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Moor Farm, Whiteparish

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MOOR FARM, WHITEPARISH

AGRICULTURAL LAND CLASSIFICATION SURVEY AND STATEMENT OF SITE PHYSICAL CHARACTERISTICS

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MOOR FARM, WHITEPARISH

AGRICULTURAL LAND CLASSIFICATION SURVEY AND STATEMENT OF SITE PHYSICAL CHARACTERISTICS

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 36.7 ha of land at Moor Farm, Whiteparish, adjacent to the A36. Field survey was based on 23 auger borings and 2 soil profile pits, and was completed in March 1998. During the survey 3 samples were analysed for particle size distribution (PSD).

2. The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in the preparation of the Wiltshire Minerals Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. Apart from the published regional ALC map (MAFF, 1977), which shows the site at a reconnaissance scale as Grade 3, the site was previously surveyed in 1988 at a scale of 1:6 100 (ADAS, 1988). However, the current survey uses the Revised Guidelines and Criteria for grading the quality of agricultural land (MAFF, 1988) and supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.

4. The site was surveyed in 1988 for a previous minerals application (ADAS, 1988). This showed the site to be a combination of Grade 2 and Subgrade 3a, with a small area of Subgrade 3b. The soils that were found during the current survey are very similar, being sandy profiles with variable lenses of heavier material within them. The previous map appears to show greater variation across the site but this is because it was carried out at a larger scale using almost twice the number of borings.

5. At the time of survey land cover was mainly winter wheat with one field of cereal stubble. Other land which was not surveyed included parts of Lowdens Copse, Round Copse, North and Church Copse. Another smaller copse near the A36 was also unsurveyed.

SUMMARY

6. The distribution of ALC grades is shown on the accompanying 1:10 000 scale ALC map. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas. Areas are summarised in the Table 1.

7. The whole of the site has been mapped as Subgrade 3a with moderate drought limitations, and a few small areas with a moderate wetness limitation.

Table 1: Distribution of ALC grades: Moor Farm

Grade	Area (ha)	% Surveyed Area (20.7 ha)
3a	~~36.7~~ 20.7	100
Other land	16.0	-
Total site area	36.7	-

CLIMATE

8. Estimates of climatic variables for this site were derived from the published agricultural climate dataset "Climatological Data for Agricultural Land Classification" (Meteorological Office, 1989) using standard interpolation procedures. Data for key points around the site are given in Table 2 below.

9. Since the ALC grade of land is determined by the most limiting factor present, overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions. Parameters used for assessing overall climate are accumulated temperature, a measure of relative warmth and average annual rainfall, a measure of overall wetness. The results shown in Table 2 indicate that there is no overall climatic limitation.

10. Climatic variables also affect ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes, which are compared with the moisture available in each profile in assessing soil droughtiness limitations. These are described in later sections.

Table 2: Climatic Interpolations: Moor Farm

Grid Reference		SU 228 233	SU 233 228
Altitude (m)		75	80
Accumulated Temperature (day °C)		1471	1465
Average Annual Rainfall (mm)		844	852
Overall Climatic Grade		1	1
Field Capacity Days		186	187
Moisture deficit (mm):	Wheat	100	99
	Potatoes	91	90

RELIEF

11. Altitude ranges from 65 metres on the northern edge of Lowdens Copse to 80 metres near Newton Farm. Gradients are mainly gently and moderately steeply sloping with no limitation.

12. The published description of the soil in this area (see Paragraph 14) mentions the risk of water erosion. Because of the acidic nature of these soils (SSEW, 1984) they lend themselves to winter cereals and maize production which can increase the risk of water erosion through the lack of crop cover in the winter months. Although evidence of water erosion was seen in the field it was not severe enough to cause an primary limitation.

GEOLOGY AND SOILS

13. The underlying geology of the site is shown on the published geology map (IGS, 1976) as being all sands of the Reading Beds. The soils found during the current survey matched the variable profiles that are expected from this type of interbedded Tertiary geology.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1:250 000 (SSEW, 1983) as being from the Fyfield 4 Association. These are described as being deep well drained often stoneless coarse loamy and sandy soils. Some fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging and some slowly permeable seasonally waterlogged fine loamy over clayey soils may also be present. There is a risk of water erosion during the winter period. This was borne out by the current survey although the profiles tended to match the description of the better drained soils.

AGRICULTURAL LAND CLASSIFICATION

15. The distribution of ALC grades found by the current survey is shown on the accompanying 1:10 000 scale map and areas are summarised in Table 1. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas.

Subgrade 3a

16. The whole of the site has been mapped as Subgrade 3a with a moderate drought limitation. Typical profiles were found to be medium sandy loam topsoils over loamy medium sand and medium sand subsoils which are well drained and were assessed as Wetness Class I (see Appendix II).

17. In some localised areas the profiles have lighter textures, as shown by Pit 1, with medium sand topsoils and subsoils. They have a moderate drought limitation at Subgrade 3b but did not form a robust mapping unit at this level of survey.

18. Clay, sandy clay and sandy clay loam lenses were found in the subsoils of several borings which are gleyed and having a low porosity are slowly permeable layers. They were assessed as Wetness Class III which with the topsoils textures indicates a moderate wetness limitation also at Subgrade 3a.

19. An area in the centre of the site which has gradients of 7- 8° was too small to be identified as a separate mapping unit and there is sufficient turning space at the top and bottom of the slope.

SOIL RESOURCES

20. The site consists of variable soil types developed over sand beds, which is shown as one Soil Unit on the attached map of soil resources. This is not a soil stripping map but is intended to illustrate the soil resources available for restoration.

Soil Unit I

21. This is the only unit on the site, covering 20.7 ha and was mainly assessed as Wetness Class I being illustrated by Pits 1 and 2.

22. The topsoil was found to be medium sand loam and occasionally loamy medium sand, confirmed by PSD, with a fairly uniform depth of 30 cm. In places there is also a medium sand topsoil texture also confirmed by PSD. Colour was 10YR43 or 10YR42. Consistence is friable with a moderately developed medium sub-angular blocky structure. Porosity was good and where the land use allowed it was well rooted. Clear smooth boundary.

23. The subsoil is a combination of loamy medium sand and medium sand, together with individual horizons of clay, sandy clay and sandy clay loam. Colours are characteristically 10YR56, 58 or 10YR63, 72. Consistency was very friable with moderately developed coarse angular blocky structure in the sandy horizons, and firm and friable with moderate coarse angular blocky and weak coarse prismatic structure in the clayey horizons. In general the porosity was still good although some of the heavier lenses are gleyed and have a low porosity.

Table 3: Soil Resources: Moor Farm

Map Unit	Depth, cm	Area, ha	Texture	Stones %	Volume, m^3
Topsoil					
I	0-30	20.7	MSL/SCL(some LMS and MS)	0	62 100
				Total Topsoil	62 100 m^3
Subsoil					
I	30-120	20.7	LMS/MS (C/SC/SCL lenses locally)	0	186 300
				Total Subsoil	186 300 m^3

24. Depths and volumes quoted should be treated with caution due to soil variability. Soil resources may extend below 120 cm.

RESTORATION

25. When the subsoil is being handled it may be possible to amalgamate the heavier lenses with the sandy textured soil to improve the overall drought and wetness characteristics of the site. It should be noted that if they do not mix then slowly permeable layers will be formed in the heavier textured horizons. If this occurs the slowly permeable horizons must have at least 50 cm of porous material above them for the profile to still be assessed as Wetness Class III and Subgrade 3a.

26. By making assumptions using typical profiles found on the site the minimum depth of material needed for restoration that will give a moderate drought limitation at Subgrade 3a can be calculated. The profiles shown in Table 4 all provide the necessary minimum water contents for Subgrade 3a.

Table 4: Minimum Profile Depths

Texture	Depth, cm	Stones, %	Structural Condition
Profile 1			
MSL	30	2	-
LMS	50	0	M
MS	90	0	M
Profile 2			
MSL	30	2	-
LMS	55	0	M
SCL	70	0	M
Profile 3			
MSL	30	2	-
MSL	50	0	M

27. Due to the light topsoils textures of the soil found on the site gradients after restoration may cause surface runoff and lead to surface erosion. The use of cover crops during the winter months may also be appropriate.

28. All restoration conditions depend on the quantities of material that are to be excavated and the final land level which can not be foreseen in the absence of detail proposals. The above paragraphs therefore only mention possible problems which may occur.

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April 1998

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APPENDIX I

DESCRIPTION OF GRADES AND SUBGRADES

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 include 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 (e.g. cereals and forage crops) the yields of which are variable. In most 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.

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

APPENDIX II

DEFINITION OF SOIL WETNESS CLASSES

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile.

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but not wet within 40 cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31 and 90 days in most years.

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

Notes: The number of days specified is not necessarily a continuous period.

'In most years' is defined as more than 10 out of 20 years.

Source: Hodgson, J M (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe.

APPENDIX III

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1997).

1. Terms used on computer database, in order of occurrence.

GRID REF.: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

WHT:	Wheat	**SBT:**	Sugar Beet	**HTH:**	Heathland
BAR:	Barley	**BRA:**	Brassicas	**BOG:**	Bog or Marsh
OAT:	Oats	**FCD:**	Fodder Crops	**DCW:**	Deciduous Wood
CER:	Cereals	**FRT:**	Soft and Top Fruit	**CFW:**	Coniferous Woodland
MZE:	Maize	**HRT:**	Horticultural Crops	**PLO:**	Ploughed
OSR:	Oilseed Rape	**LEY:**	Ley Grass	**FLW:**	Fallow (inc. Set aside)
POT:	Potatoes	**PGR:**	Permanent Pasture	**SAS:**	Set Aside (where known)
LIN:	Linseed	**RGR:**	Rough Grazing	**OTH:**	Other
BEN:	Field Beans	**SCR:**	Scrub		

GRDN'T: Gradient as estimated or measured by hand-held optical clinometer.

GLEY, SPL: Depth in centimetres to gleying or slowly permeable layer.

AP (WHEAT/POTS): Crop-adjusted available water capacity.

MB (WHEAT/POTS): Moisture Balance. (Crop adjusted AP - crop potential MD)

DRT: Best grade according to soil droughtiness.

If any of the following factors are considered significant, 'Y' will be entered in the relevant column.

MREL:	Microrelief limitation	**FLOOD:**	Flood risk	**EROSN:**	Soil erosion risk
EXP:	Exposure limitation	**FROST:**	Frost prone	**DIST:**	Disturbed land
CHEM:	Chemical limitation				

LIMIT: The main limitation to land quality: The following abbreviations are used.

OC:	Overall Climate	**AE:**	Aspect	**EX:**	Exposure
FR:	Frost Risk	**GR:**	Gradient	**MR:**	Microrelief
FL:	Flood Risk	**TX:**	Topsoil Texture	**DP:**	Soil Depth

CH:	Chemical	**WE:**	Wetness	**WK:**	Workability
DR:	Drought	**ER:**	Erosion Risk	**WD:**	Soil Wetness/Droughtiness
ST:	Topsoil Stoniness				

TEXTURE: Soil texture classes are denoted by the following abbreviations:-

S:	Sand	**LS:**	Loamy Sand	**SL:**	Sandy Loam
SZL:	Sandy Silt Loam	**CL:**	Clay Loam	**ZCL**	Silty Clay Loam
ZL:	Silt Loam	**SCL:**	Sandy Clay Loam	**C:**	Clay
SC:	Sandy clay	**ZC:**	Silty clay	**OL:**	Organic Loam
P:	Peat	**SP:**	Sandy Peat	**LP:**	Loamy Peat
PL:	Peaty Loam	**PS:**	Peaty Sand	**MZ:**	Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:-

F: Fine (more than 66% of the sand less than 0.2 mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6 mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content: **M:** Medium (< 27% clay) **H:** heavy (27 - 35% clay)

MOTTLE COL: Mottle colour using Munsell notation.

MOTTLE ABUN: Mottle abundance, expressed as a percentage of the matrix or surface described.

F: few <2% **C:** common 2 - 20% **M:** many 20 - 40% **VM:** very many 40%+

MOTTLE CONT: Mottle contrast

F: faint - indistinct mottles, evident only on close inspection
D: distinct - mottles are readily seen
P: Prominent - mottling is conspicuous and one of the outstanding features of the horizon.

PED. COL: Ped face colour using Munsell notation.

GLEY: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

STONE LITH: Stone Lithology - One of the following is used.

HR:	*All hard rocks and stones*	**SLST:**	*Soft oolitic or dolimitic limestone*
CH:	Chalk	**FSST:**	Soft, fine grained sandstone
ZR:	Soft, argillaceous, or silty rocks	**GH:**	Gravel with non-porous (hard) stones
MSST:	Soft, medium grained sandstone	**GS:**	Gravel with porous (soft) stones
SI:	Soft weathered igneous or metamorphic rock		

Stone contents are given in % by volume for sizes >2 cm, >6 cm and total stone >2 mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

Degree of development	**WA:**	Weakly developed Adherent	**WK:**	Weakly developed
	MD:	Moderately developed	**ST:**	Strongly developed
Ped size	**F:**	Fine	**M:**	Medium
	C:	Coarse	**VC:**	Very coarse
Ped Shape	**S:**	Single grain	**M:**	Massive
	GR:	Granular	**AB:**	Angular blocky
	SAB:	Sub-angular blocky	**PR:**	Prismatic
	PL:	Platy		

CONSIST: Soil consistence is described using the following notation:

L:	Loose	**VF:**	Very Friable	**FR:**	Friable	**FM:**	Firm
VM:	Very firm	**EM:**	Extremely firm	**EH:**	Extremely Hard		

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

VIS:	Visual	**S:**	Sieve	**D:**	Displacement

MOTTLE SIZE:

EF:	Extremely fine <1 mm	**M:**	Medium 5-15 mm
VF:	Very fine 1-2 mm>	**C:**	Coarse >15 mm
F:	Fine 2-5 mm		

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (OM) or grey (GM).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' should also be noted.

MANGANESE CONCRETIONS: Assessed by volume

N:	None		**M:**	Many	20-40%
F:	Few	<2%	**VM:**	Very Many	>40%
C:	Common	2-20%			

STRUCTURE: Ped Development *

WA:	Weakly adherent	**M:**	Moderately developed
W:	Weakly developed	**S:**	Strongly developed

POROSITY:

P:	Poor	- less than 0.5% biopores at least 0.5mm in diameter
G:	Good	- more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per 100cm^2:		Very Fine and Fine	Medium and Coarse
F:	Few	1-10	1 or 2
C:	Common	10.25	2 - 5
M:	Many	25-200	>5
A:	Abundant	>200	

ROOT SIZE

VF:	Very fine	<1 mm	**M:**	Medium	2 - 5 mm
F:	Fine	1-2 mm	**C:**	Coarse	>5 mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp:	<0.5 cm	**Gradual:**	6 - 13 cm
Abrupt:	0.5 - 2.5 cm	**Diffuse:**	>13 cm
Clear:	2.5 - 6 cm		

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*

* See Soil Survey Field Handbook (Hodgson, 1997) for details.