SUTTLES STONE QUARRIES

SWANWORTH QUARRY EXTENSION

SOILS CHAPTER

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 This chapter of the Environmental Statement (ES) has been prepared by Richard Stock (Soils and Agriculture) and considers the impact of the proposed development on agricultural land quality and soil resources, and the affected farm holding.

1.2 It identifies the study area and provides a detailed description of the Agricultural Land Classification (ALC) and Soil Resources (Appendix 1 of this report). It refers to the requirements in the Dorset County Council Scoping Opinion (March 2019) with specific reference to Soils and Agriculture. It describes the agricultural land classification and soil resources within the application boundary and considers the potential impacts on the soils and the farm structure and recommends measures to mitigate the impacts over and above the measures embedded in the development proposals. It refers to the EIA Handbook (November 2019), which sets out a new methodology for assessing significance criteria for development affecting agricultural land.

1.3 The proposal identifies the aspects of the working and restoration scheme which could result in soils being lost or damaged, and includes mitigation measures to prevent, reduce or offset any adverse effects, and the likely residual impacts after these measures have been taken.

2 STUDY AREA

2.1 The planning application is to extend the extraction operation to the north of the existing quarry. The extension area comprises parts of four fields. Stone will be extracted from the southern field and the two central fields. The south headland of the northern field will be used to construct a screen bund, and the southern field also provides access to the quarry. The total area affected extends to approximately 15 hectares.

2.2 Plan Number 191128-00144-12 shows the extent of the planning application boundary and the current extraction area. The approved restoration scheme for the existing quarry is shown on Landscape Restoration Concept Plan (16-102-100).

3 METHODOLOGY (SCOPING, POLICY)

Scoping Opinion Dorset County Council (March 2019)

3.1 A Scoping Opinion Request (January 2019) was submitted to Dorset County Council for consideration of the proposed development. Dorset County Council Scoping Opinion (March 2019) advises on matters to be covered in Technical Chapters. The Scoping Opinion includes specific reference to Soils and Agriculture.

3.2 The Scoping Request identifies at Section 8.4 that there will be a temporary loss of the land on a phased basis to allow extraction to be undertaken before being restored to agricultural land, and that potential damage could occur to soils during handling and

storage. It confirms that an assessment of the agricultural land quality and soil resources will be undertaken, that a methodology for soil handling and restoration to mitigate soil damage will be proposed and the impact on the farm business will be assessed.

3.3 The Scoping Opinion confirms the data required to identify and assess Significant Effects on the Environment. It requires a description of the forecasting methods or evidence used to identify and assess the significant effects and a description of mitigation measures. It concludes that '*Based on the information currently available it is considered that the issues considered in section 8.4 of the Scoping Report are not likely to give rise to significant environmental effects'.*

3.4 It is not clear from the Scoping Opinion if Natural England has been consulted specific to soils and agriculture issues on this site. However, Natural England usually confirms that 'impacts from developments should be considered in the light of the Government's policy for the protection of best and most versatile (BMV) agricultural land as set out in paragraph 171 of the NPPF'. It also recommends 'that soils should be considered under a more general heading of sustainable use of land and the ecosystem services they provide as a natural resource in line with paragraph 170 of the NPPF'.

3.5 Natural England confirms the view that 'Soil is a finite resource that fulfils many important functions and services (ecosystem services) for society, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution'. It concludes that it is important that soil resources are protected and used sustainably.

3.6 In this respect Natural England advises that the following issues should be considered in detail as part of the Environmental Statement.

1. The degree to which soils would be disturbed/harmed as part of this development and whether any 'best and most versatile' agricultural land would be affected. (If required an ALC and soil survey should be undertaken).
2. Proposals for handling different types of topsoil and subsoil and the storage of soils and their management whilst in store. (reference is made to MAFF's Good Practice Guide for Handling Soils).
3. The method of assessing whether soils are in a suitably dry condition to be handled (ie. dry and friable), and the avoidance of soil handling, trafficking and cultivation during the wetter winter period.
4. A description of the proposed depths and soil types of the restored soil profiles; normally to an overall depth of 1.2 m over an evenly graded overburden layer.
5. The effects on land drainage, agricultural access and water supplies, including other agricultural land in the vicinity.
6. The impacts of the development on farm structure and viability, and on other established rural land use, both during the site working period and following its reclamation.
7. A detailed Restoration Plan illustrating the restored landform and the proposed afteruses, together with details of surface features, water bodies and the availability of

outfalls to accommodate future drainage requirements.

3.7 In respect of agricultural and soil related issues the main effects of the development relate to moving soil from its existing position to a period of storage before moving again to its final position for restoration.

National Planning Policy Framework

3.8 National Planning Policy Framework (NPPF) makes reference to ALC and Soil at two paragraphs (170 and 171).

3.9 At paragraph 170 the NPPF states:
Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of best and most versatile land, and of trees and woodland;
c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

3.10 Paragraph 171 of the NPPF says that:
Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework [53.], take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.
[53] Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.

4 ASSESSMENT METHODOLOGY CRITERIA

4.1 In accordance with paragraph 8.4 of the Scoping Opinion the significance of the impacts on Soils, Agricultural Land Quality and Farm Viability are addressed. For topic areas within the EIA, the significance of the impact is frequently assessed by the Magnitude of the effect and the Quality/Value or Sensitivity of the resource being affected.

4.2 A proposal to develop a new framework for assessing the significance of soil in EIA has been under discussion between three leading bodies, British Society of Soil Science (BSSS), Institute of Environmental Management and Assessment (IEMA) and Natural England (NE) for a number of years. A new framework has been published in the EIA Handbook (3rd Edition) November 2019. It gives guidance on the methodology for evaluating impacts on Soils and Agricultural Land Quality but not farm viability.

Soils

4.3 The sensitivity of the soil as a receptor is largely dependent on its resilience to structural damage during soil handling (ie. Soil stripping, storing in stockpiles and re-spreading). The key to soils resilience during handling is the interaction between soil texture and soil moisture, and the effect of this interaction on soil structure. The following table, taken from the EIA Handbook shows the sensitivity of soil receptors for the purpose of the impact assessment.

Sensitivity of soil (topsoil and subsoil)	Mineral and organic soil (topsoil and subsoil)
High sensitivity (low resilience to structural damage)	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organic mineral and peaty soils where the Field Capacity Days (FCDs) are 150 or greater. Medium textured soils (silty loams, medium silty clay loams, medium clay loams and sandy clay loams) where the FCDs are 225 or greater. All soils in wetness class (WC) V and WCVI
Medium sensitivity (medium resilience to structural damage)	Clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams, silty loams and organic mineral and peaty soils where the FCDs are fewer than 150. Medium textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams where FCDs are fewer than 225. Sands, loamy sands, sandy loams and sandy silt loams where FCDs are 225 or greater or are in wetness classes WCIII and WCIV.
Low sensitivity (High resilience to structural damage)	Soils with high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the FCDs are fewer than 225and are in wetness classes WCI and WCII

4.4 In order to assess the magnitude of the impact it is important to consider what would happen to the functionality of the soil and that it is a non-renewable resource. No specific guidance is given to a assess the orders of magnitude, but it is not considered unreasonable to say that a Major magnitude is the permanent loss or sealing of the soil or agricultural land and the Negligible would be no discernible loss or reduction in functions. Medium could be considered to be the permanent loss of one or more soil functions and Low could be the temporary loss of one or more soil functions.

Agricultural land quality

4.5 The guidance on sensitivity of agricultural land quality is given in the table below taken from the EIA Handbook.

Sensitivity	**Guidance**
Very High	ALC Grades 1 and 2
High	ALC Grade 3a
Medium	ALC Grade 3b
Low	ALC Grades 4 and 5
Negligible	Previously developed land in hard uses with little potential to return to agriculture.

4.6 The guidance on magnitude is given in the table below taken from the EIA Handbook.

Magnitude	**Guidance**
Major	Relating to the permanent loss or reduction in quality of agricultural land due to development. 1. More than 20ha is a very high magnitude 2. 5-20ha is high magnitude
Moderate	Temporary or potentially reversible development
Minor	Low magnitude is a permanent loss of <5ha or development with short term effects
Negligible	As above
No change	No change

4.7 The significance matrix for Both Soils and Agricultural Land Quality is as follows.

Magnitude	**Sensitivity**				
	Very High	High	Medium	Low	Very Low
Very High	Major	Major	Moderate	Minor	Negligible
High	Major*/Mod	Major*/Mod	Minor	Minor	Negligible
Medium	Moderate	Moderate	Minor	Minor	Negligible
Low	Minor	Minor	Minor	Negligible	Negligible
*where total of grades 1, 2 and 3a is 20ha or more					

Farm viability

4.8 In the absence of an approved method for assessing significance criteria in respect of the impact on Farm Businesses, the criteria set out in the following table has been commonly used.

Criteria for assessing effects on Farm Businesses

Significance	Evaluation criteria
Major Adverse	Renders an existing full-time farm business unworkable in its current form. In such a case the farm business would not be able to continue in the same way as before the development, and the farmer would have to change the farm enterprise carried out on the remainder of the holding.
Moderate Adverse	A significant effect on the workability of a full-time farm business but where farming could continue in the same way as before the scheme. In such as a case, the farm business could largely continue in its present form, albeit the effects of the development are likely to reduce net farm income.
Minor Adverse	Limited effects on the workability and economic performance of a full-time farm unit, or the loss/significant effect on the viability of a part-time business. For the purpose of this assessment, where land is currently farmed through a tenancy arrangement where there is no legally binding, long-term security of tenure, then the impact on the enterprise is deemed to be Minor in all events; this is because the right of the tenant to farm the land could cease, with agreed notice, at any time.
Negligible	Where an adverse effect on the farm business is imperceptible

5 BASELINE INFORMATION

5.1 The survey area for the agricultural land classification and soil resource report extended to approximately 15 hectares. It includes the proposed extraction area, the main haul road to the quarry and peripheral areas for soil storage and screen berms.

5.2 The survey was undertaken during 2 separate visits. On 5th September the main soil survey was conducted by describing the soil profile at 15 locations using a 1.2m dutch auger and spade and excavating 3 soil profile pits. The survey was undertaken following harvest when the ground was dry and compact. The site was reviewed during a second visit after a number of archaeological trenches had been excavated which showed that the soil changed markedly over short distances but allowed a broad definition of the boundaries between different soil profiles to be drawn.

5.3 The Agricultural Land Classification and Soil Resource Report is attached at Appendix 1. It concludes that the site is dominated by grades 3b and 4 through a combination of wetness and stone limitations. There is a central spine of grade 3a which runs through the middle of the survey area where the main limitations are wetness and/or workability. The variability of the soil profile means that within each ALC grade there are likely to be isolated patches of lower and higher grades. Based on these observations the distribution of the grades is shown on Plan S41/2 and summarised in the table below.

Grade	Area (ha)	%
3a	4.8	32
3b	7.5	50
4	2.1	14
Non ag	0.6	4
Total	15	100

5.4 The soil resource is identified to a depth of at least 1.2m where practicable. Broadly, 3 soil profiles are described based on the depth to the underlying limestone. The shallowest comprises topsoil sitting directly over fractured limestone in a matrix with clay. Next there is a slightly deeper profile comprising topsoil overlying a clay upper subsoil with occasional limestone bands, which sits on fractured limestone and clay matrix. The deepest profile comprises topsoil overlying deep clay upper subsoil, which extends below 1.2m. The evidence from the archaeological trenches shows that the soil depth changes markedly over short distances. Some areas are predominantly deep clay with pockets of shallow brash, and elsewhere the pattern is reversed with predominantly shallow brashy soils with pockets of deep clay. It is, therefore, unrealistic to predict the distribution of soil resources within the site, except to confirm that over the extraction area a minimum of 1.2m of soil will be lifted and stored overall.

5.5 The topsoil is typically heavy silty clay loam 25cm deep with a distinction being made according to stone content. The upper subsoil (clay and silty clay loam), which equate to Grades 3b and 3a, will be lifted and stored separately. The lower subsoil (silty clay), which equates to Grade 3a will be lifted and stored to its full depth. It is anticipated from geological work that the lower subsoil is deeper than 1.2 metres and will compensate for the other shallower profiles, which sit on the matrix of limestone bands and fractured limestone.

5.6 The geological borehole data confirms great variability in the overburden depth between 0.3m and 16m, but typically between 2m and 6m. Some of the overburden comprises weathered limestone but there are also significant areas of boulder clay. It is not unreasonable to conclude there is an adequate soil resource to restore the site with a minimum soil profile of 1.2m.

5.7 The salient baseline information is:

- The extension area is predominantly grades 3b and 4, ie. Not best and most versatile land (BMV), although there is a spine of grade 3a that runs through the middle.
- Topsoil is predominantly heavy silty clay loam and can be treated as a single topsoil unit, but differentiated according to stoniness.
- The subsoil is predominantly silty clay (occasionally clay) but there are pockets of silty clay loam upper subsoil which should be lifted and stored separately.
- For the purpose of designing the working and restoration scheme the topsoil resource can be calculated to a minimum depth of 25cm and the subsoil considered to extend to 120cm (90-95cm thickness), allowing for separate storage of the silty clay/clay and silty clay loam textures.
- Where the subsoil is found deeper than 1.2m it should be retained for restoration to compensate for areas where the subsoil is absent or shallow.

5.8 The land is being purchased by the applicant and will continue to be farmed by the vendors under a Farm Business Tenancy (FBT) until it is required for quarrying. After the land is restored it will be managed through the 5-year aftercare period and it is intended that it will revert to the FBT.

6 DEVELOPMENT PROPOSALS

6.1 The detailed development proposals are described in full in the supporting statement to the planning application, but the aspects, which are relevant to Soils and Agricultural issues are described below by reference to a series of working and restoration plans.

6.2 The scheme is described in 11 plans to show the current situation and progressive development of the site through the Initial development phase, 3 working phases and final restoration as follows:

1 Current Topography
2 Expected main quarry topography before extension
3 Initial development – removal of overburden
4 Initial development – removal of mineral
5 Phase 1 – removal of overburden
6 Phase 1 – removal of mineral
7 Phase 2 – removal of overburden
8 Phase 2 – removal of mineral
9 Phase 3 – removal of overburden
10 Phase 3 – removal of mineral
11 Restoration Plan

6.3 The soil stripping operation in the agricultural land will encounter soil profiles of variable depth. It is anticipated that in the initial development area the main profile comprises stony topsoil overlying fractured limestone, with isolated pockets of deeper subsoil. The

subsoil in the remainder of the site is variable in depth and changes markedly over short distances.

Current Topography

6.3 This plan shows the current situation (February 2019) at the main quarry and the proposed extension to the north.

Expected main quarry topography before extension

6.4 Until the extension area is developed the main quarry will continue to be operated and restored. The plan shows the anticipated situation before the extension is developed. When the extension is developed part of the main quarry will be used for temporary storage of infill and restoration materials, which will include topsoil, subsoil and overburden from the extension and imported fill. The plan also shows the initial development area and the 3 phases of the extension area.

Initial development – removal of overburden

6.5 Topsoil, subsoil and overburden will be lifted from the initial development to expose the underlying mineral. All the topsoil will be stored in a bund on the west side of the initial area and the south side of phase 1. Approximately half the subsoil will be stored on the east side of the extension area and the remaining half will be temporarily stored in the main quarry. All the overburden will be temporarily stored in the main quarry.

6.6 The soil materials will be stored like on like. This will entail lifting the topsoil from the footprint of the subsoil bund and storing it in a low adjacent bund, which be replaced at Final Restoration to restore the bund footprint. All the soil bunds will be grass seeded and maintained cut and free of weeds, unless otherwise managed for wildlife.

6.7 It is anticipated that the initial development area will primarily comprise stony topsoil overlying fractured limestone. The stony topsoil will be contained within the initial bund as described.

Initial development – removal of mineral

6.8 Mineral will be removed and following processing the production waste will be placed to infill the main quarry. Concurrently inert fill will be imported to the main quarry.

Phase 1 – removal of overburden

6.9 The topsoil will be lifted and temporarily stored in the main quarry. Subsoil and overburden will be sequentially removed and taken to the main quarry. As far as practicable the overburden will be placed as infill and the subsoil will be temporarily stored.

Phase 1 – removal of mineral

6.10 Mineral will be removed and following processing the production waste will be placed to infill the main quarry. Concurrently inert fill will be imported.

Phase 2 – removal of overburden

6.11 Topsoil will be lifted and temporarily stored at 2 locations in the main quarry. This gives the opportunity to separate the moderately stony from the slightly stony topsoil. At this stage the soil profile will have been exposed across the phase from west to east, which will show the variability in the soil depths over fractured limestone and will reveal the deep pockets of subsoil that must be retained to restore the soil profile. Subsoil will be progressively lifted and temporarily held in phase1 or in the main quarry. The remaining overburden will be progressively placed in the extracted area, supplemented with imported inert waste, to infill the quarry void for restoration, before restoration of the subsoil layer.

Phase 2 – removal of mineral

6.12 Mineral will be removed and following processing the production waste will be used to infill the phase 1 void, concurrent with imported inert material. Sequentially overburden and subsoil from phase 2 will be used for infill and restoration respectively. Phase 1 will be restored as calcareous grassland using a minimal amount of topsoil, with a narrow strip on the east boundary to rough grassland. The plan shows the anticipated situation after mineral has been removed from phase 2.

Phase 3 – removal of overburden

6.13 Phase 3 is a progressive continuation of phase 2. Topsoil will be lifted and as much as possible will be direct placed in phase 2 for restoration to achieve BMV agriculture land and the remainder temporarily stored in the main quarry. Subsoil will be lifted and part will be used to build the screen on the north boundary and the remainder will be directly placed for restoration in phase 2. The topsoil from the north boundary screen footprint will be lifted and stored in an adjacent low bund. During this phase an audit of stored soil resources will determine if further deep subsoil should be retained to complete the proposed restoration work. Surplus overburden will be direct placed into phase 2 as infill, concurrent with the placement of production waste and imported inert infill. Phase 2 will restore approximately 5.3 hectares to BMV agricultural land.

Phase 3 – removal of mineral

6.14 Mineral will be removed and following processing the production waste will be used to continue filling the void concurrent with the importation of inert material.

Final Restoration

6.15 The Restoration Plan shows the extension area restored to a mix of BMV agriculture, calcareous grassland and rough grassland at original ground level. The final landform will be constructed by infilling the quarry void with surplus overburden, material available in the main quarry and imported inert material. The northern and eastern subsoil bund footprints will be restored by removing the stored subsoil, loosening the footprint and replacing the original topsoil. The topsoil bund will be restored by removing the stored topsoil and loosening the underlying topsoil. The calcareous grassland will be restored with minimal topsoil, which will be used to greater depth for the BMV agricultural land in phase 2 and to increase the depth of topsoil replaced on the northern subsoil bund footprint.

6.16 The table below shows the approximate areas of the proposed mix of afteruses, which are illustrated on the Restoration Plan.

Restored Afteruse	Approximate Area Ha
BMV Agriculture, Phase 2 and northern bund	6.86
Calcareous grassland, Phase 1	4.31
Rough Grassland, east boundary	3.83
Total	15.00

7 ASSESSMENT OF IMPACTS

Parameters

7.1 The assessment of impacts has been made according to the following parameters, commonly advised by Natural England.

- The loss of agricultural land and impact on land quality, particularly of any 'best and most versatile' agricultural land.
- Proposals for handling different types of topsoil and subsoil and the storage of soils and their management in store.
- Methods of soil handling with reference to Defra's Good Practice Guide for Handling Soils.
- Method of assessing whether soils are in a suitably dry condition to be handled.
- A description of the proposed depth and soil types of the restored profiles.
- The affects on land drainage, agricultural access and water supplies, including other agricultural land in the vicinity.
- The impacts of the development on farm structure and viability.
- A detailed restoration plan illustrating the restored landform and the proposed afteruses, together with details of surface features, water bodies and the availability of outfalls to accommodate future drainage requirements.

Loss of Agricultural Land and Land Quality

7.2. The agricultural land classification report confirms that the majority of the extension area does not comprise best and most versatile land, but there is a band of grade 3a running through the middle of the site from north to south. There will, therefore be a potential impact on BMV land.

Handling different types of soil, soil storage and management in store

7.3 The main soil resource comprises the heavy silty clay loam topsoil with variable stone content, overlying variable subsoil depths. The subsoil is either absent, shallow over fractured limestone or deeper than 1.2m. During the initial development phases the topsoil and subsoil will be lifted separately and placed into long-term stores. In later phases the topsoil and subsoil will be lifted and directly placed for restoration where practicable. If different soils are not identified and separated there is the potential to reduce the quality of the restored site.

7.4 Where soils are placed in store for a temporary period before use in restoration there are a number of situations when the soil could be damaged. This can occur at the point when the soil is initially lifted from its position in the soil profile, during transport and at placement in store. Thereafter the soil can lose quality in store depending upon the size and shape of the soil store, vegetation cover and vehicle movements over the store. There are additional points at which different soil types can be mixed and further damaged by handling or trafficking when wet.

Methods of soil handling

7.5 It is recognised that the method of soil handling and the scheme of soil movements can have significant positive or negative impacts on soils. Use of inappropriate earthmoving equipment in wet conditions can damage restored soil, which can take a long and expensive period of aftercare to remedy. A scheme of soil movements is needed to minimise soil handling and to make the best use of the available soil resources. It must also be sufficiently flexible to allow for daily management decision, without departing from the main principles.

7.6 The working and restoration scheme should comprise two elements – The Soil Handling Method and The Phased Soil Movements Programme.

Method of assessing whether soils are in a suitably dry condition to be handled

7.7 Handling soils in unsuitable moisture conditions can cause long-term damage to soil in terms of compaction and smearing. Similarly, handling soils when dry and dusty can also be damaging in terms of wind blow and loss of structure.

The proposed restored profiles

7.8 The existing soil is of variable depth over fractured limestone. Three profiles are described in which the subsoil is either absent, shallow or deep. The working and restoration programme is designed to restore the BMV land with a uniform target soil profile to a depth of 1.2m by replacing the fractured limestone with soil-like material recovered from the areas of deep subsoil. The calcareous grassland will be restored with minimal topsoil.

Land drainage, access and water supply

7.9 The proposed development will seek to extract stone over several years and the removal of agricultural land will be progressive. It is important to maintain the agricultural access and water supplies to the land for its beneficial use until such time as it is required for stone extraction. Provision will need to be made for remedial drainage if the progressive land-take disturbs the natural or artificial drainage of the remaining agricultural land.

Farm structure and viability

7.10 The extension area is being purchased by the applicant and it will continue to be farmed by the vendor through a Farm Business Tenancy until it is required for quarrying. The scheme of working and restoration will progressively take the land out of agricultural production through the initial phases but thereafter the land will be progressively restored. After restoration it is intended that the land will revert to the FBT. The net result will be a change of use of approximately 8.14 hectares of grades 3b and 4 land, which will be restored as calcareous grassland and rough grassland, and restoration of 6.86 hectares of BMV in a uniform field parcel.

Restoration plan

7.11 An overriding consideration in the design of the restoration plan is the sustainable use of soils. This is raised as a key matter for consideration in paragraph 170 of NPPF. It is addressed in the working and restoration scheme to ensure that all soils are used sustainably.

8 MITIGATION MEASURES

Parameters

8.1 Mitigation of the parameters are addressed below as required.

Loss of Agricultural Land and Land Quality

8.3 The working and restoration proposal is to restore the land at original ground levels. There will be no loss of BMV agricultural land, but there is potential to increase the area of BMV by approximately 2.66 hectares by redistributing topsoil. In contrast the areas of grades 3b and 4 will be restored as calcareous grassland and rough grassland.

Handling different types of soil, soil storage and management in store

8.4 The topsoil is predominantly heavy silty clay loam and could be handled as a single soil type, but a distinction is made between stony and less stony variants. This is a judgement that will be made in advance of soil stripping. Similarly, there are pockets of land with silty clay loam upper soil as opposed to silty clay or clay. These pockets will be lifted and stored separately where they occur

8.5 The topsoil will be lifted to a typical depth of between 25cm and placed in storage bunds no higher than 3m. Subsoil will be lifted to its full depth over fractured limestone and placed in store no higher than 5m. Deeper pockets of subsoil will be lifted where they occur to compensate for the areas with shallow subsoil. On-going soil auditing will ensure that sufficient soil resources are available to complete restoration of the site to the target soil profiles.

8.6 At the earliest opportunity after each part of a store has been constructed it will be seeded with grass for early establishment. The northern screen will be seeded with a general grazing mix suitable for the area. The smaller topsoil screens on the south and west boundaries will be seeded with a low maintenance mix, or a mix determined for ecological benefit. Seeding will take place before the end of September and the grass and the grass will be managed according to its use.

8.7 Soil stores will only be trafficked by agricultural equipment for maintenance purposes.

Methods of soil handling

8.8 Soils will be handled using hydraulic excavators, articulated dump trucks and low ground pressure bulldozers. The equipment will be used for soil stripping, placement in store and excavation from store in accordance with MAFF (2000), Good Practice Guide For Handling Soils (version 04/00), FRCA Cambridge, quoting sheets 1, 2 and 3 as follows:-

- Sheet 1 – Soil stripping with excavators and dump trucks.
- Sheet 2 – Building soil storage mounds with excavators and dump trucks
- Sheet 3 – Excavation of soil storage mounds with excavators and dump trucks
- Sheet 4 – Soil replacement with excavators and dump trucks
- Sheet 19 – Soil decompaction with bulldozer drawn tines.

8.8 Low ground pressure bulldozers will be used to shape the surface of the stores to a convex shape to shed surface water and lightly consolidate the soil to mitigate against soil erosion.

8.10 Sheet 19 is also included to allow for decompaction of the soil bund footprints if required.

8.11 Soils will be transported on specific haul routes, travelling only on the mineral surface or the restoration platform.

Method of assessing whether soils are in a suitably dry condition to be handled

8.13 The objective is that all soils shall be handled when they are in a reasonably dry and friable state, which is when they will be least susceptible to lasting damage by compaction and smearing. Additionally, soils should not be moved between November and March inclusive. This is to ensure that it will be possible to establish grass on new soil stores or restored land in favourable conditions for germination and establishment. The Applicant will be responsible for ensuring that the following constraints shall be observed in the soil moving season, based on weather conditions and soil conditions.

Weather Conditions

Soil handling shall cease during rain, sleet or snow. The following criteria shall be applied

- In light drizzle soil handling may continue for up to 4 hours unless the soils are already too moist.
- In light rain soil handling must cease after 15 minutes.
- In heavy rain and intense showers, handling shall cease immediately.

Soil Conditions

Soil tests are to be undertaken in the field. Samples shall be taken from at least 5 locations in the soil handling area. The tests shall include **Examination** and **Consistency**.

The **Examination** test is as follows:

- If the soil is wet and films of water are visible on the surface of soil particles – No Handling.
- If the sample is moist but there is a slight dampness when squeezed but it does not significantly change colour (darken) on further wetting – No Handling by Scrapers or Bulldozers but may be Handled by Tracked Excavator.
- If the sample is dry, it looks dry and changes colour (darkens) if water is added – Handling OK.

The **Consistency** test is as follows:

First test, attempt to mould soil sample into a ball by hand

- Impossible because the soil is too dry and hard – Handling OK.
- Impossible because the soil is too loose and friable – Handling OK.
- Impossible because soil is too loose and wet – No Handling.
- Possible – Go to next test.

Second test, attempt to roll ball into a 3mm diameter thread between the fingers and thumb

- Impossible because soil crumbles or collapses – Handling OK.
- Possible – No Handling.

The proposed restored profiles

8.14 The minimum target restored profile for the BMV land is the same as the typical existing Grade 3a profile of the undisturbed land, comprising 25cm topsoil over 95cm subsoil. In combination with other criteria relating to the restored landform this will allow the restored profile to achieve BMV land quality, but it is a minimum profile depth and the topsoil in particular will in practice be restored deeper. The working and restoration scheme is designed to retain the subsoil contained in the deep pockets to substitute for the fractured limestone, thereby restoring a uniform Grade 3a profile.

Land drainage, access and water supply

8.16 In order to maintain the undisturbed agricultural land until it is required for clay extraction drainage, access and water supply will be maintained. This will be a matter of site management.

Farm structure and viability

8.17 The extension area is being purchased by the applicant and will continue to be farmed by the vendor under a Farm Business Tenancy until required for stone extraction and after restoration. The impact on the farm viability will be negligible in the short-term but will benefit from the sale income which could be re-invested in the farm structure. The agricultural land will be maintained in agricultural use until required for extraction. The land will be temporarily taken out of agricultural production before restoration as specified in the working and restoration scheme. There will be a reduction in the farmable land for a number of years but when the restoration is complete there will be no net loss of land, albeit the grade 3b and 4 areas will be restored as calcareous and rough grassland.

Restoration plan

8.18 The restoration plan shows the extension area restored to original ground levels.

RECOMMENDATIONS

Supervision and monitoring

8.19 To ensure that the proposed phased working and restoration scheme succeeds a programme of supervision, monitoring and reporting will be agreed.

8.20 It is recommended that in advance of each phase of extraction a detailed survey of the stripping areas is undertaken to confirm the thickness of topsoil and subsoil, notwithstanding the data already obtained. This will inform the volume of temporary and long-term stores and the restoration depths to enable accurate survey control. After

exposure of phase 1 the working face will show the variability of soil depths over fractured limestone, which will inform the selection of deep subsoil overburden for use in profile restoration and the topsoil resource.

8.21 Periodically, a full audit of soil material will be completed to ensure sufficient soil is being retained in store to complete the restoration of the site.

Aftercare

8.22 The restored land will undergo a minimum 5-year aftercare period. This will take the form of an Outline Aftercare Strategy and Detailed Annual Management Programmes. An appropriate Outline Aftercare Strategy is attached at Appendix 2. This is proposed in accordance with NPPF paragraph 204(h).

9 IMPACTS AFTER MITIGATION

9.1 There will be no permanent loss of BMV agricultural land. Allowing for some disturbance during the temporary loss of land it is judged that this impact is **Minor** based on guidance in the EIA Handbook (November 2019). The majority of the site comprises grades 3b and lower being of medium and low sensitivity, while the magnitude is assessed as medium being a temporary loss of land or loss of less than 5 hectares where calcareous grassland with minimal topsoil is restored.

9.2 All aspects of soil handling are proposed in accordance with methodologies accepted by Natural England with reference to soil handling methods, soil handling conditions and treatment in store. All the topsoil and subsoil resources are used sustainably to restore the site to beneficial agricultural and biodiversity afteruses. In respect of the impact on soils the sensitivity of the topsoil and subsoil (heavy silty clay loam and clay) is high, while the magnitude is low, being a temporary loss of one or more soil functions. According to the significance matrix the impact on soils is **Minor**.

9.3 The farm structure and viability could be improved by the sale of the land to the applicant and its continued farming through a Farm Business Tenancy. The sale income can be re-invested in the farm structure. It is considered that the impact on farm structure and viability is **Positive**.

9.4 No secondary or indirect impacts have been identified.

10 CONCLUSION

10.1 This Chapter has been prepared using advice from Natural England to consider soils and agriculture related matters. All the issues have been covered, which mainly relate to the agricultural land quality, handling of soils, restoration and impact on farm viability.

10.2 The impact on agricultural land quality is assessed to be **Minor** in accordance with the current EIA Handbook.

10.3 The impact on soils is assessed to be **Minor** in accordance with the current EIA Handbook.

10.4 The impact on farm structure and viability is considered to be Positive where the sale income could be reinvested in the farm business.

10.4 The analysis confirms the view stated in the Scoping Opinion that soils and agricultural issues are not likely to give rise to significant environmental effects.

APPENDIX 1

AGRICULTURAL CLASSIFICATION REPORT

SUTTLE QUARRIES LIMITED

AGRICULTURAL LAND CLASSIFICATION
AND SOIL RESOURCE REPORT
ON LAND AT
SWANWORTH QUARRY

prepared by
Richard Stock
Soils and Agriculture

Email. [redacted]

Richard Stock
October 2019

CONTENTS

1. INTRODUCTION

1.1 Quarryplan instructed Richard Stock, on behalf of Suttle Quarries, to prepare an Agricultural Land Classification and Soil Resource report on approximately 15 ha of land at Swanworth Quarry near Worth Matravers. The report is required as part of the baseline information for a planning application and EIA for an extension to Swanworth Quarry and includes recommendations for soil storage and handling.

1.2 The survey area is located in four main parcels of land to the north-west of the existing quarry and south of the Kingston to Langton Matravers road. The site was accessed from the north via a farm track which runs southwards due west of the survey area. It is centred on National Grid Reference SY 965 788 at an average altitude of 125m aod.

1.3 The report is based on a soil survey which was undertaken on 5th September by sampling soil at 15 locations using a 1.2 metre dutch auger and spade, and examining three soil profile pits. At the time of the survey the cereal crop had recently been harvested and the surface had been lightly harrowed. The ground was hard and dry and penetration by auger and spade was made difficult by some high levels of stone in the subsoil. Further survey information was recorded during a second site visit after archaeological trenches had been excavated. This allowed the description of a further 25 locations and the broad definition of boundaries between different soil profiles. Further information has been obtained from the MAGIC website and the Soil Survey of England and Wales.

1.4 The soil survey details have been interpreted to grade the site in accordance with the Ministry of Agriculture, Fisheries and Food Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Agricultural Land) published in 1988. The system considers criteria relating to th**e climate, site and soil.**

2. CLIMATE

2.1 Agroclimatic data for the site influences the agricultural land classification in respect of growing conditions for crops, and the soil reaction in terms of wetness and drought.

2.2 The meteorological office has published agroclimatic data for England and Wales on a five km grid basis, which can be interpolated to produce data for specific grid points. Data for the site is presented in the table below.

Grid Reference	SY 965 788
Altitude – ALT (m)	125
Average Annual Rainfall – AAR (mm)	922
Accumulated Temperature - Jan to June - ATO	1439
Moisture Deficit Wheat - MDMWHT	98
Moisture Deficit Potatoes - MDMPOTS	88
Duration of Field Capacity - FCD	187

2.3 The climatic criteria are considered first when classifying land as climate can be overriding irrespective of soil and site conditions. The main parameters used in the assessment of climatic limitation are Average Annual Rainfall (AAR), as a measure of overall wetness, and Accumulated Temperature (ATO, Jan to June), as a measure of the relative warmth of the area.

2.4 On the basis of Rainfall and Accumulated Temperature, the site is climatic grade 1.

3 THE SITE

3.1 The land extends to approximately 15 hectares of mainly arable land. It is located in an elevated position with a south-easterly aspect approximately 3km from the coast.

3.2 The site occupies parts of 4 field parcels, which lie between the existing quarry in the south and the Kingston to Langton Matravers road in the north. At the north end it occupies the south headland of the first field, which will only be used as the footprint of a screen bund. The eastern parts of two central fields will primarily be used for quarrying and perimeter screens. A narrow east headland of the south field will provide a haul route back to the plant site in the existing quarry.

3.3 The land is used for arable production but there is little shelter and is in an exposed position.

3.4 There is no evidence that the site is at risk of flooding or that micro-relief influences land use through frost risk.

3.5 On the basis of **site** characteristics relating to gradient, microrelief and flooding there is no limitation to grade, unless affected by exposure.

4 THE SOILS

4.1 The soils are described in Soil Survey of England and Wales Bulletin 14 (Soils and Their Use in South West England), and identified on the 1:250,000 soil map of England and Wales Sheet 5. The information given in the Bulletin and maps is limited in several ways and is not a definitive soil description. Firstly, soil patterns in England and Wales are commonly complex and vary greatly in composition. Secondly, the minimum area that can be shown on the map is 0.5 km^2 and because of this many soil associations include small patches of soils which, at a larger scale, would be correlated with a different map unit. It is therefore noted that within the limitations of the map, the area is dominated by soils in the Sherborne Association, which includes soils in the Moreton and Haselor Series.

4.2 The Sherborne Association is described as *'Shallow well drained brashy calcareous clayey soils over limestone, associated with slowly permeable calcareous clayey soils.'*

4.3 The Bulletin confirms that the Sherbourne soil typically comprises stoneless or slightly stony silty clay topsoil overlying yellowish brown slightly or moderately stony calcareous clay, which sits on limestone at about 30cm. The associated Moreton series has a similar but deeper soil profile over limestone.

4.4 The detailed soil survey accords with the broad description of the Association and shows variations in soil depth across the site. Broadly, 3 soil profiles are described based on the depth to the underlying limestone. The shallowest comprises topsoil sitting directly over fractured limestone in a matrix with clay, typically described in Pit B. Next there is a slightly deeper profile (Pit A) comprising topsoil overlying a clay upper subsoil with occasional limestone bands, which sits on fractured limestone and clay matrix. Pit C comprises topsoil overlying deep clay upper subsoil. The evidence exposed in the archaeological trenches show that the soil depth changes rapidly over short distances. Some areas are predominantly deep clay with pockets of shallow brashy soils, and elsewhere the pattern is reversed with predominantly shallow brashy soils with pockets of deep clay.

4.5 The soil survey details are attached at Appendix 1 and plan S41/1 shows the soil survey locations.

5. AGRICULTURAL LAND CLASSIFICATION

5.1 The site was graded by applying the survey details to the Ministry of Agriculture, Fisheries and Food Guidelines for Agricultural Land Classification (October 1988).

5.2 The current classification system was adopted in 1988 and was a refinement of the previous system. A series of Provisional ALC maps were produced at a scale of 1 inch to 1 mile between 1967 and 1974 based on the earlier classification system, and were intended to be for guidance only for strategic planning purposes. A new series of soil maps at a scale of 1:250,000 based on the same information are available on MAGIC, an interactive, geographical information website. The 1:250,000 map of the area shows the site to be Provisional Grade 3.

5.3 The agricultural land classification system provides a framework for classifying land according to the extent to which it's physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it. The principal factors considered are **Climate, Site and Soil**. These factors, together with interactions between them, form the basis for classifying land into one of five grades. Grade 1 is land of excellent quality and grade 5 is very poor. Grade 3 is divided into sub-grades 3a and 3b since this grade covers about half of England and Wales. The grade or sub-grade is determined by the most limiting factor present.

5.4 On this site there is no limit according to **Climate**.

5.5 The assessment of **Site** factors considers the way the topography affects agricultural machinery use and crop production. The site is gently undulating and fundamentally offers no restrictions to agricultural use and cropping potential.

5.6 The main **Soil** properties, which may affect cropping potential, are texture, structure, depth, stoniness and chemical fertility. The topsoil texture, where it is heavy silty clay loam affects the workability of the soil and high stone content over some of the site will be an impediment to cultivation, harvesting and crop growth and to cause a reduction in the available water capacity of the soil. The areas of highest stone content in the south east corner and along the haul road are limited to grade 3b where there is more than 10% stone larger than 6cm across. There are also some small areas of grade 4, which are too small to map.

5.7 The remaining consideration for ALC grading on this site relates to **Interactive** limitations, principally droughtiness and wetness.

5.8 In the ALC System the method used to assess droughtiness provides an indication of the average droughtiness based on two reference crops, winter wheat and potatoes. The method used takes account of crop rooting and foliar characteristics to obtain an estimate of the average soil moisture balance (MB). MB is calculated on the basis of crop adjusted available water capacity (AP) and moisture deficit (MD). AP is a measure of the quantity of water held in the soil profile which can be taken up by the specified crop, and MD is a crop related climatological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season.

5.9 The calculation of AP depends on the texture and depth of each soil horizon, the stone content and subsoil structure. Moisture balance calculations have been made for the 3 representative soil profiles. The profiles, from deepest to shallowest are limited by drought criteria to grades 1, 2 and 3a respectively.

5.10 In terms of workability, topsoil with a heavy silty clay loam texture in this climatic region are limited to grade 3a. Where medium silty clay loam is present it is limited to grade 2.

5.11 Where topsoil is heavy silty clay loam and there is an underlying slowly permeable layer

within 50cm (wetness class IV), there is a wetness limitation to grade 4 and within 78cm (wetness class III), it is grade 3b. Where the topsoil is medium silty clay loam these grades are improved by one grade or subgrade. There are isolated locations which might be grade 2 but are too small to map.

5.12 The most limiting factor is wetness and workability.

5.13 It is concluded that the site is dominated by grades 3b and 4 through a combination of wetness and stone limitations. There is a central spine of grade 3a which runs through the middle of the survey area where the main limitations are wetness and/or workability. The variability of the soil profile means that within each ALC grade there are likely to be isolated patches of lower and higher grades.

5.14 Based on these observations the distribution of the grades is shown on Plan S41/2 and summarised in the table below.

Grade	Area (ha)	%
3a	4.8	32
3b	7.5	50
4	2.1	14
non agricultural	0.6	4
Total	15.0	100

6. SOIL RESOURCES

6.1 The agricultural soil profile is identified to a depth of at least 1.2m. Three soil profiles are identified which are represented by the profile pits A, B and C. The ALC distribution plan shows the best fit for the variable soil profiles, but the profiles change markedly over short distances. It is, therefore, unrealistic to predict the distribution of soil resources within the site, except to confirm that over the extraction area a minimum of 1.2m of soil will be lifted and stored overall.

6.2 The topsoil will be lifted to its full depth in Soil profiles A, B and C (approximately 25cm), with a distinction being made according to stone content. The upper subsoil in Profiles A and C (clay and silty clay loam), which equate to Grades 3b and 3a, will be lifted and stored separately. The lower subsoil in Profile C (silty clay), which equates to Grade 3a will be lifted and stored to its full depth. It is anticipated from geological work that the lower subsoil in Profile C is deeper than 1.2 metres and will compensate for the other shallower profiles, which sit on the matrix of limestone bands and fractured limestone.

6.3 The geological borehole data confirms great variability in the overburden depth between 0.3m and 16m, but typically between 2m and 6m. Some of the overburden comprises weathered limestone but there are also significant areas of boulder clay. It is not unreasonable to conclude there is an adequate soil resource to restore the site with a minimum soil profile of 1.2m.

7. SOIL STORAGE

7.1 Topsoil and subsoil should be stored separately to maximum heights of 3m and 5m respectively. It is recommended that the maximum inner and outer side batters are 1 in 2 and 1 in 3 respectively.

7.2 Store footprints should be prepared so that the soils and overburden are stored 'like on like'.

7.3 Stores should be grass seeded with a low maintenance mix and regularly cut. Stores should be maintained tidy and free of weeds by regular cutting or spraying as required and should only be travelled on by agricultural equipment.

8. SOIL HANDLING

8.1 It is recommended that soils are handled using hydraulic excavators, articulated dump trucks and low ground pressure bulldozers.

8.2 This equipment should be used in accordance with MAFF (2000), Good Practice Guide For Handling Soils (version 04/00), FRCA Cambridge, quoting sheets 1, 2, 3, 4,14 and 19 as follows:-

- Sheet 1- Soil stripping with excavators and dump trucks.
- Sheet 2- Building soil storage mounds with excavators and dump trucks.
- Sheet 3- Excavation of soil storage mounds with excavators and dump trucks.
- Sheet 4 – Soil replacement with excavators and dump trucks
- Sheet 14- Building soil storage mounds with bulldozers and dump trucks.
- Sheet 19- Soil decompaction with bulldozer drawn tines.

Sheet 19 is included to allow for decompaction of the soil bund footprints if required and loosening the restoration platform before soil reinstatement. Sheet 14 is included to allow the grading of soil stores before seeding for agricultural use.

8.3 Soils will be transported on specific haul routes, travelling only on the overburden surface, mineral surface or the restoration platform. It is recommended that where practicable, after the initial site development, the land should be worked and restored progressively by direct placement of the soils.

8.4 It is recommended that the soils are only handled when they are in a dry and friable condition. The objective is that all soils shall be handled when they are in a reasonably dry and friable state, which is when they will be least susceptible to lasting damage by compaction and smearing.

APPENDIX 1

Schedule of Auger Borings and
Soil Profile Pit Descriptions

KEY

Colour		Munsell Colour
db	dark brown	10yr33
dyb	dark yellowish brown	10yr46 and 36

Mottling and Gleying

0	none
x	few and faint
xx	common
xxx	many

Texture

mzcl	medium silty clay loam
hzcl	heavy silty clay loam
hcl	heavy clay loam
zc	silty clay
c	clay

Observations

nc	non calcareous
calc	calcareous
mn	manganese
spl	slowly permeable layer

Wetness Class

III	wetness class III

ALC Limitation

w	wetness and workability
st	stone

SCHEDULE OF AUGER BORINGS AND PROFILE PITS

SWANWORTH QUARRY EXTENSION

Auger No	Grid Ref SY	Depth cm	Colour	Texture	gley	Stone %	Obs	Wetness class	ALC Grade
1	96315 79062	0-26 26-40 40-45 45	db/dyb dyb dyb	mzcl hzcl hzcl	x x x	0 0 0	nc nc vs calc Impenetrable Dry and compact	III	3a w
2	96414 79095	0-28 28-58 58-75 75	db/dyb dyb dyb	hzcl hzcl zc	x xx xx	0 0 0	 v firm looser sample falls from auger	III	3b w
3	96489 79096	0-25 25-43 43-70 70	db dyb dyb	hcl/c hzc zc	x x xx	0 0 0	nc nc nc firm Impenetrable Dry and compact	III	3b w
4	96497 78987	0-25 25-65 65	db dyb	mzcl zc	x xx	6 10	brash mn v firm Impenetrable. Spl. Wc IV. Bands of limestone	IV	3b w
5	96509 78894	0-25 25-45 45	db dyb	hcl c	x xx	6 6	variable brash nc. spl wc III Struck stone See Pit A	III	3b/a w
6	96390 78793	0-25 25-60 60-75 75	db dyb dyb	hzcl hzcl zc	x x xx	12 5	Occ 100mm nc nc. v firm. spl wc III Stopped. Too hard to auger	III	3b w
7	96405 78701	0-25 25-60 60	db dyb	mzcl zc	x xx	6 5	variable brash Too dry and tight to auger.	IV/III	3b/a w/st
8	96512 78705	0-28 28-50 50	db dyb	mzcl c/zc	x xx	6 5	 Too dry and tight to auger	IV /III	3a w/st

Auger No	Grid Ref SY	Depth cm	Colour	Texture	gley	Stone %	Obs	Wetness class	ALC Grade
9	96619 78711	0-25 25	db	mzcl	x	10	>6cm. nc impossible to dig stone/clay matrix		3b st
10	96686 78690	0-25 25	db	mzcl	x	20	>6cm. nc impossible to dig stone/clay matrix		4 st
11	96742 78581	0					Too stony to get auger or spade in ground		4 st
12	96589 78796	0-25 25	db	hzcl	x	10	>6cm Struck stone. Clay/brash matrix too dry and stony to dig		3b st
13	96492 78778	0-30 30-45 45-50 50	db db/dyb dyb	hzcl hzcl c	x x	3	nc In bands of limestone Impenetrable by auger	III	3a w
14	96402 78901	0-30 30-60 60	db dyb	hzcl c/zc	x	3	nc In matrix with bands of limestone Too dry and firm to dig	III	3a w
15	96395 78990	0-28 28-70 70	db dyb	hzcl c/zc	x xx	3	 Occ band of limestone Struck band of limestone	III	3a w

SOIL PROFILE PITS

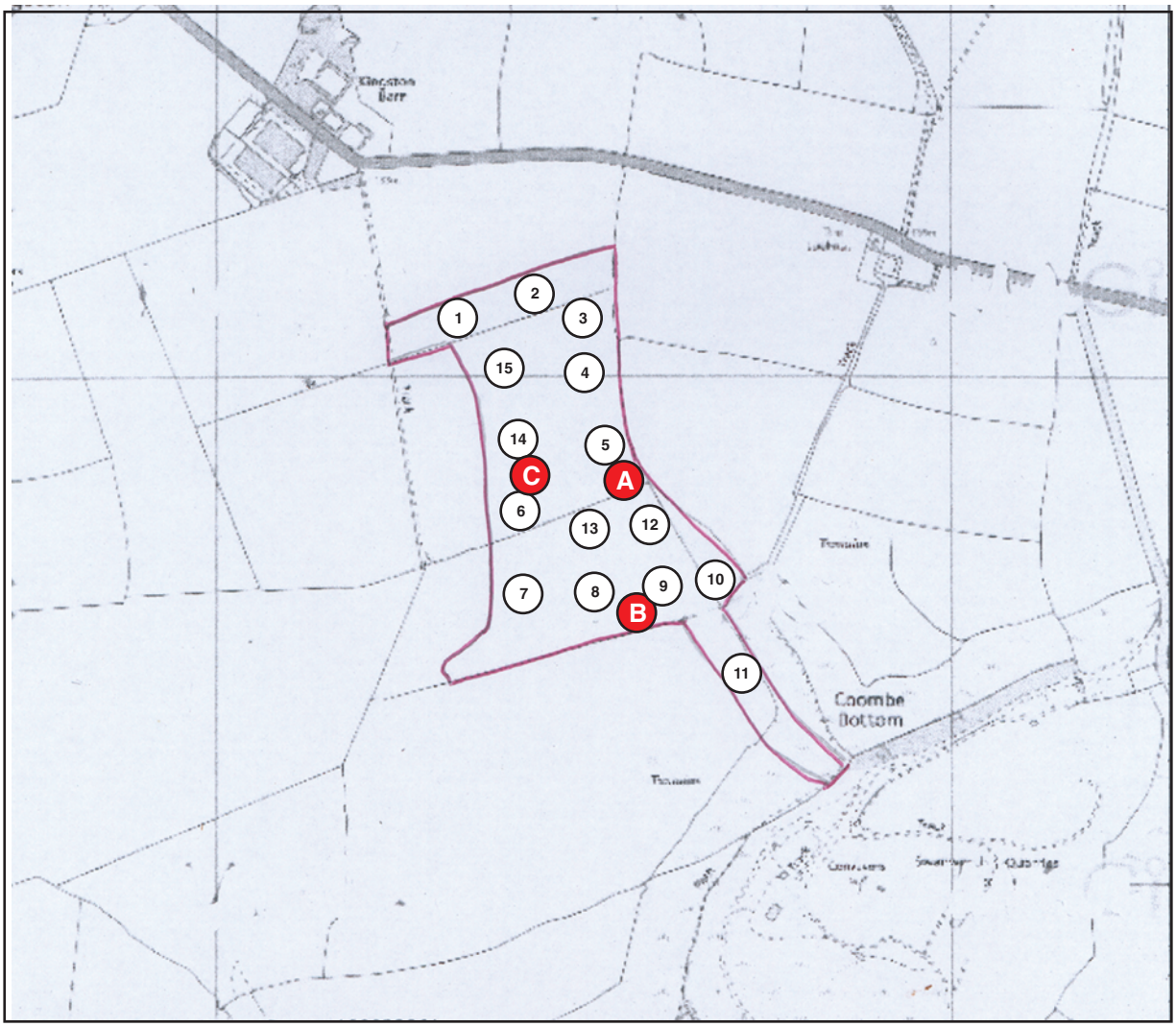
Pit A Auger 5	0-22	dark brown (10yr33) heavy clay loam. Few earthworms. Good rooting. Occasional 200mm brash on surface. No gley. Non calcareous. Cultivation layer.
	22-40	dark yellowish brown (10yr46) clay. No earthworms. No stone. Severe gley. Moderate medium course subangular blocky. Gley on ped faces. Firm. <0.5% biopores. Slowly permeable layer
	40-60	Dark yellow brown clay with matrix of limestone bands. Appears to be free draining.
	60	Pit ends. Too firm to dig.
	Wetness	***slowly permeable layer from 22cm is assigned wetness class IV. This is marginal as it is underlain by fractured limestone. Heavy clay loam topsoil, 187 FCD. Wetness grade 3b***
	Drought	***mb wheat +5mm, mb potatoes +10mm*** ***Drought grade 2***
		Overall Grade 3b

Pit B Auger 9	0-25	dark brown (10yr33) medium silty clay loam. Few earthworms. Good rooting. >10% brash >6cm. Occasional 200mm brash on surface. No gley. Cultivation layer.
	25-35	Fractured limestone in clay matrix. Rooting between horizontal limestone plates.
	35	Pit ends
	Wetness	***No slowly permeable layer is assigned wetness class I. medium clay loam topsoil, 187 FCD. grade 2, workability limitation***
	Stone	***>10% brash >6cm grade 3b***
	Drought	***mb wheat -8mm, mb potatoes -12mm*** ***Drought grade 3a***
		Overall Grade 3b

Pit C Between augers 6 and 14	0-25	dark brown (10yr33) medium to heavy silty clay loam. Few earthworms. Good rooting. slight stone (est. 2%). faint gley. Cultivation layer.
	25-60	Dark yellowish brown (10yr46) heavy silty clay loam. Slight gley. Friable, moderate medium and coarse subangular blocky, easily breaking to smaller units.
	60- 95	Dark yellowish brown (10yr46) silty clay. Moderate coarse prismatic. Firm. gleyed. Rooting on ped faces. Slowly permeable layer.
	95	Pit ends
	Wetness	***Slowly permeable layer from 60cm is assigned wetness class III. Medium to heavy silty clay loam topsoil, 187 FCD. Wetness grade 3a/3b***
	Drought	***mb wheat +42mm, mb potatoes +29mm*** ***Drought grade 1***
		Overall Grade 3a/b

PLANS

1. **Soil Survey Locations (S41/1)**
2. **Agricultural Land Classification (S41/2)**



LEGEND

Auger Location (1)

Pit (A)

Survey boundary

CLIENT Suttle Stone Quarries

SITE Swanworth Quarry Extension

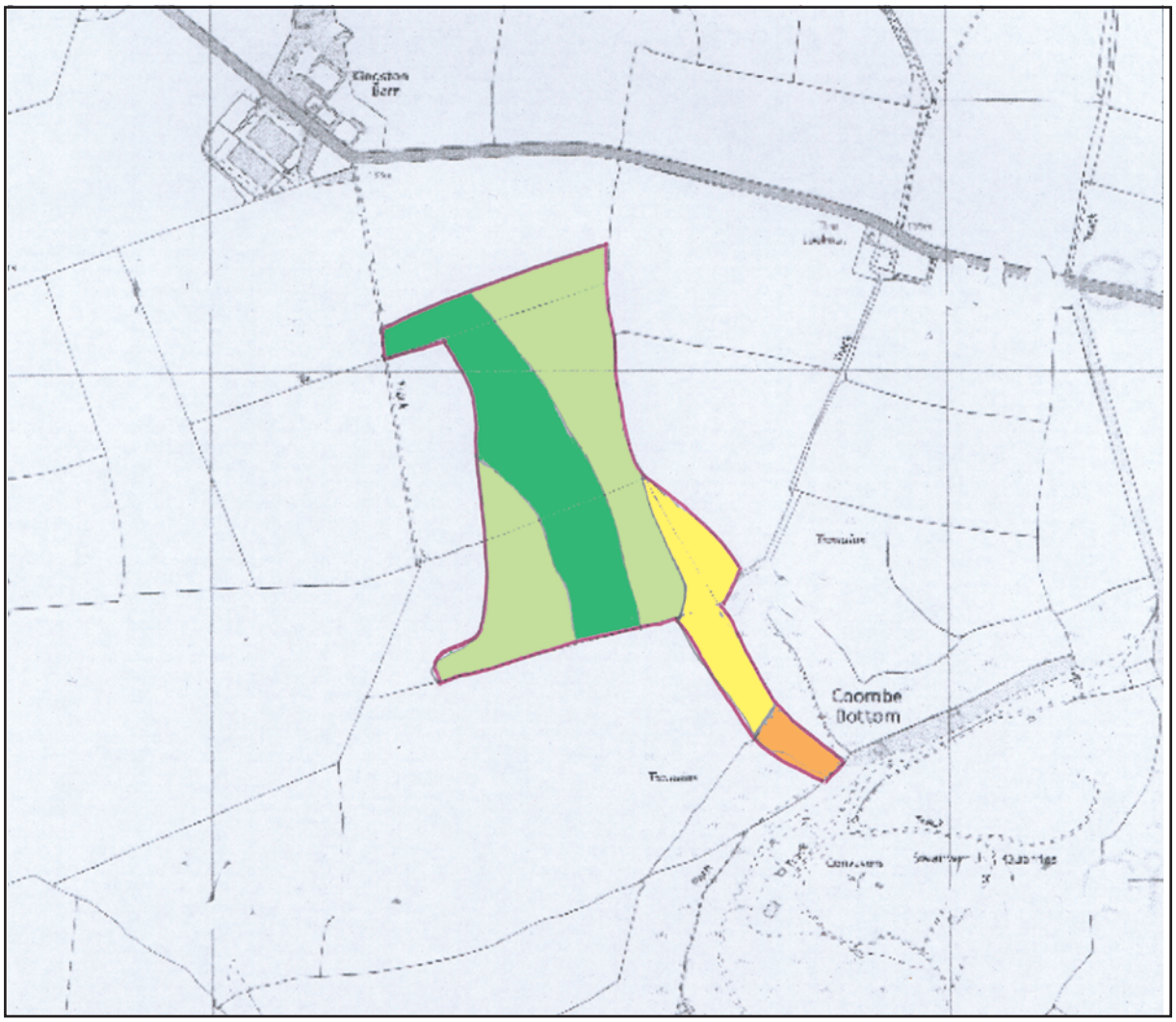
TITLE Soil Survey Locations

SCALE NTS

DATE October 2019

REF S41/1

N



LEGEND

Grade 3a

Grade 3b

Grade 4

Non-agricultural

Survey boundary

CLIENT Suttle Stone Quarries

SITE Swanworth Quarry Extension

TITLE Agricultural Land Classification

SCALE NTS

DATE October 2019

REF S41/2

N

APPENDIX 2

OUTLINE AFTERCARE STRATEGY

OUTLINE AFTERCARE STRATEGY

1 Introduction

1.1 The aftercare strategy is to ensure that the restored land is returned to a standard fit for agricultural use, as far as practicable to what it was before development.

1.2 On completion of each phase or part phase, the land will be husbanded in accordance with an agreed scheme of aftercare.

1.3 The strategy, which follows is proposed for the five-year aftercare period for the whole site as a framework within which the annual detailed management programmes will be designed.

2 Restoration

2.1 It is proposed to restore the site progressively to the agreed target soil profile.

2.2 Completion of restoration work in any year will be programmed to ensure the correct timing of cultivation and seeding.

3 Responsibility

3.1 The Company will be responsible for compliance with the aftercare management of the restored land.

3.2 Farming operations will be undertaken in accordance with the Rules of Good Husbandry and Estate Management. All soil cultivations will be completed with appropriate equipment in suitable soil and weather conditions. The structural development of the soil will be kept under review and appropriate treatment agreed at aftercare meetings.

4 Restoration to Agriculture

Seedbed preparation

4.1 Following replacement of subsoil and topsoil, the replaced topsoil will be worked with appropriate agricultural machinery to produce a fine seedbed. Any stones or other large objects, which are not indigenous to the original soil, which are likely to impede cultivation or cropping shall be removed by hand.

Soil sampling

4.2 In the first year of aftercare, topsoil will be analysed for lime and fertiliser requirements. Further sampling will be by agreement at the annual aftercare meetings.

Weeds

4.3 Weed, pest and disease control will be achieved by spraying, as necessary, with approved products.

Drainage

4.4 It is not proposed to install any land drains in the restored land in the first year in order to allow for any uneven settlement. Thereafter drains will be installed unless it is clear that there is no requirement because the land is free draining.

Cropping

4.5 The cropping and stocking of the land will be advised by the requirement to develop calcareous grassland.

4.6 Any areas of poor germination will be reseeded at the earliest opportunity.

General Remedial treatments

4.7 The Company will undertake remedial treatments such as subsoiling, fence maintenance and up-keep of other fixed equipment.

Records

4.8 Detailed records of agricultural inputs will be kept during the aftercare period and will be submitted to the Planning Authority prior to each aftercare meeting.

5 Regular Aftercare Assessment

5.1 Annual aftercare meetings should be arranged between the Company and the Mineral Planning Authority to review aftercare progress and agree the programme for the forthcoming year. It is suggested that these meetings take place in the Spring.