Cattybrook Brickworks

Agricultural Land Classification

July 1998

Resource Planning Team
FRCA Worcester
Western Region

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CATTYBROOK BRICKWORKS

AGRICULTURAL LAND CLASSIFICATION SURVEY AND STATEMENT OF SITE PHYSICAL CHARACTERISTICS

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INTRODUCTION

1 This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 7 2 ha of land at Cattybrook Brickworks Field survey was based on 8 auger borings and 1 soil profile pit and was completed in June 1998

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 South Gloucestershire Minerals Local 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 wholly Grade 3 the site had not been surveyed previously 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 At the time of survey land cover was grass ley and permanent pasture

SUMMARY

5 The distribution of ALC grades is shown on the accompanying 1 10000 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

Table 1 Distribution of ALC grades Cattybrook Brickworks

Grade	Area (ha)	% Surveyed Area (7 2 ha)
3b	7 2	100
Total site area	7 2	100

6 The site is wholly Subgrade 3b in quality The soils have clay loam topsoils overlying clay subsoils to depth with moderate wetness limitations

CLIMATE

7 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

8 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

9 Climatic variables also affect ALC grade through interactions with soil conditions The most important interactive variables are Field Capacity Clays (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 Cattybrook Brickworks

Grid Reference		ST590 836
Altitude (m)		23
Accumulated Temperature (clay C)		1518
Average Annual Rainfall (mm)		798
Overall Climatic Grade		1
Field Capacity Clays		176
Moisture deficit (mm)	Wheat	101
	Potatoes	93

RELIEF

10 Altitude ranges from 11 metres in the north of the site at Monmouth Hill to 30 metres along the eastern boundary of the site with level gently sloping land

GEOLOGY AND SOILS

11 The underlying geology of the site is shown on the published geology map (IGS 1978) as wholly Mercia Mudstone In the recent survey of the site the parent material was found to be wholly red clay

12 Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1 250 000 (SSEW 1983) as wholly the Whimple 3 Soil Association

13 The Whimple 3 Soil Association is described as having reddish fine loamy or fine silty soils over clay with slowly permeable

14 In the recent survey soils were found to closely follow the description of those of the Whimple 3 Association

AGRICULTURAL LAND CLASSIFICATION

15 The distribution of ALC grades found by the current survey is shown on the accompanying 1 10000 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

16 **Subgrade 3b**

Land of moderate quality was identified across the whole site The soils were described as having clay loam or sandy clay loam topsoil textures generally overlying a red clay subsoil to depth occasionally a thin heavy clay loam upper subsoil was encountered A soil profile pit confirmed that the red clay subsoil was slowly permeable and the soils were placed into Wetness Class IV (see appendix II) and Subgrade 3b

SOIL RESOURCES

17 The site has a single soil type 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 Topsoil and subsoil volumes for the Soil Unit are shown in Table 3

Soil Unit I

18 This is the only soil unit on the site covering 7 2 ha The soils generally have medium clay loam or sandy clay loam topsoil textures to an average depth of 25cm although this varied between 23 32cm These topsoils overlay a clay subsoil to 120cm The profiles were stoneless but had moderate wetness limitations and were assessed as Wetness Class IV as illustrated by soil profile Pit 1

A typical profile description for soil unit 1 is as follows

0 25cm	Dark brown 75YR3/2 medium clay loam stoneless moderately developed medium subangular blocky structure friable consistence moderate porosity with many fine and very fine roots Smooth abrupt boundary
28 45cm	Reddish brown 5YR4/4 slowly permeable clay with a few fine manganiferous concentrations stoneless strongly developed coarse prismatic structure very firm consistence largely due to plough compaction with poor porosity common fine and very fine roots largely passing down ped faces Smooth gradual boundary
45 61cm	Reddish brown 25YR4/4 slowly permeable clay with a few fine manganiferous concentrations strongly developed coarse angular blocky structure very firm consistence with poor porosity few fine and very fine roots Smooth gradual boundary
61 70cm	Reddish brown 25YR4/4 slowly permeable clay with common fine manganiferous concentrations moderately developed coarse platy structure firm consistence with poor porosity few fine and very fine roots Smooth gradual boundary
70 120cm	Reddish brown 25YR4/4 slowly permeable clay with common fine manganiferous concentrations weakly developed coarse platy structure friable consistence with poor porosity and few very fine roots

Table 3 Soil Resources Cattybrook Brickworks

Map Unit	Depth cm	Area ha	Texture	Stones %	Volume m^3
Topsoil					
I	25	7 2	MCL/SCL	0	18000
				Total Topsoil	18000 m^3
Subsoil					
I	95	7 2	C	0	68400
				Total Subsoil	68400 m^3

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

RESTORATION

20 Restoration of soil Unit 1 will be difficult due to the heavy nature of the soils The soils are naturally slowly permeable and without careful reinstatement may become very slowly permeable particularly if compaction should occur within the subsoil Restoration should take place when the soils are dry and friable using the established principals of good practice including loose tipping and ripping to avoid compaction in the upper and lower subsoil horizons Effective under drainage will be essential

21 Care should be taken not to mix the clay loam topsoil with the heavier clay subsoil material since the resultant heavier topsoil would result in the down grading of the soil to Grade 4 due to the workability limitation of the heavy topsoil this assumes a slowly permeable layer would occur within 75cm

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

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July 1998

REFERENCES

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HODGSON J M (Ed) (1997) Soil Survey Field Handbook Soil Survey Technical Monograph No 5 Silsoe

MAFF (1977) 1 250 000 series Agricultural Land Classification South West Region MAFF Publications Alnwick

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METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification Meteorological Office Bracknell

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5 Soils of South West England 1 250 000 scale SSEW Harpenden

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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 (eg 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 clays in most years

Wetness Class II

The soil profile is wet within 70 cm depth for 31 90 clays 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 clays but not wet within 40 cm depth for more than 30 clays in most years

Wetness Class III

The soil profile is wet within 70 cm depth for 91 180 clays 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 clays but only wet within 40 cm depth for between 31 and 90 clays in most years

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 clays but not within 40 cm depth for more than 210 clays 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 clays in most years

Wetness Class V

The soil profile is wet within 40 cm depth for 211 335 clays in most years

Wetness Class VI

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

Notes The number of clays 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		

GRDNT 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 2mm)
M Medium (less than 66% fine sand and less than 33% coarse sand)
C Coarse (more than 33% of the sand larger than 0 6mm)

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 >2cm >6cm and total stone >2mm

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

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	<1mm	**M**	Medium	2 5mm
F	Fine	1 2mm	**C**	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS

Sharp	<0 5cm	**Gradual**	6 13cm
Abrupt	0 5 2 5cm	**Diffuse**	>13cm
Clear	2 5 6cm		

HORIZON BOUNDARY FORM Smooth wavy irregular or broken *

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

SITE NAME	PROFILE NO	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Cattybrook Brickworks	pit1(asp8 7)	2^0 NW	Ley	Av Rainfall 798 mm ATO 1516 day C FC Days 176 Climatic Grade 1 Exposure Grade	Keuper Marl
JOB NO	DATE	GRID REFERENCE	DESCRIBED BY		PSD SAMPLES TAKEN
63/98	11/6/98	ST58958349	SH/SK		

Horizon No	Lowest Av Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness Size Type and Field Method	Mottling Abundance Contrast, Size and Colour	Mangan Concs	Structure Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots Abundance and Size	Calcium Carbonate Content	Horizon Boundary Distinctness and form
1	28	MCL/ HCL	75YR 3/2	2% HR (VIS)	NONE	NONE	MD MSAB	FR			MF + VF		smooth abrupt
2	45	C	5YR 4/4 (5YR 43/42)	NONE	NONE	FEW V FINE	STCPR	VM (EF)	POOR	POOR	CF + VF largely passing down ped faces		smooth gradual
3	61	C	25YR 4/4	NONE	NONE	FEW FINE	STCAB	VM	POOR	POOR	FF +VF		smooth gradual
4	70	C	25 YR 4/4 (25YR 42/43)	NONE	NONE	C FINE	MDCPL	FM	POOR	POOR	F F + VF		smooth gradual
5	120	HCL/ C	25YR 4/4	NONE	NONE	C FINE	WKCPL	FR	POOR	POOR	F VF		smooth gradual

Profile Gleyed From

Slowly Permeable Horizon From 28 Red soil SPL to 100cm

Wetness Class IV

Wetness Grade 3b

Available Water Wheat 127 mm

Potatoes 104 mm

Moisture Deficit Wheat 101 mm

Potatoes 93 mm

Moisture Balance Wheat 26 mm

Droughtiness Grade 2 Potatoes 11 mm (Calculated to 120 cm)

Final ALC Grade 3b

Main Limiting Factor(s) We

Remarks

H3 Incrin sand content compared to H2 sand is on surfs of platy peds