SFCS 4040 26/90

Sands Farm, Calne, Wiltshire

Agricultural Land Classification and Site Physical Characteristics

Report of Survey

1. Introduction

In September 1990 a survey of 34 ha of land at Sands Farm, Calne, Wiltshire, was carried out. This was in response to a proposal by ECC Quarries Limited to extend an existing quarry.

The survey was carried out by members of the Resource Planning Group (South West Region) in order to fulfil MAFF's statutory role under the Town and Country Planning (Minerals) Act, 1982, by providing a statement of the land quality and the site physical characteristics.

2. Climate, Geology and Soils

Climatic variables were obtained by interpolation from a 5 km grid database. The variables for Sands Farm are as follows:

Altitude	: 90 m
Accumulated Temperature (ATO)	: 1438°
Average Annual Rainfall (AAR)	: 790 mm
Moisture Deficit, Wheat (MDW)	: 101 mm
Moisture Deficit, Potatoes (MDP)	: 92 mm
Field Capacity Days (FCD)	: 174 days

The variables used in the assessment of an overall climatic limitation of a site are the average annual rainfall and the accumulated temperature. The average annual rainfall is a measure of the overall wetness of the site, and the accumulated temperature is a measure of the relative warmth of the locality. At Sands Farm the combination of an accumulated temperature of 1438° and an average annual rainfall of 790 mm do not constitute a climatic limiting factor. No evidence of exposure was found at the site.

The site is almost flat and overlies deposits of the Lower Greensand sequence. The soils are generally deep, brown, well drained, with a sandy loam topsoil and upper subsoil, overlying a sandy clay loam lower subsoil. The soils belong to the Bursledon association.

3. Agricultural Land Classification (ALC)

A detailed ALC survey was carried out in order to assess the degree to which the physical characteristics of the land impose long-term limitations on its use for agriculture. The agricultural land classification was determined using the Revised Guidelines and Criteria for grading the quality of agricultural land. A description of the ALC grades and

sub-grades is given as Appendix 1. The soil was examined to a depth of 1 metre by hand auger on an approximate 100 metre grid spacing at 28 sites. Two soil pits were dug and described. Auger hole descriptions are given as Appendix 2, and the pit descriptions as Appendix 3.

The distribution of the ALC grades and sub-grades is shown on the ALC map, Map 1. The location of the auger sample points and the soil pits is shown on Map 2. The extent and relative proportions of the ALC grades and sub-grades are as follows:

Grade	Area (ha)	% of Area	
1	20.1	60%	Best and Most Versatile Land
2	11.2	34%	Best and Most Versatile Land
3b	2.1	6%	
TOTAL	33.4		

Grade 1 Land

The majority of the site is Grade 1 agricultural land. The light textured profile is free draining with no wetness limitation. Moisture balance calculations indicate no droughtiness limitation. The sandy loam topsoil is not subjected to a workability limitation. The two profile pits are representative of this mapping unit.

Grade 2 Land

9 ha of land is classified as Grade 2. In the north western corner there is a possible depth limitation, with less than 60 cm of soil over a flaggy layer, and a droughtiness limitation. In the south the land is limited to Grade 2 by droughtiness. This is due to a lower subsoil texture of sand occurring from approximately 60 cm. These profiles therefore have a low available water content, which in combination with the climatic moisture deficits of 101 mm for wheat and 92 mm for potatoes, lead to low moisture balance figures, and a grading of 2 due to droughtiness.

Sub-Grade 3b Land

2 ha of land to the south of Sands Farm is classified as sub-grade 3b. This land lies alongside a stream, and is downgraded to 3b because of a wetness limitation. The soil has a heavy clay loam topsoil overlying a clay subsoil. Gleying occurs from the surface, and a slowly permeable layer extends from 35 cm. This places the soil in wetness class IV. The combination of a wetness class IV, 174 field capacity days, and a heavy clay loam topsoil, leads to an ALC grading of 3b.

4. Soil Resources

Topsoil

'Topsoil' is defined as the organic rich surface horizons. This has a texture of sandy loam in the grade 1 and grade 2 soils, and heavy clay loam is the sub-grade 3b soil.

The topsoil resources available for stripping, storing, and restoration are shown on Map 3 and outlined below:

Map Unit	Texture	Thickness (cm)	Area (ha)	Volume (m^3)
T1	SL	20	31.6	63,200
T2	HCL	30	2.1	6,300

Subsoil

'Subsoil' is defined as the less organic rich lower horizons.

In mapping unit S1 these consist of sandy loam extending from 20 cm to 60 cm depth, over sandy clay loam. For restoration to grade 1, a minimum thickness of 50 cm of sandy clay loam lower subsoil must be restored.

Mapping unit S2 consists of sandy loam upper subsoil extending from 20 cm to 70 cm depth, over loamy sand or sand. For restoration to grade 2, a minimum thickness of 30 cm of sand/loamy sand lower subsoil must be restored.

Mapping unit S3 consists of clay subsoil. This must be restored with a minimum thickness of 50 cm for restoration to 3b. Since this unit is outside the zone of sand deposits, it is not envisaged that this unit will be stripped.

The subsoil resources available for stripping, storing, and restoration are shown on Map 4 and outlined below:

Map Unit	Depth (cm)	Texture	Thickness (cm)	Area (ha)	Volume (m^3)
S1	20-60	SL	40	20.1	80,400
	60-110	SCL	50	20.1	100,500
S2	20-70	SL	50	11.2	56,000
	70-100	S/LS	30	11.2	33,600
S3	30-80	C	50	2.1	10,500

5. Soil Handling Considerations

i The topsoil and subsoil resources must be stripped, handled and stored separately.

ii In order to avoid the risk of contamination, the topsoil must be stored on topsoil, and the subsoil on top of subsoil.

iii All stripping, handling and restoration must take place under dry conditions to minimise structural damage.

iv The maximum height of the storage heaps should not exceed 7 metres for topsoil, and 10 metres for subsoil.

APPENDIX 1

DESCRIPTION OF THE AGRICULTURAL LAND CLASSIFICATION SYSTEM GRADES AND SUBGRADES

DESCRIPTION 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 and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

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 and horticultural crops can usually be grown but on some land in the 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.

Grade 3 – good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where 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 level of yields. It is mainly suited to grass with occasional arable crops (eg 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 very 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 (eg 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, eg 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.

APPENDIX 2

AUGER BORING DESCRIPTIONS

SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

(i) TEXTURE:-

Soil texture classes are denoted by the following abbreviations (all Upper case*):

S	Sand
LS	Loamy Sand
SL	Sandy Loam
SZL	Sand Silt Loam
ZL	Silt Loam
MZCL	Medium Silty Clay Loam
MCL	Medium Clay Loam
SCL	Sandy Clay Loam
HZCL	Heavy Silty Clay Loam
HCL	Heavy Clay Loam
SC	Sandy Clay
ZC	Silty Clay
C	Clay

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:

F	fine (more than $\frac{2}{3}$ of sand less than 0.2 mm)
C	coarse (more than $\frac{1}{3}$ of sand greater than 0.6 mm)
M	medium (less than $\frac{2}{3}$ fine sand and less than $\frac{1}{3}$ coarse sand)

The sub-divisions 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)

Other possible texture classes include:

P	Peat
SP	Sandy Peat
LP	Loamy Peat
PL	Peaty Loam
PS	Peaty Sand
MZ	Marine Light Silts

* There are two exceptions to the Upper Case rule:-

- The prefix "**Calc**" is used to identify naturally calcareous soils containing more than 1% Calcium Carbonate
- For organic mineral soils, the texture of the mineral fraction is prefixed by "**Org**".

(ii) STRUCTURE:-

Nature and size of structural units are denoted by the following abbreviations:

SAB	Subangular Blocky
AB	Angular Blocky
P	Prismatic

(single grain, granular and platy are not abbreviated)

F	Fine
M	Medium
C	Coarse
VC	Very Coarse

eg Weak **MSAB** = Weakly developed medium subangular blocky

(iii) OTHER

f =	few	=	less than 2% of the matrix or surface described
c =	commom	=	2-20% of the matrix or surface described
m =	many	=	20-40% of the matrix or surface described
vm =	very many	=	+40% of the matrix or surface described

f =	faint	=	indistinct mottles, evident only on close examination
d =	disinct	=	although not striking, the mottles are readily seen
p =	prominent	=	the mottles are conspicuous, and the mottling is one of the outstanding features of the horizon
gm =	grey mottling		
om =	ochreous mottling		

eg **cdom** = common distinct ochreous mottles

rrc =	rusty root channels
ppf =	pale ped faces
mn =	manganese

st =	stones 6 cm
sst =	stones 2-6 cm
vsst=	stones 2 cm

WC =	Wetness Class (use Roman numerals, eg WC IV)
SPL =	Slowly Permeable Layer
WT =	Water Table
I =	Impenetrable if used in Depth Column
IMP =	Impenetrable if used in soil profile notes

(IMP 2 x 40 cm = 2 additional borings, both impenetrable at 40 cm)

ASP = Auger Sample Point

APPENDIX 3

SOIL PIT DESCRIPTIONS

SITE NAME	PROFILE NUMBER	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
	1	Flat		Av Rainfall :- 790	
			Arable	ATO :- 1438	
Sands Farm, Calne	DATE	GRID REFERENCE		FC Days :- 174	Lower Greensand
	19/9/90	SU 013709		Climatic grade:- 1	

Horizon Number	Lowest Av Depth	Matrix and Ped Face Colours	Texture	Stoniness: Size, Shape, Type, and Field Method	Mottling Abundance, Contrast Size and Colour	Structure: Development Size and Shape	Pores and Fissures	Structural Condition	Consistence	Roots Abundance Size and Nature	Calcium Carbonate Content	Mangan Concs etc	Horizon Boundary: Distinctness and Form
1	26	10YR4/4	SL	-	-	Wk Med SAB	> .5	Good	Friable	Many	-	-	Clear Smooth
2	59	7.5YR4/4	MSCL	-	-	Massive	> .5	Poor	Friable	Common	-	-	Clear Smooth
3	100+	10YR4/6	MSCL	-	-	Massive	> .5	Poor	Friable	Few	-	-	-

Depth to Slowly Permeable Horizon :- -

Wetness Class :- 1

Wetness Grade :- 1

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Available Water Wheat :- 188

Potatoes :- 128

Moisture Deficit Wheat :- 101

Potatoes :- 92

Moisture Balance Wheat :- 87

Potatoes :- 36

Droughtiness Grade :- 1

Final ALC Grade :- 1

Main Limiting Factor(s) :- -

Remarks :- Clayey lenses intermixed with the sandy matrix below 59 cm

SITE NAME	PROFILE NUMBER	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
	2	1°		Av Rainfall :- 790	
			Ley	ATO :- 1438	
Sands Farm, Calne	DATE	GRID REFERENCE		FC Days :- 174	Lower Greensand
	20/9/90	SU 015707		Climatic grade:- 1	

Horizon Number	Lowest Av Depth	Matrix and Ped Face Colours	Texture	Stoniness: Size, Shape, Type, and Field Method	Mottling Abundance, Contrast Size and Colour	Structure: Development Size and Shape	Pores and Fissures	Structural Condition	Consistence	Roots Abundance Size and Nature	Calcium Carbonate Content	Mangan Concs etc	Horizon Boundary: Distinctness and Form
1	30 cm	10YR3/4	SL	-	-	Weak Fine SAB	> .5	Good	Friable	Many	-	-	Clear Smooth
2	75 cm	10YR4/6	SL	-	-	Weak Mod SAB, tending to massive	> .5	Good	Friable	Common	-	-	Clear Smooth
3	100 cm+	10YR5/4	SL	-	-	Weak Mod SAB tending to massive	> .5	Good	Friable	Few	-	-	-

Depth to Slowly Permeable Horizon :- -

Wetness Class :- 1

Wetness Grade :- 1

RPG0023/WJC

Available Water Wheat :- 176

Potatoes :- 119

Moisture Deficit Wheat :- 101

Potatoes :- 92

Moisture Balance Wheat :- 75

Potatoes :- 27

Droughtiness Grade :- 1

Final ALC Grade :- 1

Main Limiting Factor(s) :- -

Remarks :-