A1
Dromenagh Farm,
Iver, Bucks.

Agricultural Land Classification
ALC Map and Report

August 1998

Resource Planning Team
Eastern Region
FRCA Reading

RPT Job Number: 0302/063/98
FRCA Reference: EL 03/01135

DROMENAGH FARM, IVER, BUCKS

AGRICULTURAL LAND CLASSIFICATION REPORT

INTRODUCTION

1. This report presents the findings of an Agricultural Land Classification (ALC) survey carried out on approximately 8 hectares of restored land at Dromenagh Farm, Iver, Buckinghamshire. The survey was carried out on 25 August 1998.

2. The survey was undertaken by members of the Resource Planning Team in the Eastern Region of the Farming and Rural Conservation Agency (FRCA) [1] on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF). The purpose of the survey was to investigate the physical characteristics of the restored land in order to assign an ALC grade.

3. The pre-working characteristics of the land have been documented to a limited extent through a reconnaissance survey carried out during 1978 (FRCA Ref: 0302/007/78, site 14). A total of two borings were described across the site and the land was classified as Subgrade 3b (moderate quality agricultural land), in accordance with the ALC guidelines which were in place at the time, (MAFF, 1976). Soil profiles were described as comprising moderately stony (up to 35% total hard rock) fine sandy loam textures which overlay gravel deposits at depths of approximately 25cm. The main limitation across the site was described as being topsoil stoniness.

4. Following mineral extraction, the majority of the site was used as a landfilling of inert and putrescible waste. The purpose of carrying out the survey was to investigate the land quality of the site following the completion of the 5 year statutory aftercare programme. It is difficult, if not impossible, to forecast whether physical conditions on restored sites are likely to improve or deteriorate over time even when the land has gone beyond the aftercare period. Disturbed land is therefore graded on its condition at the time of survey.

SUMMARY

5. The findings of the survey are shown on the enclosed ALC map. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement would be misleading.

6. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. In total 8 borings and 1 soil inspection pit were described.

7. All of the land on this site has been disturbed and is classified as moderate quality (Subgrade 3b). The soils generally comprise moderately well drained profiles which are moderately to very stony throughout (containing up to 42% total flint stone) and consist of clay loam topsoils and upper subsoils over very poorly structured clay. These soil properties, most notably restricted rooting into the compacted clay lower subsoil and the high stone

[1] FRCA is an executive agency of MAFF and the Welsh Office.

contents, act to restrict the amount of profile available water for crops. As a result the level and consistency of crop yields is likely to be restricted due to a soil droughtiness limitation to an extent that Subgrade 3b is appropriate. In addition to soil droughtiness, parts of the site are limited to Subgrade 3b on the basis of topsoil stoniness (where the volume of flints > 2cm diameter is in excess of 15%). The presence of large stones in the topsoil has the effect of increasing production costs caused by extra wear and tear to equipment and reducing crop quality and establishment.

FACTORS INFLUENCING ALC GRADE

Climate

8. Climate affects the grading of land through the assessment of an overall climatic limitation and also through interactions with soil characteristics.

9. The key climatic variables used for grading this site are given in Table 1 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

Table 1: Climatic and altitude data

Factor	Units	Values
Grid reference		TQ 030 845
Altitude	m, AOD	52
Accumulated Temperature	day°C (Jan-June)	1452
Average Annual Rainfall	mm	698
Field Capacity Days	days	144
Moisture Deficit, Wheat	mm	110
Moisture Deficit, Potatoes	mm	103
Overall climatic grade		Grade 1

10. 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.

11. The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness, and accumulated temperature (ATO, January to June), as a measure of the relative warmth of a locality.

12. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. Other local climatic factors such as exposure and frost risk are not believed to have a significant effect on the site. The site is climatically Grade 1.

Site

13. The agricultural land at this site lies at an altitude of 50-55m AOD. Flooding restrictions do not affect land quality. There has been extensive earth movements related to the mineral extraction and subsequent landfilling of the site but nowhere does gradient, micro-relief or uneven surface settlement adversely affect the land quality. A number of above ground pipes for the purpose of passive venting of landfill gas were noted at the time of survey. However, these were limited in number and were spaced in such a way to not prohibit or restrict normal agricultural operations. They were not felt therefore to represent a limitation to the agricultural use of the land.

14. At the time of survey the land was in stubble (following a crop of winter cereals). A line of trees has been planted around the periphery of the site and an area of trees saplings occurs in the northern corner of the site.

Geology and soils

15. The most detailed published geological information (BGS, 1948) maps the entire site as being underlain by glacial gravel drift deposits (with Bunter Pebbles).

16. The most recently published soil information for the site (SSEW, 1983) shows the entire site to be mapped as Essendon Association. This is described as 'slowly permeable, seasonally waterlogged coarse loamy over clayey soils. Associated with similar fine loamy over clayey and fine silty over clayey soils. (SSEW, 1983).

17. Due to the soils stripping, mineral extraction, and filling with waste in the past, detailed field examination shows the soil profiles have been altered somewhat. Despite this, general soil properties (with the exception of higher stone contents) are broadly consistent with the description of the Essenden association. The soils now on site derive from those originally present. It is understood that no soil forming materials have been imported form elsewhere for the purposes of restoration.

AGRICULTURAL LAND CLASSIFICATION

18. The details of the classification of the site are shown on the attached ALC map.

19. The location of the auger borings and pits is shown on the attached sample location map and the details of the soils data are presented in Appendix II.

Subgrade 3b

20. Land of moderate quality has been mapped across the survey area. The principal limitation is soil droughtiness. The high stone (flint) content throughout these soils makes them drought prone, and high topsoil stone content is also a limitation in places, although not overriding.

21. The soils are impenetrable to the auger at variable depths (between 37cm and 55cm) across the site. The pit indicates that this is caused by the high proportion of flints in the soil profiles.

22. The majority of topsoils consist of non-calcareous, moderately to very stony (containing up to 37% total flint stone, 15% > 2cm, 3% > 6cm) medium clay loam. These rest upon similarly textured, or slightly heavier (heavy clay loam or clay), upper subsoils which are slightly to very stony (up to 37% total flint) and in places show evidence of soil wetness in the form of gleying. This may be a relict feature of former drainage conditions on the site prior to disturbance. The upper subsoils are however, in the majority of cases, considered permeable due to the high flint content. All of the lower subsoils were impenetrable to the soil auger. Pit 1 (see Appendix II) shows that these lower subsoils, although similar in texture and colour to the horizons above, have a higher flint content (up to 42% total stones). Below this horizon a compacted, very slowly permeable, clay horizon restricts rooting. This horizon shows evidence of poor drainage in the form of ochreous mottling and has a massive structure. Biopores and roots are virtually absent. All the soils across the site are assessed as Wetness Class I or occasionally II (where upper subsoils show signs of wetness). The interaction of high stone contents, restricted rooting into the compacted clay, and the local climate regime, results in these soils having restricted amounts of water available for crops, such that the land suffers a moderate droughtiness limitation. Consequently, crop growth and yields will be adversely affected.

23. In some sporadic locations topsoil stoniness alone is sufficient to downgrade the land to Subgrade 3b (where the volume of flints > 2cm diameter is in excess of 15% in the topsoil). Occasional blocks of concrete and brick fragments were also noted. The presence of large stones in the topsoil has the effect of increasing production costs caused by extra wear and tear to equipment and reducing crop quality and establishment.

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SOURCES OF REFERENCE

British Geological Survey (1948) *Sheet No. 255, Beaconsfield, Drift Edition ,1 inch to 1 mile scale.* BGS: London.

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

Met. Office (1989) *Climatological Data for Agricultural Land Classification.*
Met. Office: Bracknell.

Soil Survey of England and Wales (1983) *Soils of England and Wales, Sheet 6, Soils of South East England. 1:250,000 scale, and accompanying legend.*
SSEW: Harpenden.

APPENDIX I

DESCRIPTION OF THE 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 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 of this 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 land.

Grade 3: Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the 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.

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 that 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 severe limitations that restricts use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

APPENDIX II

SOIL DATA

Contents:

SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

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

Boring Header Information

1. **GRID REF**: national 100 km 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	**FLW**:	Fallow
PGR:	Permanent Pasture	**LEY**:	Ley Grass	**RGR**:	Rough Grazing
SCR:	Scrub	**CFW**:	Coniferous Woodland	**DCW**:	Deciduous Wood
HTH:	Heathland	**BOG**:	Bog or Marsh	**FLW**:	Fallow
PLO:	Ploughed	**SAS**:	Set aside	**OTH**:	Other
HRT:	Horticultural Crops				

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

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

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

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

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

8. 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				

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**:	Erosion Risk	**WD**:	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
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)

2. **MOTTLE COL**: Mottle colour using Munsell notation.

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 using Munsell notation.

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

7. **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/metamorphic rock		

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

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

degree of development	**WK**: weakly developed **ST**: strongly developed	**MD**: moderately developed
ped size	**F**: fine **C**: coarse	**M**: medium **VC**: very coarse
ped shape	**S** : single grain **GR**: granular **SAB**: sub-angular blocky **PL**: platy	**M**: massive **AB**: angular blocky **PR**: prismatic

9. **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

10. **SUBS STR**: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G**: good **M**: moderate **P**: poor

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

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

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

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

15. 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

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	TQ03008450	STB	NW	1			1	1	44	-66	44	-59	4			Y	DR	3B	I38 SEE PIT 1
2	TQ03108450	STB	N	1			1	1	58	-52	58	-45	4			Y	DR	3B	I50 SEE PIT 1
3	TQ02808440	STB	N	1			1	1	47	-63	47	-56	4			Y	DR	3B	I40 SEE PIT 1
4	TQ02908440	STB	E	1			1	1	45	-65	45	-58	4			Y	DR	3B	I38 SEE PIT 1
5	TQ03008440	STB	S	1			1	1	47	-63	47	-56	4			Y	DR	3B	I40 SEE PIT 1
6	TQ03108440	STB	S	1			1	1	45	-65	45	-55	4			Y	DR	3B	I38 SEE PIT 1
7	TQ03008430	STB	S	1	30		2	2	44	-66	44	-59	4			Y	DR	3B	I37 SEE PIT 1
8	TQ03108430	STB	S	1	30	30	4	3B	64	-48	62	-39	3B			Y	WD	3B	I55 SEE PIT 1
1P	TQ03008440	STB	S	1	70	70	2	2	68	-42	75	-28	3B			Y	DR	3B	PIT TO 90CM

SAMPLE	DEPTH	TEXTURE	COLOUR	MOTTLES COL	MOTTLES ABUN	MOTTLES CONT	PED COL.	GLEY	STONES >2	STONES >6	STONES LITH	STONES TOT	STRUCT/ CONSIST	SUBS STR	SUBS POR	SUBS IMP	SUBS SPL	SUBS CALC	
1	0-30	MCL	10YR42						14	2	HR	35							
	30-38	SCL	10YR43						0	0	HR	35		M					IMP GRAVELLY
2	0-30	MCL	10YR42						14	2	HR	35						Y	
	30-50	MCL	10YR43						0	0	HR	35		M					IMP GRAVELLY
3	0-30	MCL	10YR42						13	2	HR	35							
	30-40	MCL	10YR43						0	0	HR	35		M					IMP GRAVELLY
4	0-30	MCL	10YR42						12	2	HR	35							CLAY LENSES
	30-38	HCL	10YR43	10YR58	C				0	0	HR	35		M					IMP GRAVELLY
5	0-30	MCL	10YR32						15	0	HR	37							
	30-40	MCL	10YR42						0	0	HR	37		M					IMP GRAVELLY
6	0-30	MCL	10YR42						12	0	HR	35							
	30-38	MCL	10YR43						0	0	HR	35		M					IMP GRAVELLY
7	0-30	MCL	10YR42						12	2	HR	35							
	30-37	MCL	10YR43	10YR58	C			Y	0	0	HR	35		M					IMP GRAVELLY
8	0-30	MCL	10YR42						14	3	HR	35							
	30-55	C	10YR43	10YR58	C	D		Y	0	0	HR	15		P		Y			I FLINTS MIXED
1P	0-30	MCL	10YR42						15	2	HR	37	WKMSAB FR						
	30-50	MCL	10YR43						0	0	HR	37	WKCSAB FR	M					
	50-70	MCL	10YR43						0	0	HR	42	WKCSAB FR	M					
	70-85	C	25Y52	10YR58	C			Y	0	0	HR	10	MASSVE VM	P	Y		Y	Y	V SPL NO ROOTS