EC 17

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OXFORDSHIRE MINERALS PLAN
SUTTON WICK, SE AREA
AGRICULTURAL LAND CLASSIFICATION
ALC MAP & REPORT
DECEMBER 1993

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AGRICULTURAL LAND CLASSIFICATION REPORT

1.0 Summary

1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality on an area of land south-west of Sutton Wick near the village of Drayton in Oxfordshire. The work forms part of MAFF's statutory input to the preparation of the Oxfordshire Minerals Plan.

1.2 Approximately 7 hectares of land was surveyed in December 1993. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 7 soil auger borings and two soil inspection pits were assessed in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose longterm limitations on its use for agriculture.

1.3 The work was conducted by members of the Resource Planning Team in the Guildford Statutory Group of ADAS.

1.4 At the time of the survey the landuse on the site was permanent grassland and cereals.

1.5 The distribution of grades and subgrades is shown on the attached ALC map. The map has been drawn at a scale of 1:5,000. It is accurate at this scale, but any enlargement would be misleading. This map supersedes any previous survey information for this site.

1.6 Appendix 1 gives a general description of the grades, subgrades and land use categories identified in the survey. The main classes are described in terms of the type of limitation that can occur, the typical cropping range and the expected level and consistency of yield.

1.7 The entire site, an area of 7.2 hectares, has been classified as subgrade 3b due to a significant flooding limitation. The survey area is situated in a flood plain immediately adjacent to the River Thames and information obtained from the occupier of the land suggests that it experiences episodes of flooding every winter of a medium to long duration (2- > 4 days). Flooding can have a detrimental effect on yield and cause soil management problems particularly on less permeable clayey soils as are present on this site.

2.0 Climate

2.1 The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.

2.2 The main parameters used in the assessment of an overall climatic limitation are annual average rainfall, as a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality.

2.3 A detailed assessment of the prevailing climate was made by interpolation from a 5km gridpoint dataset (Met. Office 1989). The details are given in the table below and these show that there is no overall climatic limitation affecting the site.

2.4 No local climatic factors such as exposure or frost risk affect the site. It should be noted that the local climate is quite dry in a regional context with low rainfall and low field capacity days. As a result the interaction of these climatic characteristics with soil properties can increase the likelihood of soil droughtiness problems whilst partially offsetting the risk of soil wetness problems.

Table 2 : Climatic Interpolation

Grid Reference :	SU 495 943
Altitude (m) :	50
Accumulated Temperature (days) :	1462
Average Annual Rainfall (mm) :	593
Field Capacity (days) :	125
Moisture Deficit, Wheat (mm) :	117
Moisture Deficit, Potatoes (mm) :	111
Overall Climatic Grade :	1

3.0 Relief

3.1 The site is flat and lies at an altitude of approximately 50 metres. Nowhere on the site does relief or gradient affect agricultural land quality.

4.0 Geology and Soil

4.1 The relevant geological sheet for the site, Sheet 253 (BGS, 1971) shows the underlying geology to be 1st Terrace deposits of Gravel with Alluvium mapped in the centre of the site.

4.2 The published soils information for the area, Sheet 6 (SSEW, 1983) shows the soils on the site to comprise the Thames association -"Stoneless mainly clayey soils affected by groundwater. Flat land, risk of flooding". (SSEW, 1983). A detailed inspection of soils on the site revealed the presence of clayey soils with calcareous gravelly upper and lower subsoils.

5.0 Agricultural Land Classification

5.1 Table 1 provides the details of the area measurements for each grade and the distribution of each grade is shown on the attached ALC map.

5.2 The location of the soil observation points are shown on the attached sample point map.

Subgrade 3b

5.3 The entire site has been classified as subgrade 3b, moderate quality agricultural land. Soil profiles typically comprise topsoils of non calcareous heavy clay loam with 1-2% total flints over upper subsoils of calcareous and non calcareous heavy clay loam or clay containing 1-15% total small flints. Lower subsoils consist of calcareous medium sandy loam, medium clay loam or loamy medium sand with 40% total flints. Profiles exhibit some signs of soil wetness in the form of gleying above 40 cm depth and are assigned to a wetness class of II. Subsoils are periodically waterlogged as a result of high groundwater conditions rather than their slow permeability. This drainage status combined with heavy topsoil textures and climatic factors results in a classification of subgrade 3a due to soil wetness. Some profiles were found to have slowly permeable layers of clay deep in the profile and are assigned to a wetness class of III and a classification of subgrade 3b due to soil wetness. Additionally some profiles experience a moderate soil droughtiness limitation in conjunction with wetness to subgrade 3a. The presence of gravelly layers in the lower subsoil in combination with profile textures and climatic factors reduces available water for crop growth. The most limiting factor to the agricultural use of this land however, is the risk of flooding. Information obtained from the occupiers reveals the occurence of frequent episodes of flooding (defined as more than

once in 3 years) every winter of a medium to long duration (2-4+ days) which results in a classification of subgrade 3b. Flooding of this nature has a significant effect on the timing and oppertunities for agricultural operations and standing water will also adversely affect crop growth and root development. The overall effect of flooding is exacerbated by the clayey, less permeable soils which occur across this site which along with high groundwater levels prevents water from draining freely from the land.

ADAS REFERENCE : 3304/254/93
MAFF REFERENCE : EL 33/17

Resource Planning Team
Guildford Statutory Group
ADAS Reading

APPENDIX I

DESCRIPTION OF THE GRADES AND SUB-GRADES

Grade 1 : Excellent Quality Agricultural Land

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

Grade 2 : Very Good Quality Agricultural Land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural or horticultural crops can usually be grown but on some land on 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. When more demanding crops are grown yields are generally lower or more variable than on land in grades 1 and 2.

Sub-grade 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.

Sub-grade 3B : Moderate Quality Agricultural Land

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

Grade 4 : Poor Quality Agricultural Land

Land with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (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.

Urban

Built-up or 'hard' uses with relatively little potential for a return to agriculture : 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 : 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.

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, eg. buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will be shown.

APPENDIX II

REFERENCES

* BRITISH GEOLOGICAL SURVEY (1971), Sheet No.253, Abingdon, 1:63,360 scale.

* MAFF (1988), Agricultural Land Classification of England And Wales : Revised guidelines and criteria for grading the quality of agricultural land.

* METEOROLOGICAL OFFICE (1989), Climatological Data for Agricultural Land Classification.

* SOIL SURVEY OF ENGLAND AND WALES (1983), Sheet No.6, "Soils of South East England", 1:250,000 scale and accompanying legend.

APPENDIX III

DEFINITION OF SOIL WETNESS CLASSES

Wetness Class I

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

Wetness Class II

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

Wetness Class III

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

Wetness Class IV

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

Wetness Class V

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

Wetness Class VI

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

(The number of days is not necessarily a continuous period. 'In most years' is defined as more than 10 out of 20 years.)

APPENDIX IV

SOIL PIT AND SOIL BORING DESCRIPTIONS

Contents :

SOIL PROFILE DESCRIPTIONS : EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a database. This has commonly used notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF** : national grid square and 8 figure grid reference.

2. **USE** : Land use at the time of survey. The following abbreviations are used.

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

3. **GRDNT** : Gradient as measured by a hand-held optical clinometer.

4. **GLEY/SPL** : Depth in cm to gleying or slowly permeable layers.

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

6. **MB (WHEAT/POTS)** : Moisture Balance.

7. **DRT** : Best grade according to soil droughtiness.

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

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

9. **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** : Soil Erosion Risk **WD** : Combined Soil Wetness/Droughtiness **ST** : Topsoil Stoniness

Soil Pits and Auger Borings

1. **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
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 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)

2. **MOTTLE COL** : Mottle colour

3. **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% +

4. **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

5. **PED. COL** : Ped face colour

6. **STONE LITH** : One of the following is used.

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

Stone contents (> 2cm, > 6cm and total) are given in percentages (by volume).

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

- degree of development **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

8. **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

9. **SUBS STR** : Subsoil structural condition recorded for the purpose of calculating profile droughtiness.

G : good **M** : moderate **P** : poor

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

11. **IMP** : If the profile is impenetrable a 'Y' will appear in this column at the appropiate horizon.

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

13. **CALC** : If the soil horizon is calcareous, a 'Y' will appear in this column.

14. Other notations

APW : available water capacity (in mm) adjusted for wheat
APP : available water capacity (in mm) adjusted for potatoes
MBW : moisture balance, wheat
MBP : moisture balance, potatoes

SOIL PIT DESCRIPTION

Site Name : SUTTON WICK, SE BLOCK Pit Number : 1P

Grid Reference: SU49479440
Average Annual Rainfall : 595 mm
Accumulated Temperature : 1462 degree days
Field Capacity Level : 125 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 25	HCL	25Y 42 00	0	1		MDCSAB
25- 35	C	25Y 53 00	0	1	C	MDCSAB
35- 55	C	25Y 53 00	0	15	C	
55-120	LMS	25Y 63 00	0	40		

Wetness Grade : 3A
Wetness Class : II
Gleying :025 cm
SPL : cm

Drought Grade : 3A
APW : 104mm MBW : -13 mm
APP : 95 mm MBP : -16 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION :

SOIL PIT DESCRIPTION

Site Name : SUTTON WICK, SE BLOCK Pit Number : 2P

Grid Reference: SU49604933
Average Annual Rainfall : 595 mm
Accumulated Temperature : 1462 degree days
Field Capacity Level : 125 days
Land Use : Cereals
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 25	HCL	10YR42 00	0	1		WKCSAB
25- 42	C	25Y 53 00	0	1	M	WKCSAB
42- 58	C	25Y 53 00	0	15	C	
58-120	LMS	25Y 63 00	0	40		

Wetness Grade : 3A
Wetness Class : II
Gleying :025 cm
SPL : cm

Drought Grade : 3A
APW : 102mm MBW : -15 mm
APP : 94 mm MBP : -17 mm

FINAL ALC GRADE : 3B
MAIN LIMITATION :

SAMPLE NO.	GRID REF	USE	ASPECT	GRDNT	GLEY	SPL	--WETNESS-- CLASS	GRADE	-WHEAT- AP	MB	-POTS- AP	MB	M.REL DRT	FLOOD	EROSN EXP	FROST DIST	CHEM LIMIT	ALC	COMMENTS
1	SU49509440	CER		038			2	3A	126	9	103	-8	2	Y			FL	3B	FLOOD
1P	SU49479440	CER		025			2	3A	104	-13	95	-16	3A	Y			FL	3B	FLOOD
2	SU49609440	CER		020			2	3A	119	2	94	-17	3A	Y			FL	3B	FLOOD
2P	SU49604933	CER		025			2	3A	102	-15	94	-17	3A	Y			FL	3B	FLOOD
3	SU49709440	CER		035			2	3A	126	9	103	-8	2	Y			FL	3B	FLOOD
4	SU49409430	PGR		0	027		3	3B	127	10	104	-7	2	Y			FL	3B	FLOOD
5	SU49509430	CER		030			2	3A	123	6	99	-12	3A	Y			FL	3B	FLOOD
6	SU49609430	CER		035	035		3	3B	126	9	104	-7	2	Y			FL	3B	FLOOD
7	SU49709430	CER		028			1	2	123	6	94	-17	3A	Y			FL	3B	FLOOD

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	TOT	STRUCT/ CONSIST	SUBS STR	POR	IMP	SPL	CALC
1	0-38	hcl	25Y 42 00						0	0	HR	2						
	38-48	hcl	25Y 53 00	75YR56 00	C		00MN00 00	Y	0	0	HR	15		M				
	48-120	mcl	25Y 63 00						0	0	HR	40		M				Y
1P	0-25	hcl	25Y 42 00						0	0	HR	1	MDCSAB FM	M				
	25-35	c	25Y 53 00	10YR56 00	C			Y	0	0	HR	1	MDCSAB FM	M				
	35-55	c	25Y 53 00	10YR56 00	C		00MN00 00	Y	0	0	HR	15		M				
	55-120	lms	25Y 63 00						0	0	HR	40		M				Y
2	0-20	hcl	25Y 43 00						0	0	HR	2						
	20-28	hcl	25Y 42 00	10YR58 00	C			Y	0	0	HR	5		M				
	28-45	hcl	10YR54 00						0	0	HR	15		M				Y
	45-120	scl	10YR64 00						0	0	HR	40		M				
2P	0-25	hcl	10YR42 00						0	0	HR	1	WKCSAB FM					
	25-42	c	25Y 53 00	10YR56 00	M		25Y 53 00	Y	0	0	HR	1	WKCSAB FM	P	Y			
	42-58	c	25Y 53 00	10YR56 00	C			Y	0	0	HR	15		M				
	58-120	lms	25Y 63 00						0	0	HR	40		M				Y
3	0-35	hcl	25Y 43 00	10YR56 00	C				0	0	HR	1						
	35-45	c	25Y 53 00	10YR56 00	C			Y	0	0	HR	5		P				
	45-120	mcl	25Y 63 00						0	0	HR	40		M				
4	0-27	hcl	25Y 42 00	75YR56 00	C			Y	0	0		0						
	27-120	c	25Y 63 64	75YR58 00	M			Y	0	0	HR	1		P			Y	Y
5	0-30	hcl	25Y 42 00						0	0	HR	1						
	30-40	c	25Y 53 00	75YR56 00	M			Y	0	0	HR	1		P				
	40-48	c	25Y 53 00	75YR56 00	M			Y	0	0	HR	15		M				
	48-120	mcl	25Y 63 00						0	0	HR	40		M				Y
6	0-35	hcl	25Y 42 00						0	0	HR	1						
	35-50	c	25Y 53 00	75YR58 00	M			Y	0	0		0		P			Y	
	50-55	c	25Y 53 00	75YR56 00	C			Y	0	0	HR	15		M				
	55-120	mcl	25Y 63 00						0	0	HR	40		M				Y
7	0-28	hcl	25Y 53 00						0	0	HR	1						
	28-36	c	25Y 53 00	75YR56 00	M			Y	0	0		0		P				
	36-40	c	25Y 53 00	75YR56 00	C			Y	0	0	HR	15		M				
	40-120	msl	25Y 63 00						0	0	HR	40		M				Y