QTS Project Wind

Waste Recovery Plan

QTS

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Contents

Figures

Tables

1.0

Introduction

1.0 Introduction

1.1 The Site

QTS Data Centres (QTS, the Client) is proposing to construct a new data centre campus on the site of the former coal-stock yards which serviced Blyth Power Station until the early 1990's. The site consists of a parcel of land which is approximately 102 Ha in size and is located 3km north of Blyth town centre in Cambois, Northumberland. The approximate centre of the site is National Grid Reference (NGR) NZ 29820 84164.

This report will relate to the area of the site as shown in red in the Figure below – 'The Site'. The wider application site boundary is presented in blue.

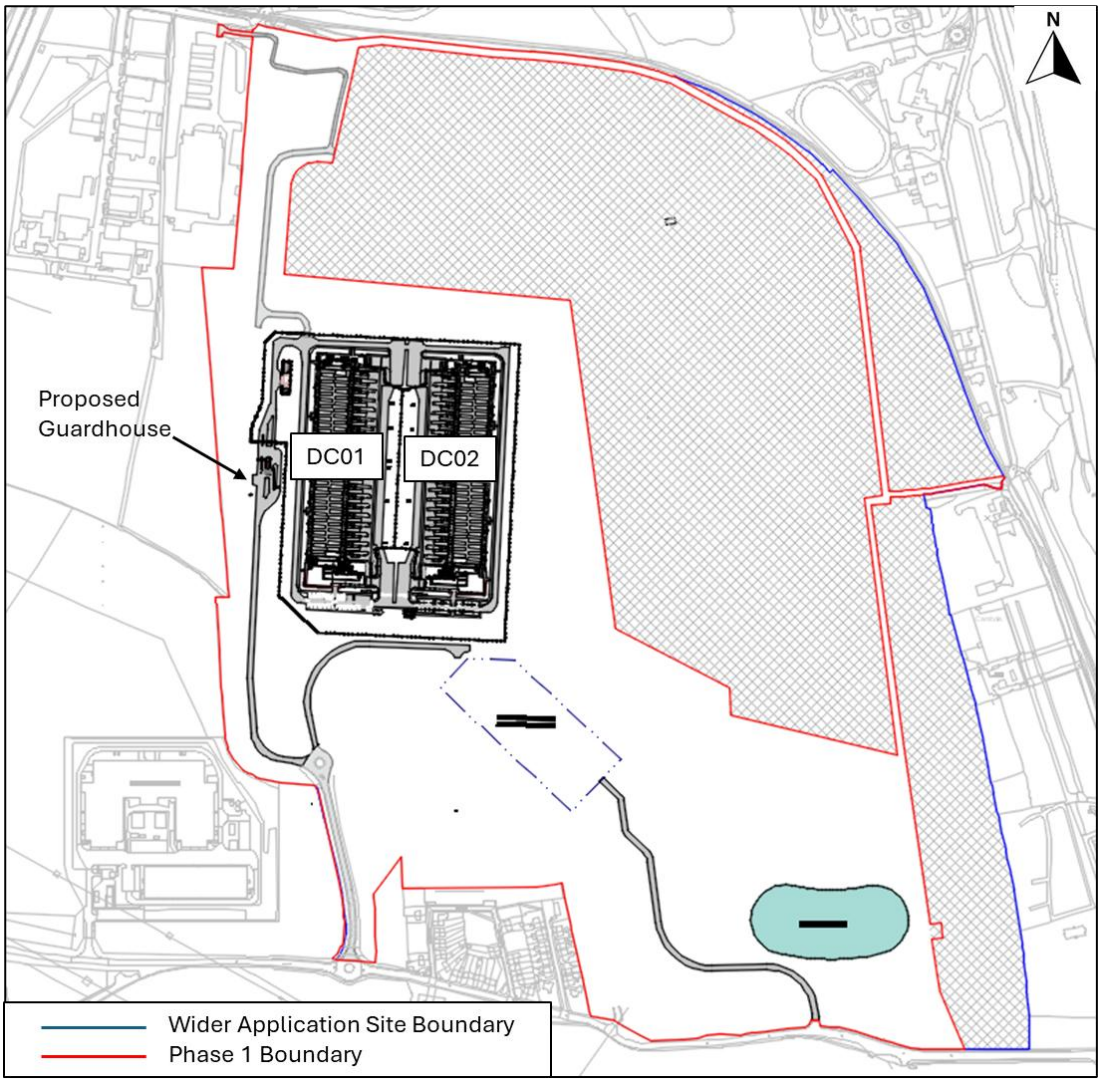

Figure 1-1: Site Layout (Red Line Boundary)

1.2 The Scheme

Development of the site will commence following completion of a phase of enabling works (refer to Section 1.4, Reference 3). Development will include the construction of Data Centre Building 1 (DC01), Data Centre Building 2 (DC02) and the guardhouse as well as below ground infrastructure.

1.3 Objectives

Cundall was commissioned by the Client to prepare a Waste Recovery Plan for the proposed development to support a deposit for recovery permit for the Burnt Shale material (also known as Red Shale) present on the Site. “Recovery of waste” is defined as any operation the principal result of which, is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function. This report aims to demonstrate that the reuse of the Burnt Shale material is a recovery activity and will outline the controls that will be in place to minimise risk to the Environment and Human Health to levels that are acceptable and suitable for the site.

Other Made Ground materials on site are considered to be low risk and are intending to be reused under the Definition of Waste Code of Practice (DoW COP) managed by CL:AIRE.

1.4 Sources of Information

The following sources of information have been used in the preparation of this report, including references therein:

1. Cundall (14 August 2025) Detailed Remediation Strategy Report reference GBR1-RMAP1-CDL-STE-XX-RP-0003.
2. Cundall (06 June 2025) Earthworks Specification. Report reference GBR1-ENA1-XXX-UG-SP-B-00-01
3. Cundall (23 May 2025) Remediation and Earthworks Strategy. Report reference GBR1-DCZZ-XXX-UG-RP-B-00-11
4. Cundall (23 May 2025) Ground Conditions Summary Report. Report reference GBR1-DCZZ-XXX-UG-RP-B-00-01
5. Arcadis (January 2025). Cambois Data Centre Campus Ground Investigation Report. Report reference: 30226657-AUK-XX-XX-RP-ZZ-0017-01 Rev 01.
6. Arcadis (January 2025) Ground Investigation Factual Report – Stage 1 Project Wind, Blyth. Report reference: 30226657-AUK-XX-XX-RP-ZZ-0015-01 Rev 03.
7. Arcadis (January 2025) Ground Investigation Factual Report – Stage 2 Project Wind, Blyth. Report reference: 30226657-AUK-XX-XX-RP-ZZ-0015-01 Rev 03.
8. Arcadis (November 2024) Cambois Data Centre Campus - Phase 2 Geoenvironmental Assessment. Report reference: 30226657-AUK-XX-XX-RP-ZZ-00112-01 Rev 01
9. Arcadis (October 2024). Coal Mining Risk Assessment– Project Wind, Blyth. Report reference: 30226657-AUK-XX-XX-RP-ZZ-0010-01 Rev 01
10. Arcadis (October 2024). Phase 1B Geoenvironmental Desk Study – Project Wind, Blyth. Report reference: 30226657-AUK-XX-XX-RP-ZZ-0006-01 Rev 01.
11. Rolton Group Limited (4th April 2024). Gas and Groundwater Monitoring Summary Report – Project Wind. Report reference: 210114-RGL-XX-XX-RP-G-0002 Rev S2-P01.
12. Rolton Group Limited (11th August 2022). Burnt Shale Trial Pit Investigations for Former Coal Stocking Yards, Cambois. Report reference: PHX-RGL-XX-XX-RP-G-000014A Rev S2-P03.
13. Rolton Group Limited (1st April 2022). Phase 1 & Preliminary Geo-Environmental Summary for Rail Head Land, Cambois. Report reference: PHX-RGL-XX-XX-RP-G-000014 Rev S2-P02.
14. Rolton Group Limited (14th May 2021). Geotechnical and Geo-Environmental Report for Former Coal Stocking Yards, Cambois. Report reference: PHX-RGL-XX-XX-RP-G-000010 Rev S2-P01.
15. Rolton Group Limited (7th April 2021). Phase 1 Geo-environmental Desk Study for Former Coal Stocking Yards, Cambois. Report reference: PHX-RGL-XX-XX-RP-G-000005 Rev S2-P05.
16. Rolton Group Limited (18th February 2021). Coal Mining Risk Assessment for Former Coal Stocking Yards, Cambois. Report reference: PHX-RGL-XX-XX-RP-G-000008 Rev S2-P04.
17. British Geological Survey (1990). Sheet NZ 28 SE. 1:10,560 Scale Solid and Drift Geology Map.
18. British Geological Survey (1990). Sheet NZ 38 SW. 1:10,560 Scale Solid and Drift Geology Map.
19. British Geological Survey (1975). Sheet 15 – Tynemouth. 1:63,650/1:50,000 Scale Solid Geology Map.
20. British Geological Survey (1975). Sheet 15 – Tynemouth. 1:63,650/1:50,000 Scale Drift Geology Map.

1.5 Limitations

The findings and opinions conveyed in this report are based on development proposals obtained from the client and the sources detailed within Section 1.4, which Cundall believes are reliable. The information contained in this report is to the best of our knowledge accurate at the date of issue. If new information becomes known pertaining to the site, Cundall reserves the right to review the information and revise the report. Should the standards, legislation, guidance, and best practice used in the production of this report be amended, updated, or withdrawn then the findings and recommendations of this report may be affected.

Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative, and liability cannot be accepted for its accuracy. There may be exceptional ground conditions elsewhere on the site which have not been recorded by previous ground investigation, and which have therefore not been considered.

2.0

Site Setting and History

2.0 Site Setting and History

2.1 Site Details

The geological and geoenvironmental setting of The Site extents have been determined based on the information contained within the references listed in Section 1.4 of this report. Where reference is made to other information sources, the source used is stated in the text.

Site Area and Shape	The Site is irregular in shape and occupies an area of 55 Ha.
Site Boundaries and Adjacent Land Use	▪ **North:** The far northern boundary is formed by the historic Cambois Branch railway line which trends from west-east along the northern boundary. The River Wansbeck Estuary is situated around 1km north of the site with land in between mostly undeveloped. The remainder of the development site (within the ownership boundary) borders the rest of the Phase 1 Enabling Boundary. ▪ **South:** The southern boundary is formed by mature trees (west) and Brock Lane (east) which separates the site from the former Blyth Power Station (now demolished). The River Blyth estuary is situated approximately 400m south of the site. The former Blyth Power Station (currently under redevelopment) and the National Grid Blyth substation occupies the land separating the site from the River Blyth. ▪ **East:** The eastern boundary extends partially through the wider site (as shown on Figure 1 2) separating the enabling works area from the wider site. East of the boundary are large stockpiles of pulverised fuel ash which rise to around 23m AOD from approximately 8m AOD. Beyond the eastern site ownership boundary, land is occupied by developments associated with Cambois town including residential and commercial developments along with Cambois Primary School. Beyond this is the North Sea. ▪ **West:** Land immediately west of the site is occupied by industrial development in the north, mature trees and undeveloped land in the south with the North Sea Link UK Converter Station beyond the southwest boundary. The A189 is situated approximately 500m west of the site.
Site Topography	Site levels grade from approximately 10.5m AOD in the northwest to around 4m AOD in the southeast. Localised level changes occur across the site associated with previous developments and the early stages of enabling works which were carried out in recent years by others. There are also a number of stockpiles across the site consisting of various materials; concrete, general made ground and pulverised fuel ash (PFA). The stockpile of PFA straddling the northern boundary is significant in size and rises up to approximately 15m AOD from approximately 10.5m AOD.
Existing Land Uses and Features	The Site is currently disused. The site features significant areas of asphalt and concrete hardstanding, relic foundations and informal roads (consisting of asphalt and gravel surfacing) associated with its former use as a coal stockyard. A network of concrete lined drainage channels (approximately 1m deep) is present around the hardstanding surfaces Overhead power cables are present in the south, trending south east to north west and then head directly north along the western boundary. A large site cabin / compound is present in the central southern part of the site.
Recent Site Developments	Enabling works have been undertaken on the site as recently as 2023, although the full extent of these works is not known as no verification reporting is available. The previous developer (British Volt) responsible for enabling the site previously entered administration in January 2023 and works ceased immediately. Based on the sudden demobilisation, the earthworks are unlikely to have been complete in accordance with the proposed development plans and material movement and handling around the site has not been fully captured within the information available.

Table 2-1: Site Details

2.2 Site History

Based on historical mapping and aerial imagery, key development dates and changes are recorded in Table 2-2.

Year	Site Activity
1865	The site is used as agricultural land.
1924	A football pitch, pavilion, and embankment have been constructed on the site.
1940	Railway line and sidings have been constructed in the north and east of the site. Other areas of the site are recorded to be used as allotments and welfare grounds.
1966	The site has been developed for use as a coal storage pad for the Blyth Power Station. A mineral railway with sidings has been developed through the centre of the site, and infrastructure including pylons, floodlighting, conveyors, reservoirs, and other ancillary buildings are recorded.
1992	Mapping from shows much of the site infrastructure to have been demolished. Two large mounds of PFA material have been deposited in the eastern site area.
2021	Aerial imagery shows evidence of surface scarring, likely associated with ground investigation and earthworks, as well as the construction of working platforms and haul roads. It is understood that this was in relation to works completed for a previously proposed development scheme.

Table 2-2: Key dates from historical mapping review

2.3 Mining Legacy

The entire site (as indicated by the boundary on Figure 1-1) is located within a coal mining reporting area with a portion of the site (north-west corner) falling in a high risk development zone, as defined by the Mining Remediation Authority (MRA - formerly the Coal Authority). Coal Mining Risk Assessment Reports have been produced by both Rolton (Reference 16) and Arcadis (Reference 9). The following key observations and conclusions have been noted.

- Six coal seams are recorded beneath the site between 104 and 218m in depth. These are considered too deep to impact the proposed development and have not been considered further.
- Potential shallow mine workings were identified by the MRA in the northwestern portion of the site associated with the outcropping Charlaw / Moorland seam, this has been designated by MRA as a High-Risk Development Zone.
- None of the intrusive investigations, including one undertaken specifically to identify mine workings within the High-Risk Development Zone, recorded evidence of shallow mine workings or mining related voids.
- Intact coal seams were recorded within 100m of the surface.
- There is no evidence of mine entries, opencast mines, coal authority managed tips or spine roads on or within 100m of the site boundary.
- There is no Coal Authority record of a damage notice, claim, court orders, active stop notice or request for preventative works on or within 50m of the site boundary that may indicate subsidence issues.
- There is no record of mine gas emissions or mine water treatment schemes within 500m of the site boundary.
- There is no record of future underground mining intents or coal mining licences within 200m of the site.

Notably the site was never recorded to be a colliery, it is anticipated that the Burnt Shale material was imported to site as a general fill material during the construction of the coal stocking yard.

2.4 Published Geological Information

The British Geological Survey (BGS) 1:10,000 scale and 1:50,000 scale geological maps of the area (References 17 to 20, Section 1.4) have been reviewed and indicates the wider site is underlain by the following sequence.

- **Superficial Geology:** The entire site is underlain by Till deposits to an anticipated depth of around 30mbgl (-25m AOD).

- **Solid Geology**: The West Sleekburn Dyke is recorded beneath the site, extending across the northern portion trending northwest to southeast. In addition:
  - The dyke is recorded as present within the Yard and Plessey seam as shown on the BGS 1:10,560 scale map (Reference 18).
- **Solid Geology:** Pennine Middle Coal Measures which are indicated as being interbedded sandstone, mudstone and siltstone in the northeast corner of the site and as sandstone across the rest of the site.
  - The Rolton report notes that the Moorland seam was encountered at 44.05mbgl, which (according to the stratigraphic column on the BGS map) is younger than the Yard and Plessey seam.
  - Based on the depth at which the Moorland seam was found, the Yard and Plessey is estimated to be around 150m beneath the site.

Although not shown on the BGS mapping, Made Ground covers the majority of the site and Alluvial deposits are anticipated to be present across the original channels of the Maw Burn and Cow Gut watercourses.

2.5 Ground Conditions

Numerous intrusive ground investigations have been carried out at the site. Rolton undertook a series of investigations between 2021 and 2024 to support a different development scheme being brought forward by British Volt. Selected enabling works including excavation and movement of material were undertaken by British Volt following the Rolton ground investigations, although the exact detail of these are not known as the scheme failed to complete and no verification records are available.

Arcadis then undertook a series of intrusive ground investigations in 2024 and 2025 for the current scheme proposals. Shallow ground conditions recorded by Arcadis therefore vary slightly to what was recorded by Rolton as a result of this. Exploratory hole locations are shown on the 'Combined Exploratory Hole Location Plan' drawing (reference: GBR1-DCZZ-XXX-UG-DR-B-01-01).

The following ground conditions were recorded in the Cundall Ground Conditions report (Reference 4) and are summarised below.

2.5.1 Artificial Deposits

2.5.1.1 Made Ground

Made Ground was encountered across the entirety of the site and has been characterised into a variety of subcategories based on its visual appearance and BS 5930 description. These categories are outlined below.

- **Topsoil** - Present in southern and western parts of the site only to an average thickness of 0.3m bgl. Descriptions were given as dark brown slightly gravelly clayey sand or soft dark brown slightly sandy slightly gravelly silt with many fine rootlets. Occasional fragments of brick, concrete, clinker, tile, glass and ceramics were recorded.
- **Asphalt** - Encountered in the northern part of the site at surface and also buried below ground (associated with historical development of the site).
- **Concrete** - Encountered generally near existing site roads, the location of the former workshop and accommodation and around the former lagoons. The average thickness of concrete across the site was around 0.3m, where exploratory holes proved the base. Concrete drainage channels are also present throughout the site
- **Railway Ballast -** Encountered in discrete locations across the Site, particularly through a linear section of the southeast corner of the site, corresponding to the former railway line which once extended through the central part of the wider site (trending north to south). The material is described as compact to moderately compact very dark grey / black sandy gravel. Gravel is medium to coarse sub-angular basalt and granite. An average thickness of 0.5m was encountered with a maximum of around 0.75m.
- **Organic Made Ground -** Encountered across the site but is particularly concentrated where the historical railway lines once ran (through the central southern portion of the site) and around the Cow Gut and further unnamed historical watercourses. Thicknesses of Organic Made Ground are typically between 0.3m and 0.5m, extending to a

maximum thickness of 4.4m thick (BH25) in the area where an unnamed historical watercourse used to be present (now culverted). The material is generally described as a soft to firm dark brown slightly sandy slightly gravelly organic clay or as firm to stiff mottled dark grey gravelly clay with organic pockets.

- **Surface Cover Granular** – Encountered across the central southern section of the site and sometimes in discrete location across the northern section of the site. This material has been characterised by its dark grey/black colouring and descriptions of sandy gravel and slightly gravelly sand. Gravel is of fine to medium subangular coal fines, basalt, furnace bottom ash and clinker.
- **Pulverised Fuel Ash (PFA)** - Predominately located beneath asphalt surfacing across the northeast coal stocking yard and is typically 1m thick in this area. PFA is also recorded in the southeast corner of the site predominantly against the internal face of the concrete walls of the PFA settling lagoons where it is typically between 0.5m and 1m thick, although a maximum thickness of 1.6m was recorded. The material is also located within a mound which straddles the northern boundary of the enabling works site (with a proven thickness of 5.8m). Descriptions of PFA across the enabling works boundary area are variable but typically are given as either a light grey sandy silt or grey slightly gravelly silty fine to medium sand. High cobble contents of subangular limestone and solidified PFA were recorded in around 40% of the positions where PFA was found (likely owing to self-concretion of the material in situ).
- **Granular Subgrade** - Encountered beneath the asphalt surfacing typically across the coal stocking yards and beneath roads in the southeast to a maximum depth of 2.95mbgl. In general, granular subgrade has an average thickness of 0.75m. Descriptions were generally given as brown or grey (occasionally yellow) angular to subrounded fine to coarse gravel. Gravel is predominantly of dolerite, sandstone, limestone and mudstone but occasionally of burnt shale, basalt and granite.
- **Reworked Clay** - Widespread across the site having been encountered in just over half of the exploratory hole locations (257 out of 391). This material was found between ground level and 4.8m bgl (beneath a road in the southeast). Reworked clay was encountered to an average depth of around 2m bgl. This material was generally described as soft to stiff brown mottled grey sandy gravelly clay with occasional cobbles and dark grey staining. Gravel is medium to coarse of subangular to subrounded sandstone, siltstone, burnt shale, coal fines and occasional clinker. Anthropogenic materials of brick burnt shale, ceramic, wood, and plastic were also encountered within around a third of the locations. In general, reworked clay was present beneath or intermixed with granular general made ground or the other made ground units described above.
- **Granular General Made Ground** - Where Made Ground was recorded but could not be characterised as a unit above it has been described as granular general Made Ground. This material was typically granular in nature. Granular general made ground was recorded to an average depth of between 1m and 1.5mbgl. The maximum depth of granular general made ground was recorded as 4.5m bgl in the far north western corner of the enabling works site boundary. Descriptions are variable but include compact to moderately compact reddish grey sandy gravel with occasional cobbles, brick, ash and clinker. Bituminous material and slag were encountered in a number of locations, in around 15% of positions.

2.5.1.2 Burnt Shale

Burnt Shale was recorded in a number of positions across the vast majority of the site. Burnt Shale was recorded during all phases of investigations, but its extents were specifically investigated during the Rolton 'Burnt Shale' investigation. The approximate extents and thicknesses of Burnt Shale are shown on the Preliminary Earthworks Strategy - Approximate Volume of Burnt Shale drawing (Drawing number: GBR1-DCZZ-XXX-UG-DR-B-01-04 V03).

Descriptions of the material as provided by both Rolton and Arcadis are diverse. All investigations were carried out in accordance with BS5930 and as such the proportion of Burnt Shale in a given stratum was not required to be quantified in the material description.

Rolton note the material as red / orange in colour and primarily encountered as sandy gravel with frequent cobbles of burnt shale. It was occasionally locally interbedded with general made ground and has likely been present on site for some time and is significantly weathered.

Arcadis encountered the material in just over 20 positions and described it as a reddish brown gravel or sand where gravel is of burnt shale featuring other constituents (such as mudstone, concrete and sandstone). Notably Arcadis only classified the material as “Burnt Shale” where material was considered to comprise >50% visually Burnt Shale material.

Cundall’s assessment of Burnt Shale has assumed that the classification of strata provided by others (Arcadis and Rolton) are reasonable, however, where Cundall have noted strata to have descriptions consistent with ‘Burnt Shale’ materials, these have been included within Burnt Shale dataset. The material classified as Burnt Shale for the purposes of this report are therefore likely to represent the maximum volume of material to be classified as such. The classification of this material for the proposed works will be any strata where Burnt Shale is considered to comprise >50% on a visual basis.

2.5.2 Superficial Deposits

2.5.2.1 Alluvium

Alluvium was identified in small clusters of positions which partially aligned to the historical channels of the Cow Gut and unnamed watercourse. However, Alluvial deposits did not follow the entire channel of the historical watercourses and is not considered to be present as a continuous layer across where the historical channels were located. Where Alluvium is present on site it is typically described as a soft to firm greenish brown / dark grey slightly sandy slightly gravelly clay. Gravel is fine to coarse subangular to subrounded of coal, siltstone, mudstone, sandstone and coal fines. Occasional pockets of organic inclusions and an organic odour were also recorded.

2.5.2.2 Till

Till is typically present across the site from ground level and approximately 2.5mbgl (depth to top). The depth to the top of the stratum is greatest in the central section of the site, associated with the historic channel of the unnamed watercourse becoming slightly deeper in the central section of the site (beneath the areas of asphalt surfacing). Till is logged as a clay in almost all exploratory holes. Descriptions are generally consistent across the site as firm to stiff, becoming very stiff with depth, dark greyish brown slightly sandy slightly gravelly clay. Gravel is angular to subrounded fine to coarse of various lithologies. Log descriptions for the upper 5m of Till are indicative of a slight weathered profile with the material being recorded as a firm mottled light grey / blue sandy slightly gravelly clay.

Granular layers were recorded in a limited number of positions (around 9 locations). These were recorded as lenses and are not considered to be a continuous layer. Descriptions were given as dense to medium dense sand and gravel. Gravel is of sandstone, siltstone and limestone. The thickness of Till is generally between 20m and 30m where the full thickness is proven.

2.5.3 Bedrock

Solid geology at the site has been considered for the site as a whole and not just for the Phase 1 boundary.

2.5.3.1 Pennine Middle Coal Measures

Solid geology at the site is the Pennine Middle Coal Measures which features interlayered bands of extremely weak to moderately strong mudstone and siltstone and moderately strong sandstone. Rockhead was encountered from -13.6m to -27.6m AOD. Bands of coal were encountered at varying depths (from -18.91m and -85.65m AOD) and were typically described as extremely weak and weak coal with pyrite present.

2.5.3.2 West Sleekburn Dyke

The West Sleekburn Dyke was not encountered during the ground investigation but is shown on the 1:10,000 geological map to pass beneath the northern part of the site trending northwest - southeast. The West Sleekburn Dyke is a mafic igneous intrusion with a top surface at a similar level to the Pennine Middle Coal Measures. It is reported to be around 15m wide under Section 4.2.3 of the Arcadis Desk Study report (Ref 3, Section 1.4).

2.6 Waste Classification & EWC Code

Preliminary Waste Classification of all materials encountered was undertaken by Arcadis as part of the GQRA submitted for the scheme (Reference 7). Fifteen samples of materials described as Burnt Shale were analysed using HazWasteOnline™ software to provide a preliminary classification. The majority of samples returned a non-hazardous classification, with only one sample being classified as Hazardous. The sample returning a Hazardous classification was from TP107 at 1.3m bgl, in a known hydrocarbon hotspot that will be removed as part of the enabling works, hazardous classification therefore is not due to the inherent properties of the Burnt Shale material.

Waste Acceptance Criteria (WAC) testing was undertaken on four samples of Burnt Shale material. One sample did not exceed the limits for inert soils and therefore has a likely classification of inert. Two Burnt Shale samples were recorded to exceed the inert limits (total organic carbon, leachable sulphate and leachable fluoride) and therefore have a non-hazardous classification. One sample from TP107, within the known hydrocarbon hot spot, was classified as Hazardous based on the hydrocarbon content only, WAC did not record concentrations above the non-hazardous threshold.

Although we recognise that the number of samples utilised in the preliminary waste assessment are low for the volume of Burnt Shale materials (equivalent to approximately 1 in 1,350m^3), additional testing to ensure chemical suitability of materials placed as part of the site works is mandated as part of the Remediation Strategy (Reference 3).

Based on the above the relevant waste code for the proposed waste to be recovered as part of the permit will be 17 05 04 (soils and stones not containing hazardous substances). Waste code 17 05 04 considered suitable for all potential forms of Burnt Shale proposed to be reused as defined in Section 2.5.1.2.

2.7 Hydrogeology

The superficial Glacial Till deposits are classified as a Secondary (undifferentiated) Aquifer and the Pennine Middle Coal Measures are classified as a Secondary A Aquifer by the Environment Agency. The site does not lie within 1km of a groundwater Source Protection Zone.

Groundwater monitoring was carried out during all phases of intrusive investigations with 85 installations in total with response zones present in Made Ground, Till, and Pennine Middle Coal Measures. Discontinuous water bodies were recorded in both the Made Ground and Till, and these are considered unlikely to plausibly support any potential abstraction. One laterally continuous groundwater body was found to be present in the Pennine Middle Coal Measures, confined by the overlying Till. The Pennine Middle Coal Measures (Secondary A Aquifer) is the only groundwater body identified that may be potentially sensitive to the placement of Burnt Shale materials.

2.8 Hydrology

Two named watercourses are present on site, Maw Burn in the north and Cow Gut in the south. Both of these watercourses have been culverted for most of their length across the site and flow from west to east, with Maw Burn entering in the north-western corner of the site, exiting along the eastern boundary and out falling into the Blyth Estuary. Cow Gut enters along the western site boundary, exits along the southern boundary and outfalls into the Blyth Estuary.

The routes of these watercourses were to be diverted as part of the previous British Volt scheme. The diversion of Maw Burn was completed with an open channel along the northern site boundary, connecting to an existing drainage channel around the eastern side of the northern PFA mound, before rejoining the original outfall from site. Where the surface water bodies are not culverted, there could be some contribution to baseflow from groundwater. Several open concrete lined drainage channels are present across the site and appear to drain into Maw Burn and Cow Gut.

Analysis of water samples from both the Maw Burn and Cow Gut were undertaken as part of the Arcadis ground investigation (Reference 8).) and some marginal exceedances of the Environmental Quality Standards (EQS) were recorded; however, surface water samples recorded higher concentrations upstream of the site than downstream, indicating that site soils are not currently impacting the water quality.

The Maw Burn and Cow Gut both then discharge into the Blyth Estuary. The Blyth Estuary is located approximately 300m south of the site and is part of the Northumberland Shore SSSI. Catchment area data does not exist under the

Environment Agency as the estuary is classed as tidal. No Environment Agency water quality data has been made available for review.

3.0

Development Proposals

3.0 Development Proposals

3.1 Planning Status

As discussed in Section 1.2, the scheme comprises multiple phases of development and the waste recovery plan has been prepared in relation to the Burnt Shale materials within the within Phase 1 of the development (Drawing number: GBR1-DCZZ-XXX-UG-DR-B-01-04 V03). The relevant planning permissions for the site with Northumberland County Council are outlined below.

- Outline planning application (24/04112/OUTES) relating to the entirety of the site, with all matters reserved, for the erection of up to ten data centre buildings of Class B8 use totalling up to 540,000m^2 gross internal area (GIA) in addition to ancillary structures, substation, emergency generators and other associated works. This planning application has a Permitted status, granted on 8 May 2025.
- Reserved matters application (25/01725/REM) for enabling works including site preparation, earthworks and other works required prior to the construction and operation of the data centre campus, pursuant to approved planning application 24/04112/OUTES. This planning application has a Permitted status, granted on 20 August 2025.
- Reserved matters application (25/02911/REM|) for access, layout, scale, appearance and landscaping, pursuant to outline planning permission 24/04112/OUTES, for two data centre buildings, including ancillary office space (Use Class B8), security gatehouse and associated landscaping and infrastructure on Phase 1 of the data centre campus. This planning application is awaiting decision.

3.2 Proposed Earthworks / Enabling Works

Based on the development proposals, the size of the site and the desire of the Client to develop the wider site in future phases, the principles of the earthworks vary over the Enabling Works. These are outlined and are taken from the relevant Remediation and Earthworks Strategy (Reference 3). The earthworks have been separated into five key development areas (Area A to Area F) based on the anticipated works, rather than the spatial distribution of ground conditions. Earthwork Zones are shown on Drawing GBR1-ENA1-STE-XX-DR-C-01-27 (Enabling Works – Phase A Existing Ground Level to Enabling Finished Ground Level) reproduced in Figure 3-1. Burnt Shale materials are only known to be present in Zone C (approximately 3,650m^3) and Zone D (approximately 13,140m^3) and the earthwork proposals for these areas are outlined below.

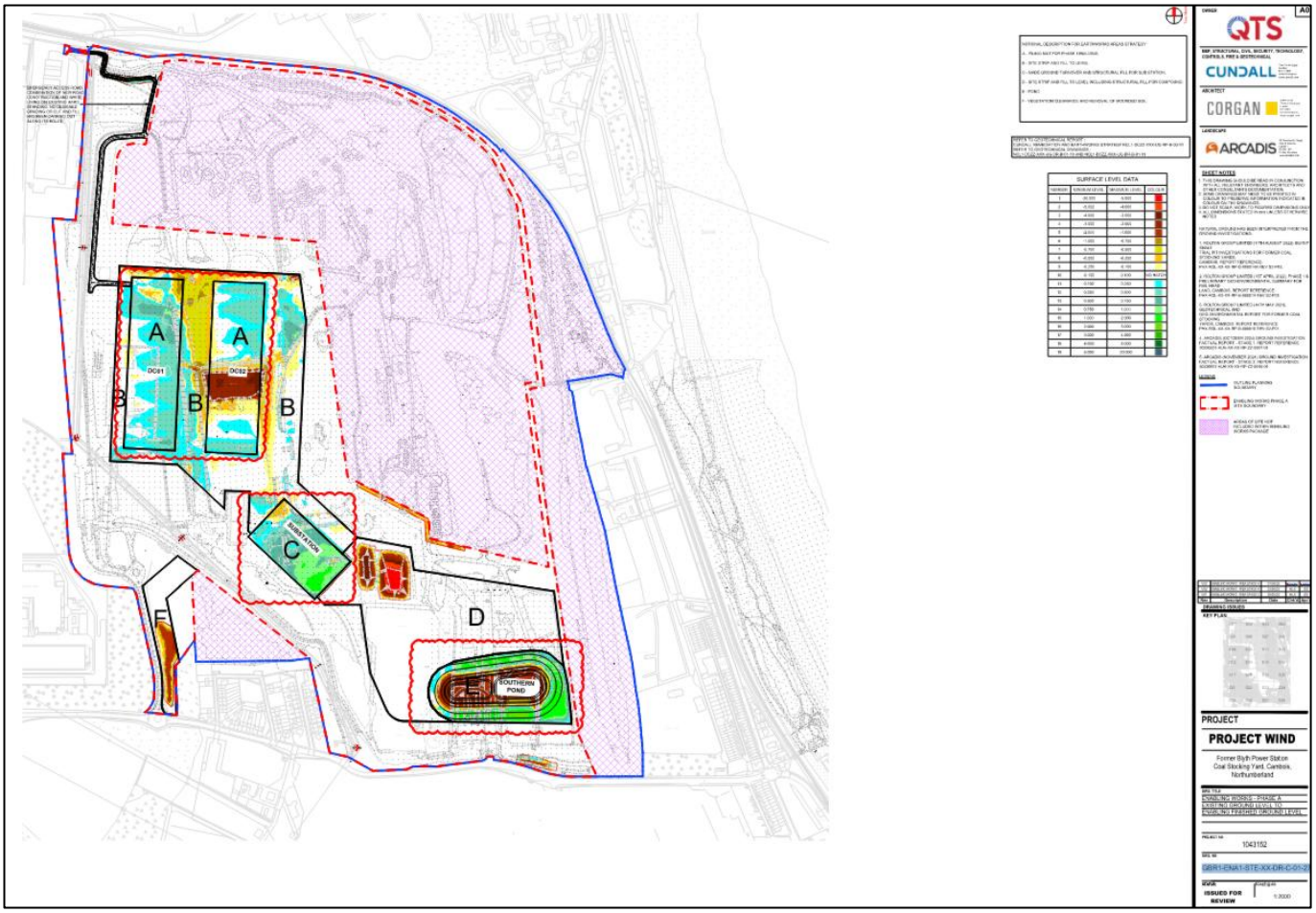

Figure 3-1- Drawing GBR1-ENA1-STE-XX-DR-C-01-27 (Enabling Works – Phase A Existing Ground Level to Enabling Finished Ground Level)

Zone C - Based on the anticipated foundation design of the substation requiring piles and the likely presence of obstructions and potentially hydrocarbon impacted soils, a full made ground turnover (site strip including excavation and replacement) will be undertaken to prove natural ground within Zone C.

Backfilling will comprise the placement of engineered general fill to 700mm below the enabling works finished ground level, followed by the placement of 700mm of engineered granular fill.

Obstructions are required to be removed in their entirety. Where previously unidentified piles are encountered that extend significantly beyond the base of excavation these are unlikely to be removed completely. In this scenario piles shall be cropped and broken out to an agreed depth (as defined in the earthworks specification) and any obstructions remaining in the ground shall be surveyed and their locations recorded. Backfilling will comprise placement of engineered granular fill to achieve the enabling works finished ground level.

Zone D - Earthworks are proposed to be minimised as no defined end use for building or development has been specified in this part of the site. Currently, Zone D comprises excess material from the prior British Volt scheme and rough / loose surfacing and vegetation. Vegetation clearance may be required at discrete locations and will be confirmed by the Client in advance of the earthworks. Bulk excavation will comprise the excavation and relocation of general fill from the north of Zone D and the breaking out and removal of below ground infrastructure.

The low area in the south of Zone D will be used as a temporary Materials Management Area for stockpiling materials that may require treatment / screening / processing prior to reuse on other phases of the scheme. Surplus engineered granular fill generated as part of the enabling works will also be stockpiled in a predetermined location in Zone D for reuse under an MMP in other areas of the site.

3.3 Suitability of Burnt Shale Materials

3.3.1 Introduction

As discussed in Section 2.6, chemical properties of the Burnt Shale mean it is a non-hazardous material (EWC 17 05 04) and were not identified by the Arcadis GQRA (Reference 7) to be of unsuitable chemical quality for reuse. This section aims to therefore outline the geotechnical suitability for reuse.

Cundall has prepared an earthworks specification for the enabling works area, which is intended to be covered by the Environmental Permit (Reference 1). The specification is based the Series 600 Specification for Highway Works (SHW), Standards for Highways and references the standards required for classification of material types on site. Appendix 6/1 outlines the requirements for acceptability and testing etc. of earthworks material and applies to all materials on site, including Burnt Shale materials. Appendix 6/1 from the earthworks specification (Reference 1) is reproduced as Appendix A and outlines acceptable material properties for each material class. Geotechnical properties of Burnt Shale material, as determined during the ground investigations, are presented in Sections 3.3.2 to 3.3.6.

3.3.2 Classification Testing (Natural Moisture Contents and Atterberg Limits)

Moisture content tests were carried out on 124 samples of Burnt Shale at depths of between 0.2m and 2.8mbgl across the Cambois Campus site. There is a general scatter of moisture testing results (a full graph of results is presented in Figure 3-2) but most of the moisture contents range from between 12% and 20%. Below 1.0m bgl, the moisture contents are typically more consistent and appear to become drier with depth and range from 10% to 15%. It is reasonable to consider a characteristic natural moisture content range of between 12% and 18%.

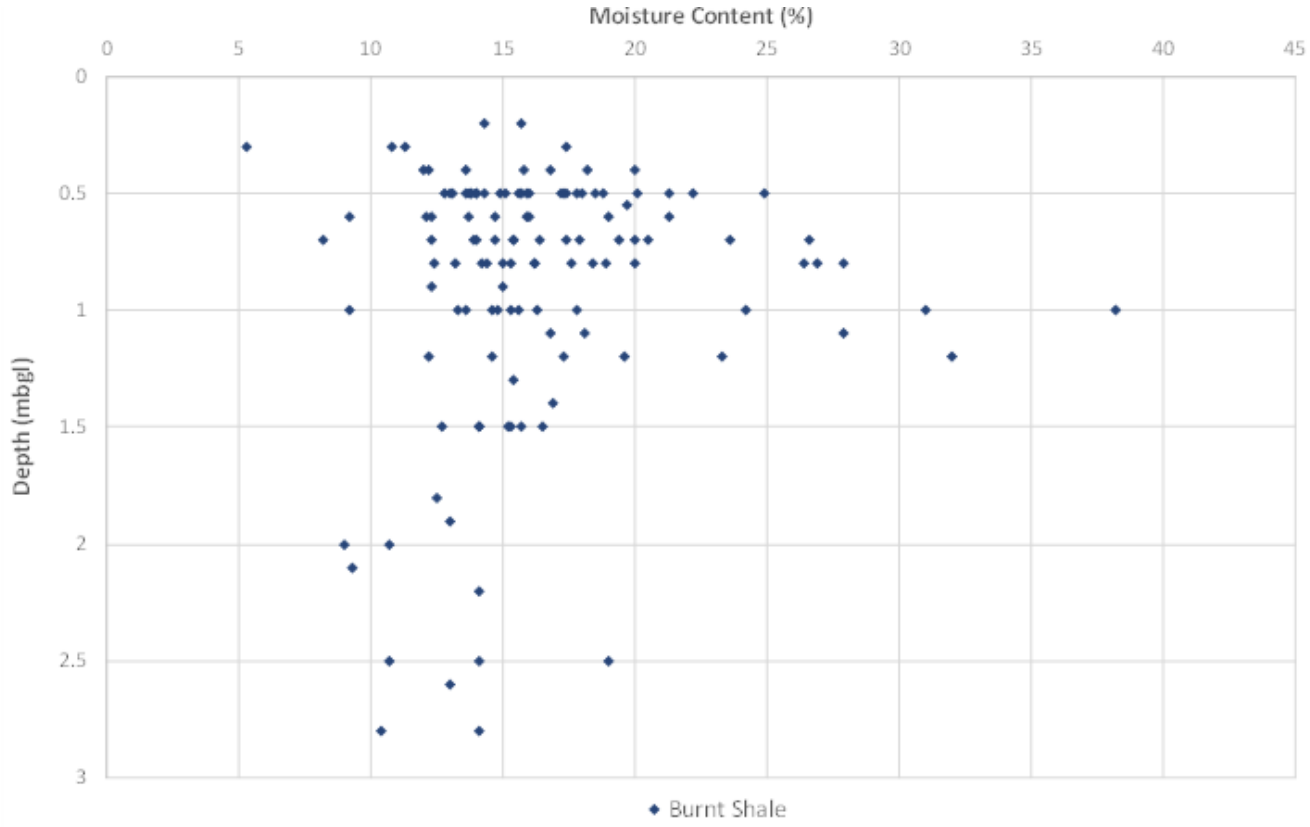

Figure 3-2 Moisture Content of Burnt Shale with Depth

Only twelve Atterberg limit tests were undertaken on the Burnt Shale and this is to be expected given the predominantly granular content of the material. Two of the samples recorded the material to be non-plastic. Although the Burnt Shale was predominantly described as granular, the results indicate a plastic limit of between 17% and 30%, liquid limits of between 38% and 61% and a plasticity index of between 18-35%. These are typically representative of an intermediate plasticity clay. Two results were recorded as 'high plasticity clay'.

3.3.3 Particle Size Distribution

PSDs were carried out on 132 samples of burnt shale at depths of 0.20m and 2.80mbgl. PSDs typically indicate that the burnt shale is predominantly a gravel but given the percentage of fines that is recorded in around 20% of the samples, this indicates that the burnt shale may have been subject to weathering or has been heavily disturbed during handling and has degraded to become more representative of a cohesive or sandy material. Of the 132 PSDs, 98 indicate grading curves similar to a Class 1A/1B, as per Series 600 SHW, with 28 samples grading curves representative of Class 2C material and six samples representative of a Class 2A/2B fill. No non-compliant samples were identified on the basis of grading results obtained from the ground investigation.

3.3.4 Compaction Tests

Seven compaction tests were carried out on samples of burnt shale at depths between 0.40m and 1.20mbgl. Four tests were carried out using a 2.5kg rammer and remaining three were carried out using a 4.5kg rammer.

Results of the 2.5kg tests indicate an optimum moisture content of between 14.8% and 24%. Maximum dry densities were recorded between 1.48 and 1.81mg/m^3 and the optimum moisture content ranged from 15% to 24%, with an average of around 19%.

Results of the 4.5kg tests indicate optimum moisture contents of 13% and 14%. Maximum dry densities were recorded between 1.86 and 1.94mg/m^3 and optimum moisture contents ranged from 13% to 14%.

A further sixteen tests are undertaken on an unnamed material within the Rolton Burnt Shale Ground Investigation and although no clarity is provided regarding the material, the report text does conclude that '*the compaction test results for granular made ground, including burnt shale, recorded maximum dry densities between 1.81 and 1.95Mg/m^3 and optimum water contents of between 9 and 15% comparable to the as received water content of the samples between 5.3% and 17%.'*

Based on the characteristic moisture content range and the range of optimum moisture contents, the bulk of the material is close to or only marginally wet of optimum moisture content and it is not anticipated to require substantial conditioning or processing.

Field compaction trails are required to be carried out as part of the earthworks specification on all material types. Although the location and dimension of the compaction trial is at the discretion of the contractor, the minimum requirements include for Burnt Shale to be spread and compacted in an area measuring at least 10m x 15m and comprising a minimum of 3 layers of fill; subsequent testing will include for density, stiffness and settlement testing.

3.3.5 Swelling

A total of 22 swell tests were undertaken during the different phases of ground investigation. 18 tests were undertaken during the Rolton Burnt Shale Ground Investigation and four were undertaken during Arcadis Ground Investigation.

Testing undertaken as part of Rolton ground investigation indicated a maximum swell of 3.85mm and an average of less than 1mm. The four tests undertaken as part of Arcadis ground investigation indicated swelling to be between 0mm and 1.3mm. Swelling potential of burnt shale is generally not considered to be an issue and therefore no earthworks testing for this has been specified.

3.3.6 California Bearing Ratio

Three CBR tests were undertaken during the Arcadis Ground Investigation and recorded CBR values ranging from 7.9% to 48%. The results appear to be higher than those anticipated from the material description, and it is reasonable to assume that a characteristic CBR value of 5% is achievable based on material descriptions.

3.3.7 Compliance with the Earthworks Specification

Based on the characteristics outlined in the preceding sections, the majority of samples of Burnt Shale obtained (a total of 132 samples) indicate gradings of material that is compliant with a Class 1A / Class 1B material as defined by Table

6/2 of the Specification for Highways Works (and referenced in Table 6/1 of the site's earthworks specification, Appendix A). 34 samples were representative of a Class 2 material (28 a Class 2C and six a Class 2A/2B) with a fines content between 15% and 80% (Class 2C) or 80% and 100% (Class 2A/2B). It should be noted that most of the Class 2 Burnt Shale material behaves as a granular material given the predominantly granular content of the material which, although compliant with the Class 2C (Stony Cohesive Material), it is likely to be unsuitable for undertaking remooulded undrained shear strength tests, therefore compliance with this aspect of the earthwork's specification will be determined in-situ following placement and compaction, if required, and following the companion trial.

No PSD results obtained from the Burnt Shale materials during the ground investigations indicate materials will be non-complaint with the grading requirements of these material classes.

Uniformity coefficients were not determined by the ground investigations; however, uniformity coefficients will only determine the materials use as a Class 1A or a Class 1B, both of which are required for the earthworks, to determine whether the fill is well graded, or uniformly graded. Uniformity coefficients are not applicable to Class 2C material. Based on our knowledge of this type of material, it argillaceous nature and observed behaviour it is likely that the movement and tracking of material will inherently, without additional effort, increase the uniformity. Burnt Shale typically self-cements, which could give rise to oversize fragments being encountered in situ during exploratory investigations, and these are also anticipated to be easily broken down without the requirement for additional treatment.

In addition to the above evidence that material will be compliant with the earthwork's specification, there is also a contractual obligation, as per the specification, for field compaction trials to be undertaken on all material types, inclusive of the Burnt Shale. During compaction trials and / or earthworks, if it is observed that oversize particles within the Burnt Shale do not break down as expected to become compliant with the relevant grading requirements, these will revert to a Class U1A (unsuitable material). This is not anticipated based on the data obtained during the previous ground investigations at the site but is a measure in place to ensure only suitable materials are recovered.

Moisture contents across the Phase A Enabling Works typically indicate that the material is between 12% and 18%. The results of the compaction tests indicate the optimum moisture content of the material ranges between 14.8% and 24% and these are typically wetter than the corresponding optimum moisture content (OMC) by between 2% and 9%. For Class 1A/B and 2C material the material should be ± 2% of OMC. It is likely that following excavation and tracking the material will be to be close to optimum moisture content and will not need significant conditioning. However, where localised wetter material is recorded, this will require conditioning via air drying, though given the granular nature of the material is anticipated that this would occur quickly following excavation.

Following the placement of Burnt Shale across the site and depending on its use (either below ground bearing / sensitive structures or in non sensitive / landscaped areas), the material will be subject to compliance testing to demonstrate its suitability. This will comprise either density testing (nuclear density and/or sand replacement tests) or settlement testing (plate load testing) and target limits of 97% density and less than 10mm settlement at a pressure of 250kN/m^2 will be required to be demonstrated to prove compliance.

On the basis of the above, Burnt Shale materials in their current condition are generally considered to be geotechnically suitable for reuse during earthworks. As described earlier in this Section, contingencies are in place for any unsuitable materials encountered.

4.0

Recovery of Waste Activities

4.0 Recovery of Waste Activities

4.1 Activities Proposed

This waste recovery permit is proposed to cover the excavation and reuse of Burnt Shale materials within the Phase 1 Site boundary. No treatment is considered likely to be required to the material in order to be suitable for reuse, as outlined in Section 3.3.7; however, detailed engineering plans will be later submitted in support of the permit. Other materials on site will be excavated and replaced under a Materials Management Plan in accordance with the Definition of Waste Code of Practice (DoWCoP) administered by CL:AIRE. As there will be two reuse regimes in place on site, detailed and auditable records will be kept for all material movements providing an auditable trail.

It is not acceptable for Burnt Shale materials to be used in any soil mixing operations and none of these are proposed as part the earthworks. For ease of regulation, it is also anticipated that Burnt Shale materials will be deposited in one continuous operation once the permit is granted, it is not suitable for Burnt Shale materials to be inter-layered with those placed under different regulatory regimes (i.e. materials placed under DoWCoP). Where Burnt Shale materials are placed above materials placed under DoWCoP it is not suitable to then additionally layer DoWCoP materials on top of Burnt Shale.

4.2 Substitution

As it is intended that these activities are carried out as deposit for recovery, it is a requirement to provide evidence that suitable funding is in place to carry out the scheme should a non-waste be required to be used. In line with Environment Agency guidance the following should be evidenced:

- the scheme falls within your area of responsibility or activity
- the scheme would result in a benefit that is proportionate to the scheme
- you have secured the funding you need to cover the cost of using non-waste, and any ongoing operating costs

4.2.1 Area of Responsibility or Activity

The site is owned, and the scheme is being developed, by Renaissance Land as a Special Project Vehicle on behalf of QTS. It is the responsibility of QTS, as site owners, to provide the relevant funding and ensure the correct activities are undertaken. Cundall and Arcadis have both been appointed by QTS to undertake design services relating to the site and MGL (Rainton Construction) have been appointed to undertake the enabling works.

4.2.2 Proportional Benefit

Reuse of Burnt Shale materials on site brings forward a number of sustainability and environmental benefits to the project. Minimisation of waste to landfill or appropriate treatment facility aligns with the UK governments overall Net Zero goals and the climate crisis declared by numerous local authorities and agencies (including Northumberland County Council and the Environment Agency). Reuse on site will prevent emissions associated with HGV movements, raw material extraction and import as well as conserving landfill capacity and reducing environmental impacts of waste disposal. On a scheme of this size and for the volume of Burnt Shale materials (approximately 17,000m^3) this aligns with a significant carbon reduction, in addition to local-scale air quality and transport infrastructure impacts.

4.2.3 Financial Gain from Using Non-wastes

There are no ongoing operating costs associated with the reuse of Burnt Shale material, contaminated land assessments to date have not recorded any exceptional risks from this material and overall controlled waters risks on site are considered to be Low (Reference 8).

The scheme has been priced on behalf of QTS by specialist cost consultants (Arcadis) and overall investment in the scheme across the Cambois Campus site is anticipated to close to £10 billion. The project budget includes a

£24.5million allowance to complete all remediation and earthworks within the Enabling Works area, this is approximately 20% of the budget allocated to the remediation of the entire campus site. Currently there is a contingency in the budget for both the removal of Burnt Shale materials (as non-hazardous classification) of £1.12million, and a further £650,000 allowance for the import of primary aggregate to ensure the site levels outlined in the planning application are achieved. These two items within the provisional contract sum for the appointed contractor are in addition to provisional sums for removal of unsuitable material, including material from known hydrocarbon hot spots that may be required as removal as Hazardous Wastes, and other materials that may be uncovered that are geotechnically unsuitable (and therefore will likely be disposed of as inert / non-hazardous).

Based on the chemical properties and preliminary waste classification of Burnt Shale materials outlined in Section 2.6, if not re-used on site Burnt Shale materials will likely be removed as inert or non-hazardous. Hazardous Burnt Shale materials are attributed to a known hydrocarbon hot spot and are not subject to the Burnt Shale provisional sum as part of the secured funding, as there is alternative contract sums allowed for the removal of known contamination hot spots and unforeseen hazardous materials. Based on an assumed market rate of £30 per m^3 for inert removal materials and £65 per m^3 for removal of non-hazardous materials, the potential costs for the removal of all 17,000m^3 of Burnt Shale materials (in Zones C & D) are presented in Table 4-1. All scenarios comprise total potential costs below the budgeted £1.12million providing evidence that this sum is sufficient.

Proportion Inert		Proportion Non-Hazardous		Total Potential Cost
%	Volume (m^3)	%	Volume (m^3)	
100	17,000	0	0	£ 510,000.00
80	13,600	20	3,400	£ 629,000.00
60	10,200	40	6,800	£ 748,000.00
50	8,500	50	8,500	£ 807,500.00
40	6,800	60	10,200	£ 867,000.00
20	3,400	80	13,600	£ 986,000.00
0	0	100	17,000	£1,105,000.00

Table 4-1 - Potential costs for the removal of Burnt Shale Materials

QTS have publicly declared that the investment in this project is c.£10billion across the 10-data centre site. The enabling works in this application will facilitate the first two data centres, a corresponding build budget cost of £2billion. The provisional sum for the use of non-waste materials is £1.12million which represents 0.056% of the overall investment in the scheme. Although data centres are costly investments, the yield on costs are typically up to 50% which is about1,000 times greater than the proportion of costs allocated to using a non-waste material. The use of waste materials present on site is driven by QTS's sustainability and environmental goals and will not impact the economic viability of the scheme. As the use of non-waste materials make up such a small proportion of the costs for the scheme and the profit margins are far above this, this is sufficient to indicate that the scheme will be making a financial gain if non-waste materials are required to be used.

Additional confidential information has been provided to the Environment Agency directly by QTS to support the case presented above. Agreement has been confirmed under separate cover.

4.3 Waste Acceptance Procedures

As outlined in the Earthworks Specification and Remediation Strategy for the site (Reference 1 and 3, respectively) all materials proposed to be reused on site will require testing and compliance with these documents. Non-compliant materials will most likely fall into a Class U1A material (geotechnically unsuitable), although some Burnt Shale materials that underly known contamination hot spots will more likely be Class U1B. As neither Class U1A or U1B materials are suitable for reuse on site these will not be recovered as part of the environmental permit and proof of their disposal and volume will be provided at permit surrender.

4.4 Suitably Qualified Persons undertaking assessments

As outlined in the EA guidance it is crucial that evidence of material suitability is provided and confirmed by a suitably qualified person. The work outlining the suitability criteria to be adhered to are members of the Cundall Ground

Engineering team. The Ground Engineering team are a specialist group of geoenvironmental and geotechnical engineers, many of whom hold chartered status and adhere to a strict code of practice. All deliverables go through a rigorous quality assurance process with multiple specialists to ensure their suitability and technical excellence.

4.5 Placement of Burnt Shale Materials

As Burnt Shale materials are geotechnically suitable for reuse as a Class 1A/B or Class 2C material and are chemically suitable for reuse on site they are suitable to be used anywhere required within the Red Line Boundary, this will be supported at application by the relevant Environmental Site Setting Design report and risk assessments, if required.

It is not acceptable for Burnt Shale materials to be used in any soil mixing operations and none of these are proposed as part the earthworks. For ease of regulation, it is also anticipated that Burnt Shale materials will be deposited in one continuous operation once the permit is granted, it is not suitable for Burnt Shale materials to be inter-layered with those placed under different regulatory regimes (i.e. materials placed under DoWCoP). Where Burnt Shale materials are placed above materials placed under DoWCoP it is not suitable to then additionally layer DoWCoP materials on top of Burnt Shale.

5.0

Conclusions

5.0 Conclusions

QTS Data Centres (QTS, the Client) is proposing to construct a new data centre campus on the site of the former coal-stock yards which serviced Blyth Power Station until the early 1990's. Cundall was commissioned by the QTS to prepare a Waste Recovery Plan for the proposed development to support a deposit for recovery permit for the Burnt Shale material (also known as Red Shale) present on the Site. "Recovery of waste" is defined as any operation the principal result of which, is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function.

Intrusive ground investigations have been carried out at the site by Rolton and Arcadis, both of whom have undertaken multiple phases of investigations. Made Ground was encountered across the entirety of the site and has been characterised into a variety of subcategories based on its visual appearance and BS 5930 description, notably the presence of Burnt Shale materials were recorded as part of this. Descriptions of the material as provided by both Rolton and Arcadis are diverse. All investigations were carried out in accordance with BS5930 and as such the proportion of Burnt Shale in a given stratum was not required to be quantified in the material description. Arcadis only classified the material as "Burnt Shale" where material was considered to comprise >50% visually Burnt Shale material. Made Ground is underlain locally by Alluvium overlying significant thicknesses of predominantly cohesive Glacial Till (20-30m thick). Bedrock at the site comprises Pennine Middle Coal Measures. Preliminary Waste Classification of Burnt Shale materials was undertaken by Arcadis. Burnt Shale materials recorded a mixture of inert and non-hazardous classification except in locations of known contamination hot spots.

The wider site has obtained outline planning for erection of up to ten data centre buildings of Class B8 use totalling up to 540,000m^2 gross internal area (GIA) in addition to ancillary structures, substation, emergency generators and other associated works. A further reserved matters application has been granted for the enabling works. Approximately 17, 000 m^3 of Burnt Shale materials are present within the enabling works boundary and the earthwork proposals comprise excavation and replacement of materials as engineering fill in these areas. No specific treatment is required for these materials to be reused.

The Deposit for Recovery permit is proposed to cover the excavation and replacement of Burnt Shale materials within the enabling works boundary. Other materials on site will be excavated and replaced under a Materials Management Plan in accordance with the Definition of Waste Code of Practice (DoWCoP) administered by CL:AIRE. As there will be two reuse regimes in place on site, detailed and auditable records will be kept for all material movements providing an easily verifiable trail.

Reuse of Burnt Shale materials on site brings forward a number of sustainability and environmental benefits to the project. Minimisation of waste to landfill or appropriate treatment facility aligns with the UK governments overall Net Zero goals and the climate crisis declared by numerous local authorities and agencies (including Northumberland County Council and the Environment Agency). Reuse on site will prevent excessive emissions associated with HGV movements, raw material extraction and import as well as conserving landfill capacity and reducing environmental impacts of waste disposal. On a scheme of this size and for the volume of Burnt Shale materials (approximately 17,000m^3) this aligns with a significant carbon reduction, in addition to local-scale air quality and transport infrastructure impacts.

There are no ongoing operating costs associated with the reuse of Burnt Shale material, contaminated land assessments to date have not recorded any exceptional risks from this material and overall controlled waters risks on site are considered to be Low (Reference 8). It is not acceptable for Burnt Shale materials to be used in any soil mixing operations and none of these are proposed as part the earthworks. For ease of regulation, it is also anticipated that Burnt Shale materials will be deposited in one continuous operation once the permit is granted and will not be interlayered with other materials.

Funding has been secured should the Burnt Shale not be allowed to be reused, this includes the assumption that all the material must be removed as non-hazardous even where preliminary classification indicates that some may be removed as inert. This evidences that the reuse of Burnt Shale materials constitutes a recovery rather than disposal activity and should be permitted as such.

Appendices

Appendices

Appendix A – Table 6/1 Reproduced from Cundall Earthworks Specification- Enabling Works (Reference GBR1-ENA1-XXX-UG-SP-B-00-01)

Appendix 6/1: Requirements for Acceptability and Testing, Etc. of Earthworks Material

General Requirements for Fill Materials

Material shall comply with Clause 601, 602, 603, 606, 608, 609, 610, 611, 612, 613, 631 to 636, 640, 644 and Table 6/1 of this Appendix as well as any additional requirements detailed within this Appendix.

Should the Contractor want to use any other fill materials than those presented within this Appendix, they shall obtain permission (and any additional specification or testing requirements) from the CA prior to importing or placing the proposed fill.

The Contractor shall be responsible for the management of all testing, assessment and use of all earthworks materials.

No material shall be placed within 500mm of cement containing materials that contain sulphates or oxidisable sulphides at a concentration that may adversely affect them, as per the guidance in TRL Report 447 'Sulfate Specification for Structural Backfills' (2005).

Proposed Fill Material

Proposed fill materials for the works are as follows:

Class 1 Granular Fill (Class 1A or Class 1B) – Site won or imported for use as engineered general fill.

Class 2 Cohesive Fill (Class 2A, Class 2B, Class 2C or Class 2E) – Site won for use as engineered general fill.

Class 4, Class 5 (Class 5A or Class 5B) – Refer to landscape architect's specification.

Class 6C – For use as starter layer, if required.

Class 6D – For use as starter layer below Class 2E fill.

Class 6F2 / 6F5 – Site won (6F2) or imported (6F5) for use as engineered granular fill.

Testing of Fill Material

The classification and acceptability testing of the earthworks materials shall be carried out by the Contractor at the point of excavation/production for on-site materials and prior to import to site for imported materials.

The required testing is specified in Appendix 1/5 and shall be carried out by the Contractor on each class of earthworks material at least seven days prior to placement (excluding moisture contents which are to be carried out on the same day as placement) or as agreed by the CA.

The Contractor shall provide copies of all classification test results and acceptability testing to the CA prior to placement of the material but not more than five days from completion of the testing, or as agreed by the CA. Testing results shall be submitted in AGS digital format as well as PDF certificates.

The Contractor shall maintain full and accurate records of where the samples were taken and when and where earthworks material is placed in the permanent works. Similarly, the Contractor shall maintain full records on each sub unit of imported materials including, but not limited to, the location of the sources, the suppliers' details, the acceptability testing and the location it has been incorporated into the works.

Groundwater Lowering and Treatment

No placement of fill is permitted into standing water and the Contractor shall determine any requirements for groundwater lowering and / or treatment. Shallow perched water is present, particularly within the granular material and this shall be drained prior to the placement of engineered general fill or engineered granular fill.

The Contractor shall be responsible for all aspects of any dewatering and monitoring systems they consider necessary to complete the contract. This shall include design, installation, operation, monitoring, protection, maintenance and removal. Wherever temporary dewatering systems are used the Contractor shall ensure that no damage occurs to

adjacent vulnerable assets such as structures, services, pipelines, roads, etc. immediately or in the long term and they shall put in place monitoring to demonstrate that they are controlling the work in a safe manner.

Any groundwater lowering proposed shall be agreed with the CA. Treatment of groundwater to be discharged from site shall be in accordance with requirements of the Environment Agency / Local Authority and Water Authority

Surface Water

Temporary and permanent drainage shall be installed as part of the enabling works contract in accordance with Drawing GBR1-ENA1-STE-XX-DR-C-01-33 and Cundall Civil Engineering Specification. The Contractor will be responsible for providing a temporary surface water management plan to accompany the initial drainage design and if deemed necessary, the Contractor can revise the temporary drainage requirements to better align with their design. Any design changes to the temporary layout shall be agreed with the CA and Northumberland County Council. Treatment of groundwater to be discharged from site shall be in accordance with requirements of Northumbrian Water Ltd.

Table 6/1 Acceptable Earthworks Materials: Classification and Compaction Requirements

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
1A	Well graded granular material	See Table 6/1 of SHW Series 600 but with no more than 1% Class B1 constituents (municipal incinerator bottom ash), Class D2 constituents (air cooled blast furnace slag), Class D4 constituents (electric arc furnace slag) or Class E constituents (nonferrous steel industry)	Engineered General Fill	Grading	BS1377: Part 2	Table 6/2	Table 6/2	Table 6/4 Method 2 in Zone B, D, E and F. End product specification to achieve 97% of maximum dry density of BS1377: Part 4 (4.5kg rammer) in Zone A and Zone C.
				Uniformity Coefficient	see Note 5	10	-	
				Moisture Content (see Note 4)	BS 1377: Part 2	OMC-2%	OMC+2%	
1B	Uniformly graded granular material	See Table 6/1 of SHW Series 600 but with no more than 1% Class B1 constituents (municipal incinerator bottom ash), Class C1 constituents (coal fly ash), Class C4 constituents (coal bottom ash), Class D2 constituents (air cooled blast furnace slag), Class D3 constituents (basic oxygen furnace slag), Class D4 constituents (electric arc furnace slag) or Class E constituents (nonferrous steel industry), Class F constituents	Engineered General Fill	Grading	BS1377: Part 2	Tab 6/2	Tab 6/2	Table 6/4 Method 3 in Zone B, D, E and F. End product specification to achieve 97% of maximum dry density of BS1377: Part 4 (4.5kg rammer) in Zone A and C.
				Uniformity Coefficient	see Note 5	-	10	
				Moisture Content (see Note 4)	BS 1377: Part 2	OMC-2%	OMC+2%	

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
2A	Wet cohesive material	Any material, or combination of materials, other than chalk	Engineered General Fill	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Table 6/4 Method 1 in Zone B, D, E and F. End product compaction to achieve 97% target compaction below Zone A and C.
				Plastic limit (PL)	BS 1377: Part 2	-	-	
				Moisture content (See note 4)	BS 1377: Part 2	PL - 4%	-	
				Moisture content	BS 1377: Part 2	OMC - 2%	OMC -2%	
				Organic Matter	BS1377-Part 3	-	5%	
				Flash Point	BS13736	>100ºC		
				Undrained shear strength of remoulded material	Clause 633	50kN/m^2	120kN/m^2	

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
2B	Dry cohesive material	Any material, or combination of materials, other than chalk	Engineered General Fill	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Table 6/4 Method 2 in Zone B, D, E and F. End product compaction to achieve 97% target compaction below Zone A and C.
				Plastic limit (PL)	BS 1377: Part 2	-	-	
				Moisture content (See note 4)	BS 1377: Part 2	-	PL - 4%	
				Moisture content	BS 1377: Part 2	OMC - 2%	OMC -2%	
				Organic Matter	BS1377-Part 3	-	5%	
				Flash Point	BS13736	>100ºC		
				Undrained shear strength of remoulded material	Clause 633	50kN/m^2	120kN/m^2	
2C	Stony cohesive material	Any material, or combination of materials, other than chalk	General Fill	Grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Table 6/4 Method 2 in Zone B, D, E and F. End product compaction to achieve 97% target compaction below Zone A and C.
				Plastic limit (PL)	BS 1377: Part 2	-	-	
				Moisture content (See note 4)	BS 1377: Part 2	OMC-2%	OMC+2%	
				Undrained shear strength of remoulded material	Clause 633	50kN/m^2	120kN/m^2	

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
2E	Reclaimed pulverised fuel ash cohesive material	Reclaimed material from lagoon or stockpile containing not more than 20% furnace bottom ash	Engineered General Fill	Moisture content (See note 4)	BS 1377: Part 2	To enable end product compaction		End product compaction to achieve 97% target compaction of BS 1377 Part 4 (2.5kg rammer)
				Water soluble sulfate content	BS EN 1744-1 Clause 10	-	3000 mg/l as SO_4	
				Oxidisable sulphides content	BS EN 1744-1 Clause 13	-	0.3% as SO_4	
				pH value	BS 1377: Part 3	6	9	
				Remoulded CBR (Swelling)	BS 1377: Part 4	No result over 10mm and the average should be less than 5mm.		
4	Various	To Landscape Architect's requirements.	Fill to landscaped areas	To Landscape Architect's requirements.				
5A	Site won topsoil	To Landscape Architect's requirements.	Topsoiling	To Landscape Architect's requirements.				
5B	Imported topsoil	To Landscape Architect's requirements.	Topsoiling	To Landscape Architect's requirements.				

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
6C	Selected uniformly graded granular material	See Table 6/1 of SHW Series 600	Starter layer	Grading	BS 1377: Part 2 (on site) BS EN 933-2 (imported)	Table 6/2 (on site) or Table 6/5 (imported material)	Table 6/2 (on site) or Table 6/5 (imported material)	Table 6/4 Method 3
				Uniformity Coefficient	See Note 5	-	10	
				Plasticity Index	BS 1377: Part 2	Non plastic- Plasticity Index		
				Los Angeles Coefficient	Clause 635	-	50	
				Moisture Content	BS 1377: Part 2	OMC-2%	OMC+2%	
6D	Selected uniformly graded granular material	See Table 6/1 of SHW Series 600	Starter layer below PFA	Grading	BS 1377: Part 2 (on site) BS EN 933-2 (imported)	Table 6/2 (on site) or Table 6/5 (imported material)	Table 6/2 (on site) or Table 6/5 (imported material)	Table 6/4 Method 4
				Uniformity Coefficient	See Note 5	-	10	
				Plasticity Index	BS 1377: Part 2	Non plastic Plasticity Index		

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
				Moisture Content	BS 1377: Part 2	OMC-2%	OMC+2%	
6F2 (site won)	Selected granular material (coarse grading)	Recycled aggregates including concrete, brick and masonry with not more 5% bituminous materials and asphalt	General Fill or Capping	Grading	BS 1377: Part 2	Table 6/2	Table 6/2	Table 6/4 Method 6. End product specification to achieve 97% of maximum dry density of BS1377: Part 4 (Vibrating hammer method) in Zone A and Zone C.
				Moisture Content	BS 1377: Part 2	OMC-2%	OMC+2%	
				Los Angeles Coefficient	Clause 635 – SHW Series 600	-	50	
				Class Ra (asphalt) content	Clause 710	-	50	
				Bitumen content	BS EN 12697-1 or BS EN 12697-39	-	2.0	
				Constituents of Coarse Recycled Aggregate	BS EN 933-11	-	-	
				Water soluble sulfate content	BS EN 1744-1 Clause 10	-	3000 mg/l as SO4	
				Oxidisable sulphides content	BS EN 1744-1 Clause 13	-	0.3% as SO4	
				pH value	BS 1377: Part 3	6	9	

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
				Determinant (see Appendix 6/15)	As relevant to determinant	Limiting Value in Appendix 6/15	Limiting Value in Appendix 6/15	
6F5 (imported)	Selected granular material (coarse grading) – imported on to site	Unbound mixture complying with BS EN 13285 containing aggregate confirming to BS EN 13242 form one or more of the following source codes: P (natural aggregates except chalk, siltstone or slate) A2 (crushed concrete) A3 (crushed bricks, masonry)	General Fill or Capping	Size designation and overall grading category	BS EN 13285 - 0/80 and G_E	Table 6/5	Table 6/5	Table 6/4 Method 6 End product specification to achieve 97% of maximum dry density of BS1377: Part 4 (Vibrating hammer method) in Zone A and Zone C.
				Maximum fines and oversize categories	BS EN13285 – UF_{12} and OC_{75}	Table 6/5	Table 6/5	
				Los Angeles Coefficient	BS EN 13242 – LA_{50}	-	50	
				Moisture Content	BS EN 1097-5	OMC-2%	OMC+2%	
				Water soluble sulfate content	BS EN 1744-1 Clause 10	-	3000 mg/l as SO_4	
				Oxidisable sulphides content	BS EN 1744-1 Clause 13	-	0.3% as SO_4	

Class	General Material Description	Permitted Constituents (All subject to requirements of Table 6/1 SHW Series 600 and Appendix 6/1)	Typical Use	Material Properties				Compaction Requirements
				Property	Test	Lower Limit	Upper Limit	
				pH value	BS 1377: Part 3	6	9	
				Determinant (see Appendix 6/15)	As relevant to determinant	Limiting Value in Appendix 6/15	Limiting Value in Appendix 6/15	

Footnotes to Table 6/1

App = Appendix

Tab = Table

Where in the Acceptable Limits column reference is made to Appendix 6/1, only those properties having limits ascribed to them in Appendix 6/1 shall apply. Where other appendices give limits for other properties not listed in this Table such limits shall also apply.

Where BS 1377: Part 2 is specified for mc, this shall mean BS 1377: Part 2 or BS 812: Part 3 as appropriate.

Uniformity coefficient is defined as the ratio of the particle diameters D60 to D10 on the particle-size distribution curve, where:

D60 = particle diameter at which 60% of the soil by weight is finer

D10 = particle diameter at which 10% of the soil by weight is finer

Materials shall comply with the current Environmental Regulations at the time of use. Reference shall be made to Annex ZA (informative) of BS EN 13242.

Acceptability limits are generic and shall be revised based on site specific source approval testing.

The limiting values of Class U1B are given in Cundall's Remediation and Earthworks Strategy.

Table 6/1 Acceptable Earthworks Materials: Classification and Compaction Requirements

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