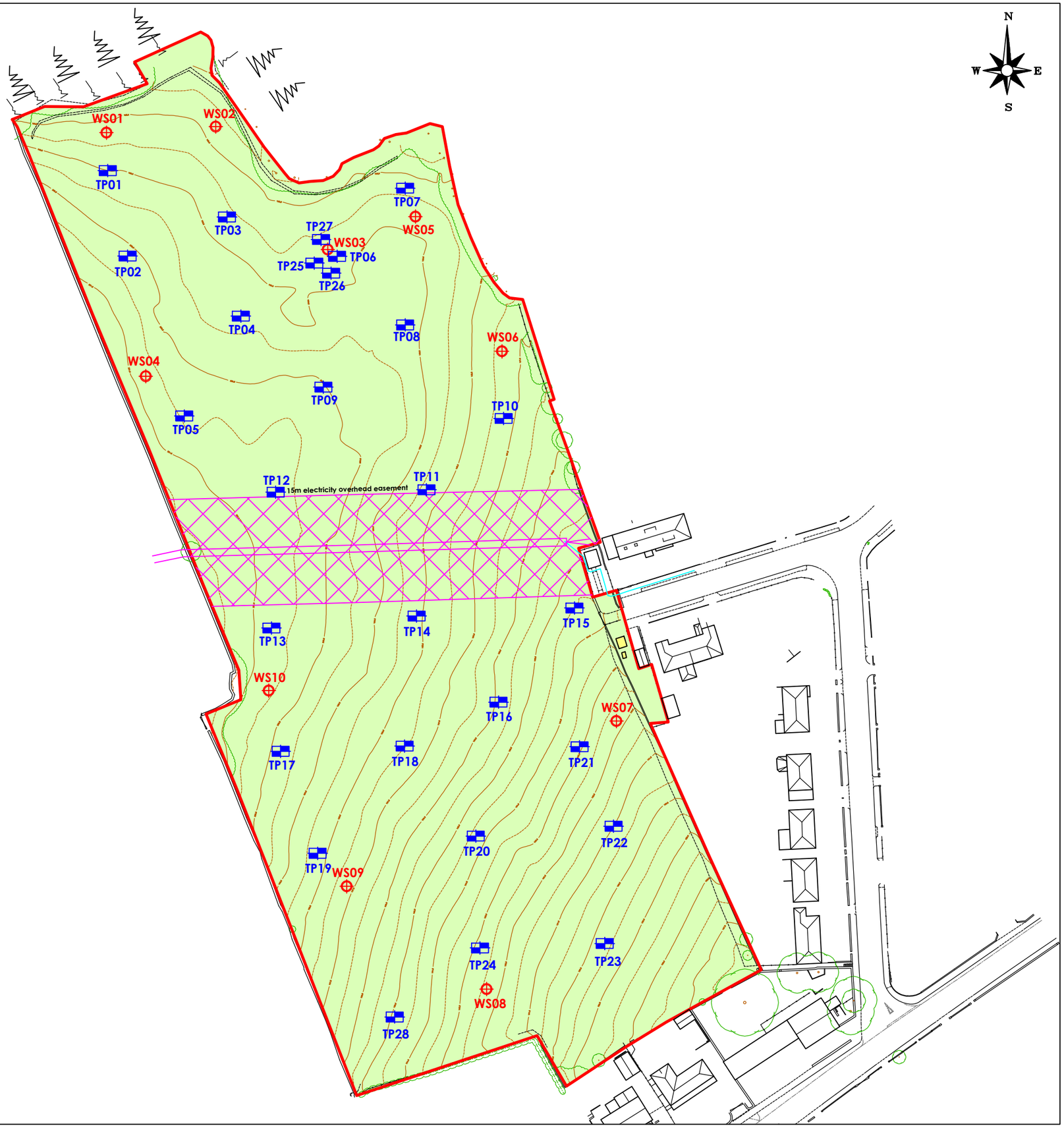
ROSLYN AVENUE, NETHERTON

DRAWING TITLE

SITE FEATURES

DRAWN	DATE	STATUS
LB	14/06/2024	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	14/06/2024	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1250	A3	5080/3	



NOTES

- TRIAL PIT LOCATION
- WINDOW SAMPLE LOCATION
- APPROXIMATE SITE BOUNDARY
- GRASS & OVERGROWN AREAS
- BUILDING
- LINE OF ELECTRICITY UTILITY (OVERHEAD)
- LINE OF ELECTRICITY UTILITY (UNDERGROUND)
- 15m EASEMENT AWAY FROM OVERHEADS

EXPLORATORY HOLE LOCATIONS BASED ON DATA FROM A HAND-HELD GPS (+/- 3M ACCURACY)

REV.	DESCRIPTION	DATE

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CLIENT

KCS DEVELOPMENTS LTD

JOB TITLE

ROSLYN AVENUE, NETHERTON

DRAWING TITLE

EXPLORATORY HOLE LOCATIONS

DRAWN	DATE	STATUS
LB	01/07/2024	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
AG	01/07/2024	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:1250	A3	5080/6	

HAZARDOUS GAS

THE SITE IS IN AN AREA WHERE 3% TO 5% OF HOMES ARE ESTIMATED TO BE ABOVE THE ACTION LEVEL, AND BASIC RADON PROTECTION MEASURES ARE REQUIRED IN NEW DWELLINGS.

FOUNDATIONS

IT IS CONSIDERED THAT SHALLOW STRIP OR DEEPENED TRENCH FILL FOOTINGS WILL BE THE MOST SUITABLE FOUNDATION SOLUTION FOR TWO OR THREE STOREY HOUSES CONSTRUCTED AT THE SITE.

FOOTINGS WILL BE PLACED IN GRANULAR RESIDUAL SOILS (SAND, GRAVEL AND COBBLES) OR SANDSTONE BEDROCK AT A MINIMUM DEPTH OF 600MM; DEEPENED WHERE MADE GROUND IS ENCOUNTERED.

MADE GROUND IS NOT CONSIDERED A SUITABLE FOUNDING STRATUM AND FOOTINGS SHOULD BE TAKEN THROUGH MADE GROUND AND INTO UNDERLYING NATURAL SOILS.

WHERE ROCK IS ENCOUNTERED AT SHALLOW DEPTH (ANTICIPATED FROM AROUND 1M TO 1.5M DEPTH) FOUNDATIONS SHOULD BE PLACED ENTIRELY ON ROCK AND NOT PARTIALLY ON ROCK AND PARTIALLY ON SOIL. THIS MAY, DEPENDING ON SURFACE GRADIENT, NECESSITATE DEEPENING OF FOUNDATIONS.

CONCRETE CLASSIFICATION

SUB-SURFACE CONCRETE SHOULD BE DESIGN SULPHATE CLASS DS-1, WITH THE SITE ALLOCATED AN ACEC CLASSIFICATION OF AC-1.

General Notes

1. Do not scale this drawing.
2. All dimensions are in millimeters unless stated otherwise.
3. This drawing is to be read in conjunction with all other relevant drawings & specifications.
4. All proprietary items to be installed in strict compliance with manufacturers instructions and recommendations.
5. No works shall commence on site until approval has been obtained from all relevant Agencies / Authorities.
6. All dimensions referred to in this drawing must be verified.

Key

- Site Boundary
- Section 104 - Sewer Easement
- Section 38 - Surface Water Sewer
- Section 38 - Surface Water Manhole
- Section 104 - Foul Water Sewer
- Section 104 - Foul Water Manhole
- Section 104 - Combined Water Sewer
- Section 104 - Combined Water Manhole
- Yorkshire Water Combined Water Sewer
- Yorkshire Water Combined Water Manhole

New combined water drainage to discharge to Yorkshire Water combined water sewer. Connection subject to a capacity check.

Hydrobrake flow control chamber restricting surface water runoff to a peak rate of 5.0l/s for all storm events up to and including 1 in 100 year + climate change storm event.

Attenuation tank to provide approximately 1450m³ of storage. 36.50m (l) x 20.00m (w) x 2.00m (d).

Plot Schedule		
Plot Number	Foundation Type	Finished Floor Level
1	Traditional strip	194.850
2	Traditional strip	195.950
3	Traditional strip	196.300
4	Traditional strip	196.550
5	Traditional strip	196.800
6	Traditional strip	196.800
7	Trench filled	197.150
8	Trench filled	197.150
9	Trench filled	197.600
10	Trench filled	197.600
11	Trench filled	197.975
12	Trench filled	198.450
13	Trench filled	198.450
14	Trench filled	198.600
15	Trench filled	199.200
16	Trench filled	199.650
17	Trench filled	199.450
18	Traditional strip	198.650
19	Traditional strip	199.950
20	Traditional strip	199.650
21	Traditional strip	200.600
22	Traditional strip	200.900
23	Traditional strip	201.250
24	Traditional strip	201.050
25	Traditional strip	200.850
26	Traditional strip	200.650
27	Traditional strip	199.600
28	Traditional strip	199.450
29	Traditional strip	199.250
30	Traditional strip	198.800
31	Traditional strip	198.200
32	Traditional strip	197.800
33	Traditional strip	198.900
34	Traditional strip	198.500
35	Traditional strip	197.250
36	Traditional strip	196.800
37	Traditional strip	196.600
38	Traditional strip	96.350
39	Traditional strip	196.850
40	Traditional strip	197.050
41	Traditional strip	197.050
42	Traditional strip	197.725
43	Traditional strip	199.950
44	Traditional strip	200.350
45	Traditional strip	200.750
46	Traditional strip	201.050
47	Traditional strip	201.450
48	Traditional strip	199.850
49	Traditional strip	199.350
50	Traditional strip	199.350
51	Traditional strip	198.600
52	Traditional strip	198.600
53	Traditional strip	197.400
54	Traditional strip	196.350
55	Traditional strip	194.450
56	Traditional strip	195.700
57	Traditional strip	197.700
58	Traditional strip	198.250
59	Traditional strip	191.300
60	Traditional strip	191.800
61	Traditional strip	192.250
62	Traditional strip	192.750
63	Traditional strip	196.200
64	Traditional strip	195.750
65	Traditional strip	195.100
66	Traditional strip	194.700
67	Traditional strip	194.000
68	Traditional strip	194.000

rev	description	drawn	date
P01	First Issue	SG	03.10.24

Status

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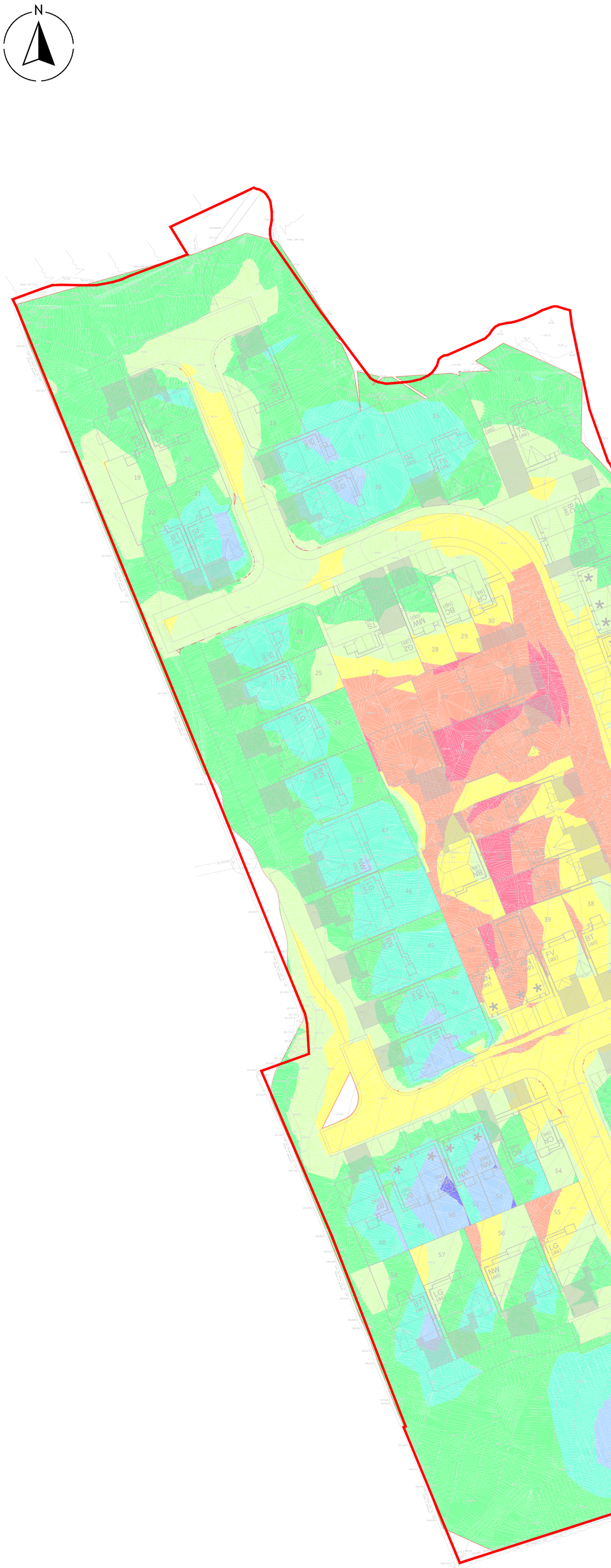
T: 07931 391372

client: HARRON HOMES

project: Land off Roslyn Avenue, Netherton, Huddersfield

drawing title: Drainage Strategy Plan - No Boundary Retaining Option

Drawing Number:		Drawn by:	Checked by:
EE100008-012		SG	SG
Project ref:	scale:	date:	original paper size:
EE100008	1:500	03.10.2024	A1



Surface Level Data					
Number	Minimum Level (m)	Maximum Level (m)	Colour	Area (m²)	Volume (m³)
1	-2.000	-1.500		502.716m²	70.072m³
2	-1.500	-1.000		2779.533m²	868.054m³
3	-1.000	-0.500		4793.911m²	2769.443m³
4	-0.500	0.000		6641.142m²	5635.699m³
5	0.000	0.500		11777.567m²	6573.277m³
6	0.500	1.000		5723.142m²	2302.724m³
7	1.000	1.500		1735.781m²	547.147m³
8	1.500	2.000		393.516m²	71.842m³
9	2.000	2.500		21.846m²	1.876m³

HAZARDOUS GAS

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6. All dimensions referred to in this drawing must be verified.

Sub-Soil Cut and Fill

Plots	= - 600mm
Topsoil	= - 250mm
Highways	= - 750mm
Driveways	= - 250mm
Shared Drives	= - 350mm

30% Bulking factor applied to cut material.

95% compaction applied to fill material.

From Modelling

Cut:	= 12146 m^3
Fill:	= 9022 m^3
Net:	= 3124 m^3 surplus subsoil.

Drainage Arisings - Adoptable Drainage

Foul Water	= 1131 m^3
Foul Water (+30%)	= 1470 m^3
Surface Water	= 1538 m^3
Surface Water (+30%)	= 1999 m^3
Attenuation Tank	= 1460 m^3
Attenuation Tank (+30%)	= 1898 m^3
Total Surplus Subsoil	**= 8491 m^3**

Topsoil Cut and Fill

Pre Dev. Topsoil Area	= 35135m^2
Cut (+30%)	= 13702m^3
Post Dev. Topsoil Area	= 21514m^2
Fill (0.95%)	= 5109m^3
Total Surplus Topsoil	**= 5893m^3**

rev	description	drawn	date
P01	First Issue	SG	11.10.24

Status

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client: HARRON HOMES

project: Land off Roslyn Avenue, Netherton, Huddersfield

drawing title: Cut and Fill Plan - No Boundary Retaining Option

Drawing Number:		Drawn by:	Checked by:
EE100008-014		SG	SG
Project ref:	**scale:**	**date:**	**original paper size:**
EE100008	1:500	11.10.2024	A1

APPENDIX B
PROTOCOL FOR IMPORTATION & USE OF SOIL COVER (CAPPING)

1 INTRODUCTION

1.1 Isolation of made ground in garden and landscaped areas beneath a cover of "clean" subsoil, and topsoil is often recommended on new developments; most notably when the made ground contains inorganic (and non-volatile organic) contaminants at concentrations above relevant guidance threshold values. A cover solution is not appropriate for volatile or semi-volatile organic contaminants (fuels, solvents etc); removal or treatment will usually be required.

1.2 The thickness of cover is dependent on the end use of the development, nature and degree of contamination (and sometimes the Local Authority whose area the site lies within), Typically for a commercial development between 300mm and 1,000mm thickness is required and for a residential development between 600mm and 1,000mm thickness is required. Regardless of the type of development, where contamination is more significant a granular hard-dig layer or geotextile marker membrane may also be required at the base of the cover.

1.3 The "clean" soil cover blocks potential linkages between the contaminated made ground and future site users. Soil cover is not required beneath areas of hardcover including buildings, private drives, carparking and roads.

1.4 If the made ground is essentially "clean", but contains materials generally considered undesirable as near-surface material in garden and landscaped areas (e.g. oversize materials such as construction/demolition rubble) then placement of cover is also required. In private gardens, in accordance with NHBC Standards Chapter 10.2, a 450mm thick soil cover should be adequate. In landscaped areas a 300mm thick soil cover should be adequate. For both gardens and landscaped areas if the made ground is essentially "clean" and comprises reworked natural soil, the only cover likely to be required is 100mm topsoil.

1.5 The **CML initiative** came into force in April 2003 and relates specifically to residential developments. It requires housebuilders to submit to NHBC (or other warranty providers) a validation report confirming the thickness and quality (i.e. contaminant-free) of the placed soil cover. Validation reports should normally be prepared by independent geoenvironmental consultants.

1.6 Failure to submit cover validation reports promptly will delay issue of the cover note by the warranty provider, which will subsequently delay the release of mortgage funds and hence legal completion; i.e. the financial implications are significant. Consequently, it is essential that cover validation is requested at least 2 weeks prior to the anticipated finalling date.

1.7 For all land uses soil cover is usually placed many weeks after completion of the preparatory/remediation works, and issue of the associated Verification Report, typically at a relatively late stage in the construction programme.

1.8 Prior to placement of soil cover, the appointed remediation contractor and/or groundworker should ensure that ground levels are low enough to accommodate the required cover thickness, taking account of any boundary issues, and, where relevant, without compromising the DPC and any sub-floor ventilation.

1.9 Ideally soil quality should initially be determined by sampling of the source (at least 7 working days before importation to the development site) to demonstrate suitability for use. Further sampling of the material at the site may also be required to demonstrate cross contamination did not occur during the importation process. Samples could also be obtained from stockpiles of site won material on site; there may comprise surplus natural ground development arisings. Soil samples could be obtained after placement of the cover layer, but this is not recommended.

1.10 Imported topsoil should be subject to testing, unless it is being sourced from a reputable commercial supplier able to provide robust certification (certificate date less than 2 months prior to import date). In addition, some analysis in accordance with BS3882 may occasionally be appropriate.

1.11 Where sampling of the source has been carried out, and on receipt of the laboratory results, Lithos will issue a confirmation of soil suitability for importation to the client, who will in turn instruct his contractor to commence importation.

1.12 Clearly, if soil cover is imported and placed before confirmation of its suitability, no guarantee can be given that validation work will yield the desired results. It may therefore be necessary to excavate and export the placed soil cover and/or import further "clean" soil.

1.13 It is likely that it will be necessary to stockpile imported soil cover material at the site. Where soils have been confirmed as suitable for use and temporarily stockpiled on site, stockpiles should be fenced-off and marked as containing certified topsoil/subsoil. The soil should be inspected prior to placement to confirm that it is the same material as previously tested, and that it has not been cross-contaminated with miscellaneous arisings generated during the construction works. Where material has been stockpiled on site for an extensive period of time further sampling may be required at the development site to demonstrate cross contamination has not taken place.

1.14 Soil **thickness** can only be checked after placement; this should be done before turfing / landscaping, but ideally after scaffolding has been dismantled.

1.15 *Sampling Frequency (to check Soil Quality):* The number of samples tested will be dependent on the nature of the source, and the quantity of material to be imported. However, in accordance with current YALPAG (Yorkshire & Lincolnshire Pollution Advisory Group) guidance[1], the testing frequency should be as follows:

Nature of source	Number of samples (from any single source material)	
	Up to 500m³	Per additional 500m³
Greenfield	At least 3#	1*
Brownfield	At least 6#	1*
Crushed product	At least 3	1*

* To be agreed with the relevant Local Authority

\# But could be up to 10 samples (if 500m³), depending on the Local Authority area within which the site is located.

1.16 On a typical residential development where gardens comprise a total area of 100m² (front and rear), and a soil cover thickness of 600mm including 100mm topsoil, for a brownfield source this testing frequency equates to approximately one topsoil sample per ten plots and one subsoil sample per two plots. Given the requirement to test a minimum number of samples from any one source, the testing frequency effectively increases for sites with only a small number of plots.

[1] *Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners & Consultants; Version 4.1, June 2021.*

1.17 **Inspection Frequency (to check soil thickness):** The number of inspection pits excavated to check cover thickness (and collect samples, if required) should be dependent on the end use of the development.

1.18 For **residential developments** the number of plots associated with a given site will dictate the number of inspection pits. The following frequencies are recommended for residential plots.

No. plots within development	Frequency of inspection pits	Remarks
1 to 5	1 pit per plot	e.g. for 3 plots, dig 3 inspection pits
6 to 20	1 pit per 2 plots	e.g. for 9 plots, dig 5 inspection pits
21 to 30	1 pit per 3 plots	e.g. for 23 plots, dig 8 inspection pits
≥ 30	1 pit per 4 plots	e.g. for 39 plots, dig 10 inspection pits

1.19 For **areas of landscaping**, regardless of development type, a minimum of 3 pits per area of soft landscaping are recommended where the landscaped area is greater than 25m^2. In individual landscaped areas smaller than 25m^2 inspection pits are not required.

1.20 Photographs should be taken of each inspection pit to show:

- The thickness of cover material present
- The presence of any geotextile marker or granular hard-dig layer (if required)
- The position of each inspection pit in relation to the plot/area of landscaping

1.21 **Soil Material Suitability**: Inspection pits should be excavated through the entire thickness of any proposed in-situ source material, or cover material (if inspection is post-placement). Stockpiles should be assessed from both the surface and by digging into the "core", to ensure the material is reasonably homogenous.

1.22 The soil material should comply with the following requirements:

- Be clean and free of foreign debris, building waste materials, glass sharps, and contaminants
- Topsoil should not have a gravel content of greater than 30% by dry weight and should generally have a maximum stone size of 50mm in any one direction
- Subsoil should generally have a maximum stone size of 75mm in any one direction
- Not have been sourced from an area within 7m laterally, or 3m vertically, of Japanese Knotweed plants, and not contain any Japanese Knotweed fragments (rhizomes, leaves, stems etc)

1.23 **Laboratory Analysis:** Whether samples are taken at source, from stockpiles on site, or from gardens and landscaped areas after placement, they should be forwarded to an analytical laboratory for testing in accordance with one of the Schedules detailed in Table 1 overleaf.

1.24 Additional determinands may be scheduled dependent on the history of the source site, although if this is considered necessary it may suggest the material is unlikely to be suitable for use as clean cover.

Table 1 – Test schedule

Source	Test schedule
Greenfield & Manufactured topsoil	pH, total metals (Cu, Ni, Zn, Cr III, Cr VI, As, Hg, Se, Cd & Pb), water soluble boron. TOC & speciated PAH Asbestos ID
Brownfield & Soil transfer stations	pH, total metals (Cu, Ni, Zn, Cr III, Cr VI, As, Hg, Se, Cd & Pb), water soluble boron. TOC, Speciated PAH & banded TPH* Asbestos ID
Crushed product	pH, total metals (Cu, Ni, Zn, Cr III, Cr VI, As, Hg, Se, Cd & Pb), water soluble boron. TOC & Speciated PAH Asbestos ID

Note: The schedules detailed above have been prepared in accordance with the Secondary Model Procedures and Land Contamination Risk Management, 2020. This document states that analysis should be relevant to potential sources and not merely a set list of parameters applied to each site.

* The YALPAG guidance recommends speciated TPH (TPH CWG) analysis for brownfield sources, but this should not be necessary unless the banded TPH analysis fails the assessment criteria detailed in Table 2 below.

Where crushed product is used at least 600mm below finished garden level, only asbestos analysis will be required.

1.25 Chemical assessment (Tier 1) criteria for imported soils are provided in Table 2, these reflect exposure and toxicological amendments proposed within the C4SL report. Where no C4SL value has been published generic assessment criteria have been derived based on the C4SL assumptions using the CLEA model (version 1.701).

Table 2 - Chemical assessment criteria for imported soils

Contaminant	Source	Tier 1 assessment criteria (mg/kg)	Comments/notes
pH	CLEA		
As	C4SL	37	
Cd	C4SL	26	
Cr (III)	CLEA	4000	
Cr (VI)	C4SL	21	
Pb	C4SL	200	
Ni	CLEA	109	Assessment of human health risk only.
Se	CLEA	434	
Hg	CLEA	199	Assumes mercury present as an inorganic compound (cf elemental metal or within organic compound). See Science Report SC050021/Mercury SGV.
Vn	CLEA	584	
B	Lithos	5	Based on phytotoxic risks as plants are the more sensitive receptor (Cu is pH dependent).
Cu	DoE	100	
Zn	DoE	200	
Benzo(a)pyrene	C4SL	5	
Naphthalene	CLEA	6	
GRO	CLEA	22	Conservative value based on value for aromatic fraction C7 to C8 range, but assuming indoor inhalation pathway still relevant (it shouldn't be).
DRO	CLEA	215	Conservative value based on value for aliphatic fraction C10 to C12 range, but assuming indoor inhalation pathway still relevant (it shouldn't be).
LRO	CLEA	1,000	Calculated value above hazardous waste screen in WM3, therefore 1,000mg/kg adopted. This may be reviewed on a site specific basis depending on the source and nature of transfer.

2 VALIDATION REPORTS

2.1 The analytical testing will usually be undertaken on a 3 or 5-day turnaround and the Client/Contractor will be notified of the soil's suitability (or otherwise) immediately after receipt of the results.

2.2 Interim plot validation certificates for residential plots should be issued to warranty providers on a plot by plot (or block by block) basis as development proceeds. Once the full development has been completed these should be pulled together into a final verification report, for submission to the Local Authority to satisfy planning conditions.

2.3 Interim validation certificates will be issued by Lithos for each landscaped area or set of landscaped areas once completed. After Lithos have been able to confirm placement of agreed thicknesses of suitable soil cover in all landscaped areas across the site, and where required to satisfy a Local Authority planning condition, we will prepare and submit a final validation letter report.