Environmental Statement: Impact Assessment on Agricultural Land Quality and Soil Resources

Proposed Mineral Extraction

Western Extension of Denbigh Quarry, Wales

Prepared for:
Breedon Southern Ltd

Prepared by:
R W Askew BSC(Hons) MSc MISoilSci CSci
Askew Land and Soil Ltd

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Our interpretation of the site characteristics is based on available data made during our desktop study and Agricultural Land Classification (ALC) / soil survey. This report has assessed the characteristics of the site in relation to the assessment of its Agricultural Land Classification (ALC). It should not be relied on for alternative end-uses or for other schemes. This report has been prepared solely for the benefit of Breedon Southern Ltd. No warranty is provided to any third party and no responsibility or liability will be accepted for any loss or damage in the event that this report is relied upon by a third party or is used in circumstances for which it was not originally intended.

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NON TECHNICAL SUMMARY

This impact assessment was commissioned by Breedon Southern Ltd ('the Applicant') to assess the likely significant environmental effects of mineral extraction, infilling and restoration, henceforth referred to as 'the Proposed Scheme', on agricultural land quality and soil resources for the western extension of Denbigh Quarry, Wales, LL16 3YE (the 'Site'). The location and extent of the proposed scheme is shown on **Figure 1**.

The development proposal involves the winning and working of limestone from the extension area, with restoration to amenity/agriculture (Calcareous Grassland).

The land at the Site is covered by soils in the East Keswick 3 association are typical brown earths, which are developed in deep, well drained slightly stony fine loamy drift. The association includes similar deep brown earths and shallower loamy soils over limestone. The association occurs on flat and gently undulating land where limestone exposures form a small but significant part of the landscape. These soils are well drained (Wetness Class I) and artificial drainage is not necessary since excess winter rain passes readily through the soils and into widely jointed limestone.

A detailed Agricultural Land Classification (ALC) survey of agricultural land at the Site was carried out on the 4th September 2019. This involved examination of the soil's physical properties at 6 locations, as shown on **Figure 1**.

The Proposed Scheme would involve soil on approximately 1.5 ha of Grade 2 and approximately 2.5 ha of subgrade 3a agricultural land being stripped and stored for reuse on site, in part, for the restoration of Calcareous Grassland (see Section 5.0). It is predicted that the restored soil profile would produce land of ALC Grade 4 to Grade 5, i.e. restricted to grassland – most likely permanent grassland or rough grazing.

Therefore, the Proposed Scheme will adversely affect approximately 1.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Grade 2 (very high sensitivity). The significance of the residual, direct, permanent effect is assessed as being **minor, which is not significant**.

In addition, the Proposed Scheme will adversely affect approximately 2.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Subgrade 3a (high sensitivity). The significance of the residual, direct, permanent adverse effect is assessed as being **minor, which is not significant**.

The quality and quantity of soil resources (topsoil and subsoil) available for reuse at the site will be identified and safeguarded in the Soil Resource Strategy (SRS) set out in Section 5.0, following best practice techniques for soil handling. By protecting soil resources in this way, the significance of the residual, direct, temporary effect of the Proposed Development on soil resources would be **minor, which is not significant.**

The calcareous grassland would be managed by grazing an appropriate stocking density of sheep. No additions of inorganic fertilizer or pesticides/fungicides would be used. It is predicted that the restored agricultural/calcareous grassland soil profile described in Table 5.1 would be permeable and well drained (Wetness Class I). Therefore, it is not necessary to provide any supplementary drainage.

1 INTRODUCTION

1.1 Background

1.1.1 This impact assessment was commissioned by Breedon Southern Ltd ('the Applicant') to assess the likely significant environmental effects of mineral extraction, infilling and restoration, henceforth referred to as 'the Proposed Scheme' (see Section 1.3 below), on agricultural land quality and soil resources for the western extension of Denbigh Quarry, Wales, LL16 3YE (the 'Site'). The location and extent of the proposed scheme is shown on **Figure 1**.

1.1.2 Denbighshire County Council (DCC) has determined that the Proposed Scheme requires an Environmental Impact Assessment (EIA). This report forms part of the Environmental Statement (ES) which accompanies the mineral planning application.

1.2 Scope of Agricultural Impact Assessment

1.2.1 The Welsh Government (WG) has been consulted by DCC in order to determine what information on agricultural land quality and soil should be included in the ES, and how these topics should be assessed. The WG provided DCC with an EIA Scoping Opinion response on 29th July 2019, an extract of which is given as **Appendix A**. This report provides the information required by DCC/WG in the Scoping Opinion response.

1.2.2 This report describes the relevant legislation and policy context; the methods used for assessment and details of the criteria used to determine significance; the baseline conditions at and surrounding the Site; the potential impacts and effects as a result of constructing and operating the proposed scheme; any mitigation or control measures required to reduce or eliminate adverse effects; and the subsequent residual effects and likely significant effects associated with the proposed scheme.

1.3 Summary of Proposed Scheme

1.3.1 As described in the Applicant's EIA Scoping Opinion request (July, 2019) and the main ES, the Proposed Scheme extends to an area of 5 hectares. The development proposal involves the winning and working of limestone from the extension area, with restoration to amenity/agriculture (pasture). The proposed extension occupies agricultural land to the west of the existing Denbigh Quarry operations, currently used for pasture. The proposed restoration for the extension area would involve:

- creation of a Priority Habitat (Calcareous Grassland) along the western part of the main quarry floor with a gentle slope to allow for natural drainage and also on the former access/office/weighbridge area;
- the creation of two surface water catchments allowing for natural soakaway to the underlying limestone in the main quarry and utilisation of the retained settlement lagoons/discharge, in a more sympathetic layout in the eastern catchment. This

retention and new profile/layout will preserve and enhance the Great Crested Newt presence that has been identified in this area;

- the formation of woodland on the northern end of the site which has been brought back up to an elevation close to original ground levels improving the connectivity between Crest Mawr SSSI and Coed Parc Pierce woodland. Retention of the screen planting around the extension area to form a vegetation link between the existing mature woodland around the south of the site and Crest Mawr SSSI. Natural regeneration of trees and shrubs assisted by the addition of soil forming materials;
- the importation of up to 100,000 tonnes of inert waste per annum to achieve a higher elevation of restoration in the northern end of the site from 2022.

1.3.2 In addition, south-facing slopes that are visible from Denbigh may be hydroseeded in order to encourage vegetation growth and reduce the contrast of the rock with the adjacent vegetation.

1.4 Assessment Methodology

1.4.1 This impact assessment has been carried out by Robert Askew who is a Chartered Scientist (CSci) and a Professional Member (MISoilSci) of the British Society of Soil Science (BSSS). Rob is also a Registered Environmental Impact Assessor with the Institute of Environmental Management and Assessment (IEMA). Rob meets the requirements of the BSSS Professional Competency Scheme for Agricultural Land Classification (ALC) (see IPSS[1] PCSS Document 2 '*Agricultural Land Classification of England and Wales*', given as **Appendix B**). The Professional Competency Scheme is endorsed, amongst others, by the Welsh Government, the Science Council, and the Institute of Environmental Assessment and Management (IEMA) (see Appendix B also).

1.4.2 This assessment is based upon the findings of a study of published information on climate, geology and soil in combination with a soil investigation carried out in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF) [2] 'Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land', October, 1988 (henceforth referred to as the 'the ALC Guidelines').

1.4.3 The Agricultural Land Classification (ALC) system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The ALC system divides agricultural land into five grades (Grade 1 'Excellent' to Grade 5 'Very Poor'), with Grade 3 subdivided into Subgrade 3a 'Good' and Subgrade 3b 'Moderate'. Agricultural land classified as Grade 1, 2 and Subgrade 3a falls in the 'best and most versatile' category within the Planning Policy Wales (PPW) December 2018.

[1] The Institute of Professional Soil Scientists (IPSS) has been incorporated within the Professional Practice Committee, which is the chartered and professional body of the British Society of Soil Science (BSSS).

[2] The Ministry of Agriculture, Fisheries and Food (MAFF) was incorporated within the Department for Environment, Food and Rural Affairs (Defra) in June 2001

Further details of the ALC system and national planning policy implications are set out in Section 2.0 of this report, and **Appendix C** 'Agricultural Land Classification: Frequently Asked Questions (WG, December 2017).

1.4.4 A detailed ALC survey of agricultural land at the Site was carried out in September 2019. This involved examination of the soil's physical properties at 6 locations, as shown on **Figure 1**. The sample locations were located using a hand-held Garmin E-Trec Geographic Information System (GIS) to enable the sample locations to be relocated for verification, if necessary. The soil profile was examined at each sample location to a maximum depth of approximately 1.2 m by hand with the use of a 5 cm diameter Dutch (Edleman) soil auger. The soil profile at each sample location was described using the 'Soil Survey Field Handbook: Describing and Sampling Soil Profiles' (Ed. J.M. Hodgson, Cranfield University, 1997). The findings of the ALC/soil survey are set out in Section 3.0.

1.4.5 A sample of topsoil was collected at three locations, i.e. auger bores 2, 4 and 6, as shown on **Figure 1**. The samples were sent to an accredited laboratory for particle size analysis, i.e. the proportions of sand, silt and clay. This is to determine the definitive texture class of the topsoil, especially with regard to distinguishing between medium clay loams (i.e. <27% clay), heavy clay loams (27% to 35% clay) and clays (>35% clay). See Section 3.0 for details.

1.5 Structure of the Remainder of this Impact Assessment Report

1.5.1 The remainder of this report is structured as follows:

- Section 2 - Impact Assessment Methodology;
- Section 3 – Baseline Information: Agricultural Land Quality and Soils;
- Section 4 – Impact Assessment;
- Section 5 – Mitigation; and
- Section 6 – Residual Effects.

2 IMPACT ASSESSMENT METHODOLOGY

2.1 Legislation and Policy

2.1.1 Soil is a key component of the environment, alongside air and water. Following amendments to the EU Environmental Impact Assessment (EIA) Directive in 2014, likely significant effects on 'land' is required to be assessed under the EIA Regulations in 2017. The legislative framework for this assessment of soil and agriculture is summarised as follows:

- Annex III of European Commission (EC) Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment. The initial Directive of 1985 and its three amendments (i.e. Directive 97/11/EC, Directive 2003/35/EC, and Directive 2009/31/EC) have been codified by Directive 2011/92/EU of 13 December 2011. Directive 2011/92/EU has been amended in 2014 by Directive 2014/52/EU; and

- The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (Welsh Statutory Instrument SI 2017/567). These Regulations consolidate with amendments the provisions of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 and subsequent amending instruments and were implemented on 16th May 2017.

2.2 Planning Policy Wales (PPW) December 2018

2.2.1 National planning policy guidance on development involving agricultural land is set out in paragraphs 3.54 and 3.55 of Planning Policy Wales (PPW) as follows:

'3.54 Agricultural land of grades 1, 2 and 3a of the Agricultural Land Classification system (ALC) is the best and most versatile, and should be conserved as a finite resource for the future.'

'3.55 When considering the search sequence and in development plan policies and development management decisions considerable weight should be given to protecting such land from development, because of its special importance. Land in grades 1, 2 and 3a should only be developed if there is an overriding need for the development, and either previously developed land or land in lower agricultural grades is unavailable, or available lower grade land has an environmental value recognised by a landscape, wildlife, historic or archaeological designation which outweighs the agricultural considerations. If land in grades 1, 2 or 3a does need to be developed, and there is a choice between sites of different grades, development should be directed to land of the lowest grade.'

2.3 Technical Advice Note 6

2.3.1 Planning policy regarding development involving agricultural land which is set out in Planning Policy Wales published in December 2018 (see above) is supplemented by Technical Advice Note (TAN) 6 'Planning for Sustainable Rural Communities' (July, 2010).

2.3.2 TAN6 provides advice on areas including sustainable rural communities and economies, rural affordable housing, rural enterprise dwellings, one planet developments, sustainable rural services and sustainable agriculture. Specific advice for development involving agricultural land is given at Section 6.2 of TAN6. Paragraph 6.2.1 states that:

'*When preparing development plans and considering planning applications, planning authorities should consider the quality of agricultural land and other agricultural factors and seek to minimise any adverse affects on the environment*.'

2.4 Denbighshire Local Development Plan 2006-2021

2.4.1 The current local plan, 'Denbighshire Local Development Plan' was formed in 2006, and then reviewed in December 2017. The local plan contains SA Objective 10 'Safeguard soil quality and function and maintain long term productivity of agricultural land' regarding the best and most versatile agricultural land, which guides:

'Will it reduce or increase the chances of soil contamination? Safeguard agricultural soil quality particularly the best and most versatile land (grades 1, 2 and 3A in the national classification)?

2.5 Best Practice Guidance

2.5.1 Best practice for the handling of soil will be followed, as set out in MAFF (2000) '*Good Practice Guide for Handling Soils*' (Sheets 1 to 4 are of main relevance to this assessment)[3].

2.6 Determining Significance

2.6.1 As described the Institute of Environmental Management and Assessment's (IEMA) EIA Guidelines (2004)[4], '…the assessment of significance is based on the characteristics (or magnitude) of the impact and the sensitivity of the receptor…'

2.7 Magnitude of Effect

I. Agricultural Land Quality

2.7.1 The magnitude of the predicted impact on agricultural land quality is assessed as 'High', 'Medium', 'Low' or 'Very Low' following the criteria given in Table 2.1 below.

[3] Ministry of Agriculture, Fisheries and Food (MAFF) (2000) '*Good Practice Guide for Handling Soils*' (Sheets 1 to 4). Available online @ http://webarchive.nationalarchives.gov.uk/20090306103114/http:/www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm

[4] Institute of Environmental Management and Assessment (IEMA') (2004) 'Guidelines for Environmental Impact Assessment'

Table 2.1: Impact Magnitude for Agricultural Land	
Impact Magnitude	**Definition**
Very High	Gives rise to an irreversible and permanent (>25 year) long term loss of more than 20 ha agricultural land of that grade or predicted long term reduction in ALC grade on more than 20 ha agricultural land of that grade (see Note 1).
High	Gives rise to an irreversible and permanent (>25 year) long term loss of between 5 and 20 ha of agricultural land of that grade, or predicted long term reduction in ALC grade on between 5 and 20 ha of agricultural land of that grade.
Medium	Development is 5 ha or more and temporary (< 25 years), or potentially 'reversible' such as soft uses that could be returned relatively easily back to agricultural land. Some adverse on-site impacts anticipated e.g. reduced yields, increased management inputs but recovery predicted in the short to medium term (within 5-10 years, see Note 2) following end of use without permanent reduction in ALC grade provided appropriate mitigation is in place.
Low	Affects < 5ha of agricultural land or with short term effects with no material reduction in ALC grade of development site.
Very Low	Non-agricultural land
Note 1: Magnitude assessments reflect the national agricultural interest embodied in the BMV consultation threshold under the Town and Country Planning (Development Management Procedure) (England) Order 2015 (20ha); and at the lower magnitude (5ha) follows the applicable thresholds and criteria of EIA Regulations 2017, Schedule 2 (10)(b). and threshold for agricultural permitted development rights.	
Note 2: Based on 5 year aftercare period for minerals development, to allow soil structure to develop post soil disturbance.	

II. Soil Resources

2.7.2 The magnitude of the predicted impact on soil resources may be assessed as 'High', 'Medium', 'Low' or 'Very Low' following the criteria given in Table 2.2 below.

Table 2.2: Magnitude of Impact - Soil Resources	
Impact Magnitude	**Soil Resources**
High	50,000 m^3 of soil or more. Based on soil resources within 20.0 ha (200,000 m^2) of land area or more, affected by the development with an average 0.25m (25 cm) layer of soil (topsoil or subsoil) (see Note 1).
Medium	25,000 m^3 to 49,999 m^3 of soil. Based on soil resources within 10.0 ha to 19.9 ha (100,000 m^2 to 199,999 m^2) of land area, with an average 0.25m (25 cm) layer of soil (topsoil or subsoil).
Low	12,500 m^3 to 24,999 m^3 of soil.

Table 2.2: Magnitude of Impact - Soil Resources	
Impact Magnitude	**Soil Resources**
	Based on soil resources within 5.0 ha to 9.9 ha (50,000 m^2 to 99,999 m^2) of land area affected by the development, with an average 0.25m (25 cm) layer of soil (topsoil or subsoil) (See Note 2).
Very Low	12,499 m^3 or less. Based on soil resources within 4.9 ha or less (49,999 m^2 or less) of land area affected by the development, with an average 0.25m (25 cm) layer of soil (topsoil or subsoil).
Note 1: Magnitude assessments reflect the national agricultural interest embodied in the BMV consultation threshold of 20 ha under TAN6, Annex B2; and at the lower magnitude (5ha) follows the applicable thresholds and criteria of the Welsh EIA Regulations 2017 (Welsh S.I. No. 567), Schedule 2 (10)(b) and threshold for agricultural permitted development rights.	
Note 2: A threshold of 5.0 ha follows the applicable thresholds and criteria of the Welsh EIA Regulations 2017 (Welsh S.I. No. 567), Schedule 2 (10), and threshold for agricultural permitted development rights.	

2.8 Sensitivity of Receptors

I. Agricultural Land Quality

2.8.1 For the purpose of this assessment, the sensitivity of agricultural land is assessed as Very high', 'High', 'Medium', 'Low' or 'Very low' following the criteria given in Table 2.3 below.

Table 2.3: Receptor Sensitivity - Agricultural Land Quality	
Value	**Receptors**
Very high	Grade 1 and Grade 2 agricultural land
High	Subgrade 3a agricultural land
Medium	ALC Subgrade 3b agricultural land
Low	Grade 4 or 5 agricultural land
Very low	Previously developed land formerly in hard uses, with little potential to return to agriculture

II. Soil

2.8.2 For the purpose of this assessment, the sensitivity of soil is assessed as 'High', 'Medium', 'Low' or 'Very Low' following the criteria given in Table 2.4 below.

Table 2.4: Receptor Sensitivity - Soil	
Value (Sensitivity)	**Descriptor**

High	Soil types with low resilience to structural damage when being handled: heavy soils with >27% clay content: heavy silty clay loam (HZCL), heavy clay loam (HCL), sandy clay (SC), silty clay (ZC), clay (C); where average annual rainfall is 700mm or greater.
Medium	Soil types with moderate resilience to structural damage when being handled: - Light textured soils: sand (S), loamy sand (LS), sandy loam (SL), sandy silt loam (SZL); where average annual rainfall is more than 1000mm; - Medium textured soils with <27% clay content: silt loam, medium silty clay loam (MZCL), medium clay loam (MCL), sandy clay loam (SCL); where average annual rainfall is 1000mm or greater; - Heavy soils with >27% clay content: heavy silty clay loam (HZCL), heavy clay loam (HCL), sandy clay (SC), silty clay (ZC), clay (C); where average annual rainfall is less than 700mm.
Low	Soil types with high resilience to structural damage when being handled: Light textured soils: sand (S), loamy sand (LS), sandy loam (SL), sandy silt loam (SZL); where average annual rainfall is less than 1000mm.
Very Low	Soil types unsuitable for reuse in restoring agricultural land, reuse in residential gardens, reuse in landscaping schemes, or reuse in ecological schemes, etc. For example, Made Ground/contaminated land.

2.9 Significance Matrix

2.9.1 The significance of the predicted impacts, which may be beneficial (positive) or adverse (negative), agricultural land quality and soil resources can be assessed as either 'Major', 'Moderate', 'Minor' or 'Negligible' according to the magnitude of the effect and sensitivity of the receptor, as set out in the Impact Assessment Matrix (IAM) given as Table 2.5.

Table 2.5: Impact Assessment Matrix – Agricultural Land Quality and Soil Resources

Magnitude of Impact	**Sensitivity of Receptor**				
	Very High	**High**	**Medium**	**Low**	**Very Low**
Very High	Major – Significant	Major - Significant	Moderate-Significant	Minor - Not Significant	Negligible - Not Significant
High	Major*/ Moderate – Significant	Major*/ Moderate - Significant	Minor - Not Significant	Minor - Not Significant	Negligible - Not Significant
Medium	Moderate – Significant	Moderate - Significant	Minor - Not Significant	Minor - Not Significant	Negligible - Not Significant

Low	Minor - Not Significant	Minor - Not Significant	Minor - Not Significant	Negligible - Not Significant	Negligible - Not Significant
Very Low	Negligible - Not Significant	Negligible - Not Significant	Negligible - Not Significant	Negligible - Not Significant	Negligible - Not Significant
*Where total of Grades 1, 2 and 3a is 20 ha or more.					

3 BASELINE INFORMATION: AGRICULTURAL LAND QUALITY AND SOILS

3.1 Background

3.1.1 This section of the impact assessment provides baseline conditions within the study area (i.e. mineral application boundary) in terms of agricultural land quality and soils. As described in Section 1.4 'Assessment Methodology', a detailed Agricultural Land Classification (ALC) and soil survey was carried out at the Site in September 2019. A full copy of the technical ALC report, including (i) a log of soil profiles recorded on Site, (ii) a soil pit description and (iii) the results of the laboratory analysis of topsoil Particle Size Distribution (PSD), is given as **Appendix D**.

3.2 Agricultural Land Classification

3.2.1 Following the approach of the MAFF Agricultural Land Classification (ALC) Guidelines (1988), it is necessary to consider the baseline conditions within the Site in terms of the main limiting factors to agricultural land quality, which are:

- climate;
- site;
- soil; and
- interactive limitations.

3.3 Climate

3.3.1 Interpolated ALC climate data[5] for the study area is given for British National Grid (BNG) reference SJ04776708 at an elevation of 143 metres (m) Above Ordnance Datum (AOD) in Table 3.1 below.

Table 3.1: Climate Data for the Western Extension of Denbigh Quarry

Climate Parameter	SJ04776708
Average Altitude (m)	143
Average Annual Rainfall (mm)	830
Accumulated Temperature above 0˚C (January – June)	1313
Moisture Deficit (mm) Wheat	84
Moisture Deficit (mm) Potatoes	68
Field Capacity Days (FCD)	193
ALC grade according to climate	2

[5] Meteorological Office (1989). Climatological data for agricultural land classification: Gridpoint datasets of climatic variables, at 5km intervals, for England and Wales. Bracknell. ISBN 0861802497

3.3.2 With reference to Figure 1 '*Grade according to climate*' on page 6 of the ALC Guidelines, the quality of agricultural land at the Site is limited by overall climate, meaning that agricultural land at the Site can be no higher than Grade 2 in the absence of any other limiting factor, i.e. site, soil, and/or interactive limitations (as described below).

3.4 Site

3.4.1 The approximately 5 ha Site is located to the northwest of Denbigh, Wales, as shown on **Figure 1**. It is centred at National Grid Reference SJ04776708. The Site is broadly triangular in shape. It is bordered by Denbigh Quarry to the east, woodland at Crest Mawr to the northwest, and agricultural land to the south.

3.4.2 With regard to the ALC Guidelines, agricultural land quality can be limited by one or more of three main site factors as follows:

- gradient;
- micro-relief (i.e. complex change in slope angle over short distances); and
- risk of flooding.

I. Gradient

3.4.3 The land at the Site lies on a gentle, southeast facing slope. It has an elevation of approximately 160m AOD at the highest point in the northwest corner, and 143m AOD at the lowest point in the southeast. The quality of agricultural land is not limited by gradient, as the angle of slope does not exceed 7° (as per Table 1 of the ALC Guidelines, 1988).

II. Micro-relief

3.4.4 The quality of agricultural land at the Site is not limited by micro-relief (i.e. complex changes in slope angle and direction over short distances).

III. Risk of Flooding

3.4.5 From a Welsh Government Flood Map online[6], the Site is located in Flood Zone A, which is considered to be at little or no risk of fluvial flooding. It is predicted that the quality of agricultural land is not limited by flood risk, re Table 2 '*Grade according to flood risk in summer*' and Table 3 '*Grade according to flood risk in winter*' of the ALC Guidelines.

3.5 Soil

I. Geology/Soil Parent Material

[6] Available online https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en

3.5.1 British Geological Survey (BGS) information available online has been utilised to show the Superficial Deposits (Drift) and Bedrock underlying the Site[7]. This provides information on the geological materials from which the soil has formed.

3.5.2 The Site is mainly underlain by bedrock described by the BGS (1:50,000) as Clwyd Limestone Group (limestone).

3.5.3 The BGS map (1:50,000) indicates that the Site is not covered by any superficial deposits, except for some glacial till (Devensian, diamicton) in a small area in the east.

II. Soil

3.5.4 Provisional information for soils at the Site was gathered from the Soil Survey of England and Wales (SSEW) soil map of Wales (Sheet 2) at a scale of 1:250,000 and accompanying Bulletin No. 11 '*Soils and their Use in Wales*' (C.C, Rudeforth et al. Harpenden, 1984). The SSEW information indicates the land at the Site is covered by soils grouped in the East Keswick 3 association.

3.5.5 As described by the SSEW, soils in the East Keswick 3 association are typical brown earths, which are developed in deep, well drained slightly stony fine loamy drift. The association includes similar deep brown earths and shallower loamy soils over limestone. The association occurs on flat and gently undulating land where limestone exposures form a small but significant part of the landscape. These soils are well drained (Wetness Class I) and artificial drainage is not necessary since excess winter rain passes readily through the soils and into widely jointed limestone.

III. Soil Survey

3.5.6 The findings of the detailed soil survey carried out in September 2019 determined one main type of soil, i.e. Soil Type 1, as described below. A detailed description of the six auger bores and one soil pit examined on Site is given in **Appendix D**.

Soil Type 1 (medium sensitivity)

3.5.7 The main type of soil profile at the Site comprises brown (Munsell colour 10YR4/3), non-calcareous, very slightly stony, medium clay loam topsoil with a moderate, medium granular structure. At a depth of approximately 20cm, the topsoil merges over an abrupt, smooth horizon boundary to yellowish brown (Munsell colour 10YR5/4), non-calcareous, very slightly stony, medium clay loam upper subsoil with a moderate, medium subangular blocky structure. At an approximate depth below ground level of 40cm, to the full auger depth (120cm), the lower subsoil comprises yellowish brown (Munsell Colour 10YR5/6), non-calcareous, moderately stony, medium clay loam with a moderate, coarse angular blocky structure. The

[7] British Geological Survey 'Geology of Britain Viewer'. Available online @ http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html

lower subsoil does not constitute a slowly permeable layer (SPL) in terms of the ALC Guidelines, but in places it contains a few, distinct ochreous mottles (Munsell colour 7.5YR6/8) and a few, fine manganese (Mn) concretions. With reference to Table 13 of the ALC Guidelines, these soil profiles are considered to be well drained (Wetness Class I).

Soil Type 1 Variant (high sensitivity)

3.5.8 As a variation to Soil Type 1, the topsoil in the south of the Site (probably associated with a superficial deposit of glacial till), was determined by hand-texturing and laboratory particle size distribution (PSD) as heavy clay loam, which is a soil receptor of high sensitivity (i.e. auger bore locations 4 and 6).

IV. Laboratory Analysis of Topsoil Texture

3.5.9 In order to substantiate topsoil texture determined during the ALC survey by hand-texturing, a sample of topsoil was collected at auger locations 2, 4 and 6 (see Figure 1). All three samples were sent to an accredited laboratory for analysis of particle size distribution (PSD), based on the British Standard Institution particle size grades. The certificate of analysis is given in **Appendix D**. The results of the PSD analysis are shown in Table 3.2 below:

Table 3.2: Topsoil Texture (re Table 10, ALC Guidelines)

Topsoil Sample Location (See Fig. 1)	% sand 0.063-2.0 mm	% silt 0.002-0.063 mm	% clay <0.002 mm	ALC Soil Texture Class
Auger Bore 2	22	56	22	Medium Clay Loam
Auger Bore 4	28	43	29	Heavy Clay Loam
Auger Bore 6	24	48	28	Heavy Clay Loam

3.6 Interactive Limitations

3.6.1 From the published information above, together with the findings of the detailed soil survey, it has been determined that the quality of agricultural land at the Site is limited by soil wetness, as described below.

I. Soil Wetness

3.6.2 From the ALC Guidelines, a soil wetness limitation exists where '*the soil water regime adversely affects plant growth or imposes restrictions on cultivations or grazing by livestock*'.

3.6.3 Agricultural land quality at the Site is limited by soil wetness as per Table 3.4 below (based on Table 6 'Grade According to Soil Wetness – Mineral Soils' in the ALC Guidelines). This table shows only combinations of wetness class and topsoil texture found at the Site.

3.6.4 The soil at the Site (Types 1 and 2) was assessed as being well-drained (Wetness Class I), as shown on the Soil Profile Logs given in **Appendix D**.

Table 3.3: ALC Grade According to Soil Wetness

Wetness Class	Texture of the Top 25 cm	176-225 Field Capacity Days
I	Sandy Loam Medium Silty Clay Loam, Medium Clay Loam* Heavy Silty Clay Loam, Heavy clay loam** Silty Clay, Clay	1 2 3a 3b
Key * <27% clay; and ** >27% clay		

3.6.5 In a climate area with 193 field capacity days (FCD), well drained soil profiles in Wetness Class I with medium clay loam topsoil are limited by soil wetness to Grade 2. Where the topsoil is heavy clay loam, well drained soil profiles (Wetness Class I) are limited by soil wetness to Subgrade 3a (re Table 6 of the ALC Guidelines).

3.7 ALC Grading at the Site

Grade 2 (agricultural land quality receptor of very high sensitivity)

3.7.1 From the published information above, together with the findings of the detailed ALC survey, it has been determined that the quality of agricultural land at the Site cannot be more than Grade 2 due to an overriding climate limitation. In addition, well drained soil profiles (Wetness Class I) with medium clay loam topsoil are limited by soil wetness to Grade 2 in this climate area, with 193 Field Capacity Days.

Subgrade 3a (agricultural land quality receptor of high sensitivity)

3.7.2 Where well drained soil profiles (Wetness Class I) have heavy clay loam topsoil, the quality of agricultural land at this Site is limited by soil wetness to Subgrade 3a.

3.7.3 The area and proportion of agricultural land in each ALC grade has been measured from an ALC map given as **Figure 2**. The findings are reported in Table 3.5 below.

Table 3.5: Agricultural Land Classification – Western Extension of Denbigh Quarry		
ALC Grade	**Total (Ha)**	**Total (% of Site)**
Grade 1 (Excellent)	0	0
Grade 2 (Very Good)	1.5	30
Subgrade 3a (Good)	2.5	50
Best and Most Versatile (BMV), i.e. ALC Grade 1, 2 and Subgrade 3a	*4.0*	*80*
Subgrade 3b (Moderate)	0	0
Grade 4 (Poor)	0	0
Grade 5 (Very Poor)	0	0
Other Land / Non-agricultural (including land in existing quarry)	1.0	20
Total	**5.0**	**100.0**

4 IMPACT ASSESSMENT

4.1 Evaluation

4.1.1 The main likely significant environmental effects of the Proposed Scheme on agricultural land quality and soil receptors are:

(i) Loss of agricultural land, particularly the 'best and most versatile' (BMV) agricultural land, i.e. ALC Grades 1, 2 and Subgrade 3a (see NPPF, Section 2.0); and

(ii) Reduction in the quality and quantity of soil resources at the Site which are available for land restoration following mineral extraction.

4.1.2 The method used to assess 'significance' is set out in Section 2.0. The magnitude of impact on agricultural land quality is described in Table 2.1, and the magnitude of impact on soil resources is set out in 2.2. The sensitivity of agricultural land quality is set out in Table 2.3 and the sensitivity of soil receptors is described in Table 2.4. A significance matrix is given as Table 2.5.

4.2 Potential Effects

I. Agricultural Land Quality

4.2.1 From the baseline information given in Section 3.0, the Proposed Scheme will potentially adversely affect approximately 1.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Grade 2 (very high sensitivity). The significance of the effect is assessed as being **minor, which is not significant**.

4.2.2 The Proposed Scheme will potentially adversely affect approximately 2.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Subgrade 3a (high sensitivity). The significance of the effect is assessed as being **minor, which is not significant**.

4.2.3 Mitigation measures to reduce the adverse effect on BMV agricultural land (in this case Grade 2 and Subgrade 3a) are set out in Section 5.0, and the significance of the residual effects of the Proposed Scheme, once mitigation measures have been implemented, are assessed in Section 6.0.

II. Soil Resources

4.2.4 From the magnitude criteria set out in Table 2.2, and the sensitivity of receptors set out in Table 2.4, the significance of the temporary effect of the Proposed Scheme on topsoil and subsoil resources from Soil Type 1 and 2 (agricultural land) is assessed in Table 4.1 and Table 4.2, prior to the implementation of mitigation measures.

Table 4.1: Impact Assessment – Soil Type 1 (Grade 2) (see Figure 2)			
Area of Soil Type (ha and m^2)	**Approximate volume (m^3) (magnitude of impact)**	**Sensitivity of soil receptor**	**Significance prior to the implementation of mitigation measures**
Total Volume of Type 1 Topsoil			
1.5 ha or 15,000 m^2	Thickness of topsoil layer = 0.20m x 15,000 m^2 = **3,000m^3** (no bulking factor) (very low magnitude)	Predominantly medium clay loam topsoil (medium sensitivity)	**Negligible**
Total Volume of Type 1 Subsoil			
1.5 ha or 15,000 m^2	Thickness of subsoil layer = 0.25m x 15,000 m^2 = **3,750m^3** (no bulking factor) (very low magnitude)	Predominantly medium clay loam subsoil (medium sensitivity)	**Negligible**

Table 4.2: Impact Assessment – Soil Type 1 Variant (ALC Subgrade 3a) (see Figure 2)			
Area of Soil Type (ha and m^2)	**Approximate volume (m^3) (magnitude of impact)**	**Sensitivity of soil receptor**	**Significance prior to the implementation of mitigation measures**
Total Volume of Type 1 Topsoil			
2.5 ha or 25,000 m^2	Thickness of topsoil layer = 0.20m x 25,000 m^2 = **5,000m^3** (no bulking factor) (very low magnitude)	Predominantly heavy clay loam topsoil (high sensitivity)	**Temporary Minor adverse - not significant**
Total Volume of Type 1 Subsoil			
2.5 ha or 25,000 m^2	Thickness of subsoil layer = 0.25m x 25,000 m^2 = **6,250m^3** (no bulking	Predominantly heavy clay loam	**Temporary, minor-adverse, not significant**

	factor) (very low magnitude)	subsoil (high sensitivity)	

4.3 Potential Effects – Post Mineral Extraction and Land Restoration

4.3.1 It is predicted that, once minerals have been extracted and the land has been restored, the Proposed Scheme would result in the residual, permanent loss of 1.5 ha of Grade 2 and 2.5 ha of Subgrade 3a, and the restoration of Calcareous Grassland (most likely of Grade 4/Grade 5 quality) in its place.

5 MITIGATION

5.1 Background

5.1.1 This section provides mitigation measures to avoid, reduce or offset the adverse effects of the Proposed Scheme.

5.2 Agricultural Land Quality

5.2.1 As described earlier in Section part of the Proposed Scheme, the proposed restoration for the extension area would involve;

- creation of a Priority Habitat (Calcareous Grassland) along the western part of the main quarry floor with a gentle slope to allow for natural drainage and also on the former access/office/weighbridge area;
- the creation of two surface water catchments allowing for natural soakaway to the underlying limestone in the main quarry and utilisation of the retained settlement lagoons/discharge, in a more sympathetic layout in the eastern catchment. This retention and new profile/layout will preserve and enhance the Great Crested Newt presence that has been identified in this area;
- the formation of woodland on the northern end of the site which has been brought back up to an elevation close to original ground levels improving the connectivity between Crest Mawr SSSI and Coed Parc Pierce woodland. Retention of the screen planting around the extension area to form a vegetation link between the existing mature woodland around the south of the site and Crest Mawr SSSI. Natural regeneration of trees and shrubs assisted by the addition of soil forming materials;
- the importation of up to 100,000 tonnes of inert waste per annum to achieve a higher elevation of restoration in the northern end of the site from 2022.

5.2.2 In addition, south-facing slopes that are visible from Denbigh may be hydroseeded in order to encourage vegetation growth and reduce the contrast of the rock with the adjacent vegetation.

5.2.3 The thickness of the restored soil layers, and corresponding volume of soil required for restoring the Calcareous Grassland, is given in Table 5.1 (below).

Table 5.1: Proposed soil layers for restoring Calcareous Grassland

Depth of restored soil layer below ground	Description of soil resources required for restoring calcareous	Approximate volume of soil resources required for restoring calcareous grassland

level, and approximate thickness of layer (cm)		
0cm-10cm (10cm)	Type 1 Topsoil	45,000m^2 X 0.1m = 4,500m^3
10cm+	Limestone (calcareous) screening material or similar	Available on site

5.2.4 It is predicted that sowing an appropriate calcareous grassland mixture on the restored profile in Table 5.1 above would produce a soil profile of ALC Grade 4 to 5 quality, i.e. mainly suited to grass/permanent pasture or rough grazing.

5.2.5 Surplus topsoil and subsoil excavated during mineral extraction on Site would be utilised in areas to be restored for non-agricultural uses on Site, including screening, as part of the Proposed Scheme.

5.3 Soil Resource Strategy (SRS)

5.3.1 Possible mitigation with regard to the safeguarding and reuse of soil resources on Site in a sustainable manner is described below.

I. General Requirements for Soil Handling

5.3.2 The quality and quantity of soil resources (topsoil and subsoil) within the Site shall be maintained by following the approach of the DEFRA 'Code of Practice for the Sustainable Management and Use of Soil on Construction Sites' (Defra, September 2009) (available online @).

5.3.3 All soil and soil forming materials shall be handled in accordance with MAFF's Good Practice Guide for Handling Soil, Sheets 1 – 4 (handling soil using backacters and dumptrucks). As per: http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm.

5.3.4 The restoration of land for agricultural purposes shall follow the DEFRA 'Guidance for Successful Reclamation of Mineral and Waste Sites', available online @ http://www.sustainableaggregates.com/library/docs/l0276_guidance-full.pdf.

5.3.5 All soil shall only be moved when in a dry and friable condition. For all soil types, no soil handling should proceed during and shortly after significant rainfall, and/or when there are any puddles on the soil surface.

5.3.6 Throughout the period of working, restoration and aftercare, the operator shall take all reasonable steps to ensure that drainage from areas adjoining the Site is not impaired or rendered less efficient by the permitted operations.

5.3.7 The operator shall take all reasonable steps, including the provision of any necessary works, to prevent damage by erosion, silting or flooding and to make proper provision for the disposal of all water entering, arising on or leaving the Site during the permitted operations.

5.3.8 Any oil, fuel, lubricant, paint or solvent within the site shall be so stored as to prevent such material from contaminating topsoil, subsoil, soil forming material, or reaching any watercourse.

5.3.9 Throughout the period of working, restoration and aftercare, the operator shall have due regard to the need to adhere to the precautions for preventing the spread of plant and animal diseases', published by the Government (available online @ https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants).

II. Ground Preparation

5.3.10 Prior to stripping agricultural topsoil, all above-ground vegetation should be cleared off Site, so that the amount of vegetation within the topsoil strip is minimised (this is to minimise the amount of anaerobic decomposition of vegetation / organic matter that will occur within the topsoil stockpiles).

III. Soil Stripping

5.3.11 Before any part of the Site is excavated or traversed by heavy vehicles or machinery or is built upon, or used for the stacking of topsoil, subsoil, soil forming material or overburden, or as a machinery dump or plant yard, or for the construction of a road, all available topsoil and subsoil shall be stripped from that part.

IV. Soil Storage

5.3.12 Bunds for the storage of soils shall conform to the following criteria:

(i) Topsoil and subsoil shall be stored separately.

(ii) Where continuous bunds are used, dissimilar soils shall be separated by a third material, previously agreed in writing with the Mineral Planning Authority (MPA).

(iii) topsoil bunds shall not exceed 3 m in height and subsoil bunds shall not exceed 5 m in height.

(iv) Materials shall be stored like upon like, so that topsoil shall be stripped from beneath subsoil bunds, and subsoil from beneath overburden bunds.

(v) All storage bunds containing soils which are intended to remain in situ for more than 6 months or over the winter period are to be grassed over and weed control and other necessary maintenance carried out to the satisfaction of the MPA. The seed mixture and

the application rates are to be agreed with the MPA in writing no less than one month before it is expected to complete the formation of the storage bunds.

(vi) All topsoil, subsoil, and soil forming material shall be retained on the Site.

V. Soil Placement

5.3.13 The restored soil profile outlined in Table 5.1 (above) will recreate a soil profile of ALC Grade 4 to Grade 5 quality.

5.4 Agricultural Aftercare and Drainage Scheme

5.4.1 The calcareous grassland would be managed by grazing an appropriate stocking density of sheep. No additions of inorganic fertilizer or pesticides/fungicides would be used. It is predicted that the restored agricultural/calcareous grassland soil profile described in Table 5.1 would be permeable and well drained (Wetness Class I). Therefore, it is not necessary to provide any supplementary drainage.

6 RESIDUAL EFFECTS

6.1 Residual Effects – Construction Phase

6.1.1 This section assesses significant residual effects of the Proposed Scheme on agricultural land quality and soil resources, once mitigation measures set out in Section 5.0 are implemented.

6.2 Agricultural Land Quality

6.2.1 The Proposed Scheme would involve soil on approximately 1.5 ha of Grade 2 and approximately 2.5 ha of subgrade 3a agricultural land being stripped and stored for reuse on site, in part, for the restoration of Calcareous Grassland (see Section 5.0). It is predicted that the restored soil profile would produce land of ALC Grade 4 to Grade 5, i.e. restricted to grassland – most likely permanent grassland or rough grazing.

6.2.2 Therefore, the Proposed Scheme will adversely affect approximately 1.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Grade 2 (very high sensitivity). The significance of the residual, direct, permanent effect is assessed as being **minor, which is not significant**.

6.2.3 In addition, the Proposed Scheme will adversely affect approximately 2.5 ha of agricultural land (i.e. low magnitude of impact) in ALC Subgrade 3a (high sensitivity). The significance of the residual, direct, permanent adverse effect is assessed as being **minor, which is not significant**.

6.3 Soil Resources

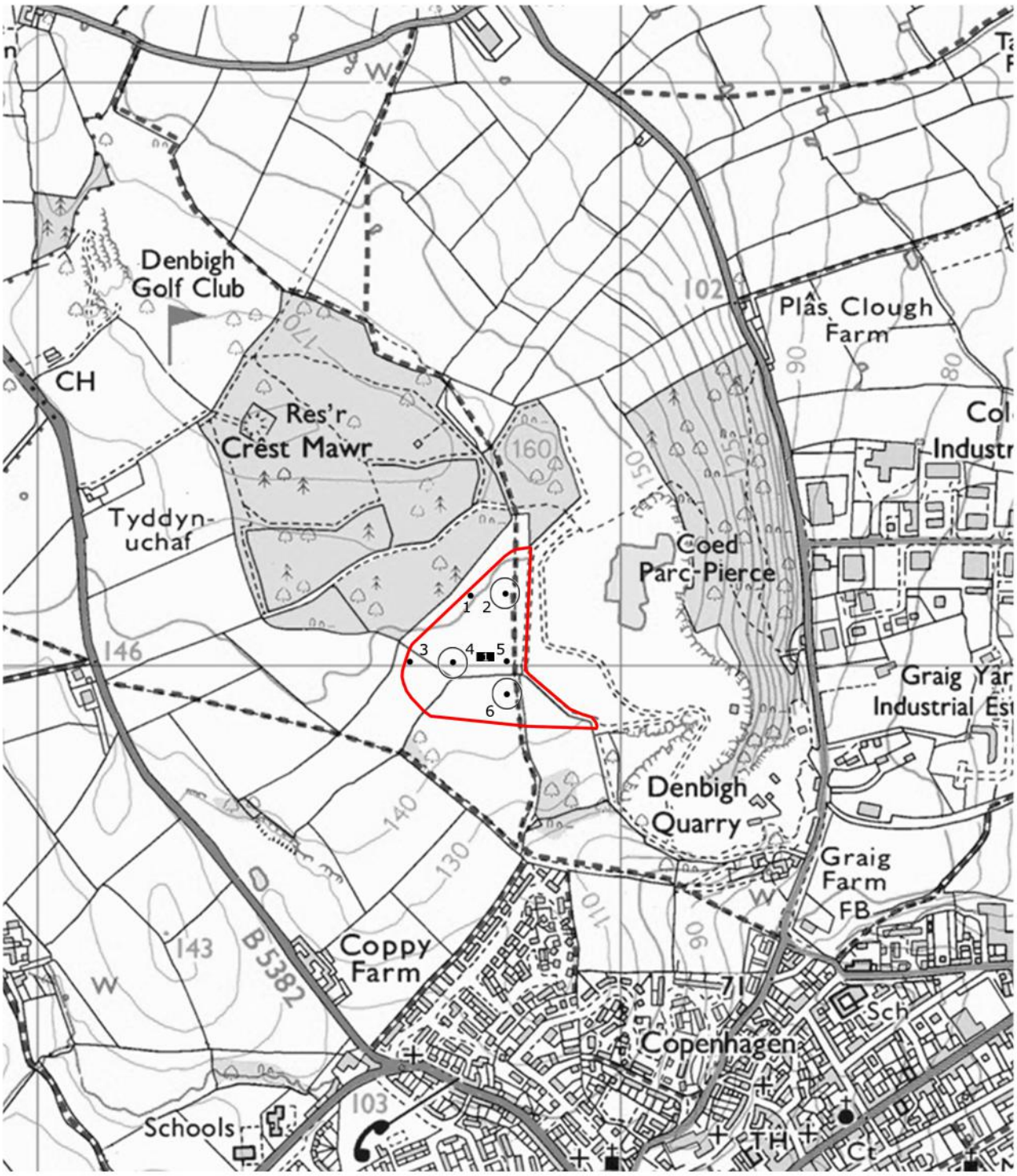
6.3.1 In line with current EU and UK Government thinking, the quality and quantity of soil resources (topsoil and subsoil) available for reuse at the site should be identified and safeguarded in the Soil Resource Strategy (SRS) set out in Section 5.0, following best practice for soil handling.

6.3.2 By protecting soil resources in this way, the significance of the residual effect of the Proposed Development on soil resources would be **negligible**.

6.4 Residual Effects: Post Mineral Extraction

6.4.1 It is predicted that, once minerals have been extracted and the land has been restored, the Proposed Scheme would result in the residual, permanent loss of 1.5 ha of Grade 2 and 2.5 ha of Subgrade 3a, and the restoration of Calcareous Grassland (most likely of Grade 4/Grade 5 quality) in its place.

Figures



Site boundary

Auger location

Topsoil Sample

Soil Pit

N

Client

Breedon Southern Ltd

Project No C662
Dwg. No 01
Scale NTS
Date 14/10/19
Drawn By ELA

Figure 1

Sample Locations

Project Name

Western Extension of Denbigh Quarry, Wales

R W Askew BSc(Hons) MISoilSci MSc CSCi
The Old Stables, Upexe, Exeter, EX5 5ND
Tel: 07753 227 224
Email: rw.askew@btinternet.com

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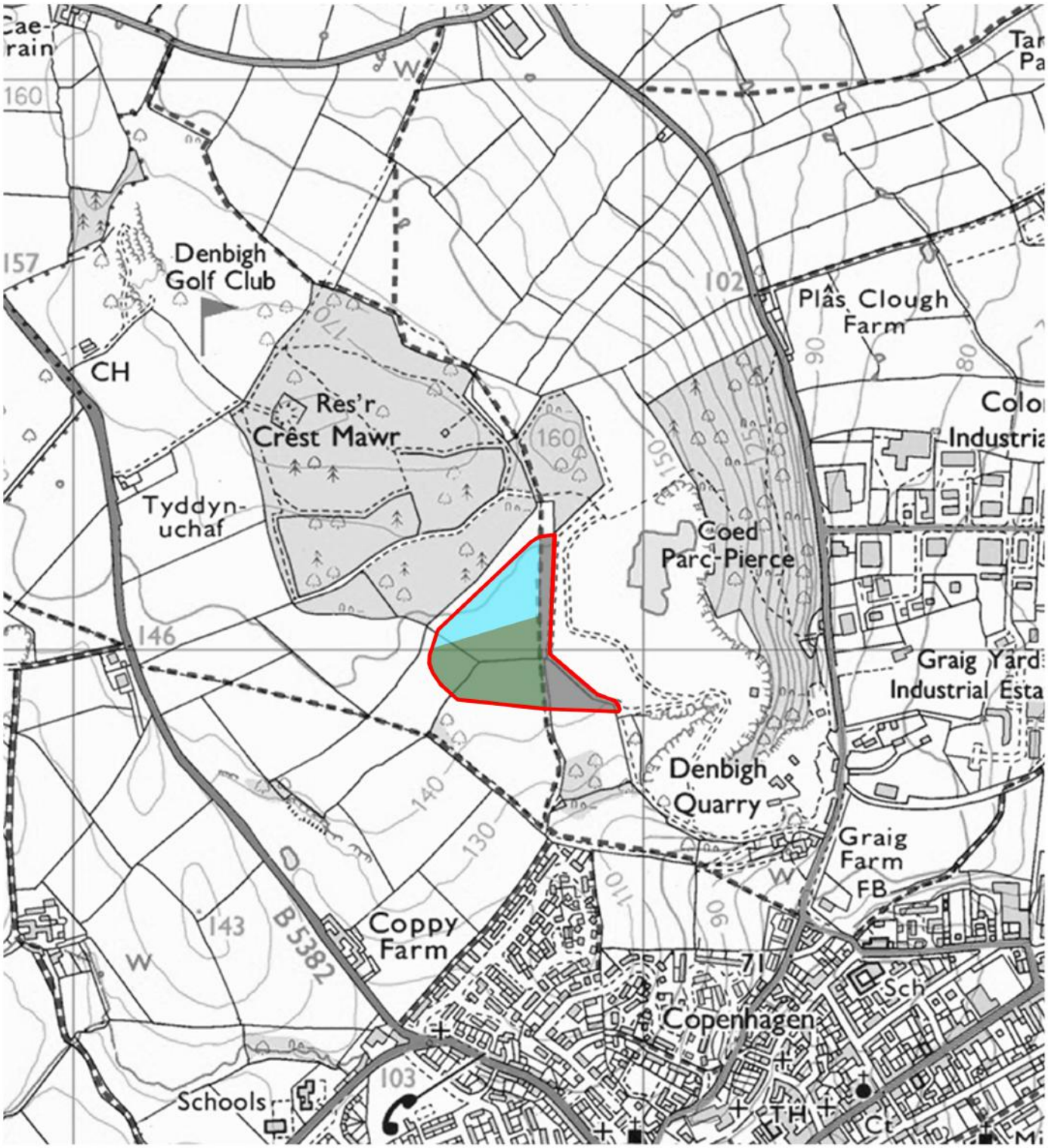

ALC Grade

- Grade 1
- Grade 2
- Subgrade 3a
- Subgrade 3b
- Grade 4
- Grade 5
- Other land

Site boundary

N

Client

Breedon Southern Ltd

Project No C669
Dwg. No 02
Scale NTS
Date 14/10/19
Drawn By ELA

Figure 2:

Agricultural Land Classification

Project Name

Western Extension of Denbigh Quarry, Wales

R W Askew BSc(Hons) MISoilSci MSc CSCi
The Old Stables, Upexe, Exeter, EX5 5ND
Tel: 07753 227 224
Email: rw.askew@btinternet.com

Appendix A:
Extract from Welsh Government EIA Scoping Opinion Consultation, 29th July 2019

Eich cyf / Your ref

Ein cyf / Our ref : 01/2019/0573

Dyddiad / Date : 14 August 2019

Rhif union / Direct dial : 01824 706727

Cyngor sir ddinbych denbighshire County Council

Richard Hunt
PleydellSmithyan Ltd.
20A The Wharfage
Ironbridge
Telford
Shropshire
TF8 7NH

Dear Sir / Madam,

Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017

CAIS / APPLICATION: **01/2019/0573**

CYNNIG / PROPOSAL: **Request for Scoping Opinion relating to the winning and working of limestone from the western extension of Denbigh Quarry**

LLEOLIAD / LOCATION: **Graig Quarry (also known as Denbigh Quarry), Graig Road, Denbigh**

SCOPING OPINION OF DENBIGHSHIRE COUNTY COUNCIL AS LOCAL PLANNING AUTHORITY

This letter is issued in accordance with the above Regulations, in response to your request for a Scoping Opinion from the Local Planning Authority. The Scoping Opinion is issued on the basis of the information contained in your letter dated 01 July 2019, and the EIA Scoping Report (document ref: M18.155.R.002 dated July 2019).

In adopting this Scoping Opinion the County Council has taken into account the consultation responses received, and considered the specific characteristics of the proposal, the type of development and the environmental features likely to be affected by the development. All "development" proposed in the application should be assessed and referred to within the Environmental Statement when the planning application is submitted. This Scoping Opinion seeks to ensure that any Environmental Statement submitted with respect to a planning application for the development proposals described in the Scoping Request includes information that is reasonably required to assess the environmental effects, and allow a determination to take place. Please note that further information may still be required once the Environmental Statement has been submitted.

Any Environmental Statement submitted must contain at least the information referred to in Schedule 4 of the above Regulations. You are reminded that the Statement must address the baseline conditions, likely significant impacts, the probability of effects and the proposed mitigation measures. The information provided should be that which is necessary to demonstrate the risks, likelihood of occurrence and likelihood of any significant impact. This should include an outline of the main alternatives studied by the applicant.

We have consulted with the bodies considered to have an interest in the project by reason of their statutory responsibilities or remit. The Local Planning Authority notified both the Local Member and the Town Council regarding the Scoping Request so that they have been made aware of the Scoping Request and the proposed extension at Denbigh Quarry. Responses have been received from the following bodies, and the opinions set out below are also informed by their comments.

- Natural Resources Wales (NRW)
- Clwyd Powys Archaeological Trust (CPAT)
- Cadw
- Welsh Government Agricultural Land Use Policy Team
- Denbighshire County Council Ecological Officer
- Denbighshire County Council Public Protection Officer (Pollution Control)
- Denbighshire County Council Public Rights of Way (PROW)
- Denbighshire County Council Highways Authority
- Denbighshire County Council Tree Officer

DESCRIPTION OF THE PROPOSAL:

The site subject of the Scoping Opinion is an extension of an existing limestone quarry called Denbigh Quarry (also known as Graig Quarry); an active limestone quarry north of the town of Denbigh. The permitted site comprises approximately 28 hectares of land and the proposed extension area is approximately 5 hectares in extent. The development proposal will comprise 'the winning and working of limestone from the extension area with restoration to amenity/agriculture (pasture)'. Mineral would be removed from a series of working faces through a programme of controlled blasting. It would then be transported to the processing area before undergoing treatment for sale or for supply to the onsite concrete batching works. Removal of mineral from the application site would only take place via the existing access point onto Ffordd y Graig. Output from the quarry extension would not exceed the currently permitted levels of export from the existing quarry amounting to 500,000 tonnes per annum. However, current extraction rates are in the region of 200,000 tonnes per annum and this is not expected to increase as a result of the extension application.

DESCRIPTION OF THE SITE AND SURROUNDINGS:

To the north, west and south the land is rural, predominantly agricultural fields and woodland comprising pasture and a mix of ancient and more recent woodland. Craig Mawr Wood to the north of the proposed extension site is a Site of Special Scientific Interest (SSSI) and another SSSI (Graig Quarry) is situated 150m to the south east of the proposed extension area. Further to the south, at a distance of approximately 250m from the southern boundary of the application site is the northern boundary of the town of Denbigh. The eastern boundary of the proposed extension is the existing quarry which is, itself, bounded on the east by Graig Road/Ffordd y Graig, with the Colomendy Industrial Estate further to the east.

The existing quarry is accessed off Graig Road/Ffordd y Graig via a purpose-built access road that is owned by the operator of the quarry and all access to the extension area would be via the existing site.

The proposed extension area consists of agricultural fields in arable use to the west of the existing working area and to the south of the Crest Mawr woodland. The surrounding area comprises pasture and arable fields.

Please note that dewatering of volumes greater than 20m³/day will now require an abstraction licence from Natural Resources Wales. For more details please see the link below or contact NRW's Water Resources Permitting Team for more advice. https://naturalresourceswales.gov.uk/permits-and-permissions/water-abstraction-and-impoundment/changes-to-water-abstraction-licensing-exemptions/?lang=en

Details on pollution prevention should be included within the ES (see: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/). The site is located on the Clwyd Limestone Group which has been classified as being a Principal Aquifer which is able to support large potable water supply abstractions and is vulnerable to contamination from polluting activities. A method statement detailing the prevention and mitigation measures should also be submitted. Summary of what is needed in the Environmental Statement:

a. Hydrogeological Impact Appraisal.
b. Water Management Plan.
c. Method statement detailing pollution prevention and mitigation measures.

There is a private water supply obtained from a surface water derived well located north east of the site at grid ref. 305217 / 367595. The proposed quarry extension should not have a detrimental effect on the quality or quantity of water supplied to the private water supply.

The site boundary is completely within zone A Flood Risk Zone as per the Development Advice Maps accompanying TAN15. This is considered to be at little or no risk of fluvial flooding and as such a Flood Consequence Assessment is not required for the development.

9. Potential effects on agricultural land and soil resources

The proposed extension occupies agricultural land to the west of the existing Denbigh Quarry operations currently used for pasture. Soils would then be stripped and placed in storage with some of that storage forming an attenuation bund along the southern and north western boundaries.

Agricultural Land Classification (ALC)

The Land, Nature and Forestry Division of Welsh Government does not hold any detailed ALC field survey information for the proposed site. The Predictive ALC Map for Wales notes the site to be Grade 2 and Subgrade 3a.

A detailed ALC Survey (according to the '*Revised Guidelines and Criteria for Grading the Quality of Agricultural Land'* – MAFF 1988) and Physical Characteristics Report will be required for the site to confirm if the land is 'Best and Most Versatile' (BMV) agricultural land, the proportion of grades identified and soil resources available. It is noted in the Request for Scoping Opinion Document (Ref: M18.155.R.002) under paragraph 7.58 that this will be undertaken by the applicants.

The Land, Nature and Forestry Division of Welsh Government would expect to be consulted on the above report and to validate it. Validation is a free of charge service completed by the Land, Nature and Forestry Division of Welsh Government on behalf of the MPA. The surveyor should ensure that the survey report includes the complete auger boring and pit schedule (identifying topsoil and subsoil horizon depths, texture, stoniness, structure, porosity, depth at which gleying comes in and morphology - matrix colour, ped face colour where applicable, mottling), auger boring and pit location plan, and top soil texture analysis results report.

If it is confirmed that the site contains BMV Agricultural Land. The Land, Nature and Forestry Division of Welsh Government expects that the BMV policy sequential test (as per Planning Policy Wales 10 paragraph 3.54 and 3.55) to be applied in full.

10. Traffic and Transportation

It is considered that the scope of the proposed ES to be appropriate and it is noted that the subject of traffic and transportation of vehicles assessing and egressing the quarry would be scoped out.

11. Potential effects on Public Rights of Way

Footpath 508/6 would be diverted from its current position in a south westerly direction, adjacent to the Crest Mawr SSSI and beyond the wood-line, to meet and connect with footpath 508/5.

Whilst Denbigh is the third most populous settlement in the County, it also has a high proportion of people under 60. It's the 8th largest community by area but has only the 11th largest network of paths by distance of the 40 County Communities. When considered as a density of km/km^2 it is 18th in the County. The Community is short of a sufficient path network to meet the needs of the size of settlement if levels of use were to meet the Government's aspirations for health and well-being through activity.

Path 6 is fed by paths 1, 2 and 3 coming out of a condensed housing area of upper Denbigh, path 6 leads to Crest Wood, a SSSI which has a number of informal woodland paths the local public appear to aim for. In addition the public can use this path and connected path 5 to create a circular walk to Henllan and back, avoiding the principle road which is devoid of a footway for most of its length. For this reason the path features as a component of our Community Miles routes 'The Henllan Walk' which was produced with the assistance of Henllan Community Council.

One concern, looking at the proposal, is that any diversion passing the edge of the site would create a significant detour that would be inconvenient and clearly not shorter or more commodious than the present route. More information of the actual level of use for the route at present would be beneficial, such as the placement of user counters on the kissing gates we have installed measuring current footfall. An assessment of the amount of people from the nearby housing areas in upper Denbigh would be also beneficial to establish who presently use the route and on what basis and what impact any changes may have on their aspiration to walk that way.

The Public Rights of Way department and the Planning Department would then be in a better position to determine what the best mitigation measures can be explored to have in place to hopefully ensure the diverted path continues to service the community meeting our expectations to encourage active enjoyment of the countryside to produce health benefits and see use of it increase during the duration of the extension of the quarry and not decline. This might include how the Henllan Walk could be enhanced to improve its appeal to locals and visitors as part of any benefit the quarry could bring.

Whilst it is considered what is being proposed will have a detriment to the existing footpath network, and a diversion is unlikely to improve on possibly reducing public desire to use the paths, there appears to be sufficient room for a new woodland path within the existing woodland to the east of the quarry along Ffordd y Graig. Furthermore, there are opportunities to provide a continuation of this path around the perimeter of the wood to reach the existing path. An examination of what opportunity the existing woodland either during and/or after the quarrying might give in terms of additional access to extend public access to the area providing a net benefit to users especially those on the north east areas of Denbigh of Vale Street, Barkers Well and Rhyl Road.

Appendix B: IPSS Professional Competency Scheme Document 2 – Agricultural Land Classification

DOCUMENT 2

Agricultural Land Classification (England and Wales)

Background

The evaluation of land for its agricultural potential in England and Wales[1] is accomplished by application of the Agricultural Land Classification[2] (ALC). Professional competence in Agricultural Land Classification builds upon foundation skills in field soil investigation, description and interpretation (IPSS PCSS Document 1). This system of professional competence is based upon a detailed written procedures document developed by the Farming and Rural Conservation Agency[3].

Qualifications

Professional soil scientists with competence in Agricultural Land Classification will have graduated in a relevant science subject. They will also have a number of years of relevant field experience and will have, or be adequately qualified for, membership of a relevant professional body such as the Institute of Professional Soil Scientists.

Minimum competencies

Skills and Knowledge:

These are described under a number of subheadings that relate to different tasks. A professionally competent contractor should have the skills and knowledge identified under the **General heading** and **all other headings that are relevant** to the tasks required.

General

1. A general knowledge and understanding of natural soil development and of world, European and national soil taxonomy
2. A detailed knowledge and understanding of the Agricultural Land Classification system relevant to the site and of the classification of land according to the current published Guidelines and other documents[1,2,] and the ability to apply it accurately and consistently in the classification of an area of land

[1] Similar systems are employed in Scotland and Northern Ireland

[2] ALC Revised Guidelines and Criteria for the Grading the Quality of Agricultural Land (MAFF, 1988) and Climatological Datasets for ALC (Met. Office, 1989)

[3] A former Executive Agency of the Ministry of Agriculture , Fisheries and Food (now Defra)

DOCUMENT 2

Agricultural Land classification (England and Wales)

Institute of Professional Soil Scientists

3. An awareness and knowledge of existing published and unpublished, paper-based and digital ALC information and sources
4. A knowledge of paper and digital topographic, geology and soil maps, mineral assessment reports and memoirs and other technical sources of reference; and of their role in ALC work
5. An understanding of map scales and of the Ordnance Survey National Grid
6. The ability to investigate, sample, describe and interpret soils in the field in a consistent manner and to professional standards (IPSS PCSS Document 1)
7. Knowledge of relevant European and national regulations and policies including national and local land use planning policy and guidance, and soil protection policy
8. The ability to effectively communicate soil information in a simple and relevant form to developers, planners and other relevant professionals with clear statements as to the reliability and certainty of the results
9. The ability to write accurate, concise reports in clear English and in line with best practice examples of ALC survey that communicate the relevant information to all relevant communicants
10. An awareness of the importance of systems of quality assurance and control in all aspects of professional work

Preparations prior to field survey

1. The ability to compile background site physical data (e.g. relief, geology, soils, climate, flood-risk, exposure and grade from published and unpublished sources) and understanding of the limitations of the data obtained
2. An understanding of scale and of how different survey sampling densities may impact on the certainty of results obtained. A knowledge of how to tailor survey density appropriately to the requirements of the client, and understanding of the limitations that might impose
3. The ability to compute gradients from map contours
4. A thorough knowledge of climatic data interpolation procedures (and any available associated bespoke computer software), and the ability to obtain representative site values
5. An understanding of soil maps, the concepts of soil associations and soil series and their limitations as a background to ALC grading
6. A knowledge of GPS and data logger technology and its uses and limitations for field survey work
7. A knowledge and understanding of relevant Health and Safety legislation requirements for work in the field
8. An understanding of basic biosecurity requirements and any animal or plant health restrictions which may be in force

Field survey for Agricultural Land Classification

1. The ability to determine, lay out and work to a relevant sampling strategy
2. Competency in the Foundation Skills (field soil investigation, sampling, description and interpretation) as per IPSS PCSS Document 1
3. The ability to accurately and consistently apply the ALC system to soil and other data collected during the field survey

Reporting

1. The knowledge and ability to compile an ALC map from background information and data collected during the field survey
2. The ability to write an ALC survey report according to an agreed format
3. Understanding of the principles of quality assurance and the ability to apply these as required by the client
4. The ability to convey the findings of the survey verbally such that they are understood by the client

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The following organisations have given their support to the Institute of Professional Soil Scientist's Working with Soils Professional Competency Initiative:

iPSS
Institute of Professional Soil Scientists

'Defra welcomes initiatives, such as the IPSS Working with Soils Competency Statements, that aim to improve the quality of professional soils advice'

ADAS

afbi Agri-Food and Biosciences Institute

AHDB Agriculture & Horticulture Development Board

AICC Association of Independent Crop Consultants

National Parks Britain's breathing spaces
Parciau Cenedlaethol Prydain
Tir i enaid gael lonydd
Pàircean Nàiseanta na h-Alba
Àiteachan analachadh bheatainn

BALI British Association of Landscape Industries

BIAC

CEH Centre for Ecology & Hydrology
Natural Environment Research Council

CIWEM

The co-operative farms

CPRE Campaign to Protect Rural England
Standing up for your countryside

Cresswell
a Hyder Consulting group company

Earthcare Technical

Asiantaeth yr Amgylchedd Cymru
Environment Agency Wales

ENPAA English National Park Authorities Association

FWAG Farming & Wildlife Advisory Group

Comisiwn Coedwigaeth Cymru
Forestry Commission Wales

Game & Wildlife Conservation Trust

Greenvale AP
Natural choice for fresh potatoes

IAgrE

iema
Institute of Environmental Management & Assessment

The James Hutton Institute

Landscape Institute
Inspiring great places

Land Research Associates

defra
Department for Environment Food and Rural Affairs

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IPSS
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LEAF
LINKING ENVIRONMENT AND FARMING
Integrated Farm Management

NIAB TAG

NFU

National Trust

NATURAL ENGLAND

PRODUCE WORLD
GROWING TRUST

ROTHAMSTED RESEARCH

Royal Agricultural College

ROYAL AGRICULTURAL SOCIETY of ENGLAND

SAC

Sainsbury's

SALMON & TROUT ASSOCIATION

SEPA
Scottish Environment Protection Agency

SOCIETY OF Biology

Soil Association

SNIFFER
SCOTLAND & NORTHERN IRELAND FORUM FOR ENVIRONMENTAL RESEARCH

The Scottish Government

the SCIENCE council

THE wildlife TRUSTS

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

TOPSOIL The Sustainable Choice from British Sugar

Unilever

Llywodraeth Cymru
Welsh Assembly Government

Waitrose

wrap
Working together for a world without waste

Appendix C: Welsh Government 'Agricultural Land Classification: Frequently Asked Questions' December 2017

Agricultural Land Classification
Frequently Asked Questions
June 2016

Llywodraeth Cymru
Welsh Government

General Background Questions

What is the ALC system?
The Agricultural Land Classification (ALC) system provides a method for assessing the quality of farmland in England and Wales. The ALC system classifies land into five grades, with 1 being the best and 5 being the worst and Grade 3 subdivided into Subgrades 3a and 3b. The current grading methodology is described in The Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF 1988) sometimes referred to as 'The Blue Book'.

What is agricultural land?
Agricultural land is land which is capable of being used for agricultural purposes (e.g. cropping).The current use of the land does not affect the grade or agricultural potential of the land. Where the potential for agriculture has been irreversibly lost (e.g. through housing development) the land should no longer be classed as agricultural. For planning purposes, it is recommended that the Local Planning Authority is contacted to confirm the status of the land. Also see: Can land be high grade if it is not cropped or is used for grazing?

What is ALC used for?
The ALC is used to grade the quality of agricultural land so that informed decisions can be made over its future use within the planning system. The planning systems in England and Wales seek to conserve the 'Best and Most Versatile (BMV) agricultural land. Government policies in **Wales** with regard to BMV land can be found on the Welsh Government ALC webpages at: Welsh Government Web Topic - Agricultural Land Classification BMV policies in **England** are set out in the National Planning Policy Framework.

What is Best and Most Versatile agricultural land?
National planning policy defines the Best and Most Versatile agricultural land as land within grades 1, 2 and 3a. This is good to excellent quality land which can best deliver the food and non-food crops for the future.

How does the Agricultural Land Classification system grade land?
The criteria for grading are based on the long term physical limitations of land for agricultural use, such as **climate** (temperature, rainfall, aspect, exposure and frost risk), **site** (gradient, micro-relief and flood risk) **and soil** (texture, structure, depth and stoniness, and also chemical properties which cannot be corrected), and interactions between these factors such as soil wetness, droughtiness and erosion. Field survey to obtain site and soil data is required. The current grading methodology is described in: The Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF 1988)

What do the different grades mean?

Generalised Description of the Agricultural Land Classification Grades

Grade & standard colour notations	Description of agricultural land	Detail
1	Excellent quality	No or very minor limitations on agricultural use. Wide range of agricultural and horticultural crops can be grown. High yielding and consistent.
2	Very good	Minor Limitations on crop yield, cultivations or harvesting. Wide range of crops but limitations on demanding crops (e.g. winter harvested veg). Yield high but lower than Grade 1.
3 (subdivided)	Good to moderate	Moderate limitations on crop choice, timing and type of cultivation, harvesting or level of yield. Yields lower and more variable than Grade 2.
3a	Good	Moderate to high yields of narrow range of arable crops (e.g. cereals), or moderate yields of grass, oilseed rape, potatoes, sugar beet and less demanding horticultural crops.
3b	Moderate	Moderate yields of cereals, grass and lower yields other crops. High yields of grass for grazing/ harvesting.
4	Poor	Severe limitations which restrict range and/or level of yields. Mostly grass and occasional arable (cereals and forage), but highly variable yields. Very droughty arable land included.
5	Very poor	Severe limitations which restrict use to permanent pasture or rough grazing except for pioneering forage crops.

A full description of the grades can be found in Appendix 1.

Can land be high grade if it is not cropped or is used for grazing?

The **c**urrent land use does not affect the grade or longer term agricultural potential of the land. Land use is an economic and management choice of the land manager. The ALC grade describes what the land is potentially capable of, not what it is currently used for.

Can the ALC grading be changed by farming practices?

Normal agricultural land management will rarely, if ever, affect the ALC grading of land. The grading is based on the long term physical and chemical limitations of land for agricultural use. The current or historic agricultural management, or intensity of use, does not affect the ALC grade. ALC grading could potentially only be improved by very major and expensive interventions, well beyond the scope of normal agricultural works. Examples could include major new drainage schemes, new flood defence systems or infilling / levelling of highly uneven land. It is extremely unlikely that an ALC grading would drop because of neglect or poor agricultural management.

Will fertilizer improve the grade?

Applications of fertiliser or lime are part of the normal management of agricultural land and do not affect the grade. Normal fertiliser levels in the soil have no bearing on ALC grade. Chemical limitations in ALC relate to major long term problems that cannot easily be remediated. These can include extreme acidity, saline environments and presence of toxic elements.

What can I grow on my land? (Crop suitability)
The suitability of land for certain crops is determined by a variety of factors. The ALC Grade of the land doesn't determine what can be grown, but indicates the type of crops that are generally suited to land of that quality and versatility. Typical crops are given in Appendix 1.

Are land values determined by ALC grade?
The ALC system was developed to inform land use planning decisions. The use of the ALC system for land valuation has never been intended and should not be used for this purpose.

Grade and Map Questions

What is the grade of my land?
The only way to accurately determine the agricultural grade of land is by way of a detailed field survey in accordance with the current ALC 1988 guidelines. What does a detailed field survey involve?

In **Wales**, the Welsh Government holds detailed field survey information for selected areas which can be made available upon request. If detailed survey information is not available, we can provide predictive ALC information for individual sites upon request. Also see: What is predictive ALC information?

The Welsh Government is currently investigating options to produce predictive ALC maps. For further information please contact LQAS@wales.gsi.gov.uk.

The most up-to-date information on ALC Grades in **England** can be found on www.Magic.gov.uk/ (Landscape tab). Detailed field surveys (Post 1988 ALC layer on the Magic website) are available for selected areas. Also see: What about strategic maps showing the likely occurrence of best and most versatile land mentioned in TIN049?

What is predictive ALC information?
Predictive information provides an indication of the likelihood (high, moderate or low) of BMV land being present within a defined area of land. Predictive information does not provide a definitive grade for a site which can only be achieved through a detailed field survey in accordance with the current ALC 1988 guidelines. Also see: What does a detailed field survey involve?

What are the 'Provisional' ALC maps?
Between 1967 and 1974 the Agricultural Land Classification, for the whole of England and Wales, was mapped at a scale of one inch to one mile (1:63 360). Mapping was based on a combination of field survey, other mapped data sources and expert local knowledge (such as ADAS agricultural advisors). Because of variations in the amount of basic information available for different parts of the country, there was some variation in the exactitude of the surveys. The maps were essentially of a reconnaissance nature and usually it was not feasible to delineate patches of different quality less than about 80 hectares. The maps were labelled as 'Provisional' with the intention that they would be revised / finalised in the future. This was never carried out on a systematic basis. Because of this, more detailed site specific field surveys are normally carried out for individual development proposals.

In 1975, a 1:250 000 scale version of the earlier Provisional maps was published. This was considered a more appropriate scale for the intended strategic use. It is the recommended product today for strategic scale information. Importantly, the 1:250 000 scale maps were based on the same information as the 1: 63 360 maps, with no additional data or survey. Other provisional map products exist (e.g. poster maps of all England and Wales) but again, all are based on the same survey information, though the smaller scale maps have been generalised.

How accurate are the Provisional Maps?

ALC grades are heavily based on soils, which change little over time. The Provisional ALC maps dating from the 1960s and 1970s remain valid today as a strategic guide only. It is extremely unlikely that a detailed ALC field survey covering all of England and Wales will ever be undertaken. The cost and time needed would be prohibitive. More recent detailed field surveys, where available, usually represent the most definitive source of ALC data available.

Why can't I see field boundaries on the Provisional ALC map?

The scale of the map is too small to show individual field boundaries. It is a strategic scale map and the minimum mapping unit is about 80 hectares. The Provisional (1:250 000 scale) maps are not sufficiently accurate for use in assessment of individual fields or development sites, and should not be used other than as general guidance. You should refer to more detailed ALC mapping, if available. Also see What is the grade of my land?

Which maps should I use? (most definitive)

The Provisional ALC Maps dating from the 1960s and 1970s are still in use. However, they should only be used as a strategic guide, in the absence of more recent survey information, being most suitable for policy makers or for a general overview at a strategic scale to inform strategic land use decisions. They pre-date the subdivision of Grade 3 and are not suitable for site specific interpretation. Any field surveys carried out prior to 1 January 1989 will need reassessment and should not be considered definitive. Detailed field surveys from 1 January 1989, according to the 1988 MAFF guidelines, represent the most definitive source of ALC data and should normally be used where site-specific decision making is required.

Why do different maps show different grades for the same area?

ALC assessments became more field based and site specific from 1976, partly due to limitations of the Provisional mapping. On 1 January 1989, the current system of ALC grading was introduced: (*The Revised guidelines and criteria for grading the quality of agricultural land*: MAFF 1988). The guidelines provide the most definitive ALC grading and normally supersede any earlier surveys. In some areas there will be several different levels of detail of ALC data. Soils are variable and the grade of the land can vary over small distances. The ability to map this variation depends on the scale of the survey and the associated scale of mapping. The most detailed survey will usually represent the most definitive grading.

What are the 'Revised Guidelines'?

The ALC was devised and introduced in the 1960s and Technical Report 11 (MAFF, 1966: Technical Report 11, Agricultural Land Classification of England and Wales) outlined the national system. Following a review of the system, criteria for the sub-division of Grade 3 (3a, 3b & 3c) were published in 1976 and Technical Report 11/1 (MAFF, 1976: Technical Report 11/1, Agricultural Land Classification of England and Wales. The definition and identification of Sub-grades within Grade 3) outlined the updated.

The new and most up-to-date guidance was issued in 1988 "The *Revised guidelines and criteria for grading the quality of agricultural land".* This was implemented from 1 January 1989. The 1988 Revised guidelines were developed and tested with the aim of updating the system without changing the original concepts. This recognises two subgrades within in Grade 3: Subgrade 3a and Subgrade 3b, the latter being a combination of the previous Subgrades 3b and 3c. Consequently, modern ALC surveys are sometimes referred to as 'post 1988' or post revision. Any surveys carried out using the old guidelines (sometimes referred to as pre 1988 surveys or pre revision) would need to be reassessed under the current criteria.

What does pre and post revision / pre and post 1988 mean?
See What are the 'Revised Guidelines'

Can I get a paper map?
Paper copies of the Provisional Maps are no longer available.

In **Wales**, you are advised to contact the Welsh Government for advice and information on availability of Welsh ALC maps. Contact LQAS@wales.gsi.gov.uk or Welsh Government, Rhodfa Padarn, Llanbadarn Fawr, Aberystwyth, Ceredigion SY23 3UR

In **England** all maps are available digitally, either as downloads from www.Magic.gov.uk/ or as pdfs http://publications.naturalengland.org.uk/category/2595819. Individual detailed survey maps for England are available from the Natural England Enquiry Service on 0300 060 3900 or by email enquiries@naturalengland.org.uk. Also see: What about strategic maps showing the likely occurrence of best and most versatile land mentioned in TIN049? [England Only]

Can I access ALC information online?
In **Wales**, the Welsh Government is currently developing online maps which will show all available ALC information for Wales. In the meantime you are advised to contact the Welsh Government for advice and information on availability of ALC information. Contact LQAS@wales.gsi.gov.uk or Welsh Government, Rhodfa Padarn, Llanbadarn Fawr, Aberystwyth, Ceredigion SY23 3UR

In **England** the 1:250 000 ALC dataset can be downloaded from the Natural England website http://www.gis.naturalengland.org.uk/pubs/gis/GIS_register.asp (there is also a link from the Magic website) .The post 1988 ALC data layer (which shows a subdivision of Grade 3) can also be made available, by contacting Naturalenglandgidatamanagers@naturalengland.org.uk . Both these data sets are also available to download from http://www.geostore.com/environment-agency/. Also see: What about strategic maps showing the likely occurrence of best and most versatile land mentioned in TIN049? **[England Only]**

What about strategic maps showing the likely occurrence of best and most versatile land mentioned in TIN049? [England Only]
A digital strategic scale dataset showing the likely occurrence of best and most versatile land in **England only** has been prepared for use at 1:250 000 scale, being most suitable for policy makers or for a general overview at a strategic scale to help direct development towards lower quality land. Due to licence restrictions, this digital dataset or bespoke extracts from it can only be supplied to public bodies such as local authorities, Highways England, Environment Agency etc. and consultants acting on their behalf. Copies of existing paper map extracts covering a limited number of locations may be available on request. In all cases, users should satisfy themselves that they have the most up to date version of the data. Requests for digital datasets should be sent to Naturalenglandgidatamanagers@naturalengland.org.uk; all other enquiries to enquiries@naturalengland.org.uk
This note provides further information
file://N:\@Communities_Land_Use\Strategy_Environmental_Services\Spatial_planning\Development_planning\Soils\ALC\BMV maps\stratmapexplannote 2012.docx

I can't see grades on Magic {England Only}
The Provisional ALC data can only be viewed at 1:250 000 scale. If the map on display is at a larger scale (smaller number e.g. 1:50 000) the data will not be visible. Try changing the map scale. Detailed ALC survey data can be viewed at any scale, but there is not full coverage of the country, so your area of interest may not have detailed data available. Also refer to There is no detailed survey of my land, is a field survey required?

Survey Related Questions

There is no detailed survey of my land, is a field survey required?
It depends why you want to know the grade of your land. For a planning purpose you should contact your local planning authority for advice.

What does a detailed field survey involve?
ALC surveys are undertaken, according to the published Guidelines by field surveyors using hand held augers to examine soils to a depth of 1.2 metres. This usually consists of one boring per hectare, supplemented by digging occasional small pits (usually by hand) to inspect the soil profile at representative locations to provide more detailed information about soil conditions to depths up to 1.2 metres. Information obtained by these methods is combined with climatic and other data to produce an ALC map and report, which will normally include individual soil profile and pit descriptions, and written explanations to support the grading applied. ALC maps are normally produced on an Ordnance Survey base at varying scales from 1:10,000 for detailed work to 1:50 000 for reconnaissance survey. It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions.

Can you recommend an ALC surveyor?
The Institute of Professional Soil Scientists (the professional body of the British Society of Soil Science) maintains a register of competent soil surveyors who have experience of carrying out ALC surveys. www.soils.org.uk. Other professional bodies may also maintain lists of their members who undertake ALC work. It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions.

Is urban land subject to ALC surveys?
Urban land may be shown on ALC survey maps. It will normally not be surveyed because the land has relatively little potential for return to agricultural use. The full definition of urban and other non-agricultural categories in the ALC system can be found in Appendix 1. You should contact your local planning authority for advice on whether an ALC survey is required to support a planning application.

Does the Welsh Government carry out ALC (detailed field) surveys?
Yes. The Welsh Government does carry out detailed Agricultural Land Classification (detailed field) surveys. These surveys are undertaken largely in response to requests from Local Planning Authorities for individual sites or areas at the urban edge which are being considered for development. The Welsh Government also holds copies of detailed individual Agricultural Land Classification (ALC) surveys carried out by them, as well as the former Welsh Office or Welsh Assembly Government. In addition the Welsh Government also provides a site survey validation service for Local Planning Authorities providing a technical assessment of submitted reports and enables them to fully consider land quality in the decision making process.

Does Natural England carry out ALC surveys?
Natural England provides advice to Local Planning Authorities on ALC matters, but does not carry out ALC field surveys. Natural England holds copies of detailed individual Agricultural Land Classification (ALC) surveys carried out by the former Ministry of Agriculture, Fisheries

and Food until the late 1990s. These surveys were undertaken largely in response to requests from Local Planning Authorities for individual sites or areas at the urban edge which were to be considered for development; not all agricultural land was surveyed at the time. There is no longer a national programme to survey all areas in detail and since the late the 1990's, the Government no longer undertakes detailed field surveys itself. Specialist consultants are engaged by developers, Local Planning Authorities, landowners and others to carry out detailed Agricultural land Classification surveys for local plans and other development proposals.

What sampling density should I use in my ALC field survey?
There is no prescribed guidance on the sample density of field surveys; however, most experienced ALC surveyors use an average density of 1 sample point per hectare (carried out on the Ordinance Survey 100m grid). Soil pits are also useful to obtain further information about soil structure, porosity and stone content, rock layers etc. to enable confirmation of the grading found on site. The number of soil pits is difficult to specify in advance of starting field survey work. In general, one soil pit is dug for each of the main grades or soil types on the site, though not necessarily for each map unit, but it should be left to the professional judgement of the surveyor as to the appropriate minimum number required.

Surveys at this detailed level can also enable an assessment of the soil resources in line with the Defra Code of Practice for the Sustainable Use of Soils on Construction Sites and will allow users to present the land quality case to public inquiry level if required.

Depending upon the type of development, location, scale, purpose of the survey, availability of existing ALC data etc., less detailed surveys (or sometimes more detailed) surveys may be undertaken, but expert advice must be sought from a soil scientist or other practitioner experienced in undertaking ALC survey work. All data captured in ALC surveys is done to the same standard (i.e. standard recording of soil colour, texture etc. plus pits). The only difference in a less detailed survey is the grid spacing, not the quality or detail of data capture at the points examined.

It is important that ALC surveys are completed by an experienced ALC surveyor to ensure that the evidence is accurate and robust to inform planning decisions. The British Society of Soil Scientists run training courses and has a competency scheme, ***Working with Soil***, covering aspects of soil survey and the ALC system.

What climate data is used for ALC?

The definitive climatic data used for assessing the overall climatic limitation (and for the wetness and droughtiness limitations) are obtained from a series of grid point datasets compiled specifically for ALC (Meteorological Office 1989: Climatological Data for Agricultural Land Classification). They provide long term average values of the required variables on a 5km grid covering the whole of England and Wales. These variables are interpolated for the location (grid reference) and altitude for intermediate sites.

I am a consultant/soil scientist undertaking a detailed ALC site survey and the land benefits from irrigation. Should I be taking this into account in my grading assessment?
No. The advice that irrigation should be removed from the ALC assessment was expressed in a consultation on the ALC system in 1996.

APPENDIX 1: AGRICULTURAL LAND CLASSIFICATION (ALC)

Descriptions of the Grades and Subgrades

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics. The grading guidance and cut-offs for limitation factors in the MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land enable land to be ranked in accordance with these general descriptions.

Descriptions are also given of other land categories which may be used on ALC maps.

Grade 1: Excellent Quality Agricultural Land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2: Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land of this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a: Good Quality Agricultural Land

> Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b: Moderate Quality Agricultural Land

> Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4: Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5: Very Poor Quality Agricultural Land

Land with severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

Descriptions of other land categories used on ALC maps

Urban
Built-up or 'hard' uses with relatively little potential for a return to agriculture including: housing, industry, commerce, education, transport, religious buildings, cemeteries. Also, hard-surfaced sports facilities, permanent caravan sites and vacant land; all types of derelict land, including mineral workings which are only likely to be reclaimed using derelict land grants.

Non-agricultural
'Soft' uses where most of the land could be returned relatively easily to agriculture, including: golf courses, private parkland, public open spaces, sports fields, allotments and soft-surfaced areas on airports/ airfields. Also active mineral workings and refuse tips where restoration conditions to 'soft' after-uses may apply.

Woodland
Includes commercial and non-commercial woodland. A distinction may be made as necessary between farm and non-farm woodland.

Agricultural buildings
Includes the normal range of agricultural buildings as well as other relatively permanent structures such as glasshouses. Temporary structures (e.g. polythene tunnels erected for lambing) may be ignored.

Open water
Includes lakes, ponds and rivers as map scale permits.

Land not surveyed
Agricultural land which has not been surveyed. Where the land use includes more than one of the above land cover types, e.g. buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will usually be shown.

Source: Section 2: MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land.

Appendix D: Agricultural Land Classification – Western Extension of Denbigh Quarry (September, 2019)

Agricultural Land Classification:

Denbigh Quarry, Wales

Prepared for:
Pledydell Smithyman Limited

Prepared by:
R W Askew BSC(Hons) MSc MISoilSci CSci
Askew Land & Soil Limited

Date:

15th January 2020

Project Number:
C669

Contract/Proposal No:	C669
Issue:	1
Author:	Rob Askew
Date:	15th January 2020

Our interpretation of the site characteristics is based on available data made during our desktop study and soil survey. This desktop study and soil survey has assessed the characteristics of the site in relation to the assessment of its Agricultural Land Classification. It should not be relied on for alternative end-uses or for other schemes. This report has been prepared solely for the benefit of Breedon Southern Ltd. No warranty is provided to any third party and no responsibility or liability will be accepted for any loss or damage in the event that this report is relied upon by a third party or is used in circumstances for which it was not originally intended.

Version Control Record

Issue	Description of Status	Date	Initials
A	First Draft	15/09/2019	RWA
1	First Issue to Client	15/01/2020	RWA

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FIGURES

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1 INTRODUCTION

1.1 Background

1.1.1 This report was commissioned by Pledydell Smithyman Limited to determine the quality of agricultural land at a site proposed development at Denbigh Quarry, Wales, LL16 3YE ('the Site'). The assessment is made in accordance with the Agricultural Land Classification (ALC) system for England and Wales (see 'Methodology' below).

1.1.2 The approximately 5.0 hectare (ha) Site is located to the northwest of Denbigh. The approximate centre of the Site is located at British National Grid (BNG) reference SJ 04774 67080. Denbigh Quarry is located adjacent to the east, with forestry to the northwest and agricultural land to the south and west. The location of the Site is shown on **Figure 1**.

1.2 Methodology

1.2.1 This report has been prepared by a Chartered Scientist (CSci), who is a Fellow (F.I. Soil Sci) of the British Society of Soil Science (BSSS). The author meets the requirements of the BSSS Professional Competency Scheme for ALC, which is endorsed, amongst others, by the Department for Environment, Food and Rural Affairs (Defra), Natural England, the Science Council, and the Institute of Environmental Assessment and Management (IEMA) (see BSSS Document 2 'Agricultural Land Classification of England and Wales')[1].

1.2.2 This assessment is based upon the findings of a study of published information on climate, geology and soil, in combination with the findings of a detailed soil investigation carried out by the former Ministry of Agriculture, Fisheries and Food (MAFF)[2] in accordance with the national 'Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land', October, 1988 (henceforth referred to as the 'the ALC Guidelines').

1.2.3 The ALC system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The ALC system divides agricultural land into five grades (Grade 1 'Excellent' to Grade 5 'Very Poor'), with Grade 3 subdivided into Subgrade 3a 'Good' and Subgrade 3b 'Moderate'. Agricultural land classified as Grade 1, 2 and Subgrade 3a falls in the 'best and most category as set out in at paragraph 3.54 of Planning Policy for Wales (2018) and Technical Advice Note 6. Further details of the ALC system and national planning policy implications are set out by the Welsh Government in a guidance note which is available online3.

[1] British Society of Soil Science. Professional Competency Scheme Document 2 'Agricultural Land Classification of England and Wales'. Available online @ https://www.soils.org.uk/sites/default/files/events/flyers/ipss-competency-doc2.pdf Last viewed 15th January 2020

[2] The Ministry of Agriculture, Fisheries and Food (MAFF) was incorporated within the Department for Environment, Food and Rural Affairs (Defra) in June 2001

[3] Welsh Government. Agricultural land classification: frequently asked questions. Available online @ https://gov.wales/agricultural-land-classification-frequently-asked-questions Last viewed 15th January 2020.

1.2.4 A detailed soil survey and ALC was carried on the 4th September 2019. The ALC survey involved examination of the soil's physical properties at six auger locations, at a sampling density of approximately one soil profile per ha. The soil profile was examined at each sample location to a maximum depth of approximately 1.2 m by hand with the use of a 5cm diameter Dutch (Edleman) soil auger. One soil pit, i.e. Soil Pit 1, was excavated by hand with a spade in order to examine certain soil physical properties, such as stone content and the structural condition of the subsoil, more closely. The locations of the auger bores and soil pits are shown on **Figure 1**. A record of the soil profiles recorded at each auger bore location is given as **Appendix A**. A description of the soil profile recorded in Soil Pit 1 is given as **Appendix B**.

1.2.5 The auger locations were located using a hand-held Garmin E-Trec Geographic Information System (GIS) to enable the sample locations to be relocated for verification, if necessary. Where auger locations on a 100 m grid pattern fall on headland, tramlines, or within 3 m of a hedgerow or tree, they were relocated on agricultural land close by, i.e. to avoid compacted ground or land affected by tree roots, etc.

1.2.6 The soil profile at each sample location was described using the 'Soil Survey Field Handbook: Describing and Sampling Soil Profiles' (Ed. J.M. Hodgson, Cranfield University, 1997). Each soil profile was ascribed an Agricultural Land Classification (ALC) grade following the MAFF ALC Guidelines.

1.2.7 A sample of topsoil was collected at auger bore locations 2, 4 and 6 as shown on **Figure 1**. The samples were sent to an accredited laboratory for particle size distribution (PSD) / soil texture analysis, i.e. the proportions of sand, silt and clay. This is to determine the definitive texture class of the topsoil, especially with regard to distinguishing between fine, medium and coarse sand fraction. A copy of the laboratory Certificate of Analysis reporting the findings of the topsoil PSD analysis is given as **Appendix C**.

2 AGRICULTURAL LAND CLASSIFICATION

2.1 Introduction

2.1.1 This section of the report sets out the findings of the Agricultural Land Classification (ALC). It is based on a desktop study of relevant published information on climate, topography, geology, and soil in conjunction with a detailed ALC survey carried out on the 4th of September 2019.

2.1.2 As described in the ALC Guidelines, the main physical factors influencing agricultural land quality are:

- climate;
- site;
- soil; and
- interactive limitations.

2.1.3 These factors are considered in turn below.

2.2 Climate

2.2.1 Interpolated climate data relevant to the determination of the Agricultural Land Classification (ALC) grade of land at the Site is given in Table 2.1 below.

Table 2.1: ALC Climate Data

Climate Parameter	**Data for** SJ 04774 67080
Average Altitude (m)	143
Average Annual Rainfall (mm)	830
Accumulated Temperature above 0˚C (January – June)	1313
Moisture Deficit (mm) Wheat	84
Moisture Deficit (mm) Potatoes	68
Field Capacity Days (FCD)	193
Grade According to Climate	2

2.2.2 With reference to Figure 1 '*Grade according to climate*' on page 6 of the ALC Guidelines, there is an overall climatic limitation to the quality of agricultural land at the Site. This means that agricultural land at the Site is limited to a maximum of ALC Grade 2 in overall climatic terms, in the absence of any other limiting factor, i.e. site, soil and/or interactive limitations.

2.2.3 Agricultural land at the Site is predicted to be at field capacity (i.e. near saturation point) for 193 days per year, mainly over the late autumn, winter and early spring. In combination with topsoil texture will cause an 'interactive limitations' to agricultural land quality at the Site, i.e. soil wetness and / or soil droughtiness (see below).

2.3 Site

2.3.1 As show on **Figure 1**, the approximately 5.0 hectare (ha) Site is located to the northwest of Denbigh, Wales. The approximate centre of the Site is located at British National Grid (BNG) reference SJ 04774 67080.

2.3.2 With regard to the ALC Guidelines, agricultural land quality can be limited by one or more of three main site factors as follows:

- gradient;
- micro-relief (i.e. complex change in slope angle over short distances); and
- risk of flooding.

I. Gradient and Micro-Relief

2.3.3 The relief of the Site is broadly level. It has an elevation of approximately 160 metres (m) Above Ordnance Datum (AOD) at the highest point in the northwest corner of the Site. The land slopes towards the lowest point in the southeast, at an elevation of approximately 143m AOD. The quality of agricultural land at the Site is not limited by gradient, as the angle of slope does not exceed 7° (as per Table 1 of the ALC Guidelines, 1988).

2.3.4 In addition, the quality of agricultural land at the Site is not limited by micro-relief, i.e. complex changes in slope angle and direction over short distances.

II. Risk of Flooding

2.3.5 From the Welsh Government's Flood Map for Planning website[4], the Site is located in Flood Zone A, at little or low risk of fluvial flooding. It is predicted that the quality of agricultural land is not limited by flood risk, re Table 2 '*Grade according to flood risk in summer*' and Table 3 '*Grade according to flood risk in winter*' of the ALC Guidelines.

2.4 Soil

I. Geology/Soil Parent Material

[4] Welsh Government. Long term flood risk maps. Available online @ https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en Last viewed 15/01/2020.

2.4.1 British Geological Survey (BGS) information available online[5] has been utilised to identify the Bedrock underlying the Site and any Superficial (Drift) Deposits over the Bedrock. This information helps to determine the parent material from which the soil has formed.

2.4.2 The BGS information (1:50,000) indicates that Site is underlain entirely by the Clwyd Limestone Group (limestone).

2.4.3 The BGS information (1:50,000) indicates that bedrock at the Site is not covered by any superficial deposits, except for a limited covering of glacial Till (Devensian, diamicton) in the east.

II. Published Information on Soil

2.4.4 The Soil Survey of England and Wales (SSEW) soil map of Wales (Sheet 2) at a scale of 1:250,000 and accompanying Bulletin No. 11 '*Soils and their Use in Wales*' (C.C, Rudeforth et al. Harpenden, 1984) reports that agricultural land at the Site is covered by soils in the East Kewsick 3 association.

2.4.5 As described by the SSEW, the East Keswick 3 soils are typical brown earths in deep, well drained slightly stony fine loamy drift. They are mapped in this association with similar deep brown earths and shallower loamy soils over limestone. The association occurs on flat and gently undulating land where limestone exposures form a small but significant part of the landscape. These soils are well drained (Wetness Class I) and artificial drainage is not necessary since excess winter rain passes readily through the soils and into widely jointed limestone

III. Soil Survey

2.4.6 The soil survey carried out on the 4th of September 2019 confirmed the presence of one main type of soil over the Site as follows.

Soil Type 1

2.4.7 The main type of soil profile at the Site comprises brown (Munsell colour 10YR4/3), non-calcareous, very slightly stony, medium clay loam topsoil with a moderate, medium granular structure. At a depth of approximately 20cm, the topsoil merges over an abrupt, smooth horizon boundary to yellowish brown (Munsell colour 10YR5/4), non-calcareous, very slightly stony, medium clay loam upper subsoil with a moderate, medium subangular blocky structure. At an approximate depth below ground level of 40cm, to the full auger depth (120cm), the lower subsoil comprises yellowish brown (Munsell Colour 10YR5/6), non-calcareous, moderately stony, medium clay loam with a moderate, coarse angular blocky structure. The lower subsoil does not constitute a slowly permeable layer (SPL) in terms of the ALC Guidelines, but in places it contains a few, distinct ochreous mottles (Munsell colour 7.5YR6/8)

[5] British Geological Survey 'Geology of Britain Viewer'. Available online @ http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html Last viewed 15/01/2020

and a few, fine manganese (Mn) concretions. With reference to Table 13 of the ALC Guidelines, these soil profiles are considered to be well drained (Wetness Class I).

Variant

2.4.8 As a variation to Soil Type 1, the topsoil in the south of the Site (probably associated with a superficial deposit of glacial till), was determined by hand-texturing and laboratory particle size distribution (PSD) as heavy clay loam (i.e. auger bore locations 4 and 6). See below.

2.4.9 A log of the six soil profiles recorded during the soil survey is given as **Appendix A**. Descriptions of the soil profile recorded on Site 1 (see **Figure 1**) is given as **Appendix B**.

2.4.10 A sample of topsoil was collected at auger bore locations 2, 4 and 6 (see **Figure 1**). The samples were sent to an accredited laboratory for analysis of particle size distribution (PSD), based on the British Standard Institution particle size grades. The certificate of analysis is provided as **Appendix C**. The findings of the PSD analysis are shown in Table 2.2 below:

Table 2.2: Topsoil Texture (re Table 10, ALC Guidelines)

Topsoil Sample Location (See Fig. 1)	% sand 0.063-2.0 mm	% silt 0.002-0.063 mm	% clay <0.002 mm	ALC Soil Texture Class
Auger Bore 2	22	56	22	Medium Clay Loam
Auger Bore 4	28	43	29	Heavy Clay Loam
Auger Bore 6	24	48	28	Heavy Clay Loam

2.5 Interactive Limitations

2.5.1 From the published information and the results of the Site visit, it has been determined that the quality of agricultural land at the Site is limited by soil wetness.

I. Soil Wetness

2.5.2 From the ALC Guidelines, a soil wetness limitation exists where 'the soil water regime adversely affects plant growth or imposes restrictions on cultivations or grazing by livestock'. The ALC grade according to soil wetness at the Site is given in Table 2.3 below (based on Table 6 'Grade According to Soil Wetness – Mineral Soils' in the ALC Guidelines):

Table 2.3: ALC Grade According to Soil Wetness

Wetness Class	Texture of the Top 25 cm	176-225 Field Capacity Days

I	Sand, Loamy Sand, Sandy Loam, Sandy Silt Loam	1
	Sandy Clay Loam/Medium Silty Clay Loam /Medium Clay Loam*	2
	Heavy Clay Loam**	3a
	Sandy Clay/Silty Clay/Clay	3b
Key * <27% clay; and ** >27% clay		

2.5.3 In a climate area with 193 field capacity days (FCD), well drained soil profiles in Wetness Class I with medium clay loam topsoil are limited by soil wetness to Grade 2. Where the topsoil is heavy clay loam, well drained soil profiles (Wetness Class I) are limited by soil wetness to Subgrade 3a (re Table 6 of the ALC Guidelines).

2.6 ALC Grading at the Site

2.6.1 From the published information above, together with the findings of the detailed ALC survey, it has been determined that the quality of agricultural land at the Site cannot be more than Grade 2 due to an overriding climate limitation. In addition, well drained soil profiles (Wetness Class I) with medium clay loam topsoil are limited by soil wetness to Grade 2 in this climate area, with 193 Field Capacity Days.

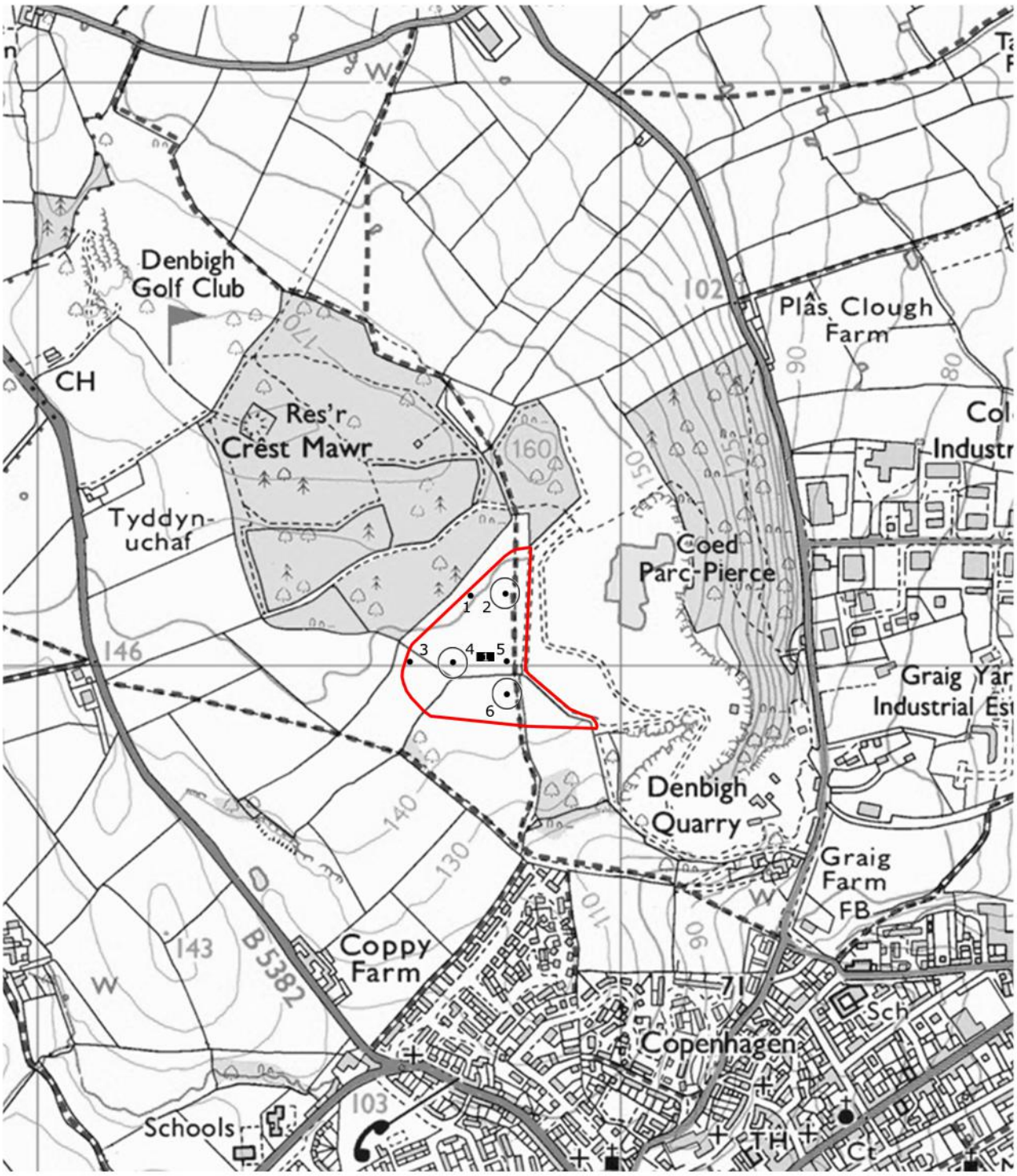
2.6.2 Where well drained soil profiles (Wetness Class I) have heavy clay loam topsoil, the quality of agricultural land at this Site is limited by soil wetness to Subgrade 3a.

2.6.3 The area (ha) and proportion (%) of agricultural land in the different ALC grades have been determined from the ALC map given as **Figure 2** and are given in Table 2.5.

Table 2.5: Agricultural Land Classification – Western extension of Denbigh Quarry

ALC Grade	**Total (Ha)**	**Total (% of Site)**
Grade 1 (Excellent)	0	0
Grade 2 (Very Good)	1.5	30
Subgrade 3a (Good)	2.5	50
Best and Most Versatile (BMV), i.e. ALC Grade 1, 2 and Subgrade 3a	*4.0*	*80*
Subgrade 3b (Moderate)	0	0
Grade 4 (Poor)	0	0
Grade 5 (Very Poor)	0	0
Other Land / Non-agricultural	1.0	20
Total	**5.0**	**100**

Figures



Site boundary

Auger location

Topsoil Sample

Soil Pit

N

Client

Breedon Southern Ltd

Project No C662
Dwg. No 01
Scale NTS
Date 14/10/19
Drawn By ELA

Figure 1

Sample Locations

Project Name

Western Extension of Denbigh Quarry, Wales

R W Askew BSc(Hons) MISoilSci MSc CSCi
The Old Stables, Upexe, Exeter, EX5 5ND
Tel: 07753 227 224
Email: rw.askew@btinternet.com

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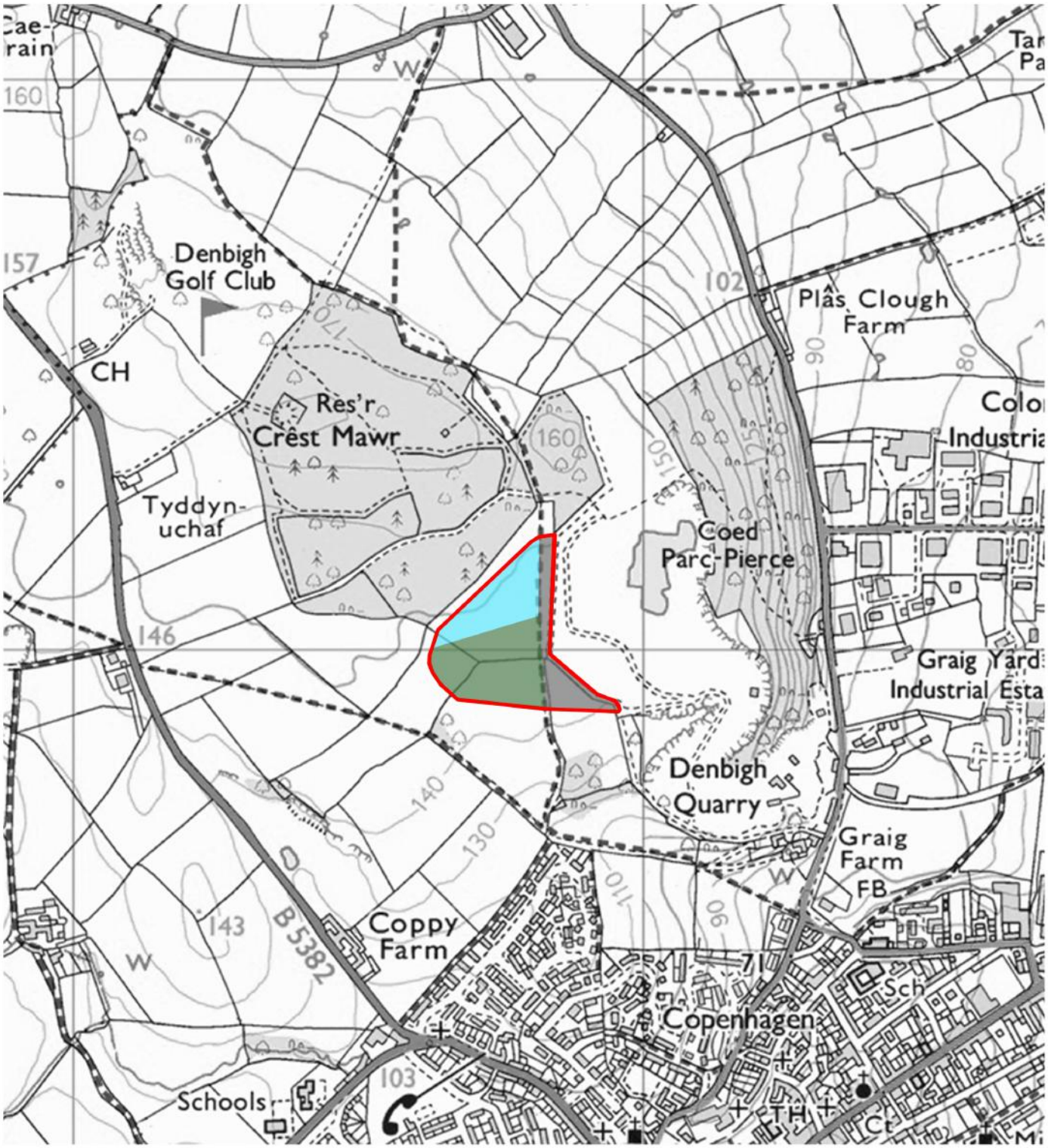

ALC Grade

- Grade 1
- Grade 2
- Subgrade 3a
- Subgrade 3b
- Grade 4
- Grade 5
- Other land

Site boundary

N

Client

Breedon Southern Ltd

Project No C669
Dwg. No 02
Scale NTS
Date 14/10/19
Drawn By ELA

Figure 2:

Agricultural Land Classification

Project Name

Western Extension of Denbigh Quarry, Wales

R W Askew BSc(Hons) MISoilSci MSc CSCi
The Old Stables, Upexe, Exeter, EX5 5ND
Tel: 07753 227 224
Email: rw.askew@btinternet.com

Appendix A:
Soil Profile Logs

Point	Grid ref.			Alt (m)	Slope °	Aspect	Land use	Depth (cm)			Matrix	Ochreous Mottles		Grey Mottles		Gley	Texture	Stones - type 1				Stones - type 2				Ped			SUBS STR	CaCO3	Mn C	SPL	Drought			Wet		Final ALC			
	NGR	X	Y					Top	Bttm	Thick	Munsell colour	Form	Munsell colour	Form	Munsell colour			%	> 2cm	> 6cm	Type	%	> 2cm	> 6cm	Type	Strength	Size	Shape					MBw	MBp	Gd	WC	Gw	Limitation 1	Limitation 2	Limitation 3	Grade
1	SJ 04720 67100	304720	367100	160			LEY	0	20	20	10YR3/3					No	MCL - Cla	1	1	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	44	33	1	WC I	2	Wetness			2
								20	40	20	10YR5/4					No	MCL - Cla	4			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								40	120	80	10YR6/2					No	MCL - Cla	30			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
2	SJ 04800 67100	304800	367100	143			LEY	0	18	18	10YR4/3					No	MCL - Cla	3	1	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	50	37	1	WC I	2	Wetness			2
								18	45	27	10YR5/4					No	MCL - Cla	0			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								45	120	75	10YR5/6					No	MCL - Cla	25			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
3	SJ 04620 67000	304620	367000	147			LEY	0	18	18	10YR4/3					No	MCL - Cla	6	2	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	45	32	1	WC I	3a	Wetness			3a
								18	42	24	10YR5/4	FD - Fe	7.5Y6/8			Yes	HCL - Clay	10			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								42	120	78	10YR6/2	FD - Fe	7.5Y6/8			No	HCL - Clay	25			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
4	SJ 04700 67000	304700	367000	147			LEY	0	20	20	10YR4/3					No	HCL - Clay	6	2	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	46	33	1	WC I	3a	Wetness			3a
								20	45	25	10YR5/4	FD - Fe	7.5Y6/8			Yes	HCL - Clay	10			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								45	120	75	10YR6/2	FD - Fe	7.5Y6/8			No	HCL - Clay	25			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
5	SJ 04800 67000	304800	367000	143			LEY	0	24	24	10YR4/2					No	HCL - Clay	10	4	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	26	26	2	WC I	3a	Wetness			3a
								24	47	23	10YR5/3	FD - Fe	7.5Y6/8			Yes	HCL - Clay	20			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								47	120	73	10YR6/3	FD - Fe	7.5Y6/8			No	C - Clay	35			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
6	SJ 04800 66900	304800	366900	143			LEY	0	23	23	10YR4/2					No	HCL - Clay	8	4	0	HR - All hard rocks or stones (i.e. those which cannot be scratched with								Not Applic	NON - N	No	No	36	27	1	WC I	3a	Wetness			3a
								23	45	22	10YR5/3	FD - Fe	7.5Y6/8			Yes	HCL - Clay	16			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	No	No									
								45	120	75	10YR6/3	FD - Fe	7.5Y6/8			No	HCL - Clay	35			HR - All hard rocks or stones (i.e. those which cannot be scratched with								Moderate	NON - N	Yes	No									
	END																																						

Appendix B:
Soil Pit Descriptions

Project	Location	Date	Surveyor(s)	Company
C669	Western Extension of Denbigh Quarry, Denbigh, Wales	04-Sep-19	Rob Askew	Askew Land and Soil

Pit	WC	Grade	Limitation(s)	Notes
1	I	2	Climate and Wetness	

Grid Ref.			Altitude	Nearest	Topography				Flora		Weather and conditions			
Square	East	North		point	Gradient	Aspect	Slope form	Surface	Culivation type	Vegetation types	Temp	Sky	Wind	Precipitation
SJ	048	671		AB2	2°	SE	Straight	Level	Ploughed	Ley Grassland	Warm	Cloudy	Slight	Showers

Horizon	Depth		Matrix			Gleying			Mottles			Stone content					Calc.	Mn C	Ped/soil structure				Horizon boundary		Biopores	SPL
	Top	Bttm	Texture	Colour	Munsell	Gley	Colour	Munsell	Form	Colour	Munsell	%	H	Type	S	Type			Dev.	Size	Structure	Strength	Distinct	Form		
Ap	0	20	MCL	B	10YR4/3	No						1	1	LMST			Non		Mod	Med	Granular	Firm	Abrupt	Smooth	>0.5	No
B	20	40	MCL	YB	10YR5/4	No						4	1	LMST			Non		Mod	Med	Sub-Ang Blocky	Firm	Abrupt	Smooth	>0.5	No
C	40	120	MCL	YB	10YR5/6	No			FD	RY	7.5YR6/8	30	30	LMST			Non	Few	Mod	Coarse	Angular	Firm	n/a	n/a	>0.5	No

Appendix C:
Topsoil Particle Size Distribution (PSD)

ANALYTICAL REPORT

Report Number	**69211-19**	**N717**	**ROB ASKEW**	**Client**	**C699 DENBIGH QUARRY**
Date Received	**09-SEP-2019**				
Date Reported	**13-SEP-2019**				
Project	**SOIL**				
Reference	**C699**				
Order Number					

Laboratory Reference		**SOIL450622**	**SOIL450623**	**SOIL450624**
Sample Reference		**2**	**4**	**6**
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**
Sand 2.00-0.063mm	% w/w	22	28	24
Silt 0.063-0.002mm	% w/w	56	43	48
Clay <0.002mm	% w/w	22	29	28
Textural Class **		MCL	HCL	O-HCL

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

Document Control **This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

** Please see the attached document for the definition of textural classes.

Reported by *Myles Nicholson*

Natural Resource Management, a trading division of Cawood Scientific Ltd.
Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
Tel: 01344 886338
Fax: 01344 890972
email: enquiries@nrm.uk.com

ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand, loamy sand, sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam classes* according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.