

8FCS 6155

39/93

A390 GRAMPOUND BYPASS
CORNWALL

**AGRICULTURAL LAND CLASSIFICATION
REPORT OF SURVEY**

Resource Planning Team
Taunton Statutory Unit

September 1993

ADAS 

AGRICULTURAL LAND CLASSIFICATION

A390 GRAMPOUND BYPASS

REPORT OF SURVEY

1. The site, an area of 146.5 ha of land around Grampound, Cornwall was graded using the Agricultural Land Classification (ALC) system in September 1993. The survey was carried out on behalf of MAFF as part of its statutory role in the consultation of a proposed Bypass with Cornwall 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. A total of 96 auger borings and 3 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: Grampound Bypass

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
3a	70.5	48.1	58.0
3b	35.9	24.5	29.6
4	6.6	4.5	5.4
5	8.4	5.7	7.0
Non Agric	9.1	6.2	
Urban	15.9	10.9	
Farm building	<u>0.1</u>	<u>0.1</u>	—
TOTAL	146.5	100%	100% (121.4 ha)

The survey area crosses several steep sided valley features, with gentler sloping land on the hill tops and valley floor. Much of the land was under grass leys at the time of survey with some arable land in the western part of the site. Soils across the whole of the site are broadly similar comprising deep heavy and medium clay loam topsoils over very stony heavy clay loam and occasionally sandy silt loam subsoils. Soils are generally well drained but the high FC days restricts the workability of the soils. The affect of steep slopes on the grading of the agricultural land is also an important limiting ^{factor} in this site.

2. INTRODUCTION

An area of 146.5 hectares of land around Grampond was surveyed on behalf of MAFF, as part of its statutory role in the consultation with Cornwall County Council. The survey was carried out in September 1993 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 96 borings were supplemented by 3 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 this area (MAFF 1970) shows much of the site to be Grade 2 and 3 with Grade 4 on the valley sides and floor. 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 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 were interpolated from the Agricultural Climate Dataset (Meteorological Office 1989). The parameters used for assessing overall climatic limitation 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 land lying above 67 m AOD is limited to Grade 2 with a climatic limitation and that land above 55 m AOD is at field capacity for more than 225 days in any year. This imposes a greater limitation on the workability of topsoils.

Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat (MDW) and potatoes (MDP) are also shown. These data are used in assessing the soil wetness and droughtiness limitations referred to in Section 6. No locally limiting climatic factors such as exposure were noted in the survey area.

Table 1 Climatic interpolations: Grampond Bypass

Grid Reference	SW 933 482	SW 940 482	SW 940 483
Height (m)	20	65	70
Accumulated Temperature (day deg)	1619	1568	1562
Average Annual Rainfall (mm)	1112	1158	1164
Overall Climatic Grade	1	1	2
Field Capacity (Days)	220	227	228
Moisture Deficit, Wheat (mm)	94	86	85
Potatoes (mm)	85	75	74

4. RELIEF AND LANDCOVER

The survey area crosses several steep sided valley features with gentler sloping land on the hill tops and valley floor. The steeper slopes limit land to grades 3b, 4 and 5 where the safe operation of some types of farm machinery is limited. Nearly all the agricultural land was under grass leys at the time of survey with some arable land in the western part of the site.

5. GEOLOGY AND SOILS

The published 1:50,000 scale solid and drift geology map, sheets 347 and 353 (Geological Survey of England and Wales 1982 and 1975) shows all the site except a broad section along the river valley to comprise Grampound Grit. The river valley is marked as Alluvium.

The Soil Survey of England and Wales mapped the soils of the area in 1983, at a reconnaissance scale of 1:250,000. This map shows the soils in the east of the site and the hill tops in the west to comprise Denbigh 2 Association* and the steep slopes and valley floor to comprise Denbigh 1 Association**.

The recent survey indicates there are two broad soil types found across the site. The first, found mainly to the north and east of Grampound comprises medium clay loam topsoils with occasional heavy clay loam topsoils over very stony (38-60% silty rock) heavy clay loam subsoils starting from 30 or 40 cm to depth. Soils in the valley floor and the western part of the site were similar to those described above, although topsoil textures were more consistently heavy clay loam except for medium clay loams in the south west and subsoils were generally slightly stony silt sandy loams to 80 cm below which stone contents increased.

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.

Table 2 Distribution of ALC grades: Grampound Bypass

Grade	Area (ha)	% of Survey Area	% of Agricultural Land
3a	70.5	48.1	58.0
3b	35.9	24.5	29.6
4	6.6	4.5	5.4
5	8.4	5.7	7.0
Non Agric	9.1	6.2	
Urban	15.9	10.9	
Farm building	0.1	0.1	
TOTAL	146.5	100%	100% (121.4 ha)

***Denbigh 2 Association**

Well drained fine loamy soils over slate or slate rubble. Some fine loamy soils variably affected by groundwater.

****Denbigh 1 Association**

Well drained fine loamy and fine silty soils over rock some similar soils with slowly permeable subsoils and slight seasonal water logging. Some shallow soils.

Subgrade 3a

Over half the agricultural land has been graded 3a (good quality agricultural land). This relates to the stony soil types with medium clay loam topsoils and also areas below 225 FC days and heavy clay loam topsoils. These soils experience a slight droughtiness limitation but have an overall workability limitation imposed by topsoil texture and FC days.

Subgrade 3b

There are 3 reasons for land to be graded 3b. Land above 55 m AOD and west of the River Fal is limited to subgrade 3b due to the heavy clay loam topsoils and high FC days. The level area of the river valley north of the village is limited to this grade because of a slight wetness limitation indicated by the gleyed subsoils within 40 cm. These soils are assessed as Wetness Class III and thus graded 3b. The third type limitation experienced by land in this subgrade is slope. The moderately steep slopes to the south and west of Grampond restrict the safe operation of some types of farm machinery.

Grades 4 & 5

Land of these grades is found on the steeper slopes of the valley sides. Grade 4 relates to slopes of between 11° and 18° , grade 5 to slopes of more than 18° .

Urban and Non Agricultural Land

The survey included 15 ha of urban land. This includes roads, residential buildings and gardens. Non agricultural land includes woodlands and the recreational ground near the centre of Grampond.

APPENDIX 1

REFERENCES

GEOLOGICAL SURVEY OF ENGLAND AND WALES (1982 & 75) Solid and Drift edition.
Sheets 347 and 353 1:50,000 scale

MAFF (1970) Agricultural Land Classification Map Sheet 170 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 map scale permits, the cover types 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).

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 1148 mm	PARENT MATERIAL
Grampond Bypass		IP	1° South West	Fallow	ATO: 1579 day °C	
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: >225	SOIL SAMPLE REFERENCES
39/93		28/9/93	ASP 11; SW 9370 4890	VR/PRW	Climatic Grade: 2	
					Exposure Grade: N/A	

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	30	HCL	7.5YR4/3	1% >2cm HR 9% <2cm ZR 10% ZR sieved	None	None	Moderate Medium Subangular Blocky	Friable	Moderate	Many	Few Fine	None	Smooth/ Abrupt
2	80+	HCL	5YR5/4	38% >2cm 22% <2cm 60% ZR sieved	None	None	Not described due to high stone content. Probably moderate fine SAB	-	Moderate	Many	Few Fine to 35cm	None	-

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: 1

Wetness Grade: 3b

NL336j

Available Water Wheat: 122 mm

Potatoes: 96 mm

Moisture Deficit Wheat: 88 mm

Potatoes: 77 mm

Moisture Balance Wheat: 34 mm

Potatoes: 19 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability

Remarks:

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 1148 mm	PARENT MATERIAL
Grampound Bypass		Pit 2	2° West	Turnips	ATO: 1579 day °C	Grampound Grit
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: >225	SOIL SAMPLE REFERENCES
39/93		27 Sept 93	Near ASP 38; SW 9390 4868	P Woode/G Clark	Climatic Grade: 1	NAD/40
					Exposure Grade: N/A	

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	40	MCL	10YR44	14% (Dry sieve, >2 cm, 1%; Wet sieved >2mm, 13%) silty rock	None	None	-	Friable	Moderate	Many	Common V. Fine + Fine	None	Abrupt/ smooth
2	70	HCL	7.5YR4/4	38% (Dry sieve >2cm, 5% wet + sieve >2mm, 33%) silty rock	None	None	Too stoney	Friable	Few V. Fine	Many	Few V. Fine	None	Clear/ smooth
3	95	C	7.5YR6/4	10% >2cm 42% >2cm 52% silty rock (sieved)	None	None	Too stoney	Friable	Moderate	Many	V. Fer Fine	None	-

Profile Gleyed From: Not mottled

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

NL336i

Available Water Wheat: 112 mm

Potatoes: 105 mm

Moisture Deficit Wheat: 88 mm

Potatoes: 77 mm

Moisture Balance Wheat: 24 mm

Potatoes: 28 mm

Droughtiness Grade: 2 (Calculated to 95 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks:

SITE NAME		PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 1148 mm	PARENT MATERIAL	
Grampound		Pit 3	4° SE	PGR	ATO: 1579 day °C	Grampound Grit	
JOB NO.		DATE	GRID REFERENCE	DESCRIBED BY	FC Days: >225	SOIL SAMPLE REFERENCES	
39/93		30/9/93	Boring No 93: SW 9290 4830	Paul Barnett	Climatic Grade: 1	NAD/42 + NAD/43	
					Exposure Grade: N/A		

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size, Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	37	MCL	10YR/43	5% HR	None	None	-	-	-	>0.5%	Many Fine	None	Clear, smooth
2	80	MSZL	2.5Y/54	8% SSST	None	None	MCSAB	Friable	Moderate	>0.5%	Many Fine	None	Clear, smooth
3	80+	MSZL	2.5Y/52	40% SSST	None	None	Too stony to assess	Friable	Assumed Moderate	Fissures	Few Fine	None	-

Profile Gleyed From: None

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

NL336i

Available Water Wheat: 122 mm

Potatoes: 116 mm

Moisture Deficit Wheat: 88 mm

Potatoes: 77 mm

Moisture Balance Wheat: 34 mm

Potatoes: 39 mm

Droughtiness Grade: 1 (Calculated to 120 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Workability

Remarks:

Pit dug to 90 cm