

SFCs 6280

6/94

Withyhayes, Lymstone, Devon

AGRICULTURAL LAND CLASSIFICATION

REPORT OF SURVEY &

SOIL PHYSICAL CHARACTERISTICS

**Resource Planning Team
Taunton Statutory Unit**

January 1994

ADAS 

AGRICULTURAL LAND CLASSIFICATION AND SITE PHYSICAL CHARACTERISTICS

LAND AT WITHYHAYES, LYMPSTONE, DEVON

REPORT OF SURVEY

1. SUMMARY

The site, an area of 9 hectares of land at Withyhayes, Lympstone, is the subject of a proposed land raising operation. The area was graded using the Agricultural Land Classification (ALC) system in January 1994. The survey was carried out on behalf of MAFF in response to consultation from Devon County Council.

The fieldwork was carried out by ADAS (Resource Planning Team, Taunton Statutory Unit) at a scale of 1:10,000. The information is correct at this scale but any enlargement would be misleading. In order to gain a more accurate representation of land quality, a 200-metre-wide strip of land around the application site was graded, giving a total survey area of 43 ha. A total of 39 auger borings and 2 soil profile pits were examined. The distribution of ALC grades identified in the survey area is detailed below and illustrated on the accompanying map.

Distribution of ALC grades

Grade	Area (ha)	% of Agricultural Land	% of Survey Area
2	15.7	38.2	36.4
3a	13.2	32.1	30.6
3b	12.2	29.8	28.4
Urban	0.7	-	1.7
Non-agricultural	1.3	-	3.0
TOTAL	43.1	100%	(41.1 ha) 100%

The site occupies a gently undulating area of arable grass ley and set aside land use. Soils are variable across the site, although clay profiles with workability limitations are dominant. However, the northern part of the site comprises stony sandy loam over clay profiles with a moderate droughtiness limitation.

2. INTRODUCTION

An area of 43 hectares of land at Withyhayes, Lymptone, was surveyed on behalf of MAFF as part of its statutory role in response to an application for land raising. The survey was carried out in January 1994 by ADAS (Resource Planning Team, Taunton Statutory Unit) using the Agricultural Land Classification (ALC) system and conducted at a scale of 1:10,000 (approximately one sample point for every hectare of agricultural land). The 39 borings were supplemented by 2 soil inspection pits used to assess subsoil conditions. The information is correct at the scale shown but any enlargement would be misleading.

The published provisional 1" to the mile ALC map of the area (MAFF, 1972) shows the site to comprise Grade 1 and Grade 3 land. The current survey supersedes any previous surveys and was undertaken to provide a more detailed representation of the agricultural land quality using the Revised Guidelines and Criteria (MAFF, 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on the agricultural use. The grading takes account of the top 120 cm of the soil profile. A description of the grades used in the ALC system can be found in Appendix 2.

3. CLIMATE

The grade of the land is determined by the most limiting factor present. The overall climate is considered first because it can have an overriding influence *on restricting land to lower grades despite other favourable conditions.*

Climatic data for the site was interpolated from the published agricultural climate dataset (Meteorological Office, 1989). The parameters used for assessing climate are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness). The results shown in Table 1 indicate that there is no overall climatic limitation.

Table 1 Climatic interpolations: Withyhayes, Lymptone

Grid Reference	SY 000 855
Altitude (m)	40
Accumulated Temperature (day °)	1555
Average Annual Rainfall (mm)	775
Field Capacity (days)	164
Moisture deficit: Wheat (mm)	110
Potatoes (mm)	105
Overall Climatic Grade	1

Climatic data on Field Capacity Days (FCD) and moisture deficits for wheat (MDW) and potatoes (MDP) are also shown. This data is used in assessing soil wetness and droughtiness limitations referred to in Section 6. A description of the Soil Wetness classes used is included in Appendix 3.

4. RELIEF AND LANDCOVER

The site occupies an undulating area, the highest point being 60 m on the eastern boundary, from which land falls gently to 25 m AOD at Gulliford Farm.

5. GEOLOGY AND SOILS

The published 1:50,000 scale solid and drift geology map, sheet 339 (Geological Survey of England and Wales, 1976), shows most of the site to comprise Exmouth Sandstone and Mudstone. However, an area of sands and alluvium transect the middle of the site. The soil survey of England and Wales mapped the soils in the area in 1983 at a reconnaissance scale of 1:250,000. This map shows the soils across the entire site to comprise Newham Association. These soils are described as well drained reddish coarse and fine loamy soils over gravel, locally deep, some similar soils affected by groundwater. The recent survey indicates that there are 2 soil types across the site. Much of the land comprises variable clayey profiles with medium clay loam topsoils underlain by clay loam upper subsoils and clay at depths between 30 and 70 cm. The northern part of the site comprises medium sandy loam topsoils over slightly stony sandy clay loam upper subsoils and very stony loamy medium sandy lower subsoils. Below this at a depth of approximately 80 cm clay is found.

6. AGRICULTURAL LAND CLASSIFICATION

The distribution of ALC grades identified in the survey area is detailed in Table 2 and shown on the accompanying ALC map. The information is correct at the scale shown but any enlargement would be misleading.

Table 2 Distribution of ALC grades: Withyhayes

Grade	Area (ha)	% of Agricultural Land	% of Survey Area
2	15.7	38.2	36.4
3a	13.2	32.1	30.6
3b	12.2	29.8	28.4
Urban	0.7	-	1.7
Non-agricultural	1.3	-	3.0
TOTAL	43.1	100%	(41.1 ha) 100%

Grade 2

The central block and south-eastern corner of the site have been graded 2. This land comprises moderately well drained clayey profiles, described in Section 5, with slowly permeable clay horizons beginning at 60 or 70 cm depth. These soils have been assessed as Wetness Class II and experience a slight wetness and droughtiness limitation.

Subgrade 3a

Soils of this grade relate to 2 soil types: the small block of 3a in the south of the site relates to similar soils to the Grade 2 land, with the slowly permeable clay horizon beginning at between 40 and 50 cm depth. This places soils into Wetness Class III, Grade 3a. The northern block of land graded 3a, relates to the stony coarser textured profiles described in Section 5. These profiles experience a moderate drought limitation due to the high stone content in the lower subsoils.

Subgrade 3b

The 2 blocks of land graded 3b have a moderately severe wetness limitation imposed by shallow clay slowly permeable subsoils and medium clay loam topsoils.

Other Land

The farm track and derelict farm buildings are shown as urban. The playing fields in the southern part of the site are shown as non-agricultural.

7. SOIL RESOURCES

Soil resources described below and illustrated on the accompanying map relate to the central area of the land surveyed for ALC purposes which is the proposed soil landfill.

Topsoil

Topsoil is defined as the organic-rich surface horizon. Topsoils across the whole site have been mapped as one unit comprising slightly stony medium clay loam, occasionally medium sandy loam, topsoils to a depth of 25 cm. The stone contents vary across the site, reaching a maximum of 18% in the southern part of the site. The soils are well rooted and non-calcareous with moderately developed fine sub-angular blocky structures.

A total topsoil resource of 2250 m³ is available.

Subsoil

Subsoil is defined as the less organic-rich lower horizons. The subsoils across this site can be handled as 3 units.

The subsoils of map unit II need to be split at 60 cm depth. The upper subsoils comprise clay loam and occasionally silty clay loam textures which are slightly stony with approximately 7% hard rock. The soils in this unit are friable and have a moderate medium angular blocky structure, giving a moderate structural condition. They are porous and well rooted.

The lower subsoils of unit II and the entire subsoils of unit III can be treated as one soil handling unit. These soils comprise slightly stony clay to a depth of approximately 120 cm. These subsoils are friable and sometimes firm moderately developed coarse angular blocky. These soils have a diminishing amount of roots and pores below approximately 75 cm depth.

A total subsoil resource of 8550 m³ is available across the whole site.

APPENDIX 1

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES, 1976, Solid and Drift edition, sheet 339, Newton Abbot, 1:50,000 scale

MAFF (1972), Agricultural Land Classification Map, sheet 176, Provisional 1:63,360 scale

MAFF (1988), Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for Grading the Quality of Land), Alnwick

METEOROLOGICAL OFFICE (1989), published climatic data extracted from the agroclimatic dataset, compiled by the Meteorological Office

SOIL SURVEY OF ENGLAND AND WALES (1983), sheet 5, Soils of South-west England, 1:250,000 scale

APPENDIX 2

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 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.

Descriptions of other land categories used on ALC maps

Urban

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

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

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

APPENDIX 3

DEFINITION OF SOIL WETNESS CLASSES

Wetness Class I

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

Wetness Class II

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

Wetness Class III

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

Wetness Class IV

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

Wetness Class V

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

Wetness Class VI

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

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

Source: Hodgson, J M (in preparation) Soil Survey Field Handbook (revised edition).

SOIL RESOURCES

Materials and Volumes

Map unit	Average depth (cm)	Area (ha)	Soils	Stones	Volume (m ³)
I	0-25	9.0	MCL (occ MSL)	2% HR	2250
			TOTAL	TOPSOIL	<u>2550</u>
II	25-60	6.5	MCL/HCL (occ MZCL)	7% HR	2275
II	60-120	6.5	C	5% HR	3900
III	25-120	2.5	C	2% HR	2375
			TOTAL	SUBSOIL	<u>8550</u>

Abbreviations

MCL	Medium clay loam
MSL	Medium sandy loam
MZCL	Medium silty clay loam
C	Clay
HR	Hard rock

SITE NAME		PROFILE NO.		SLOPE AND ASPECT		LAND USE		Av Rainfall: 797 mm			PARENT MATERIAL		
Withyhayes Farm, Lymptone		Pit 1		0°		SAS		ATO: 1510°			Mudstone and Sandstone		
JOB NO.		DATE		GRID REFERENCE		DESCRIBED BY		FC Days: 166			SOIL SAMPLE REFS		
6/94		26/1/94		ASP 5 SX 999 857		N A Done and G Clark		Climatic Grade: 1			NAD/110, NAD/111		
Horizon Number	Lowest Av Depth (cm)	Matrix and Ped Face Colours	Texture	Stoniness: Size, Shape, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Structure: Development Size and Shape	Pores and Fissures	Structural Condition	Consistence	Roots: Abundance, Size and Nature	Calcium Carbonate Content	Mangan Concs etc	Horizon Boundary: Distinctness and form
1	35	75YR43	MSL	>2cm 4% Dry sieve Est 4% <2cm/>2mm Total 8% HR	None	MDCSAB	Many	Moderate	Friable	Many fine	None	None	Smooth/ gradual
2	55	75YR43	MSL	>2cm 4% Dry sieve Est 4% >2mm <2cm Total 8% HR	75YR58 Common distinct	WDCSAB	Many (mainly worm channels)	Good	Friable	Many fine and v fine	None	Few	Clear/ smooth
3	80	5YR46	LMS	15% >2cm HR (Dry sieve) 45% >2mm <2cm Wet sieve Total 60% HR	5YR73 Common Distinct	WDM Granular (mostly aggregated around stones)	Many	Good	Very friable	Few fine	None	None	Abrupt/ smooth
4	120	25YR44 5YR73 (sand)	C decreasing sandy lenses with depth	0	5YR58 Many distinct	MDFSAB tending towards medium	Well fissured but few pores observed	Good	Friable	None	None	None	-

Profile Gleyed From: 55 cm

Depth to Slowly
Permeable Horizon: 80 cm

Wetness Class: 1

Wetness Grade: 1

VP336-1

Available Water Wheat: 148 mm

Potatoes: 89 mm

Moisture Deficit Wheat: 110 mm

Potatoes: 105 mm

Moisture Balance Wheat: +38 mm

Potatoes: -16 mm

Droughtiness Grade: 3A (calculated to 120 cm)

Final ALC Grade: 3A

Main Limiting Factor(s): Droughtiness

Remarks:

SITE NAME		PROFILE NO.		SLOPE AND ASPECT		LAND USE		Av Rainfall: 797 mm			PARENT MATERIAL		
Withyhayes Farm, Lympstone		Pit 2		2° South West		Permanent Grass		ATO: 1510°			Sandstones/Mudstones		
JOB NO.		DATE		GRID REFERENCE		DESCRIBED BY		FC Days: 166			SOIL SAMPLE REF:		
6/94		21/2/94		ASP 10/SY001 856		PRW/HLJ		Climatic Grade: 1			HLJ/15		
Horizon Number	Lowest Av Depth (cm)	Matrix and Ped Face Colours	Texture	Stoniness: Size, Shape, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Structure: Development Size and Shape	Pores and Fissures	Structural Condition	Consistence	Roots: Abundance, Size and Nature	Calcium Carbonate Content	Mangan Concs etc	Horizon Boundary: Distinctness and form
1	25cm	10YR4/3	MCL	<1% HR Visual	-	MFSAB	Many	Moderate	Friable	Many fine	None	None	Abrupt smooth
2	65cm	7.5YR4/2	MCL	5% >2cm sieved dry 2% <2cm visual 7% Total HR	-	MMAB	Many	Moderate	Friable	Few fine	None	None	Abrupt smooth
3	76 cm	10YR6/4	C	5% (visual) HR	10YR58 Many distinct	MCAB	Very porous	Moderate	Friable	Few fine	None	Few Mn	Abrupt smooth
4	95cm+	05YR6/3	C	2% (visual) HR	05YR58 Many distinct	MCAB	<0.5%	Moderate	Firm	Few fine	None	Few Mn	-

Profile Gleyed From: 65cm

Depth to Slowly Permeable Horizon: 76cm

Wetness Class: II

Wetness Grade: 2

Available Water Wheat: 138mm

Potatoes: 112mm

Moisture Deficit Wheat: 110mm

Potatoes: 105mm

Moisture Balance Wheat: 28mm

Potatoes: 7mm

Droughtiness Grade: 2 (calculated to 120 cm)

Final ALC Grade: 2

Main Limiting Factor(s): Wetness and Droughtiness

Remarks:

- Difficulty in obtaining structure for 4th horizon due to wetness
- Pit dug to 95cm
- Augered to 120cm