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Hampshire Minerals Plan
Site 12 : HMS Daedalus, Lee-on-the-Solent
Agricultural Land Classification
ALC Map and Report
November 1993

HAMPSHIRE MINERALS PLAN
SITE 12 : HMS DAEDALUS, LEE-ON-THE-SOLENT
AGRICULTURAL LAND CLASSIFICATION REPORT

1. Summary

1.1 In November 1993, a detailed Agricultural Land Classification (ALC) survey was carried out on approximately 156 hectares of land at HMS Daedalus near Lee-on-the-Solent in Hampshire. ADAS was commissioned by MAFF's Land Use Planning Unit to determine the quality of 10 sites in Hampshire. The work forms part of MAFF's statutory input to the Hampshire Minerals Plan.

1.2 The survey was conducted by members of the Resource Planning Team in the Guildford Statutory Group at an observation density of approximately one boring per hectare. A total of 9 borings and 2 soil inspection pits were described in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). The guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on its use for agriculture. At the time of the survey the land had recently been drilled with a new crop.

1.3 The distribution of the grades and subgrades is shown on the attached ALC map and the areas and extents are given in the table below. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement may be misleading.

Table 1 : Distribution of Grades and Subgrades

Grade	Area(ha)	% of Site Area	% of Agricultural Area
3a	6.1	3.9	74.4
3b	2.1	1.4	25.6
Total Agricultural Area	8.2	5.3	100%
Non-Agricultural	99.8	64.0	
Woodland	1.6	1.0	
Urban	46.4	29.7	
Total Area of Site	156.0	100	

1.4 A general description of the grades, subgrades and land-use categories is provided as an appendix. 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.

1.5 The majority of the agricultural area of the site has been classified as Subgrade 3a, the principal limitation being soil wetness. This was evidenced by the presence of gleyed and slowly permeable clay horizons, at moderate depth, causing a drainage impedance within the profile. In the areas classified Subgrade 3b, the gleyed and slowly permeable horizons were at shallow depth. Some areas of Subgrade 3a, towards the north principally, are classified on the basis of soil droughtiness. This is due to a very stony horizon within the profile restricting available water.

2. 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 average annual 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. However, climatic factors do interact with soil factors to influence soil wetness and droughtiness limitations.

Table 2 · Climatic Interpolation

Grid Reference	SU570023
Altitude (m)	8
Accumulated Temperature (days)	1548
Average Annual Rainfall (mm)	770
Field Capacity (days)	157
Moisture Deficit, Wheat (mm)	118
Moisture Deficit, Potatoes (mm)	115
Overall Climatic Grade	1

3. Relief

3.1 The land at this site is approximately 8m AOD. Overall the site is level and as such neither gradient or microrelief affect the agricultural land quality.

4. Geology and Soil

4.1 The British Geological Survey published map, Sheet 331, Portsmouth (1964), shows the site to be underlain by Pleistocene and Recent deposits of Plateau Gravel and Brickearth. The agricultural area is underlain by Plateau Gravel.

4.2 The Soil Survey of England and Wales published map, Sheet 6, Soils of South East England (1:250,000, 1983), shows the site to be underlain by soils of the Hamble 2 Association. These are described as 'deep stoneless well drained silty soils and similar soils affected by groundwater, over gravel locally. Usually found on flat land'(SSEW 1984). The majority of soils encountered on the agricultural land at this site were dissimilar to the description above, being affected by a drainage impedance and of a clayey nature.

5. 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 3a

5.3 Land of good quality covers the majority of the agricultural area at this site. Soils in this area were found to be of two different types. To the north of the site soils were found to be drought limited, and generally consisted of a very slightly stony (c.5% flints by volume) medium clay loam topsoil over a gleyed very slightly stony (c.5% flints by volume) medium clay loam upper subsoil. This passed to a very stony (c.48% flints by volume) gleyed clay horizon, overlying a slowly permeable (from structural observation, Pit 1, Appendix III) slightly stony (c.10% flints by volume) clay lower subsoil. The stones within the profile limit water availability to crops which in combination with local climatic factors means that there is a risk of drought stress.

The remainder of the area mapped as good quality, towards the south of the site, is limited by soil wetness. Profiles comprise a slowly permeable (from structural observation, Pit 2 Appendix III) clay horizon, beneath a very slightly stony (c.3% flints by volume) medium clay loam topsoil, and occasionally a stoneless heavy clay loam upper subsoil. The depth to the slowly permeable horizon is such that Wetness Class III (see Appendix II) has been assigned, which given the local climatic regime and texture class of the topsoil means that Subgrade 3a is appropriate. Land of this quality could be expected to produce high yields of a narrow range of arable crops especially cereals and moderate yields of a wider range of crops including oilseed rape, potatoes and sugar beet.

Subgrade 3b

5.4 Land of moderate quality has been mapped across approximately one-third of the agricultural area. The key limitation is soil wetness as caused by a slowly permeable (from structural observation) clay horizon at shallow depth, beneath a very slightly stony (c.5% flints by volume) medium clay loam or medium silty clay loam topsoil. The shallow depth at which the slowly permeable horizon occurs when combined with the local climatic regime and the workability restrictions of a medium textured topsoil leads to Subgrade 3b being appropriate. Land of this quality could be expected to produce moderate yields of a narrow range of crops, principally cereals and grass.

5.5 Soil wetness limits agricultural land quality because it adversely affects seed germination and survival, partly by a reduction in soil temperature and partly by anaerobism, inhibiting the development of a good root system. Wetness also increases the sensitivity of the soil to structural damage and leads to a reduction in the number of days when cultivation by machinery or grazing by livestock is possible.

5.6 The areas marked as urban and non-agricultural constitute the naval air training base HMS Daedalus. The urban areas mapped include runways, taxiways, roadways and associated buildings. Between these, areas of grassland not in agricultural use are mapped as Non-Agricultural.

ADAS Reference : 1504/213/93
MAFF Reference : EL15/107

Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

* British Geological Survey (1964) Sheet No. 331, Portsmouth, 1:63360, Solid and Drift Edition.

* 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.

* Soil Survey of England and Wales (1984), Soils and their use in South East England. Bulletin No. 15.

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.

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.

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 re-claimed 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

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 III

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 : HANTS MINS S12 DAEDALUS Pit Number : 1P

Grid Reference: SU57050250
Average Annual Rainfall : 770 mm
Accumulated Temperature : 158 degree days
Field Capacity Level : 157 days
Land Use : Bare Soil
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 36	MCL	10YR43 00	0	5		WKCSAB
36- 54	MCL	75YR43 00	0	5	C	MDCSAB
54- 84	C	10YR53 00	0	48	C	WKCSAB
84-120	C	10YR63 00	0	10	M	WKCSAB

Wetness Grade : 2
Wetness Class : II
Gleying :036 cm
SPL :084 cm

Drought Grade : 3A
APW : 126mm MBW : 8 mm
APP : 103mm MBP : -12 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : HANTS MINS S12 DAEDALUS Pit Number : 2P

Grid Reference: SU57050220
Average Annual Rainfall : 770 mm
Accumulated Temperature : 158 degree days
Field Capacity Level : 157 days
Land Use : Bare Soil
Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 40	MCL	10YR43 00	0	3		
40- 83	C	10YR52 00	0	0	M	WKCPL
83-120	C	10YR52 00	0	0	M	

Wetness Grade : 3A
Wetness Class : III
Gleying :040 cm
SPL :040 cm

Drought Grade : 2
APW : 132mm MBW : 14 mm
APP : 109mm MBP : -6 mm

FINAL ALC GRADE : 3A
MAIN LIMITATION : Wetness

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
1P	SU57050250	PLO		036	084	2	2	126	8	103	-12	3A				DR	3A	PIT 90 AUG 120
2P	SU57050220	PLO		040	040	3	3A	132	14	109	-6	2				WE	3A	PIT 83 AUG 120
25	SU56930250	PLO		035	035	4	3B	109	-9	107	-8	3A				WE	3B	IMPST 90 1P
26	SU57000250	PLO		033	045	3	3A	101	-17	109	-6	3A				WE	3A	IMPST 75 1P
27	SU57100250	PLO				1	1	73	-45	73	-42	3B				DR	3B	IMPST 45 1P
41	SU57000240	PLO		045	045	3	3A	132	14	109	-6	2				WE	3A	SPL 45 2P
42	SU57100240	PLO		030	030	4	3B	111	-7	102	-13	3A				WE	3B	SPL 30 2P
54	SU56920230	PLO		020	045	3	3A	119	1	110	-5	3A				WE	3A	SPL 45 2P
55	SU57000230	PLO		0	035	4	3B	114	-4	105	-10	3A				WE	3B	SPL 35 2P
56	SU57100230	PLO		035	035	4	3B	114	-4	105	-10	3A				WE	3B	SPL 35 2P
69	SU57000220	PLO		035	045	3	3A	120	2	111	-4	3A				WE	3A	SPL 45 2P

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	PED GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC
1P	0-36	mcl	10YR43 00						0	0	HR	5	WKCSAB FR					
	36-54	mcl	75YR43 00	10YR58 00	C			Y	0	0	HR	5	MDCSAB FR	M				
	54-84	c	10YR53 00	10YR58 61	C			Y	0	0	HR	48	WKCSAB FM	M				
	84-120	c	10YR63 00	10YR58 71	M			Y	0	0	HR	10	WKCSAB FM	M		Y		Y
2P	0-40	mcl	10YR43 00						0	0	HR	3						
	40-83	c	10YR52 00	75YR58 00	M		00MN00 00	Y	0	0		0	WKCPL FR	P		Y		Y
	83-120	c	10YR52 00	75YR58 00	M		00MN00 00	Y	0	0		0		P		Y		Y
25	0-35	mcl	10YR43 00						0	0	HR	2						
	35-85	c	10YR63 62	75YR58 00	M			Y	0	0		0		P				Y
	85-90	c	10YR62 71	75YR46 58	M		00MN00 00	Y	0	0	HR	20		P				Y
26	0-33	mcl	10YR43 44						0	0	HR	2						
	33-45	hcl	10YR42 00	10YR46 00	C			Y	0	0	HR	1		M				
	45-65	c	10YR53 00	75YR56 00	M			Y	0	0	HR	1		P				Y
	65-75	c	10YR53 52	75YR58 00	M			Y	0	0	HR	5		P				Y
27	0-30	mcl	10YR43 00						0	0	HR	3						
	30-40	mcl	10YR44 00						0	0	HR	5		M				
	40-45	mcl	10YR44 54						0	0	HR	30		M				
41	0-30	mcl	10YR43 00						0	0	HR	2						
	30-45	mcl	10YR43 53						0	0		0		M				
	45-120	c	10YR52 00	75YR58 00	M		00MN00 00	Y	0	0		0		P				Y
42	0-30	mcl	10YR42 00						0	0	HR	5						
	30-50	c	10YR52 00	10YR58 00	M			Y	0	0	HR	2		P				Y
	50-100	c	10YR63 00	10YR58 52	M			Y	0	0	HR	2		P				Y
54	0-20	mzcl	10YR42 00						0	0	HR	5						
	20-45	hzcl	10YR42 00	10YR58 00	C		00MN00 00	Y	0	0	HR	2		M				
	45-100	c	75YR63 00	10YR58 00	M		00MN00 00	Y	0	0	HR	2		P				Y
55	0-35	mcl	10YR42 00	10YR58 00	C			Y	0	0	HR	5						
	35-100	c	10YR53 00	10YR58 71	M		00MN00 00	Y	0	0	HR	2		P				Y
56	0-35	mcl	10YR42 00						0	0	HR	5						
	35-75	c	10YR53 00	10YR58 61	C			Y	0	0	HR	2		P				Y
	75-100	c	75YR63 00	10YR58 71	M		00MN00 00	Y	0	0	HR	2		P				Y
69	0-35	mzcl	10YR42 00						0	0	HR	5						
	35-45	c	10YR52 00	10YR58 61	C		00MN00 00	Y	0	0		0		M				
	45-100	c	10YR64 00	10YR58 61	M		00MN00 00	Y	0	0	HR	2		P				Y