GREAT OAK
AGRICULTURAL LAND USE AND SOILS ASSESSMENT REPORT

DATE

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1 INTRODUCTION

1.1 This report provides an assessment of the potential effects of the proposed mining operations at Great Oak Site on agricultural land use and soil resources. The study area for this assessment comprises the land directly affected by the proposed Scheme.

1.2 The assessment of effects on agricultural land use and soil receptors has been undertaken taking into account relevant national and local policy as identified in Section 2 below, and adopting the methodologies described Section 3.

1.3 The existing baseline conditions, against which the likely environmental effects of the Scheme are assessed, have been determined through a review of desk based information and detailed site surveys, and are described in Section 4.

1.4 Section 5 identifies those mitigation measures that have been adopted as part of the Scheme, which are relevant to this topic. These include the detailed proposals for the soil handling strategy to be adopted throughout the operation of the Scheme.

1.5 Section 6 contains the assessment of the potential effects arising from the Scheme, taking into account the measures to be adopted as part of the project.

1.6 The objectives of the assessment are to:

- identify all soils and agricultural land use receptors within and adjacent to the proposed development Site that may be affected by the works;
- characterise the baseline environmental conditions for soils and agricultural land use within the Site;
- identify the measures that have been adopted as part of the Scheme to reduce, as far as possible, the effects on agricultural land use and soils; and
- assess the likely effects on agricultural land use and soils arising from the implementation of the Scheme.

2 LEGISLATIVE AND POLICY CONTEXT

National Policy

National Planning Policy Framework (March 2012)

2.1 The National Planning Policy Framework (NPPF), sets out the Government's planning policies for England and how these are expected to be applied. With regard to agriculture and soils Section 11, "Conserving and enhancing the natural environment" contains the following policy guidance (para. 109):

"The planning system should contribute to and enhance the natural and local environment by:

- *Protecting and enhancing valued landscapes, geological conservation interests and soils."*

And (para. 112):

"Local Planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land. Where significant development of agricultural land is necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality."

2.2 The best and most versatile land is defined as land graded 1, 2 or 3a according to the MAFF ALC guidelines 1988.

2.3 With regard to soils and agricultural land quality the NPPF states at Paragraph 109:

"The planning system should contribute to and enhance the natural and local environment by:

- Protection and enhancing valued landscapes, geological conservation interests and soils"

2.4 Paragraph 112 states:

"Local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land"

2.5 In regard to the sustainable use of minerals, paragraph 143 states

"In preparing Local Plans, local planning authorities should:

Put in place policies to ensure worked land is reclaimed at the earliest opportunity, taking account of aviation safety, and that high quality restoration and aftercare of mineral sites takes place, including for agriculture (safeguarding the long term potential of best and most versatile agricultural land and conserving soil resources)"

3 METHODOLOGY

3.6 The identification of the existing baseline conditions in relation to agricultural land use and soils has been undertaken in two stages, including a desk top review of available published information and a detailed Site survey of agricultural land quality and soil resources. Both stages have focused on identifying soil types and resources, agricultural land quality and the farming framework across the study area.

Desk Studies

Soils and Agricultural Land Quality

3.7 The information reviewed during the desk study of soil types and the quality of the agricultural land has included:

- Published soil survey and British Geological Survey information;
- MAFF published 1 inch to 1 mile Provisional Agricultural Land Classification Sheet;
- Site specific climatic information taken from the Agroclimatic Datasets produced by the Meteorological Office for the MAFF Agricultural Land Classification Guidelines (October 1988); and
- Ordnance Survey maps at 1:25,000 scale to identify topographic characteristics of the survey area.

3.8 The methodology employed for determining the quality of agricultural land is known as the Agricultural Land Classification (ALC), which is a system originally devised by MAFF (now part of Natural England). The ALC system was introduced in 1966 but has been comprehensively revised and the current guidelines 'Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land' were introduced in October 1988.

3.9 The ALC system provides a framework for classifying land according to the extent to which physical characteristics impose long-term limitations on agricultural use. The system is based on the assessment of the following limiting factors:

- Climate; accumulated temperature and annual average rainfall;
- Site; gradient, micro-relief and flood risk;
- Soil; texture, structure, depth and stone content; and
- Interaction of the above; soil wetness, droughtiness and liability to erosion.

3.10 These factors impose limitations on the performance of land in terms of the typical cropping range and expected level and consistency of yield. The ALC grade, which ranges from grade 1 (highest quality land) to grade 5 (lowest quality land), is determined according to the severity of the limitations. Grade 3 is further subdivided into subgrades 3a and 3b.

3.11 The National Planning Policy Framework (2012) identifies grades 1, 2 and 3a as defined within the ALC system as the 'best and most versatile land'.

Farming Framework

3.12 The desk study review of information on the local farming framework has included information from the following sources:

- Department for Farming, Environmental and Rural Affairs (DEFRA) district farming statistical data;
- Interactive MAGIC Website for Rural Land Designations including Less Favoured Areas and land within the Environmental Stewardship Scheme;

Site Survey

Soils and Agricultural Land Quality

3.13 A detailed survey of soil resources and agricultural land quality was carried out on the site in August 2012. This survey included the examination of soil profiles using a 1.2m dutch hand auger at approximately 100m intervals across the Site. In addition, having identified the main soil types across the Site during the auger boring survey a soil pits were excavated by hand within the main soil units to further confirm the soil characteristics. The auger boring and soil pit descriptions are contained in Appendix 1.

3.14 For each of the auger borings the following standard soils data have been collected:

- Soil horizon depths;
- Soil texture of all horizons;
- Soil colour;
- Stone contents, estimated from augering, confirmed by soil pit excavation/ and or sample analysis;
- Presence and characteristics of mottling, a soil wetness indicator;
- Presence of manganese concretions, a soil wetness indicator;
- Identification of gleyed horizons;
- Identification of slowly permeable layers; and

- Identification of impenetrable rock layers.

Farming Framework

3.15 The structure of land ownership and farming has been further considered through:

- Site visits to look at patterns of agricultural land use; and
- Information provided by UK Coal to determine the nature of farming practices on the Site.

Assessment of Effects

3.16 The assessment of effects on agricultural land use and soils has been based on the value or sensitivity of the receptor and the magnitude of the predicted effects.

Sensitivity of the Receptor

3.17 With respect to value or sensitivity, a level has been assigned to the key receptors in the agricultural assessment, agricultural land quality, soils and the farming framework. The guidelines that have been used to assess this are described in Table 1. Where a receptor could be placed within more than one category of value, conservative professional judgement has been applied to determine which category is appropriate.

Table 1: Guidelines for Value and Sensitivity

Value and Sensitivity	Guidelines
High	Grade 1 agricultural activity Specialised horticultural/intensive agricultural unit.
Medium	Grades 2 and 3a agricultural land Annual horticultural cropping High Level Stewardship Schemes
Low	Grades 3b and lower quality land Arable and grassland areas Environmental Stewardship Schemes
Negligible	Grade 4 or 5 agricultural land Grassland/ limited arable areas

Magnitude of Effect

3.18 The magnitude of the effect on agricultural land use and soils has been considered with regard to the key factors in the agricultural assessment, agricultural land quality and the farming framework. There is no guidance on the thresholds that should be applied for this topic area. However, land loss area thresholds historically adopted by the Ministry of Agriculture in their consideration of proposals involving the loss of 20 ha or more of the 'best and most versatile' land, a criteria that is still applied by the Welsh Government in their consideration of development proposals, have been taken into account in the development of the criteria used in this assessment.

3.19 The magnitude of an effect has been categorised as high, medium, low or negligible as described in Table 2. Where an effect could be placed within more than one category of magnitude, conservative professional judgement has been applied to determine which category is appropriate.

Table 2: Guidelines for Assessment of Magnitude

Magnitude	Guidelines
High	Loss of more than 50 ha of the best and most versatile land. Agricultural production affected at a regional level with full time farming enterprises rendered unworkable.
Medium	Loss of more than 20 ha of best and most versatile land. Agricultural production affected at a local level. Full-time farming enterprise/s rendered unworkable.
Low	Loss of 5 – 20 ha best and most versatile land. Affects the workability of individual farming enterprises, but farming can continue as before.
Negligible	Loss of less than 5 ha best and most versatile land. No adverse effects on farming enterprises or production.

Significance of Effect

3.20 For the purposes of assessment, a scale of significance has been adopted. The evaluation of significance has been based on professional judgement and takes into account the matrix presented at Table 3. This approach uses the terms beneficial (for an advantageous or positive effect on an environmental resource or receptor) or adverse (for a detrimental or negative effect on an environmental resource or receptor).

Table 3: Significance of Effects

Sensitivity	Magnitude			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

3.21 The duration of the effect is indicated where known using the terminology short, medium and long term.

- Permanent: For the lifetime of the Project or longer;
- Temporary - Short term: A period of months, up to one year;
- Temporary - Medium term: A period of more than one year, up to five years;
- Temporary - Long term: A period of greater than five years.

4 BASELINE DESCRIPTION

Location

4.1 The site lies immediately to the south of the A500 a few kilometres east of Junction 16 of the M6. The western boundary runs along Bignall End Road. The southern boundary is just to the north of the B5500 Audley Road and furthest eastern point is located at the access into the site from Talke Road.

4.2 The site is crossed diagonally in a north-east to south-west direction by the disused former railway line runs more or less parallel to Bignall End Road about 200m to the east. There are also various internal tracks.

4.3 There are a few small areas of woodland, the largest being associated with a disused shaft just east of the former railway line south-east of Woodlands Farm.

Topography

4.4 The highest ground is in the east, reaching just over 200m a.o.d. where the ground begins to rise towards the hill where Wedgewood's Monument is situated. The slopes in this vicinity are quite steep in places and, in themselves, pose an agricultural limitation (see below).

4.5 The slopes are gentler in the rest the site. The 150m contour runs almost exactly along the line of the disused railway and, to the west, the ground firstly falls away gently to around 140m a.o.d.into the valley of a small watercourse, the Brierly Brook.

Relevant Published Information

Geology and Soils

4.6 The central and eastern parts of the site are underlain by Carboniferous Middle and Upper Coal Measures (British Geological Survey Sheet 123, Stoke-on-Trent and the British Geological Survey internet portal).

4.7 The Coal Measures outcrop on the higher ground in the east and on the surrounding slopes. They consist mainly of greyish mudstones with subordinate siltstones and sandstones. The maps show a more pronounced band of sandstone outcropping to the south and west of Oakhill Wood and in the vicinity of the former railway line near the northern boundary.

4.8 The 1:50,000 geological map, but not the BGS Portal shows land around Jamage farm as disturbed ground and the national Soil Map (1:250,000)shows a substantial area in the east of the site as being land restored after previous opencast coal mining.

4.9 Elsewhere, however, the bedrock is covered by glacial till which is shown as occurring on the lower ground in the centre and west of the site.

4.10 The geological maps show very minor occurrences of bedrock along the sides of the watercourse which leaves the site near Bignall End.

4.11 No detailed soil map for the area has been published and so the only published information is the relevant sheet (Sheet 3, Midland and Western England) of the 1:250,000 National Soil Map. This shows geographic groupings of soils called Soil Associations, usually related to specific parent materials.

4.12 The associations shown on the map are closely linked to the geology. Association 713a BARDSEY is shown where the Coal Measures outcrop in the centre-east of the site, Association 711n CLIFTON is associated with the glacial till in the west. As already noted an area of land restored after previous opencast coal mining is indicated along the eastern side of the site, as Association 92c (DISTURBED SOILS 3). The area shown Association 92c is somewhat larger than the disturbed ground indicated on the geological map.

4.13 Association 713a BARDSEY is described as a collection of "slowly permeable seasonally waterlogged loamy over clayey and fine silty soils over soft rock", accompanied by "some well drained coarse loamy soils over harder rock". In this description "fine loamy" and "coarse loamy" mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

4.14 The "slowly permeable seasonally waterlogged loamy over clayey soils over soft rock" are the Bardsey series *per se*. The generally similar soils but with a fine silty texture throughout are the Ticknall series and the accompanying "well drained coarse loamy soils over harder rock" are the Rivington series, formed over the subsidiary sandstone bands.

4.15 Association 711n CLIFTON is described as a collection of "slowly permeable seasonally waterlogged reddish fine and coarse loamy soils and similar soils with slight seasonal waterlogging. Some deep coarse loamy soils seasonally affected by groundwater". It is developed in reddish glacial till (boulder clay).

4.16 The "slowly permeable seasonally waterlogged reddish fine loamy soils" are the Clifton series *per se* and which are developed more or less directly in the glacial till or with only a thin surface layer of more loamy i.e. less clayey material. The Claverley series is found where the superficial loamy drift is thicker and so are the "slowly permeable seasonally waterlogged reddish coarse loamy soils". The "similar soils with slight seasonal waterlogging" are the Arrow series and the "coarse loamy soils seasonally affected by groundwater" are the Quorndon series.

4.17 The areas of glacial till sometimes have patches of sandy glaciofluvial material and here soils of the Wick or Newport series would be expected, but the areas at Great Oak are probably insignificantly small.

Published ALC Information

4.18 The site is on the provisional 1:63,360 ALC map for Stoke-On-Trent (Sheet 110) published in the 1972. The site is shown as undifferentiated Grade 3 in the east and centre, corresponding essentially to the land with Clifton and related soils and Grade 4 in the west where the soils are formed in Coal Measures materials.

4.19 The accompanying Report is very generalised and does not give any useful information as to the reasons for these gradings or where within Grade 3 the Clifton or Claverley areas are considered to be. The general indications are, however, that these soils developed in glacial till are low in the Grade i.e. what would now be Subgrade 3b unless there is a fairly substantial cover of lighter

textured superficial drift in which case they could be higher i.e. Subgrade 3a. The Grade 4 in the west has probably been allocated to that grade because of the overall adverse topography and contrasting shallow, stony soils over sandstone and poorly drained, heavy textured soils over mudstone.

4.20 Whilst these provisional maps provide useful information as to the likely relative grading of different soil types they were produced using reconnaissance fieldwork and a system of ALC that has since been comprehensively revised. They cannot therefore be used to identify the detailed pattern of ALC grades across individual sites.

Climate

4.21 The climatic information needed to apply the Agricultural Land Classification system has been obtained from the Met Office's standard 5km grid point data set for representative points in the west, near the middle of the site and on the high ground in the east, as in the table below:-

Table 4 – Site Specific Climatic Data

Grid reference	SJ 814516	SJ 819514
Altitude (m)	150	200
Average Annual Rainfall AAR (mm)	809	845
Accumulated Temperature ATO (day ^{o})	1294	1237
Moisture Deficit for wheat (mm)	78	70
Moisture Deficit for potatoes (mm)	62	51
Field Capacity Duration (days)	193	199
Overall Max ALC Grade due to Climate	2	2

4.22 The data for the three locations are broadly similar but show the effect of increasing altitude on the rainfall (which increases) and accumulated temperature (which falls) with rise in height. There is an overall slight climatic limitation so that, even if all other factors taken into consideration in ALC were non-limiting, the maximum grading could be no higher than Grade 2.

4.23 The rainfall of over 800mm is relatively high but is not untypical of north-western England. It means that the climatic moisture deficit which builds up in the summer is relatively low (less than 80mm for wheat and less than 65mm for potatoes). The period at which the soil is at field capacity, during which excess rainfall has to drain from the profile unless prevented by poor profile drainage (Field Capacity Duration) is around 190-200 days, which is a relatively long period and of considerable significance when assessing the land quality of soils with impeded drainage which, as will be described below, are widespread on the site.

Site Survey – Soil Types

4.24 The site inspection confirmed the broad division of soils developed in glacial till and associated fluvio-glacial deposits over most of the site and those associated with the outcrops of the Carboniferous bedrock in the east. There is also a substantial area of disturbed soils around Diglake Farm and also to the east of the site around Jamage Farm. The distribution of the soil types across the site is identified in Figure 1. It is convenient to continue to use the soil series names since this allows easier linkage with the published information described above.

4.25 As far as the glacial till and related soils are concerned, the individual profiles which might be attributed to the Clifton and Claverley series form a complex of soils which cannot be mapped as individual areas. This soil complex is therefore mapped as a single recognised soil type of Clifton and Claverley series (Cu/Clv) on the accompanying map. This is discussed in more detail below.

4.26 Where the soils are developed in Carboniferous bedrock, however, it is possible to map separate areas of those developed from mudstone, the Badsey series (By on the accompanying map), and those over sandstone, the Rivington series (Rc on the accompanying map).

4.27 Thus the accompanying soil map and the following description of the soils cover four main kinds of soils:-

- Clifton/Claverley (Cu/Clv) developed in glacial till
- Bardsey (By) developed in Carboniferous mudstone
- Rivington (Rc) developed in Carboniferous sandstone
- Disturbed soils (D)

Clifton, Claverley and related series

4.28 The main soil parent material on the lower ground in the centre and west of the site is glacial till and subsoils developed in this are slowly permeable, causing impeded drainage. There is, however, often a variable thickness of loamy, more permeable surface material with a variable stone content. The thicker this is, the better the natural drainage.

4.29 The heaviest and wettest soils are where there is little or no superficial loamy material and the soils are developed more or less directly in glacial till. These would be classed as the Salop series (Sh). There are, however, only scattered occurrences of such soils, usually only represented by a single auger boring surrounded by other types of soils and so the accompanying soil map does not show any separate area of these. For the record, they seem to be found mainly in the extreme north-west and due east of Great Oak Farm.

4.30 A typical Salop series profile consists of a dark brown or dark greyish brown, heavy clay loam topsoil directly over a strongly mottled clay which is slowly permeable. The mottling indicates impeded drainage and, given the relatively moist climate and proximity of the slowly permeable subsoil to the surface, such soils are in Wetness Class IV on a scale ranging from I (freely drained) to VI (effectively a swamp).

4.31 A typical Clifton soil has a dark brown, medium clay loam or sandy clay loam topsoil usually with less than 10% stones. The upper subsoil is a greyish brown, mottled, sandy clay loam, medium clay loam, or heavy clay loam. Below this, and within 50cm of the surface, there is a prominently mottled, slowly permeable clay or sandy clay similar to that which makes up the whole of the Salop series subsoil. Clifton series soils at Great Oak are typically in Wetness Class IV.

4.32 A typical Claverley soil has a dark brown, medium clay loam or sandy clay loam topsoil often, at Great Oak, with more than 10% stones (slightly to moderately stony). The upper subsoil is a greyish brown sandy clay loam, medium clay loam, or heavy clay loam and this tends to be, stonier, browner and less mottled than the otherwise similar horizon in the Clifton soils. Where the

slowly permeable clay is encountered, this is at more than 50cm from the surface and so the soils are no worse than Wetness Class III and occasional profiles may even be in Wetness Class II.

4.33 In isolated profiles, the stoniness prevented augering to a depth sufficient to reach the slowly permeable clay. The stoniness itself indicated that such profiles should be classed as Claverley series rather than as Clifton series and a Wetness Class of III or possibly II in some cases has been assumed.

4.34 The loamy surface material is believed to be at least partly of fluvio-glacial origin and throughout its occurrence in the Midlands and Northern England the Clifton Association has patches of soils developed more or less entirely in such material. These are both sandier and usually much better drained (Wetness Class I) than the adjacent soils with slowly permeable clay at depth (Salop, Clifton and Claverley series).

4.35 The geological map shows a patch of such glacial fluvial sand and gravel in the vicinity of Bonnie Braes Farm at the north-west corner. The area, however, is very small and is represented only by a single soil of the Newport series. This consists of a dark brown, medium sandy loam topsoil and a very thin loamy sand subsoil over orange sand at only 30cm from the surface.

4.36 There are a couple of other, equally small patches of fluvio-glacial material elsewhere on the site, not indicated as such on the geological map. Here the soils, classed as Wick series, are more loamy and so transitional to the Claverley series. Typically they consist of a dark brown, medium sandy loam or sandy clay loam topsoil and a brown subsoil of similar texture. The profiles become sandier or stonier with depth and there is no sign of any underlying clay or drainage impedance due to it within auger depth.

4.37 The above profiles exhibit the full range of conditions encountered in the Clifton Association as the thickness and sandiness of superficial material increases. At one end of the spectrum are the Salop series with little or no loamy superficial material and which has the underlying clay immediately below the topsoil, resulting in poor drainage (Wetness Class IV). The Clifton series has up to 50cm of superficial loamy material over the clay but is still in Wetness Class IV. More than 50cm of superficial loamy material produces soils classed here as the Claverley series. These are better drained (Wetness Class III or II). Where the superficial fluvio-glacial derived material is so thick that effectively the whole profile is developed in it the profiles are well drained (Wetness Class I) and classed as the Wick series where the material is loamy like that at the top of the Clifton and Claverley profiles and as Newport where it is sandier.

4.38 It had been considered, during the survey, that there might be groups of auger borings within the Salop, Wick and Newport series that could be mapped separately. However, the location of these soil types are isolated and cannot therefore be mapped as discrete areas of different soil types.

Bardsey series

4.39 The Bardsey series is formed in Carboniferous Mudstone and, as a consequence, comprises heavy textures and suffers from impeded drainage. In terms of textures, drainage impedance and Wetness Class, the profiles are very similar to those of the Salop series developed in glacial till but they tend to be greyer and the colour mottling in the subsoil tends to be yellower and more diffuse than in the Salop soils.

4.40 A typical profile has a dark greyish brown, heavy clay loam topsoil, directly overlying a grey mottled clay which is slowly permeable. They are accordingly classed as Wetness Class IV.

4.41 There is only a small area of Bardsey soils, to the north-east of the small area of woodland near the north-east corner of the site, plus a single isolated profile on the edge of the site near the south-west corner and which is included within an area of Rivington soils.

Rivington series

4.42 The Rivington series is quite different from any of the soils so far described. It is formed over Carboniferous sandstone and so has a relatively light texture but is very stony and shallow over rock or sandstone rubble. It is, however, well drained (Wetness Class I).

4.43 A typical profile comprises a dark brown, slightly stony, medium sandy loam or medium sandy silt loam topsoil over a similarly textured but generally stonier subsoil. The subsoil is so stony that it is very difficult to penetrate by hand auger (impossible in a few profiles) and most profiles had to be abandoned at about 35 to 40cm from the surface as the material being encountered was considered to be rock or sandstone rubble. The only relatively deep profile, and even then only 60cm thick, is near the bottom of a slope where material washed down from upslope has probably accumulated.

4.44 The Rivington soils are found on the steep slopes in east of the site.

Disturbed Soils

4.45 The main area of disturbed soils in the vicinity forms part of a larger area subject to underground and open-cast mining located to the east of the site.

4.46 The area of disturbed soils is in the vicinity of Diglake Farm and thought to be associated with the former underground colliery here. There is a range of soil conditions that occur within this area. This varies from profiles where there is only surface contamination of the topsoil by coal and shale material, to profiles that contain a more extensive spreading of waste materials overlying in situ glacial till at depth. At a few locations there appear to be a considerable thickness of waste materials, including coal washings. All of the auger borings in this area have at least some covering of topsoil. The range of soil conditions is expressed in the Auger Boring records attached as Appendix 1.

Site Survey – Agricultural Land Classification

4.47 The land within the site has been identified to comprise predominantly lower quality grade 4 land with smaller areas of grade 3a and 3b agricultural land. The distribution of the grades of land across the site is shown in Figure 2. The main limitations on the quality of the agricultural land on the site are soil wetness, but also in some areas, soil stoniness linked to soil droughtiness. Those soils with impeded drainage including profiles typical of the Salop, Clifton Claverley and Bardsey series are affected by soil wetness, whilst the well drained soil profiles overlying the sandstone (Rivington series) are limited by soil stoniness leading to droughtiness. The free draining soils overlying the sandstone are also found on the steeper slopes on the site which are subject to a severe gradient limitation. The isolated occurrences of well drained Wick and Newport soils within

the general area of Clifton and Claverley soils are also limited mainly by droughtiness but to a far less extent than the Rivington profiles.

4.48 The Wetness limitation is assessed in the ALC system on the basis of the Wetness Class of the soil profile, the texture of the topsoil, and the climatic parameter of Duration of Field Capacity, which is around 190 - 200 days for this site.

4.49 For the range of topsoil textures found in the Salop, Clifton, Claverley and Bardsey series soils, the relevant ALC criteria are such that soils in Wetness Class II i.e. some of the Claverley series are in ALC Subgrade 3a. They are also in Subgrade 3a if in Wetness Class III and the topsoils are sandy clay loams or medium clay loams, but are 3b if the topsoils are heavy clay loams. Most of the Claverley profiles on the site give land of ALC Subgrade 3a.

4.50 For the soils in Wetness Class IV i.e. most, but not all of the Salop, Clifton and Bardsey profiles, the grading is Subgrade 3b if the topsoils are sandy clay loams or medium clay loams, but 3b if the topsoils are heavy clay loams. The former situation is the most common, so that most of these profiles give Subgrade 3b. The few Salop and Bardsey soils which have heavier textured topsoils give Grade 4.

4.51 In terms of soil wetness therefore, the difference between grade 3a and 3b land on this site depends on two criteria;

- The presence of a medium clay loam/sandy clay loam/sandy loam topsoil texture; and
- The presence of more than 50cm of permeable soil materials above the slowly permeable soil horizon.

4.52 The identification of the characteristics associated with land graded 3a is important in terms of the consideration of how the soil materials on the site may best be stripped and restored to ensure that the higher quality “best and most versatile” grade 3a land may be effected reclaimed within the site proposals.

4.53 For the soils where droughtiness is a limitation, the assessment is based on calculating the amount of moisture each soil can hold over the summer versus the demands of two test crops (wheat and potatoes). Calculations carried out in accordance with the ALC guidelines indicate gradings of Grade 2 for the few occurrences of Wick series, 3a for the single Newport soil and in the range Subgrade 3b to Grade 4 for the shallow, stony Rivington soils over Carboniferous sandstone.

4.54 The main limitation of most of the Rivington soils, however, is the steep slopes on which they occur and, for this reason alone, none of them can be graded above Grade 4.

4.55 With regard to the grading of the disturbed soils around Diglake Farm and Jamage Farm, the original soils in this location would probably have been mainly in the 3b/a range with some falling into grade 4. Contaminating the topsoil with colliery wastes and or replacing the upper subsoil with colliery wastes has, of course, done nothing to improve these soils and, overall, a grading of grade 4 is considered appropriate.

4.56 The areas and percentages of ALC grades identified on the agricultural land within the site are therefore as follows:

Table 5 – Agricultural Land Classification of Agricultural Land within the Site

Grade	Area (ha)	Percentage
3a	15.9	22
3b	14.7	21
4	40.3	57
Total	70.9	100

Soil Resources - Topsoil

4.57 There are four main types of topsoils present on the site as identified on Figure 3. These include :-

Unit 1	**Medium and lighter textured medium clay loams/sandy clay loams and sandy loam to an average of approximately 25cm thickness**
	This Unit is the most extensive across the site and includes the topsoils from the Clifton, Claverley, Wick and Newport series soils identified during the survey
Unit 2	**Heavy clay loam – approximately 25cm average thickness**
	This unit is located on the north-eastern part of the site where the poorly drained soils of the Bardsey series have been identified during the survey
Unit 3	**Mixed disturbed topsoils to a thickness of approximately 25cm**
	This Unit is located around the Diglake Farm and Jamage Farm area where the main areas of disturbed soils on the site have been identified
Unit 4	**Stony sandy clay loams/ sandy loams to a thickness of approximately 35cm depth**
	This unit is located in two small areas to the east of the site and corresponds to the areas of the Rivington series soils found on the steepest land within the site. Although the topsoils are recorded to depths of around 25cm within the profile descriptions, the stony subsoils below these topsoils only extend below the topsoil to a depth of between 35 and 40cm above the rubbly sandstone layer. It is therefore proposed the 25cm of topsoil should be stripped together with the shallow similarly textured subsoil as a single horizon to an overall depth of approximately 35cm

Soil Resources - Subsoil

4.58 There are three main subsoil types as identified on Figure 4. These include;

Unit 1	**Higher quality upper subsoils to an average thickness of > 60cm overlying heavier clayey lower subsoils.**
	The areas of Unit 1 soils are representative of the areas of higher quality grade 3a land on the site as they comprise an upper subsoil of better drained medium clay loam/sandy clay loam or heavy clay loam above the slowly permeable clayey lower subsoil horizon. The depth of the freely draining upper subsoil leads to these profiles being classified as Wetness Class III and graded 3a accordingly.
Unit 2	**Heavy textured and poorly drained clayey subsoils to an average thickness of > 95cm**
	This unit comprises the more poorly drained subsoil materials where the slowly permeable clays occur within 50cm of the surface and the profiles are therefore graded no higher than grade 3b according to the ALC system.
Unit 3	**No subsoil materials**
	This unit includes the area where the soils are shallow and overlay sandstone layers. As described above, it is suggested that the shallow subsoil (approx 10cm depth) should be stripped with the topsoil as a single horizon in this area as the textural characteristics are similar throughout the profile.
Unit 4	**Restored subsoil – mixed clay and shale material**

Agricultural Land Use

Published Information DEFRA Statistical Information 2010

4.59 DEFRA produce annual farming statistical data collated on a local authority basis that provides an overview of the types of farming land use that exist in the Newcastle-under-Lyme area around the Site and the wider West Midlands regional area. The latest published statistics have been produced for 2010 and a summary of the data for taken from the dataset are provided below:

Table 6: DEFRA Farming Land Use Statistics 2010

	Arable Crops (ha including cereals)	% Total Farmed Area	Fruit and Veg (ha)	% Total Farmed Area	Grassland (ha)	% Total Farmed Area
Newcastle under Lyme District	2,325	20	-	0	9,101	80
West Midlands Region	355,880	41	16,427	2	488,428	57

4.60 The statistics indicate that grassland (livestock based enterprises) is the main agricultural land use within the area around the Site and that this is a significantly higher percentage of grassland than that found in the wider West Midlands region where approximately 41% of the agricultural land is in arable use.

Site Survey

4.61 The site comprises entirely permanent pasture, which is characteristic of the majority of the land in the surrounding area of the Newcastle under Lyme district. At the time of survey the area of land was being grazed by a limited number of beef cattle located mainly on the eastern part of the site.

4.62 It is understood that the area is let for grazing on the basis of short term agreements. There are no farm buildings or farmhouses within the site area and none of the land is entered into an environmental stewardship agreement.

5 PROPOSED MITIGATION INCORPORATED INTO THE PROPOSAL

Soil Handling Strategy

5.1 A proposed draft soil handling methodology for the site is provided in Appendix 2. This methodology has been developed from the standards used by UK Coal Surface Mines Ltd. to restore large areas of overburden, subsoil and topsoil, as sites progress through the working and into the restoration phase. taking into account best practice guidance provided in documents including:

- DEFRA Good Practice Guide for Handling Soils (2000), referred to in the DEFRA Guidance for Successful Reclamation of Mineral and Waste Soils (2004);and
- The Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009).
- Environment Agency publication, 'Think soils. Soil assessment to avoid erosion and runoff.'

5.2 It is based on the assessment of agricultural soil resources that has been carried out on the site as described in Section 4 of this chapter. The design of the restoration scheme has also been developed taking these into account.

5.3 The general principles on which it is based are:-

- Recognition of and separate handling of different kinds of topsoil, subsoil, soil substitutes and other bulk materials on the Site;
- Handling of soils, particularly during the replacement phase, by such machinery and operated in such a way as to minimise soil compaction; and
- Ensuring that all concerned are aware of the objectives and methodology and that the operations are adequately supervised and monitored.

Agricultural Aftercare

5.4 Once the restoration of soil materials within identified phases of the site is complete, these areas automatically enter the 5 year aftercare period, which would eventually lead to the complete reclamation of the site.

5.5 In outline, the agricultural aftercare programme would contain the following key elements:

- The proposed cropping pattern would be grass for the first one/two years, followed by an arable break crop on agricultural land, following the installation of an agricultural under-drainage scheme.

- Care would be taken in carrying out initial cultivations prior to grass sowing to ensure that the soils are not overcultivated or damaged.
- Soil samples would be taken and analysed to ensure that the appropriate fertiliser /lime dressings are applied to encourage the initial grass establishment
- Other operations, including weed control treatments would be undertaken as necessary
- Remedial soil treatments, including stone-picking and subsoiling would be undertaken as necessary and at the appropriate time in the process.
- Annual aftercare meetings would be held to review progress and specifically to review cropping and husbandry information for the preceding year and to agree cropping proposals for the forthcoming year

5.6 Prior to the commencement of aftercare a detailed scheme would be submitted to the MPA for the 'statutory' five year period. Following the commencement of the aftercare programme a report summarising the overall progress in aftercare would be submitted to the MPA annually. This report and proposed programme for the following year would be discussed and amended as necessary annually at a meeting with representatives from the MPA.

6 ASSESSMENT OF EFFECTS

Agricultural Land Quality and Soils

5.7 The proposals for the restoration of the land within the Site and the incorporation of a detailed soil handling methodology which is based on recognised principles of best practice have been designed to ensure that:

5.8 All the topsoil and subsoil resources present within the Site would be conserved and effectively restored; and

5.9 Soil profiles would be restored in accordance with soil profile specifications provided for grades 3a and 3b agricultural land within the Site.

5.10 The detailed ALC survey has identified that the Site contains approximately 15.9 ha of grade 3a agricultural land, which is defined as the lowest quality land within the category of "best and most versatile" land, according to the NPPF.

5.11 There would be a temporary medium term loss of agricultural land quality across the Site as a result of the Scheme's progressive excavation and restoration operations over a 2 and a half year period. The 5 year aftercare period would be progressively implemented once specific areas of the Site have been restored. Based on low to medium sensitivity of the receptor and a low magnitude of loss, the temporary effect on agricultural land quality arising from the Scheme is assessed to be of **Minor Adverse temporary Significance.**

5.12 However, the design of the restoration and aftercare scheme together with the mitigation measures included upfront as part of the Scheme would ensure that, as far as possible, the agricultural land within the Site, including the grade 3a "best and most versatile" land can be successfully reinstated. The residual effect on agricultural land quality is therefore assessed, based on a low to medium sensitivity of the receptor and a negligible magnitude of impact, to be of **Negligible Significance**.

Farming Framework

5.13 There would be a temporary medium term loss of the agricultural grassland areas within the Site as a result of the Scheme's progressive excavation and restoration operations over a 2 and a half year period. The areas of grassland would be progressively reintegrated into the farming framework during the 5 year aftercare period.

5.14 The Site is not currently being used as an integral part of any established farm holding. Rather it is being used as temporary grazing for limited numbers of livestock. It is therefore assessed that the loss of the this land during the excavation and restoration of the Site would have a negligible magnitude of impact on the framework of farm holdings where the land is considered to be of low sensitivity based on the quality of the land and the nature of the farming taking place on the Site. The overall effect on the farming framework during the implementation of the Scheme is therefore assessed to be of **Negligible temporary Significance**.

5.15 The Scheme includes the restoration of much of the Site to agricultural land use, incorporating recognised best practice techniques in the restoration of soil resources within the agricultural areas. These areas would then be reintegrated into the farming framework following the aftercare period. The residual effect on the framework of farm holdings is therefore assessed, based on a low sensitivity of the receptor and a negligible magnitude of impact, to be of **Negligible Significance.**

7 REFERENCES

British Geological Survey, Sheet 123 (Stoke-on-Trent), 1:50,000.

British Geological Survey internet portal at ww.maps.bgs.ac.uk, consulted May 2012

Soil Survey of England and Wales, National Soil Map Sheet 3 (Midland and Western England), 1:250,000 and accompanying Regional Bulletin (1984)

Agricultural Land Classification, Provisional Sheet 110 (Stoke-On-Trent), 1: 63,360 (1972) and Accompanying Report (1975)

Ministry of Agriculture Fisheries and Food (1988) Agricultural Land Classification of England and Wales. *Revised guidelines and criteria for grading the quality of agricultural land*

The Meteorological Office (1989) Office *Climatological data for Agricultural Land Classification*

DEFRA MAGIC Website available at: http://magic.defra.gov.uk/

DEFRA Farming Statistical Data 2010 available at: http://www.defra.gov.uk/statistics/foodfarm/

MAFF/DEFRA (2000) Good Practice Guide for Handling Soils available at: webarchive.nationalarchives.gov.uk/20090306103114/http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm

Environment Agency (2008) Think Soils. Soil assessment to avoid erosion and runoff.

DEFRA (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

This can obtained as a hard copy from DEFRA, Soils Policy Team, 3C Nobel House, London SW1P 3JR or, as at November 2011, or available at DEFRA Archives website at:-
archive.defra.gov.uk/environment/quality/land/soil/built-environ/documents/code-of-practice.pdf
archive.defra.gov.uk/environment/quality/land/soil/built-environ/documents/toolbox-talks.pdf

APPENDIX 1 – SOIL AUGER BORING AND SOIL PIT DESCRIPTIONS

APPENDIX 1 - AUGER BORING AND SOIL PIT DESCRIPTIONS

Notes

1. All depths are measured in cm. from the surface.

2. Colours are abbreviated:-

B	- Brown
DB	- Dark brown
DG	- Dark grey
DGB	- Dark greyish brown
G	- Grey
GB	- Greyish brown
LG	- Light grey
SB	- Strong brown (orange)
VDB	- Very dark brown
VDGB	- Very dark greyish brown
YB	- Yellowish brown

3. Mottling, if any, is abbreviated:-

o	- ochreous (orange-brown)
g	- grey
gb	- greyish brown
rb	- reddish brown
yb	- yellowish brown
fnt	- faint
occ	- occasional

4. Textures are abbreviated:-

c	- clay
hcl	- heavy clay loam
lms	- loamy medium sand
mcl	- medium clay loam
ms	- medium sand
msl	- medium sandy loam
mszl	- medium sandy silt loam
sc	- sandy clay
scl	- sandy clay loam
SPL	- Slowly Permeable Layer

5. All horizons are stoneless or have only occasional stones, unless otherwise noted

6. Soil types (soil series) are as follows

By	- Bardsey	Rc	- Rivington
Clv	- Claverley	Sh	- Salop
Cu	- Clifton	wQ	- Wick
Na	- Newport		

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION)							
Salop Series (poorly drained formed more or less directly in till)							
80425 52050	0 - 24	DB	mcl				
(80400 52000)	24 - 35	RB, o	hcl				
	35 +	RB, o & g	c (SPL)	IV		3b	Sh
80500 52100	0 - 27	DB	hcl				
	27 - 50	RB, o	c (SPL?)				
	50 +	RB, o & g	c (SPL)	IV		4	Sh
80800 51640	0 - 27	DGB, o	hcl				
(80800 51600)	27 +	GB, o & g	c (SPL)	IV		4	Sh
80800 51900	0 - 24	DGB, o	hcl				
	24 - 40	GB, o	hcl				
	40 +	G, o & gb	c (SPL)	IV		4	Sh
81100 51500	0 - 20	DGB, o	hcl				
	20 +	G, o & gb	c (SPL)	IV		4	Sh
81100 51600	0 - 25	DGB, o	hcl				
	25 - 45	GB, o	hcl + sandy lenses				
	45 +	G, o & rb	c (SPL)	IV		4	Sh
81590 51800	0 - 26	DGB	hcl				
(81600 51800)	26 +	G, o & gb	c (SPL)	IV		4	Sh
Clifton Series (poorly drained formed in till with relatively thin loamy surface)							
80800 51540	0 - 25	DGB, o	mcl				
(80800 51500)	25 - 45	GB, o & g	hcl				
	45 +	G, o & gb	c (SPL) + sandy lenses	IV		3b	Cu
80800 51800	0 - 26	DB, fnt o	mcl				
	26 - 45	GB, o	hcl				
	45 +	G, o & rb	c (SPL) + sandy lenses and occ stones	IV		3b	Cu
80800 52000	0 - 25	DB, fnt o	mcl				
	25 - 45	B, o	hcl				
	45 +	GB, rb	c (SPL) + sandy lenses	IV		3b	Cu
80900 51600	0 - 26	DGB, fnt o	mcl				
	26 - 45	GB, o & g	hcl				
	45 +	G, o & gb	c (SPL) + sandy lenses	IV		3b	Cu

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Clifton Series (poorly drained formed in till with relatively thin loamy surface) (continued)							
80910 51675	0 - 25	DGB, fnt o	mcl				
(80900 51700)	25 - 65	B, g	hcl				
	65 +	RB, o & g	c (SPL)		III	3a	Cu
80900 51800	0 - 26	DGB, fnt o	mcl				
	26 - 40	GB, o	hcl				
	40 +	G, o & gb	c (SPL)		IV	3b	Cu
80900 51900	0 - 26	DB	mcl				
	26 - 40	GB, o & g	mcl/hcl				
	40 +	G, o & yb	c (SPL)		IV	3b	Cu
80900 52000	0 - 26	DGB, fnt o	mcl				
	26 - 45	GB, o	hcl				
	45 +	RB, gb	c (SPL)		IV	3b	Cu
81000 51400	0 - 30	DGB, fnt o	mcl				
	30 - 45	GB, o	hcl				
	45 +	LG, o	c (SPL)		IV	3b	Cu
81000 51600	0 - 24	DGB, o mcl					
	24 - 40	GB, o	hcl				
	40 +	G, o & gb	c (SPL)	+ sandy lenses	IV	3b	Cu
81000 51700	0 - 32	DB	mcl				
	32 - 45	B, o	hcl				
	45 +	B, o & g c (SPL)		IV	3b	Cu	
81000 51800	0 - 27	DGB, fnt o	mcl				
	27 - 45	GB, o	hcl				
	45 +	G, o & gb	c (SPL)		IV	3b	Cu
81100 51700	0 - 25	DB	scl				
	25 - 35	B	scl				
	35 - 45	B, o	scl/hcl				
	45 +	B, o & g c (SPL)		IV	3b	Cu	
81100 51900	0 - 30	DB	scl				
	30 - 40	GB, o & g	scl/sc				
	40 +	RB, o & g	c (SPL)		IV	3b	Cu

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type		
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)								
Clifton Series (poorly drained formed in till with relatively thin loamy surface) (continued)								
81200 51500	0 - 26	DGB, o mcl						
	26 - 45	GB, o	hcl, slightly stony					
	45 +	RB, o & gb	c (SPL) + sandy lenses	IV		3b	Cu	
81200 51600	0 - 27	DGB, fnt o	mcl					
	27 - 45	GB, o	hcl, stony					
	45 +	GB, o & rb	sc/c (SPL) + sandy lenses		IV		3b	Cu
81165 51700	0 - 27	DGB	mcl					
(81200 51700)	27 - 40	GB, o	mcl					
	40 - 45	GB, o & g	hcl					
	45 +	G, o	c (SPL)	IV		3b	Cu	
81200 51800	0 - 28	DGB	mcl					
	28 - 50	GB, o & g	hcl, slightly stony					
	50 +	GB, o & rb	c (SPL)	IV		3b	Cu	
81200 51900	0 - 31	DB	mcl					
	31 - 40	GB, o	mcl					
	40 - 45	GB, o & g	hcl					
	45 +	RB, o & g	c (SPL)	IV		3b	Cu	
81300 51200	0 - 35	DGB, o hcl						
	35 - 45	GB, o & g	hcl					
	45 +	G, o & gb	c (SPL)	IV		4	Cu	
81300 51600	0 - 28	DGB, o mcl						
	28 - 45	GB, o	hcl					
	45 +	GB, o & rb	sc/c (SPL) + sandy lenses		IV		3b	Cu
81400 51500	0 - 28	DGB	scl					
	28 - 45	LG, o	scl/msl					
	Sudden transition to							
	45 +	B, o & g c (SPL)		IV		3b	Cu	
81400 51600	0 - 30	DB	scl					
	30 - 40	G, o	scl					
	40 - 45	G, o	sc/c					
	45 +	RB, o & g	c (SPL)	IV		3b	Cu	
81400 51700	0 - 27	DGB	scl					
	27 - 45	LG, o	scl					
	45 +	LG, o & g	c (SPL) + sandy lenses	IV		3b	Cu	

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Clifton Series (poorly drained formed in till with relatively thin loamy surface) (continued)							
81400 51800	0 - 27	DGB	mcl				
	28 - 45	GB, o & g	hcl				
	45 +	GB, o & g	c (SPL)		IV	3b	Cu
81500 51200	0 - 25	DGB	mcl				
	25 - 40	RB, o	hcl				
	40 +	RB, o & g	c (SPL?)		IV	3b	Cu
81500 51800	0 - 32	DB	mcl				
	32 - 45	G, o	msl/hcl				
	45 +	G, o & gb	c (SPL)		IV	3b	Cu
81600 51000	0 - 26	DB	mcl				
	26 - 45	GB, o & g	scl				
	45 +	GB, o & g	sc (SPL)		IV	3b	Cu
81600 51900	0 - 33	DB	mcl				
	33 - 40	GB, o & g	mcl/hcl				
	40 - 50	GB, o & g	hcl/sc				
	50 +	G, o & gb	c (SPL)		IV	3b	Cu
81800 51500	0 - 26	DGB, o mcl					
	26 - 45	GB, o	hcl				
	45 +	GB, o & g	c (SPL)		IV	3b	Cu
81800 51600	0 - 26	DGB, o	mcl/hcl				
	26 - 45	GB, o	hcl				
	45 +	GB, o & g	c (SPL)		IV	3b/4	Cu
81800 52000	0 - 31	DB	mcl				
	31 - 45	GB, o & g	hcl				
	45 +	G, o & gb	c (SPL)		IV	3b	Cu
81900 51600	0 - 35	DB	mcl				
	35 - 45	GB, o & g	mcl + fragments of coal				
	45 +	LG, o & gb	c (SPL)		IV	3b	Cu
81900 51950	0 - 25	DGB	mcl				
(81900 51900)	25 - 35	GB, o & g	mcl				
	35 - 45	GB, o & g	scl				
	45 +	G, o & rb	c (SPL)		IV	3b	Cu

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Claverley Series (imperfectly drained formed in till with relatively thick loamy surface)							
80500 52000	0 - 27	DB	mcl				
	27 - 40	B, occ o	mcl, slightly stony				
	40 - 60	B, o	hcl, slightly stony				
	60 +	GB, o & g	c (SPL)	III		3a	Clv
80600 52000	0 - 27	DB, fnt o	mcl				
	27 - 40	B, occ o	mcl				
	40 - 60	GB, o	mcl				
	60 +	B, o & g	c (SPL)	III		3a	Clv
	Top of 5-6° slope						
80700 51800	0 - 24	DGB, fnt o	scl				
	24 - 45	B, occ o	scl				
	45 - 60	B, o	lms, wet				
	60 +	RB, o & g	sc (SPL)	III		3a	Clv
80700 52000	0 - 25	DB, fnt o	mcl				
	25 - 45	B, o	mcl, stony				
	45 +	Impenetrably stony		II?		3a	Clv
80900 51500	0 - 25	DB	mcl				
	25 - 45	B, occ o	hcl, slightly stony				
	45 +	Impenetrably stony		II?		3a	Clv
81000 51500	0 - 30	DB	mcl				
	30 - 70	B	mcl/hcl				
	70 +	RB, o & g	hcl (SPL?)	II		3a	Clv
81000 51900	0 - 27	DB	scl				
	27 - 45	GB, o	scl				
	45 - 60	GB, o & g	scl				
	60 +	B, o	c (SPL)	III		3a	Clv
81000 52000	0 - 27	DGB, fnt o	mcl				
	27 - 55	GB, o	mcl				
	55 - 70	GB, o	c (SPL) + sandy lenses, slightly stony				
	70 +	Impenetrably stony		III		3a	Clv
81100 51200	0 - 27	DB	scl, slightly stony				
	27 - 50	B, occ o	scl, slightly stony				
	50 - 75	B, o	ms, wet at base				
	75 +	RB, o & g	c (SPL)	II		3a	Clv

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Claverley Series (imperfectly drained formed in till with relatively thick loamy surface) (continued)							
81100 51400	0 - 29	DB	scl				
	29 - 45	B, occ o	scl				
	45 - 70	B, o	scl				
	70 +	B, o & g sc (SPL)		II/III	3a	Clv	
81100 51800	0 - 30	DB	mcl, slightly stony				
	30 - 50	RB, fnt o	hcl, slightly stony				
	50 - 60	RB	ms, slightly stony				
	60 +	Impenetrably stony		II?	3a	Clv (odd)	
81100 52000	0 - 26	DB, fnt o	mcl				
	26 - 60	GB, o	mcl				
	60 +	GB, o & g	c (SPL) + sandy lenses	III	3a	Clv	
81200 51200	0 - 29	DB	mcl				
	29 - 50	B, occ o	scl, slightly stony				
	50 - 60	B, o	ms, wet				
	60 +	RB, o & g	c (SPL)	III	3a	Clv	
81200 51300	0 - 30	DB	scl, stony				
	30 - 40	B, fnt o	scl, stony				
	40 +	Impenetrably stony		II?	3a	Clv	
81200 51400	0 - 25	DB	mcl, slightly stony				
	25 - 45	B, occ o	mcl/hcl, slightly stony				
	45 +	Impenetrably stony		II?	3a	Clv	
81290 51300	0 - 35	BL	mcl				
(81300 51300)	30 - 55	G, o	mcl				
	55 +	Impenetrably stony		II/III	3a	Clv	
81300 51400	0 - 26	DB	mcl				
	26 - 45	GB, o	mcl, stony				
	45 - 60	GB, o	scl, stony				
	60 +	Impenetrably stony		II/III	3a	Clv	
81300 51500	0 - 27	DB	mcl				
	27 - 40	GB, o	mcl, stony				
	40 - 55	GB, o	scl, stony				
	55 +	Impenetrably stony		II/III	3a	Clv	
81300 51700	0 - 30	DB	hcl				
	30 - 60	RB	hcl				
	60 +	RB, g	hcl (SPL)	III	3a	Clv	

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Claverley Series (imperfectly drained formed in till with relatively thick loamy surface) (continued)							
81285 51900	0 - 26	DB	msl				
(81300 51900)	26 - 55	B	msl				
	55 - 65	GB, o	scl				
	65 - 75	GB, o & g	sc (SPL)				
	75 +	G, o & gb	c (SPL)	III		3a	Clv
81300 52000	0 - 25	DB	mcl				
	25 - 45	B	mcl, slightly stony				
	45 - 55	B, o	scl, stony				
	55 +	Impenetrably stony		II/III		3a	Clv
81500 51500	0 - 30	DB	scl				
	30 - 55	B	scl				
	55 - 60	B, occ o	scl, slightly stony				
	60 +	Impenetrably stony		II?		3a	Clv
81500 51700	0 - 29	DB	scl				
	26 - 60	G, o & g	stratified ms & sc				
	60 +	LG, o	c (SPL)	III		3a	Clv
81500 51900	0 - 27	DB	mcl				
	27 - 60	GB, o	scl				
	60 +	RB, o & g	c (SPL)	III		3a	Clv
81500 52000	0 - 27	DB	scl				
	27 - 60	B, o	scl				
	60 - 65	GB, o	scl/sc, slightly stony				
	65 +	Impenetrably stony		II?		3a	Clv
81600 50900	0 - 22	DB	mcl				
	22 - 35	RB	mcl, slightly stony				
	35 - 45	B, o & g	scl, + clayey lenses, stony				
	45 +	Impenetrably stony		II?		3a	Clv
81600 51300	0 - 27	DB	mcl				
	27 - 35	B, occ o	mcl				
	35 - 50	GB, o & g	hcl, slightly stony				
	50 +	Impenetrably stony		II/III		3a	Clv
	At top of steep slope						
81600 51600	0 - 29	DB	scl				
	29 - 60	B	scl, slightly stony				
	60 - 65	B, occ o	msl, slightly stony				
	65 +	Impenetrably stony		II?		3a	Clv

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Claverley Series (imperfectly drained formed in till with relatively thick loamy surface) (continued)							
81575 51990	0 - 24	DB	mcl				
(81600 52000)	24 - 55	GB, o	mcl				
	55 - 65	GB, o	scl, stony				
	65 +	Impenetrably stony			II?	3a	Clv
81700 51500	0 - 27	DB	mcl, slightly stony				
	27 - 50	B	mcl, slightly stony				
	50 - 65	B, o & g	hcl, slightly stony				
	65 - 70	GB, o & g	hcl/c (SPL)				
	70 +	Impenetrably stony			III	3a	Clv
81700 51600	0 - 25	DB	scl				
	25 - 55	GB, o	scl + sandy lenses				
	55 +	GB, o & g	c (SPL)		III	3a	Clv
81800 51700	0 - 30	DB	mcl				
	30 - 50	B	mcl, slightly stony				
	50 +	Impenetrably stony			II?	3a	Clv
81900 51700	0 - 25	DB	mcl, slightly stony				
	25 - 60	B, occ o	mcl/scl, slightly stony				
	60 +	RB, o & g	hcl/c (SPL)		III	3a	Clv
Wick Series (well drained loamy soils over fluvioglacial sands and gravels)							
81100 51300	0 - 25	DB	msl, stony				
	25 - 45	SB	msl, stony				
	45 +	Impenetrably stony			I	2	wQ
81200 52000	0 - 29	DB	scl				
	29 - 55	B	scl				
	55 - 60	B	msl				
	60 +	B	ms		I	2	wQ
Newport Series (well drained sandy soils over fluvioglacial sands and gravels)							
80700 51900	0 - 24	DB	msl				
	24 - 30	SB	lms				
	30 +	SB	ms		I	3a	Na

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS OVER GLACIAL TILL AND RELATED FLUVIOGLACIAL DEPOSITS (CLIFTON ASSOCIATION) (continued)							
Soils developed in Alluvium							
80900 51400	0 - 29	VDGB, o	scl				
	29 - 45	DGB, o & g	scl				
	45 +	GB, o & g	scl, very wet	IV/V		3b?	Alluv
SOILS DEVELOPED FROM CARBONIFEROUS ROCKS (BARDSEY ASSOCIATION)							
Bardsey Series (poorly drained soils developed from Carboniferous mudstones)							
81700 51095	0 - 25	DGB, o	hcl				
(81700 51100)	25 - 45	G, o	sc (SPL)				
	45 +	B, g	c (SPL)	IV		4	By
81700 51800	0 - 24	DGB	hcl + coal fragments				
	24 - 35	YB, o & g	c (SPL)				
	35 +	DG, o	c (SPL)	IV		4	By
81800 51800	0 - 26	DGB	hcl + coal fragments				
	26 - 50	G, yb	c (SPL) + coal fragments				
	50 +	LG, o	c (SPL)	IV		4	By
81800 51900	0 - 27	DB	hcl				
	27 - 60	SB, g	c (SPL)				
	60 +	G, o	c (SPL)	IV		4	By
81900 51850	0 - 30	VDB	mcl + coal fragments				
(81900 51800)	30 - 60	B, o	mcl + coal fragments				
	60 +	SB, fnt rb	c (SPL)	III	3a	By	
82800 51500	0 - 25	DB, occ o	hcl				
	25 - 45	GB, o	hcl				
	45 +	G, o & gb	c (SPL)	IV		4	By
82800 51600	0 - 26	DB, o	hcl				
	26 +	G, o	c (SPL)	IV		4	By
	Actually Dale series rather then Bardsey						
Rivington Series (well drained shallow soils over Carboniferous sandstones)							
81600 51100	0 - 25	DB	mszl, stony (sandstone fragments)				
	25 - 30	Sandstone rubble					
	30 +	Impenetrably stony (rock?)		I		4	Rc
81700 51000	0 - 25	DB	mszl, stony (sandstone fragments)				
	25 +	Impenetrably stony (rock?)		I		4	Rc
	Very narrow strip on side of a valley cut down through till to bedrock						
81700 51400	0 - 25	DB	mszl, slightly stony (sandstone fragments)				
	25 - 40	B	msl, stony (sandstone fragments)				
	40 +	Impenetrably stony (rock?)		I		4	Rc

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
SOILS DEVELOPED FROM CARBONIFEROUS ROCKS (BARDSEY ASSOCIATION) (CONTINUED)							
Rivington Series (well drained shallow soils over Carboniferous sandstones) (continued)							
81800 51400	0 - 24	DB	msl, slightly stony (sandstone fragments)				
	24 - 45	B	msl, stony (sandstone fragments)				
	45 - 60	B	scl, stony (sandstone fragments)				
	60 +	Impenetrably stony (rock?)		I		3b	Rc
	On more gently sloping "tail" below 14° slope						
81900 51400	0 - 26	DB	msl, slightly stony (sandstone fragments)				
	26 - 40	B	lms, stony (sandstone fragments)				
	40 +	Impenetrably stony (rock?)		I		4	Rc
	On 15° slope						
81900 51500	0 - 20	DB	mszl, slightly stony (sandstone fragments)				
	20 - 30	B	mszl, stony (sandstone fragments)				
	30 +	Impenetrably stony (rock?)		I		4	Rc
	At bottom of 14° slope with sandstone rubble at bottom of field						
82000 51600	0 - 26	DB	mszl				
	26 - 40	B	msl, stony (small sandstone fragments)				
	40 +	Impenetrably stony (rock?)		I		4	Rc
	On 12.5° slope with sandstone outcrops nearby						
82000 51700	0 - 24	DB	mszl				
	25 - 35	B	mszl, stony (small sandstone fragments)				
	35 +	Impenetrably stony (rock?)		I		4	Rc
DISTURBED SOILS							
81400 51100	0 - 25	DB	mcl + admixed subsoil				
	25 -45	Mixture of mottled GB clay and topsoil					
	45 +	RB, o	c (SPL)		4		D
	Appears to be soil from elsewhere spread over pre-existing subsoil						
81400 51200	0 - 50	DGB	scl + admixed subsoil				
	Sudden transition to						
	50 +	LG, o	c (SPL)		4		D
	Appears to be soil from elsewhere spread over pre-existing subsoil						
81400 51400	0 - 25	VDB	scl				
	25 +	Mixture of coal and topsoil				4	D
	Soil from elsewhere spread over ?coal washings?						

Grid Ref	Depth	Colour & Mottles	Texture	Wetness Class	ALC Grade	Soil Type	
DISTURBED SOILS (continued)							
81400 51900	0 - 27	DB	mcl + admixed subsoil				
	25 - 45	GB, o	hcl				
	45 - 60	GB, o	hcl + coal, very stony				
	60 +	Too hard to penetrate by auger			4	D	
81500 51000	0 - 20	DB	mcl				
	20 - 35	Mixture of grey clay, shale and coal					
	35 +	Too hard to penetrate by auger			4	D	
	Thought to be disturbed ground, but not fully worked						
81500 51100	0 - 25	DB	mcl				
	25 - 40	Mixture of grey clay and coal					
	40 +	Too hard to penetrate by auger			4	D	
	Thought to be disturbed ground, but not fully worked						
81500 51300	0 - 50	DGB	hcl + admixed subsoil, sandstone and coal				
	50 +	DG	shaley backfill		4	D	
	Soil from elsewhere spread over backfill						
81500 51400	0 - 28	DGB	mcl + stones, shale and coal				
	28 - 50	B, o & g	c				
	50 +	GB, o & g	c (SPL)		4	D	
	Appears to be soil from elsewhere spread over pre-existing subsoil						
81600 51200	0 - 20	VDB	mcl, stony				
	20 - 50	Mixture of greyish scl, stones and coal					
	50 +	RB, o & g	c (SPL)		4	D	
	Appears to be soil from elsewhere spread over pre-existing subsoil						
81600 51400	0 - 20	DB	mcl				
	20 - 70	Mixture of GB	clay, shale and coal				
	70 +	Too hard to penetrate by auger ?			4	D	
	Thought to be disturbed ground, but not fully worked						
81600 51500	0 - 25	DB	scl				
	25 - 50	Mixture of shale, sandstone and subsoil					
	50 +	Too hard to penetrate by auger ?			4		D
	Thought to be disturbed ground, but not fully worked						
81700 51200	0 - 28	DB	mcl				
	28 +	Mixture of GB clay, shale and coal				4	D
81700 51300	0 - 50	Mixture of scl topsoil, shale, sandstone and subsoil					
	50 +	Too hard to penetrate by auger ?			4		D
82100 51600	0 - 21	DB	mcl + coal				
	21 -30	Mixture of shale, sandstone and subsoil					
	30 +	Too hard to penetrate by auger			4		R
	Restored workings						
82100 51700	0 - 15	DGB	hcl				
	15 +	Mixture of DG clay, coal and stones			4	R	
	Restored workings						
82200 51500	0 - 20	DGB	hcl + coal and stones				
	20 +	Too hard to penetrate by auger			4	R	
	Restored workings						

82200 51600	0 - 25	Mixture of DB mcl topsoil, shale and coal				
	25 +	Too hard to penetrate by auger ?		4	R	
	Restored workings					
82300 51610	0 - 22	DB	mcl			
(82300 51610)	22 +	Mixture of GB clay, shale and coal			4	R
	Restored workings					
82400 51500	0 - 27	DB, o	mszl + coal			
	27 +	DG	shaley backfill		4	R
	May be the residue of a screen bank rather than a fully worked area					
82400 51600	0 - 25	DB	hcl + coal			
	25 - 35	Mixture of GB clay, shale and coal				
	35 +	Too hard to penetrate by auger		4		R
	Restored workings					
82500 51500	0 - 26	DB, o	mcl + coal			
	26 +	DG	clay and shale backfill		4	R
	May be the residue of a screen bank rather than a fully worked area					
82500 51600	0 - 27	DB	hcl + coal			
	27 - 30	Mixture of GB clay, shale, stones and coal				
	30 +	Too hard to penetrate by auger ?		4		R
	Restored workings					
82600 51500	0 - 25	Mixture of DGB hcl topsoil, shale and coal				
	25 +	Too hard to penetrate by auger ?		4		R
	Restored workings					
82700 51500	0 – 23	DB	mcl	4		R
	23+	Mixture of GB clay and backfilled shale				

Soil Pit Profile Descriptions

Clifton/Claverley

0 - 25cm	Dark greyish brown with faint, medium, ochreous mottles; medium clay loam; occasional medium and large stones; well developed fine subangular blocky structure; moist; friable to firm; rare small worms; abundant grass roots (Topsoil)
25 - 45cm	Greyish brown with common, distinct, medium and large ochreous and grey mottles; heavy clay loam; stones as above; moderately developed medium subangular blocky to massive structure; moist; firm; no worms observed; occasional grass roots (Subsoil).
45 - 60cm	Grey with distinct, large, ochreous and greyish brown mottles; clay; rare small stones; very weakly developed coarse angular blocky to massive structure; moist; firm; no worms observed; rare grass roots; Slowly Permeable Layer (Subsoil continued)
60+cm	As above, but becoming increasing reddish with depth; Slowly Permeable Layer (Subsoil continued)
	Wetness Class IV (even after artificial drainage) Grade 3b

Clifton/Claverley

0 - 25cm	Dark brown; medium clay loam; 10-15% hard angular stones, mostly >2cm, occasionally >6cm; weakly developed medium subangular blocky structure; moist; friable; occasional worms; abundant grass roots (Topsoil)
25 - 35cm	Brown with occasional small ochreous mottles; medium clay loam; stones as above; weakly developed coarse angular blocky structure; moist; firm; no worms observed; occasional grass roots (Subsoil)
35-55cm	As above but with common distinct ochreous and grey mottles (Subsoil continued)
55-65cm	Pale reddish brown with common small ochreous mottles; clay; 20% stones as above; massive structure; moist; very firm; no worms observed; no roots; Slowly Permeable Layer (Subsoil continued)
65+cm	As above but very stony
	Wetness Class III (after artificial drainage) – Grade 3a

Bardsey

0-24cm	Dark greyish brown; heavy clay loam; up to about 10% small, hard stones; moderately developed medium subangular blocky structure; moist, friable to firm; no worms observed; abundant grass roots (Topsoil)
24-45cm	Yellowish brown with common, distinct, medium ochreous and grey mottles; clay; stones as above; moderately developed coarse prismatic structure; moist; firm; no worms observed; occasional grass roots; Slowly Permeable Layer (Subsoil)
45+cm	Grey, with abundant ochreous mottles; clay; occasional stones; weakly developed coarse prismatic to massive structure; moist; very firm; no worms observed; rare grass roots; Slowly Permeable Layer (Subsoil continued)
	Wetness Class IV (even after artificial drainage)

Rivington

0 - 18cm	Dark brown; medium sandy silt loam; about 10% stones >2cm and a further 10% smaller stones, mostly angular sandstone; well developed fine subangular blocky structure; moist; friable; common small worms; abundant grass roots (Topsoil)

18 - 40cm Brown; medium sandy silt loam; about 20% stones as above, but including about 5% >6cm; moderately well developed fine to medium subangular blocky structure; moist; friable; occasional small worms; occasional roots (Subsoil)

40+cm Extremely stony sandy loam or fragmented sandstone (Rocky substrate)

Wetness Class I

APPENDIX 2 – DRAFT SOIL HANDLING METHODOLOGY- UK COAL

Soil Handling Strategy

Great Oak
Surface Mining Scheme

January 2014

1. Introduction

1.1 The Great Oak site is located approximately 6 kilometres to the north-west of Newcastle-under-Lyme within Staffordshire. The settlement of Bignall End is located to the south-west of the site. Bignall Hill and Butters Green lie to the south. Red Street is located to the south-east. To the north is the A500 dual carriageway, beyond which lies the settlement of Talke (to the north east of the site). The Great Oak site has a total site are of approximately 80 hectares.

1.2 The objective of the soil handling strategy is:

i. to ensure soil resources forming part of the proposed mining scheme are handled in the correct manner, taking into account best practice for the handling of large quantities of soils;
ii. to maximise the reinstatement of soil resources so as to be capable of sustaining flexible agricultural operations and other land uses, as detailed in the proposed restoration scheme;
iii. to minimise the need to re-handle soils, and
iv. to provide woodland and other wildlife habitats within a sustainable agricultural landscape.

1.3 A detailed survey of soil resources and agricultural land quality was carried out on the site by RPS Ltd in August 2012 and is described in the *"Great Oak Agricultural Land Use and Soils Assessment Report"* that is included at Appendix F. The information provided within the report has been utilised to design the provisional restoration scheme.

1.4 The Soil Handling Strategy has been prepared having considered the following guidance:

i. Mineral Planning Guidance Note 7 (MPG7) – The Reclamation of Mineral Workings (DoE, 1996);
ii. Forestry Commission Bulletin 110, Reclaiming Disturbed Land for Forestry;
iii. DEFRA – Protecting our Water, Soil and Air, A code of Good Agricultural Practice for farmers, growers and land managers;
iv. DoE, 1996; Guidance on Good practice for the Reclamation of Mineral Workings to Agriculture, and – The Reclamation of Mineral Workings to Agriculture;
v. MAFF, 2000 – Good Practice Guide for Handling Soils Leaflets 1-19;
vi. DETR – Soil Forming Materials: Their Use in Land Reclamation;
vii DCGL – Effectiveness of Aftercare Provisions for Minerals Workings.

1.5 The Soil Handling Strategy is a document prepared to ensure that the proposed site working scheme will facilitate a sustainable restoration scheme.

1.6 UK Coal Surface Mines Ltd (UK Coal) will liaise with the Minerals Planning Authority (MPA). This documentation provides the basis for an integrated

approach to soil handling and management throughout the working, and restoration of the surface mine.

1.7 Should a situation arise where there is a need to deviate from the Soil Handling Strategy, UK Coal will notify the MPA and such works will proceed in liaison with the MPA.

2. Surface Hydrology and Drainage

2.1 The gradients of the restored agricultural land will provide effective surface drainage and a landform which is conducive to good, safe agricultural practice.

2.2 As the site begins the operational phase, surface drainage will be collected and controlled, by passing through water treatment areas, as appropriate.

These temporary surface drainage features will be designed to restrict site discharges to the quality, volume and peak flow rates, as detailed in the Discharge Consent issued by the Environment Agency (EA).

2.3 In accordance with established good practice for restored surface mining sites, the land intended for agricultural use will be comprehensively under-drained. Agricultural sub-soiling after installation of the under drainage will improve the efficiency of the drainage. The scheme will be designed to the relevant standards for restored land, as set out in the relevant technical notes, including;

ADAS, 1995 “Technical Note on Workmanship and Materials for Land Drainage Schemes”

MAFF Land Drainage Service Research and Development, “Report No. 5, Pipe Size Design for Field Drainage” and,

ADAS Report 345, "The Design of Field Drainage Pipe Systems".

The scheme will be submitted to the MPA for approval and will be installed in year two or three of the rehabilitation programme in order to facilitate the key objective of effective soil rehabilitation.

2.4 The requirement for supplementary drainage treatments, e.g. additional sub soiling operations, will be assessed throughout the aftercare period.

3. Soil Handling

3.1 The characteristics of the soils represent an important factor in the potential for successful restoration. All topsoil resources will be conserved to make up a restored profile that is as deep as possible, 1m – 1.2m maximum over the backfilled material. Topsoil and subsoil will be retained and stored on site and used to restore the site.

3.2 Handling of soils would normally take place during the period April to September. During this period the soils are more likely to be in a dry and friable condition and the ground is likely to be firm enough to carry the weight of plant without undue risk of structural damage to the soil. In any event, topsoil will only be handled when it is in a sufficiently dry and friable state. Soils will only be handled outside this period if ground conditions are suitable and agreement has been reached with the MPA.

3.3 The selection of soil handling equipment and the methods of operation will have regard to established best practice for large scale soil stripping and restoration activities. The methodology will also be appropriate for the stripping and restoration of large areas of subsoil and topsoil.

3.4 All plant will run on the lowest available horizon at all times through the stripping and re-instatement of the soils.

3.5 No plant or vehicles shall cross undisturbed or reinstated topsoil except where such movement is essential and unavoidable for purposes of undertaking permitted operations.

3.6 Topsoil will be stripped from subsoil and overburden storage areas. Subsoil will remain in-situ beneath the subsoil storage areas. Subsoil will be stripped from the overburden storage areas. Excavation areas and internal haul roads will be stripped of topsoil and subsoil. Soil making materials will be stockpiled separately from stripped topsoil and subsoil.

3.7 Soil will be stripped in a progressive manner during the first year of operations. The topsoil will be stored in soil mounds at agreed locations around the site perimeter to form screening mounds. Subsoil will be stored at agreed locations which will reduce the haulage of the materials to and from the individual mounds, so far as is possible taking into account the subsoil quality from discrete areas of the site.

3.8 The soil stripping, storage and reinstatement will be supervised by experienced personnel. It will be the responsibility of the Site Manager to ensure that the optimum volumes of topsoil, subsoil and soil making materials, if necessary, are recovered and utilised to create a quality restoration. Soil handling operations will be suspended if the weather or ground conditions deteriorate.

3.9 Soil handling will take place only when the soil is sufficiently dry and friable to avoid soil smearing, compaction or structural damage. Operations will be suspended:-

i. during periods of heavy rainfall;
ii. if there is standing water on either the soil or overburden on which soil is being placed; and
iii. if the surface of the material over which soils are being replaced is not in suitable condition, i.e. too wet or plastic.

3.10 The soils will be assessed to determine that they will not be susceptible to damage during handling, by virtue of high moisture content. The moisture content and suitability for handling will be determined by a field assessment This field assessment will be carried out on representative samples of topsoil and subsoil, as necessary. Where there is significant variation in the textures within each of the horizons, additional samples will be assessed. Appropriate methods of soil stripping shall be separately agreed with the MPA for any permanently wet or waterlogged areas.

3.11 Before development commences, the Report on Soil Resources & Land Quality will be combined with this Soils Handling Strategy document to form

the Great Oak Soil Handling and Management Manual to be made available on site. The manual will:

i. clearly identify soil types, map units and texture groups referred to in the soils report and soil handling strategy;

ii. identify the origin and final locations of specific soils types used in the agricultural restoration;

iii. be reviewed annually as part of the Annual Soils Management Audit.

Soil Handling - Plant

3.12 Topsoil will be stripped with small hydraulic shovels or back hoes and articulated dump trucks. Subsoil will be stripped using hydraulic shovels and articulated or rigid dump trucks.

3.13 Low ground pressure (LGP) dozers and small hydraulic shovels or back hoes will be used to grade the soil storage mounds and to shape the restored profiles to ensure that they can be sown with an appropriate grass seed mixture and the sward managed through the working phase of the site.

3.14 The soil handling methodology will follow established best practice in this specialised field, where large volumes of soils and areas of land are routinely stripped, stored and restored to their final landform.

3.15 The soil stripping operation will be reviewed daily and supervised by a competent person. Soil units will be identified on site. Each unit above the base/formation layer, whether it be topsoil or subsoil, will be stripped sequentially. Each horizon will be stripped to its natural thickness and will not be inter-mixed with other horizons. The dump trucks will travel by an approved route to the soil storage area or receptor site on the lowest available horizon. Sufficient topsoil and subsoil will be stripped during each season to ensure that the operation of the coal recovery will not be adversely affected prior to the next season.

Available Soil Volumes & Storage

3.16 Topsoil, subsoil and other soil making materials will be stored according to their quality in separate mounds which do not overlap, unless otherwise agreed with the MPA.

The location of the proposed topsoil, subsoil and soil making material mounds are shown on Drawing No. 36 DO2. The height of the topsoil storage mounds will be restricted to a maximum of 5.0m whilst subsoil and soil making materials will be stored in mounds up to a height of 10.0m.
Soil heap locations are detailed on the Indicative Plans, six months to 18 months in the Environmental Statement.

Wherever practical, soils that are stripped will be placed directly to bed.

Details of Soil Stripping Movements

3.17 In each soil handling season (normally April to September unless otherwise agreed with the MPA), soil stripping will not commence on any phase until:

i. the MPA has received notification at least two working days before soil stripping is due to commence; and

ii. standing crops and excess vegetation has been removed.

An Annual Soils Management Audit will provide an early indication of those areas to be stripped in the following year.

3.18 No part of the site shall be excavated or traversed by heavy vehicles or plant (except as necessary to strip that area of topsoil or subsoil) or used for the stationing of plant and buildings, overburden, waste or mineral deposits until all available topsoil and subsoil has been stripped from that area.

Details of Soil Stripping Movements - Topsoil

3.19 The Soil Resources and Land Quality Report (Environmental Statement Appendix F) details the physical properties of the topsoil. The locations of topsoil storage mounds are shown on Drawing No Drawing No. 36 DO2.

3.20 All available topsoil will be stripped and stored in topsoil mounds around the site perimeter to form screening mounds. Where there are ownership boundaries crossing the site, then each owner will have their own topsoil and subsoil restored to their land.

Details of Soil Stripping Movements – Subsoil

3.21 The Soil Resources and Land Quality Report (Environmental Statement Appendix F) details the physical properties of the subsoil resource.

3.22 Where the quality of subsoil varies sufficiently, the most favourable subsoil within the agricultural area will be stripped to the depths indicated and stored together in mounds. On restoration these materials will be used for the restoration to the agricultural land. Where there are ownership boundaries crossing the site, then each owner will have their own subsoil restored on their land.

Details of Soil Stripping Movements – Soil making material

3.23 Should any suitable soil-making materials be found within the overburden, this may be set aside in separate storage mounds to ensure that the designed soil profiles can be created. These materials will be either stored separately or incorporated into designated sections of the site overburden mounds.

Reinstated Soil Profiles – general

3.24 With the exception of the water bodies, all areas will be reinstated with a soil profile of:

- In order to meet the specification for grade 3a "best and most versatile" agricultural land, it is suggested that the specification would be as follows
    - 25cm Unit 1 Topsoil;
    - 35cm Unit 1 Upper Subsoil;
    - 40 – 60cm Unit 1 lower subsoil or Unit 2 Subsoil.
- For the remaining areas of lower quality grade 3b/4 land on the site, it is suggested that the specification would be as follows:
    - 25cm of Unit 2, 3 or 4 topsoils;
    - 75cm – 95cm or more of lower quality subsoil materials from units 2 and 4.

Annual Soils Management Audit

3.26 At the end of each soil handling season UK Coal will prepare and submit to the MPA an Annual Soils Management Audit. The audit will include a report and plans detailing:

i. the areas stripped of topsoil and subsoil;

ii. the location of each topsoil, subsoil and soil making material storage mound;

iii. the quantity and nature of material within the mounds; and

iv. the quantity and area of topsoil, and subsoil placed directly from stripping to its final restored location.

Management of Soil Mounds

3.27 All topsoil and subsoil mounds will be seeded with grass to minimise loss of material by weathering/erosion and to prevent infestation by weeds. Each soil mound is formed as a civil engineering construction and the grass sward is important to minimise any movement of material as a result of water ingress. The grass sward will be subject to an annual maintenance regime and excessive weed growth will be controlled by a combination of herbicides and mechanical means.

Reinstatement: Ground Preparation

3.28 Overburden will be replaced and levelled so that after replacement of the soils the contours will conform to those of the proposed restoration plan and will marry into the surrounding land. The overburden will be inspected by the MPA and the plan of the restored overburden area signed to confirm that it complies with the relevant planning condition.

3.29 Prior to the placement of subsoil the surface of the overburden will be scarified to improve the interface and to form a 'key' between the overburden and the subsoil.

Reinstatement: Soil Replacement

3.30 Topsoil and subsoil will be replaced using hydraulic shovels, back hoes, dozers and dump trucks to a uniform average thickness over the designated areas.

3.31 The type of plant employed will be determined by the soil quality, ground conditions and operational efficiency. The type of plant and method of operation will be selected to avoid damage to the soil or compaction to the soil profile and will be consistent with the established best practice in this specialised field, where large volumes of soils and areas of land are routinely stripped, stored and restored to their final landform.

3.32 Subsoil and topsoil will be spread sequentially over the prepared overburden surface. As the soil is replaced, the reinstated subsoil will form an outer margin to the reinstated topsoil in order to prevent any losses of this valuable resource. The haulage plant will run on the lowest available horizon.

3.33 Plant and vehicles will not cross any area of replaced subsoil or topsoil, except where essential and unavoidable for the purpose of spreading soils or beneficially treating such areas.

3.34 With the exception of any proposed open water areas, and prior to the placement of topsoil the reinstated subsoil will be ripped to the full depth of each layer, where placed in two layers, or to its full depth, where placed in one layer, and picked to remove stone, wire rope, or other foreign objects capable of impeding normal agricultural and land drainage operations. Any stone larger than 225mm in any dimension, as well as any wire rope or other foreign object will be removed from the loosened surface. These materials will be removed and will either be buried within the overburden or stockpiled for future use. The subsoil surface will then be graded to the required landform and scarified to improve the interface and form a 'key' between the subsoil and the topsoil.

3.35 Where the subsoil is reinstated in two layers the upper subsoil layer will be placed and spread to make up the full profile specified over the loosened lower subsoil layer using hydraulic shovels, backhoes, dozers and dump trucks in such a manner as to avoid compaction of the previously reinstated subsoil.

Where the full depth of subsoil has been spread and graded, this will be ripped and stone picked in one operation, as detailed above.

3.36 Following inspection by the MPA, the plan of the restored subsoil area will be signed to confirm that it complies with the relevant planning condition. Topsoil will then be placed and spread to the average depths specified over the graded subsoil in such a manner as to avoid compacting reinstated soils.

3.37 The spread topsoil will be inspected by the MPA and the plan of the restored topsoil area signed to confirm that it complies with the relevant planning condition. At this point, the aftercare management period on that area of land begins.

3.48 Once the topsoil has been confirmed as having been restored, it will then be harrowed or disced, and prepared for agricultural cultivation by removing any wire or stones larger than 100mm in any direction. This stone will either be buried within the overburden or stockpiled for future use.

3.49 The MPA will be given 2 working days' notice of completion of each of the above subsoil and topsoil restoration stages and given an opportunity to inspect the restored surface, prior to the commencement of any further restoration or cultivation operations.

Restored Soil Profiles

3.51 The Soils Handling Strategy is indicative of the methods to be adopted to handle the soils.

3.53 In the event that surplus volumes of topsoil, subsoil or soil making materials are available for reinstatement the materials will be utilised to improve the soil profiles in liaison and agreement with the Mineral Planning Authority.

4 Aftercare Management of Restored Land

4.1 Drawing No.36DO3 of the Environmental Statement forms the basis of the proposed aftercare scheme.

4.2 Before 30th September of every year during the Aftercare Management Period, and not less than four weeks prior to the Annual Review Meeting, an annual report in accordance with current guidelines will be submitted to the MPA and land-owners, recording the operations carried out on the land since the date of restoration, or the previous aftercare meeting, and setting out the intended operations for the next 12 months.