

FCSC 4482

PENWITH DISTRICT PLAN: PENZANCE, NEWLYN, MADRON, MARAZION AND ST BURYAN

Agricultural Land Classification

Report of Survey

1. Summary

As part of MAFF's statutory input to the preparation of the Penwith District Plan, detailed Agricultural Land Classification (ALC) surveys were carried out around Penzance, Newlyn, Madron, Marazion and St Buryan in Cornwall.

A total of 250 hectares was surveyed around the five settlements to provide information on the type of land quality to be affected by future development. The areas surveyed in each case extend beyond the proposed District Council sites in order to help MAFF assess the knock-on effects of local development on adjacent agricultural land and to define areas of poorer land quality which MAFF might view as more suitable for development.

The attached ALC maps illustrate the distribution of land quality and the tables below provide the ALC statistics by grade for each area. An additional map is attached which breaks down the large Penzance-Newlyn survey area into smaller blocks of agricultural land, and the grades have been measured and described separately for these smaller areas - Newlyn-Tredavoe; land north of Stable Hobba Industrial Estate; Trereife Barton Area; Nancealverse - Castle Horneck Area; Higher Trannack-Ponsandane Area; Gulval-Heliport Area.

Fieldwork was carried out by the Resource Planning Group (South West Region) at a scale of 1:10,000 (ie approximately one soil observation per hectare). The information is also mapped at 1:10,000; it is accurate at this scale and any enlargement may be misleading. Previous MAFF ALC surveys carried out in 1990 at Madron, Higher Trannack and the Heliport have been incorporated into the ALC map and the statistics. All other previous ALC information for these areas is now superceded by the 1992 fieldwork.

Survey work has been carried out using MAFF's "Revised Guidelines and Criteria for Grading the Quality of Agricultural Land" (MAFF 1989). 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. A description of the general grades used in the ALC system is attached.

Soil workability and local exposure are the two key factors affecting the grading of land in this area. The maps reveal that minor areas of Grade 1 land occur at Nancealverse and near Trereife, with significant areas of Grade 2 land along the western and northern fringe of Penzance and at Madron, Marazion and St Buryan. The exposure risk is more significant at Newlyn, limiting much of the land here to Sub-grade 3A, whilst

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the areas of poorer quality land (Sub-grade 3B, Grade 4 and Grade 5) throughout the survey areas relate to locally steep gradients.

Distribution of Grades and Sub-grades: Newlyn-Tredavoe Area

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
1	0.8	1.7
3A	37.0	76.8
3B	9.8	20.3
4	0.6	1.2
Non Agric	2.8	-----
Urban	4.3	100% (48.2 ha)
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Total	55.3	

Distribution of Grades and Sub-grades: North of Stable Hobba Industrial Estate

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	5.3	35.6
3A	3.8	25.5
3B	4.5	30.2
4	1.3	8.7
Woodland	1.9	-----
Non Agric	1.3	100% (14.9 ha)
Urban	1.3	
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Total	19.4	

Distribution of Grades and Sub-grades: Trereife Barton Area

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
1	1.7	7.1
2	20.8	86.3
3A	1.0	4.1
3B	0.6	2.5
Non Agric	2.5	-----
Agric Bldgs	0.4	100% (24.1 ha)
Urban	3.9	
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Total	30.9	

Distribution of Grades and Sub-grades: Nancealverse-Castle Horneck Area

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
1	5.0	9.5
2	35.2	66.5
3A	1.1	2.1
3B	6.2	11.7
4	5.1	9.6
5	0.3	0.6
Woodland	3.7	-----
Non Agric	4.6	100% (52.9 ha)
Agric Bldgs	1.3	
Urban	9.3	
Not Surveyed	20.6	
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Total	92.4	

Distribution of Grades and Sub-grades: Higher Trannack-Ponsandane Area

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	14.1	43.0
3b	16.1	49.0
4	1.6	4.9
5	1.0	3.1
Urban	1.7	-----
Non Ag	0.6	100% (32.8 ha)
Farm Buildings	0.2	-----
Total	35.3	

Distribution of Grades and Sub-grades: Gulval-Heliport Area

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	17.3	70.6
3b	7.2	29.4
Urban	1.1	-----
Non Ag	0.3	100% (24.5 ha)
Total	25.9	

Distribution of Grades and Sub-grades: Madron

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	8.0	35.4
3a	14.6	64.6
Urban	3.3	-----
Total	25.9	100% (22.6 ha)

Distribution of Grades and Sub-grades: Marazion

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	31.9	68.5
3a	10.1	21.6
3b	4.1	8.8
4	0.5	1.1
Urban	4.5	-----
Non Ag	1.5	100% (46.6 ha)
Total	52.6	

Distribution of Grades and Sub-grades: St Buryan

<u>Grade</u>	<u>Area (ha)</u>	<u>% of Agricultural Area</u>
2	17.4	100%
Urban	2.1	
Non Ag	1.7	
Total	21.2	

## 2. Climate

The climatic criteria are considered first when classifying land as they may be overriding in the sense that severe climatic limitations will restrict land to low grades irrespective of favourable soil or site conditions.

A detailed estimate of the prevailing climate has been made for each survey area by interpolation from a 5 km grid dataset. The latter is held in LandIS, a computer-based land information system developed by the SSLRC and funded by MAFF.

The parameters used in assessing the impact of overall climate are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness).

Details of the 11 climatic interpolations are attached. These show that for all the areas, with the exception of Madron, there is no overall climatic limitation (ie the area is potentially Grade 1). At Madron, the combination of Accumulated Temperature and Average Annual Rainfall restricts the land to no better than Grade 2. The survey area at Madron is also above an important workability cut-off (+225 Field Capacity Days). In effect, this means that soils at Madron will be less flexible in terms of their workability than similar soils at Penzance and elsewhere below 225 FC days.

The local climatic factor of exposure (to strong winds and salt-laden winds) is an important factor throughout the survey areas. Only the minor areas of Grade 1 have sufficient shelter to be unaffected. The assessment of exposure risk is based on the local advice that ADAS horticultural officers would normally provide to farmers. Consultations have taken place at particular key sites, and the results of these have been extrapolated to similar locations.

The assessments have been made in relation to the range of crops that can be grown in most years, and this range has been related to the general description of the ALC grades. The suitability of the land for top fruit, raspberries, strawberries, lettuce, flowers, bulbs, runner beans, leeks, broccoli and polythene tunnels has been assessed. The majority of these crops would fall into the 'exposure sensitive' category with top fruit, raspberries, lettuce and runner beans particularly sensitive and leeks and broccoli less so.

Grade 2 land equates to 'slightly exposed'. Here, the majority of the above range is permitted with the exception of one or two of the more sensitive types.

Sub-grade 3A equates to 'exposed'. Here, the majority of the range is not permitted and the general land use is restricted to broccoli, bulbs, early potatoes, other field vegetables and grass.

CLIMATIC INTERPOLATIONS

	Penzance Survey Areas				
Grid Reference	SW 470316	SW 479312	SW 489317	SW 458308	SW 456282
Altitude (m)	58	18	15	75	105
Average Annual Rainfall (mm)	1102	1046	1025	1145	1120
Accumulated Temperature (° days)	1594	1640	1643	1576	1542
Field Capacity (days)	216	207	203	223	218
Moisture Deficit, Wheat (mm)	90	97	98	87	85
Moisture Deficit, Potatoes (mm)	79	88	89	76	74
Overall Climatic Grade	1	1	1	1	1

	Madron Survey Area		St Buryan Survey Area		Marazion Survey Area	
Grid Reference	SW 449321	SW 455318	SW 407252	SW 411260	SW 514312	SW 519311
Altitude (m)	132	100	95	124	5	61
Average Annual Rainfall (mm)	1179	1151	1077	1094	964	1013
Accumulated Temperature (° days)	1510	1547	1556	1522	1654	1590
Field Capacity (days)	229	224	210	213	192	199
Moisture Deficit, Wheat (m)	78	83	92	87	103	94
Moisture Deficit, Potatoes (mm)	64	71	81	75	96	86
Overall Climatic Grade	2	2	1	1	1	1

The field assessment takes account of the management of boundary vegetation to maintain or enhance shelter but does not attempt to assess the likely benefits that would arise if new boundaries or shelterbelts were planted in the future.

### 3. Agricultural Land Classification

#### 3.1 Newlyn-Tredavoe Area

Sub-grade 3A: Pit 5 is typical of the soils that occur on the crest slopes between Tredavoe and Newlyn. The soils themselves are potentially Grade 1, with no evident limitation (deep, well-drained Medium Sandy Silt Loams overlying Medium Clay Loam lower subsoils) but are downgraded on the basis of exposure. The site lies open to the effect of winds from the west and south west, with little topography to moderate the impact of the winds between the site and the coast. Boundary vegetation shows clear signs of wind pruning, and the site is not suitable for the long-term production of a wide range of sensitive horticultural crops.

An additional area of this grade has been identified on the floodplain in the north of the sub-area (which also affects part of the Stable Hobba land). Pits 1 and 6 describe these variable soils which, on balance, are placed in 3A. Pit 1 actually describes a Grade 1 profile although adjacent borings indicate distinct wetness problems and, at the time of survey, hollows in the field were holding water and supported sedge vegetation. Pit 6 represents the soils on the stream edge on the slightly higher land with very large subsoil stone contents which restrict the available water in the profile.

#### 3.2 North of Stable Hobba Industrial Estate

Land quality varies considerably throughout this area. The best land, Grade 2, is confined to the crest top and gentle south-west facing slopes that are found adjacent to the urban edge at Alverton. Pit 2 is typical of these soils. They experience a workability limitation which is related to the topsoil textures (Medium Clay Loams) and the prevailing field capacity level (+220 days). This restricts the period during which cultivations and trafficking by machinery and livestock can take place safely without causing soil structural damage.

The adjacent floodplain land experiences wetness limitations (described in the section above relating to Pits 1 and 6) which restrict the land to Sub-grade 3A. Areas of steeper slopes have been placed in Sub-grade 3B and Grade 4, where gradients are in the range 7-11° and 11-18° respectively.

#### 3.3 Treereife Barton

Grade 1: A small area of this grade picks out the lighter textured topsoils (Medium Sandy Silt Loams) which occur in a sheltered hollow. The deep and free-draining nature of the soils means that they do not experience a droughtiness or wetness limitation, and the light topsoil textures mean that

they do not experience the workability limitation of adjacent Medium Clay Loam topsoils.

Grade 2: Pit 2 is typical of these soils which experience a workability limitation and a slight exposure problem. The workability is related to the MCL topsoils at this high FCD level (+220 days). This part of the Penzance survey area does get slight protection from the topography at Newlyn-Tredavoe. Consequently, it is placed in a better exposure class, and should be able to support a wide range of horticultural crops.

Sub-grade 3A: A small area of this grade identifies soils that experience a significant wetness problem in clay subsoils (gleying, but no SPLs; Wetness Class II).

Sub-grade 3B: This represents an area where slopes are locally in the range 7-11°.

### 3.4 Nancealverse-Castle Horneck Area

This section contains the highest concentration of high quality agricultural land within the Penzance survey boundary. An area of Grade 1 at Nancealverse highlights light-textured soils which occur in an area of shelter. Mature tree plantings and other boundary vegetation provide adequate protection from the winds to the west and south-west. The soils are deep MSZLs overlying MCLs with no evidence of wetness, droughtiness or workability restrictions.

The extensive areas of Grade 2 land the majority ALC type, described earlier by Pit 2. Workability and exposure are both the limiting factors.

Sub-grade 3B land is either typified by Pit 4 soils, which experience a topsoil stoniness limitation (>15%), or occur where gradients are in the range 7-11°.

Grade 4 and 5 relate to sites with gradients of 11-18° and >18° respectively.

An area of "Disturbed Land" has been mapped adjacent to the Bypass. This section experienced soil removal, trafficking by heavy machinery, and some soil replacement during the construction of the road. This occurred within 5 years of the current survey and a sufficient period may not have elapsed for any amelioration of the damage to soil structure to have occurred. Anecdotal evidence from the farmer suggests that the area has lost part of its initial flexibility and that it is now difficult to manage due to the presence of a complicated wetness problem.

MAFF was refused access at the time of survey to a block of land around Lutherwearne Farm. This has been designated "Not Surveyed" on the ALC map.

### 3.5 Higher Trannack-Ponsandane Area

#### Grade 2

These soils are light textured (medium sandy loams) which are free draining. These soils experience no limitation themselves but their location on the higher land above Penzance means that the versatility of the land is reduced by risk of exposure, to the extent described in Section 2.

#### Sub-grade 3B, Grades 4 and 5

Much of this area has limiting gradients. Land over 7° is downgraded to sub-grade 3b, that over 11° to 4 and land with gradients over 18° are only suitable for grazing in the long term and so are classified as Grade 5.

### 3.6 Gulval-Heliport Area

#### Grade 2

These soils are described by Pit 8. The medium sandy loam topsoils provide excellent workability for this land, but the close proximity to the sea means that a full variety of crops, particularly sensitive horticultural crops cannot be grown. The risk from salt laden winds is too great. The soils are therefore downgraded to Grade 2. The soils are free draining and soil water availability provides no problem.

#### Sub-grade 3B

These soils suffer from restricted drainage. The extent of this is seen in Pit 7. The soil profile has medium clay loams to depth which are gleyed and slowly permeable from 32 cm. The soils must be assigned to Wetness Class IV. Combined with the local FCDs these soils can be graded no better than 3B.

### 3.7 Madron

#### Grade 2

These soils are light textured (Medium Sandy Silt Loams) but with the FCDs being greater than 225, these soils can be graded no better than Grade 2. The soils are free draining with few stones. The north east side of Madron is relatively protected from exposure risk.

#### Sub-grade 3A

This area has a greater workability limitation than described above because the topsoil texture is medium clay loam. The versatility of the land is restricted by the times when access can be made onto the soil without risk of damaging the soil structure. This side of the village shows evidence of exposure in the form of windpruned boundary vegetation. However the limitation imposed by exposure risk is no greater than the workability limitation.

### 3.8 Marazion

#### Grade 2

Workability is the main limitation here. The FCD level is lower than at Madron and so the medium clay loam soils can be Grade 2. The soils are slightly stoney with stone content at depth (70 cm) increasing to 25% . The survey area shows evidence exposure but within this area the risk is no greater than the workability limitation.

#### Sub-grade 3a

These soils are the same as in the Grade 2 area but the exposure risk is assessed to be greater. These areas are high up and open to the sea. The risks associated with cultivations here restrict the versatility of the land such that it is down graded.

#### Sub-grade 3a and Grade 4

These areas have limiting gradients, over 7° and 11° respectively. The versatility of the land is reduced because the range of machinery that can be safely used is restricted.

### 3.9 St Buryan

#### Grade 2

Here the main limitation is workability. Although the soils are borderline MCL/MSZL( 17% clay) they work as Medium Clay Loams. This topsoil texture is a free draining soil combined with the FCD level of 210 restricting the soils to Grade 2. The soils become stoney at depth. There is some evidence of exposure in the area but this is considered to be no greater a limitation to versatility than the workability limitation.