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FAREHAM BOROUGH LOCAL PLAN
Land around Brook Avenue, Warsash, Hampshire

Agricultural Land Classification
ALC Map and Report

February 1998

Resource Planning Team
Eastern Region
FRCA Reading

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AGRICULTURAL LAND CLASSIFICATION REPORT

FAREHAM BOROUGH LOCAL PLAN
LAND AROUND BROOK AVENUE, WARSASH, HAMPSHIRE

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 40 hectares of land at Brook Avenue, Warsash on the Hampshire coast between Southampton and Portsmouth. The survey was carried out during February 1998.

2. The survey was undertaken by the Farming and Rural Conservation Agency (FRCA)[1] on behalf of the Ministry of Agriculture, Fisheries and Food (MAFF), in connection with MAFF's statutory input to the Fareham Borough Local Plan. This survey supersedes any previous ALC information for this land.

3. The work was conducted by members of the Resource Planning Team in the Eastern Region of FRCA. The land has been graded in accordance with the published MAFF ALC guidelines and criteria (MAFF, 1988). A description of the ALC grades and subgrades is given in Appendix I.

4. At the time of survey the land in agricultural use on the site consisted of permanent grassland grazed by ponies and areas of rough grassland. Most of the survey area consists of 'Other land' the majority of which comprises residential areas and the remainder is woodland, trackways and nurseries.

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 area and proportions of the ALC grades and subgrades on the surveyed land are summarised in Table 1.

Table 1: Area of grades and other land

Grade/Other land	Area (hectares)	% surveyed area	% site area
3b	7.8	72.2	19.5
4	3.0	27.8	7.5
Other land	29.2	N/A	73.0
Total surveyed area	10.8	100	27.0
Total site area	40.0	-	100

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

7. The fieldwork was conducted at an average density of 1 boring per hectare of agricultural land. A total of 16 borings and 1 soil pit were described.

8. Most of the land suffers from soil droughtiness problems to varying degrees, since the underlying geology is river terrace deposits. In places, topsoil stones, soil wetness and flood risk are equally limiting. Subgrade 3b and Grade 4 are appropriate for this land.

9. Across the higher land soil profiles are well drained but very stony. Topsoils comprise fine loamy textures which are moderately stony. These pass to similar textured subsoils which are very stony and typically impenetrable to the soil auger. These soil properties interact with the local climate to restrict the amount of available water in the soil. Depth to the very stony subsoil determines the severity of the droughtiness limitation. Moisture balance calculations indicate that Subgrade 3b and Grade 4 are appropriate. The effect of soil droughtiness is to reduce the flexibility of the land and reduce crop yields.

10. In places, topsoil stoniness is equally limiting on Subgrade 3b land. A high volume of flints in the topsoil has the effect of acting as an impediment to cultivation, harvesting and crop growth. In addition, a high stone content can increase production costs by causing extra wear and tear to farm machinery.

11. On the lower land, on the south-western boundary of the site, soil wetness is a problem. Topsoils are fine loamy becoming heavier with depth passing to poorly drained clays. Such impeded drainage causes the utilisation of the land to be restricted. The land adjoining the River Hamble also suffers from high groundwater levels and seepage. Information supplied by the Environment Agency also suggests that this low-lying land may be at risk from flooding.

FACTORS INFLUENCING ALC GRADE

Climate

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

13. The key climatic variables used for grading this site are given in Table 2 and were obtained from the published 5km grid datasets using the standard interpolation procedures (Met. Office, 1989).

14. 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.

15. 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 (AT0, January to June), as a measure of the relative warmth of a locality.

Table 2: Climatic and altitude data

Factor	Units	Values	
Grid reference	N/A	SU 491 067	SU 495 070
Altitude	m, AOD	5	20
Accumulated Temperature	day°C (Jan-June)	1552	1535
Average Annual Rainfall	mm	784	793
Field Capacity Days	days	160	161
Moisture Deficit, Wheat	mm	119	116
Moisture Deficit, Potatoes	mm	115	112
Overall climatic grade	N/A	Grade 1	Grade 1

16. The combination of rainfall and temperature at this site mean that there is no overall climatic limitation. The sites close proximity to the sea means that it is an area which is recorded as 'rather exposed' (Met. Office, unpublished data, 1968). However, no physical evidence of this was seen at the time of the survey. Frost risk does not affect land quality in this locality. The site is climatically Grade 1. However, climatic factors do interact with soil properties to influence soil wetness and soil droughtiness. At this locality the climate is relatively warm and moist, in regional terms.

Site

17. The site lies at altitudes in the range <5-20 m AOD. The highest ground occurs along the eastern site boundary with land falling gently to the lowest land along the western boundary. The majority of the survey area is not affected by any site restrictions (i.e., gradient or micro-relief). However, a small area of land along the River Hamble may be subject to flooding, and the presence of hydrophilic vegetation is an indicator of more permanent waterlogging. Consequently Grade 4 has been mapped.

Geology and soils

18. The most detailed published geological information (BGS, 1987) covering the area shows the majority of it to be underlain by river terrace deposits. The remainder of the site is shown to be Earnley Sands which, extends from the River Hamble and runs parallel to Brook Avenue.

19. The most detailed soil map for the area shows it to be mapped as 'urban' (SSEW, 1983). However, the soil association mapped along the River Hamble is the Wickham 3. This is described as 'slowly permeable seasonally waterlogged fine loamy over clayey and coarse loamy over clayey soils, and similar more permeable soils with slight waterlogging. Some deep coarse loamy soils affected by groundwater' (SSEW, 1983). Soil of the Sonning 1 association (SSEW, 1983) is mapped east and south east of Warsash. This is described as 'well drained flinty coarse loamy and sandy soils, mainly over gravel with some loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging' (SSEW, 1983). The majority of the soils on this site were consistent with this description.

AGRICULTURAL LAND CLASSIFICATION

20. The details of the classification of the site are shown on the attached ALC map and the area statistics of each grade are given in Table 1, page 1.

21. 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

22. Land of moderate agricultural quality has been mapped in the north, along the north-east and south-west boundaries of the site. It occurs in conjunction with two soil types.

23. Most of the land classified as Subgrade 3b is affected by a soil droughtiness limitation. Soils along the north and north-east boundaries of the site comprise non-calcareous medium clay loam topsoils. These may contain up to 30 % total flints by volume (8-18% > 2 cm in size). Topsoils overlie similar subsoils which are impenetrable to the soil auger between 40 and 70 cm depth. Soil pit 1 (see Appendix II) is typical of these soils. Subsoils are very stony containing up to 59 % total flints by volume. A few of these soils are gleyed and in the absence of a slowly permeable horizon, is suggestive of a fluctuating water table. Wetness class II describes the drainage status of these gleyed soils, however, the overriding limitation is one of droughtiness. These stony soils restrict the amount of water which is available to plants and moisture balance calculations indicate that this land cannot be classified any higher than Subgrade 3b. The resulting drought stress may cause the level and consistency of yields to be depressed.

24. Some of the land restricted to Subgrade 3b on drought is also limited by topsoil stones (16-18% > 2 cm). High stone volumes in the topsoil has the effect of increasing production costs by enhancing the wear and tear to farm machinery, and impairing the establishment, growth and quality of crops.

25. A localised area of land along the south-west boundary is affected by soil wetness problems. Soils comprise non-calcareous medium clay loam or sandy clay loam topsoils which may contain up to 5 % total flints by volume. These pass to heavy clay loam or clay upper subsoils. These profiles are all gleyed within 40 cm, evidence of severely impeded drainage arising from the presence of slowly permeable horizons between 25 and 40 cm. The depth to these slowly permeable clay subsoils results in soils being assigned to wetness class IV. This combination of poor soil drainage, topsoil texture and climatic factors, gives rise to a land classification of Subgrade 3b. A significant soil wetness problem affects seed germination and survival, partly by a reduction in soil temperature and partly through the creation of anaerobic conditions. This also inhibits the development of a good root system and can affect crop growth.

Grade 4

26. Poor quality land is located along the western fringes of the survey area. Both soil droughtiness and soil wetness affect land quality. On the higher land, non-calcareous

medium clay loam topsoils with up to 30 % total flints by volume (8-20 % >2cm) were impenetrable to the soil auger. Upper subsoils were impenetrable to both spade and soil auger and were assumed to be as stony as the subsoil of pit 1 i.e., 59 % total flints. Consequently, these soils are severely droughty and Grade 4 is appropriate. On the lowest land, bordering the high tide mark of the River Hamble, the presence of hydrophilic vegetation (i.e., rushes) indicates that soils are waterlogged for most of the year and are suitable only for low intensity grazing. This arises as a result of high groundwater levels and seepage. Flood information supplied by the Environment Agency indicates that this area may also be prone to flooding. Overall this land is severely restricted in terms of its agricultural use.

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SOURCES OF REFERENCE

British Geological Survey (1987) *Sheet No. 315, Southampton. 1:50,000.*
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) *Sheet 6, Soils of South-East England, 1:250,000.*
SSEW: Harpenden.

Soil Survey of England and Wales (1984) *Soils and their Use in South East England*
SSEW: Harpenden

APPENDIX I

DESCRIPTIONS 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 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 (e.g. 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 which restrict 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	**OTH**	Other
DCW:	Deciduous woodland	**BOG:**	Bog or marsh	**SAS:**	Set-Aside
HTH:	Heathland	**HRT:**	Horticultural crops	**PLO:**	Ploughed

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	**ST:**	Topsoil Stoniness
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
EX:	Exposure				

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	**FSST:**	soft, fine grained sandstone
ZR:	soft, argillaceous, or silty rocks	**CH:**	chalk
MSST:	soft, medium grained sandstone	**GS:**	gravel with porous (soft) stones
SI:	soft weathered igneous/metamorphic rock	**GH:**	gravel with non-porous (hard) stones

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	**MD**:	moderately developed
	ST:	strongly developed		
Ped size	**F**:	fine	**M**:	medium
	C:	coarse		
Ped shape	**S**:	single grain	**M**:	massive
	GR:	granular	**AB**:	angular blocky
	SAB:	sub-angular blocky	**PR**:	prismatic
	PL:	platy		

9. **CONSIST**: Soil consistence is described using the following notation:

L: loose	**FM**: firm	**EH**: extremely hard
VF: very friable	**VM**: very firm	
FR: friable	**EM**: extremely firm	

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 appropriate 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

LIST OF BORINGS HEADERS 09/06/98 LAND AROUND BROOK AVENUE

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	TQ49400730	FLW	NW	1			1	1	104	-15	89	-26	3A				DR	3A		IMP 100CM
2	TQ49500730	FLW	NW	1			1	1	63	-56	63	-52	4				DR	3B		SEE PIT1
3	TQ49290711	PGR	SW	2			1	1	37	-82	37	-78	4				DR	4		ALSO TSST
4	TQ49400720	PGR	SE	1	29		2	2	71	-48	77	-38	3B				DR	3B		3B TSSTONES
5	TQ49670720	PGR					1	1	47	-72	47	-68	4				DR	3B		
6	TQ49210704	PGR					1	1	36	-83	36	-79	4				DR	4		SEE 1P
7	TQ49300700	RGR					1	1	43	-76	43	-72	4				DR	4		SEE 1P
8	TQ49600710	PGR					1	1	79	-40	88	-27	3B				DR	3B		
9	TQ49700710	RGR			65		1	1	87	-32	90	-25	3B				DR	3B		
10	TQ49300690	RGR					1	1	33	-86	33	-82	4				DR	4		.
11	TQ49430695	RGR			50		1	1	83	-36	91	-24	3B				DR	3B		
12	TQ49300700	RGR					1	1	66	-53	68	-47	4				DR	3B		3B TSSTONES
13	TQ49100680	PGR	W	1	0	25	4	4	78	-41	84	-31	3B				WE	4		HYDROPHILICVEG
14	TQ49120670	PGR	W	1	0	45	3	3A	105	-14	110	-5	3A				WE	3A		Q SPL 45
15	TQ49100660	PGR	W	1	0	40	4	3B	104	-15	109	-6	3A				WE	3B		Q SPL 40
16	TQ49200660	PGR	W	1			1	1	138	19	99	-16	3A				DR	3A		
1P	TQ49500730	FLW	NW	1			1	1	72	-47	61	-54	3B				DR	3B		

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES----- COL	ABUN	CONT	PED COL.	GLEY	----STONES---- >2	>6	LITH	STRUCT/ TOT	CONSIST	SUBS STR	POR	IMP	SPL	CALC
1	0-23	MCL	10YR31						9	2	HR	16						
	23-100	SCL	10YR46						0	0	HR	25		M				IMP GRAVELY
2	0-27	MCL	10YR31						8	0	HR	16						
	27-46	MCL	10YR42						0	0	HR	30		M				IMP GRAVELY
3	0-28	MCL	10YR31						16	0	HR	30						IMP GRAVELY
4	0-29	MCL	10YR31						18	5	HR	30						
	29-63	MCL	10YR41	10YR46	M			Y	0	0	HR	30		M				IMP GRAVELY
5	0-30	MSL	10YR31						13	2	HR	30						
	30-40	MCL	10YR32						0	0	HR	40		M				IMP GRAVELY
6	0-28	MCL	10YR31						18	5	HR	30						IMP GRAVELY
7	0-29	MSL	10YR31						16	3	HR	30						
	29-50	CS	10YR62						0	0	HR	30		M				IMP GRAVELY
8	0-35	MCL	10YR31						13	3	HR	25						
	35-70	MCL	75YR44						0	0	HR	30		M				IMP GRAVELY
9	0-28	MCL	10YR32						4	1	HR	25						
	28-40	MCL	10YR42						0	0	HR	20		M				
	40-65	HCL	10YR54	10YR66	C	F		S	0	0	HR	10		M				
	65-78	HCL	10YR53	10YR68	C	D		Y	0	0	HR	5		M				
	78-80	C	10YR5363	10YR58	C	D		Y	0	0	HR	50		P				IMP GRAVELY
10	0-27	MSL	10YR31						16	3	HR	30						IMP GRAVELY
11	0-30	MCL	10YR31						9	0	HR	20						
	30-50	MCL	10YR63						0	0	HR	25		M				
	50-70	MCL	10YR41	10YR46	M			Y	0	0	HR	30		M				IMP GRAVELY
12	0-33	MCL	10YR31						20	3	HR	30						
	33-55	MCL	10YR32						0	0	HR	35		M				IMP GRAVELY
13	0-25	SCL	05Y31	75YR58	C			Y	0	0	HR	5						
	25-60	C	25Y41	75YR58	C			Y	0	0	HR	5		P		Y		SATURATED
14	0-25	MCL	10YR41	75YR46	C			Y	0	0		0						
	25-45	HCL	10YR51	10YR58	M			Y	0	0		0		M				
	45-80	C	10YR61	75YR58	M			Y	0	0		0		P		Y		
15	0-30	MCL	10YR41	75YR46	C			Y	0	0		0						
	30-40	HCL	25Y61	75YR58	M			Y	0	0		0		M				
	40-80	C	25Y71	75YR68	M			Y	0	0		0		P		Y		

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	
16	0-30	MSL	10YR32						7	0	HR	12							
	30-55	MSL	10YR33						0	0	HR	15		M					
	55-65	SCL	10YR54						0	0	HR	5		M					
	65-120	SCL	10YR54	75YR58	C			S	0	0	HR	5		M					
1P	0-30	MCL	10YR31						8	0	HR	16							
	30-80	MCL	10YR42						0	0	HR	59		M					WET SIEVE STONES