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**THORNY DOWN, FIRSDOWN,
NR SALISBURY
AGRICULTURAL LAND CLASSIFICATION
AND
SITE PHYSICAL CHARACTERISTICS**

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THORNY DOWN, FIRSDOWN, NR SALISBURY

**AGRICULTURAL LAND CLASSIFICATION
& SITE PHYSICAL CHARACTERISTICS**

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THORNY DOWN, FIRSDOWN, NR SALISBURY

AGRICULTURAL LAND CLASSIFICATION SURVEY

SUMMARY

The survey was carried out by ADAS on behalf of MAFF as part of its statutory role in response to an adhoc planning application for an extension to a landfill site at Thorny Down. The fieldwork at Thorny Down was completed in March 1995 at a scale of 1:10,000. Data on climate, soils, geology and previous ALC Surveys was used and is presented in the report. The distribution of grades is detailed below and illustrated on the accompanying ALC map. Information is correct at this scale but could be misleading if enlarged.

Distribution of ALC grades: Thorny Down

| Grade | Area (ha) | % of Survey Area | % of Agricultural Land |
|-------|------------|------------------|------------------------|
| 3a | 18.7 | 85.8 | 85.8 |
| 3b | <u>3.1</u> | <u>14.2</u> | <u>14.2</u> |
| TOTAL | 21.8 | 100.0 | 100.0 |

Most of the site is Subgrade 3a. Soils across the entire site comprise silty loam topsoils over chalk rock at a shallow depth and experience a moderate drought limitation. An area of 3b occurs on the previously worked land where only 20 cm topsoil has been replaced over chalk.

1. INTRODUCTION

An Agricultural Land Classification (ALC) Survey was carried out in March 1995 at Thorny Down, near Salisbury on behalf of MAFF as part of its statutory role in response to an application for an extension to the landfill site at Thorny Down. The fieldwork covering 21.8 ha of land was conducted by ADAS at a scale of 1:10,000 (approximately one boring per hectare of agricultural land). A total of 20 auger borings were examined and 2 soil profile pits used to assess subsoil conditions.

The published provisional one inch to the mile ALC map of this area (MAFF 1974) shows the grades of the site at a reconnaissance scale to be all non-agricultural land.

The recent survey supersedes this map having been carried out at a more detailed level and using the Revised Guidelines and Criteria for grading the quality of agricultural land (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.

2. 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 a lower grade despite other favourable conditions.

Estimates of climatic variables were interpolated from the published agricultural climate dataset (Meteorological Office 1989). The parameters used for assessing overall 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 there is no overall climatic limitation.

Table 1: Climatic Interpolations: Thorny Down

| | |
|---------------------------------|------------|
| Grid Reference | SU 211 342 |
| Altitude (m) | 130 |
| Accumulated Temperature (day °) | 1403 |
| Average Annual Rainfall (mm) | 771 |
| Overall Climatic Grade | 1 |
| Field Capacity Days | 169 |
| Moisture deficit (mm): | |
| Wheat | 101 |
| Potatoes | 92 |

Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat and potatoes are also shown. These data are used in assessing the soil wetness and droughtiness limitations referred to in later sections.

3. RELIEF AND LANDCOVER

The site occupies a gently sloping coombe which is used for arable crops. The restored valley floor area was in set-aside at the time of survey. The new level of 120 m AOD is the lowest point on the site, with land rising to 145 m AOD on the western edge.

4. GEOLOGY AND SOILS

The geology of the site is shown on the published 1:50,000 scale drift geology map. (Institute of Geological Sciences 1976). This map shows the whole area to be underlain by upper chalk.

The soils were mapped by the Soil Survey of England and Wales in 1983 at a reconnaissance. This map shows the area to comprise Andover 1 Association. These soils are described as shallow well drained calcareous silty soils over chalk on slopes and crests with deeper soils in valley bottoms.

The recent survey found similar soils to the mapped association. Topsoils across the whole site were slightly stony silty loams of variable depth. A shallow silty loam upper subsoil with approximately 40% chalk rock occurs across most of the site although this varies with relief. Towards the valley floor deeper less chalky upper subsoils were found to extend to a depth of approximately 50 cm.

5. AGRICULTURAL LAND CLASSIFICATION

The distribution of ALC grades is shown in Table 2 and on the accompanying ALC map. The information could be misleading if shown at a larger scale.

Table 2: Distribution of ALC grades: Thorny Down

| Grade | Area (ha) | % of Survey Area | % of Agricultural Land |
|-------|------------|------------------|------------------------|
| 3a | 18.7 | 85.8 | 85.8 |
| 3b | <u>3.1</u> | <u>14.2</u> | <u>14.2</u> |
| TOTAL | 21.8 | 100.0 | 100.0 |

Subgrade 3a

Over three quarters of the site is good quality agricultural land. The shallow soils over chalk impose a drought limitation because of the limited depth of soil matrix holding moisture for crop growth. Some profiles are slightly deeper and less droughty but occupy an insufficient area to warrant a Grade 2 map unit.

Subgrade 3b

The area of previous tipping and restoration has been graded moderate quality land. These soils have less topsoil than elsewhere and no distinguishable upper subsoil. Therefore this area experience a greater drought restriction and a soil depth limitation. The chalk matrix exhibits bluish colours and foul smells at depth indicating gas induced anaerobism. Such gas emissions from landfill effect plant growth imposing a chemical limitation on the use of this land.

6. SOIL RESOURCES

Table 3 Topsoil Resources: Thorny Down

| Unit | Av. depth cm | Area ha | Texture | Stone % | Volume m ³ |
|------|--------------|---------|---------|---------|-----------------------|
| A | 30 | 18.7 | ZL | 15 | 561,000 |
| B | 20 | 3.1 | ZL | 15 | <u>62,000</u> |
| | | | | | 623,000 |

Topsoil

The topsoils across the site can be treated as one unit although there are slight depth variations, noticeably only 20 cm on the restored land (**Unit B**). The silty loam topsoil occurs to an average depth of 30 cm in **Unit A**. The structure is weakly developed medium and fine subangular blocky which is friable and well rooted. The stone content varies across the site ranging from approximately 8% chalk to 15% chalk with smaller amounts (2-5%) of flints. A total topsoil resource of 623,000 m³ is available across the site.

Subsoils

Table 4 Subsoil Resources: Thorny Down

| Unit | Av. depth cm | Area ha | Texture | Stone % | Volume m ³ |
|------|--------------|---------|---------|---------|-----------------------|
| A | 30-40 cm | 18.7 | ZL | 12-35 | 187,000 |
| A | 40-80 cm | 18.7 | Chalk | - | 748,000 |
| B | 20-80 cm | 3.1 | Chalk | - | 186,000 |

Unit A has a variable silty loam horizon to a maximum depth of 50 cm on the lower slopes of the coombe but on average extends to 40 cm depth. This horizon should be stripped and stored separately to the chalk matrix below. The silty loam horizon has a moderately developed medium and fine subangular blocky structure which is friable has good pores and common roots. The chalk stone content varies between 12-35%. A total upper subsoil resource of 187,000 m³ is available for restoration.

Below an average depth of 40 cm chalk rock occurs. Roots were observed to be penetrating this to a depth of 60 cm however if land of similar quality is to be restored then it would be preferable that at least 40 cm of chalk is retained as a lower subsoil matrix. A total resource of 748,000 m³ of chalk matrix should be stripped and stored in this unit.

Unit B has only one subsoil horizon comprising chalk matrix to a depth of approximately 80 cm. This horizon can be treated as one unit and retained as a lower subsoil matrix. A further 186,000 m³ of chalk matrix should be stored from **Unit B**.

Resource Planning Team
Taunton Statutory Unit
March 1995

APPENDIX 1

REFERENCES

INSTITUTE OF GEOLOGICAL SCIENCES (1976) Drift Edition, Sheet 298, Salisbury

MAFF (1974) Agricultural Land Classification Map, Sheet 167, Provisional 1:63,360 scale.

MAFF (1988) Agricultural Land Classification of England and Wales (Revised Guidelines and Criteria for grading the quality of agricultural land), Alnwick.

METEOROLOGICAL OFFICE (1989) Climatological Data for Agricultural Land Classification.

SOIL SURVEY OF ENGLAND AND WALES (1983) Sheet 5, Soils of South West England, 1:250,000 scale.

APPENDIX 2

DESCRIPTION OF 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 landcover 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).

THORNY DOWN, FIRSDOWN, SALISBURY

SOIL RESOURCE SCHEDULE

| Unit | Horizon | Av. depth cm | Area ha | Texture | Stone % | Volume m ³ |
|------|-----------|--------------|---------|---------|---------|-----------------------|
| A | Topsoil | 0-30 cm | 18.7 | ZL | 15 | 561,000 |
| A | Subsoil 1 | 30-40 cm | 18.7 | ZL | 12-35 | 187,000 |
| A | Subsoil 2 | 40-80 cm | 18.7 | Chalk | - | 748,000 |
| B | Topsoil | 0-20 cm | 3.1 | ZL | 15 | 62,000 |
| B | Subsoil | 20-80 cm | 3.1 | Chalk | - | 186,000 |

| | | | | | | |
|--------------------------|--|----------------------|------------------------------------|---------------------|---|-----------------------------------|
| SITE NAME Thorny Down | | PROFILE NO. Pit 1 | SLOPE AND ASPECT 3° N | LAND USE Plough | Av Rainfall: 771 mm ATO: 1403 day °C FC Days: 168 Climatic Grade: 1 Exposure Grade: 1 | PARENT MATERIAL Upper Chalk |
| JOB NO. 20/95 | | DATE 14/8/95 | GRID REFERENCE ASP 14 SU 343207 | DESCRIBED BY NAD | | SOIL SAMPLE REFERENCES NAD 212 |

| 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 | 23 | ZL | 10YR43 | 5% HR >2cm 5% ch >2cm 10% <2cm ch 20% Total | - | None | WDMSAB | Friable | M | Good | Common fine | Yes | Clear/smooth |
| 2 | 35 | ZL | 10YR44 | 35% Chalk S+D | - | None | MDMSAB | Friable | Good | Good | Common fine | Yes | Clear/wavy |
| 3 | 90+ | Chalk | White 2.5Y80 | Chalk | - | None | All chalk | - | - | Well fissured | Few fine obs to 60 cm | Yes | |

Profile Gleyed From: -
Depth to Slowly Permeable Horizon: -
Wetness Class: 1
Wetness Grade: 1

Available Water Wheat: 91 mm
Potatoes: 94 mm
Moisture Deficit Wheat: 101 mm
Potatoes: 92 mm
Moisture Balance Wheat: -10 mm
Potatoes: 2 mm
Droughtiness Grade: 3a (Calculated to 60 cm)

Final ALC Grade: 3a
Main Limiting Factor(s): Drought

Remarks:

NL3361

| | | | | | | | |
|--------------------------|--|----------------------|--|---------------------------|--|-----------------------------------|--|
| SITE NAME Thorny Down | | PROFILE NO. Pit 2 | SLOPE AND ASPECT 3° S bottom of shallow dip | LAND USE Winter Barley | Av Rainfall: 771 mm ATO: 1403 day °C | PARENT MATERIAL Upper Chalk | |
| JOB NO. 20/95 | | DATE 15/3/95 | GRID REFERENCE ASP 7 SU 344 210 | DESCRIBED BY N A Done | FC Days: 169 Climatic Grade: 1 Exposure Grade: 1 | SOIL SAMPLE REFERENCES NAD 213 | |

| 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 | 35 | ZL | 10YR34 | 2% HR >2cm 8% Chalk <2cm | - | - | MDM+FSAB | Fraible | M | Good | Many fine | Yes | Gradual/ smooth |
| 2 | 50 | ZL | 10YR44+46 | 3% HR 12% Chalk | - | - | MDM+FSAB | Friable | G | Good | Many fine | Yes | Sharp/ irregular |
| 3 | 80+ | Chalk | 25Y63 | - | - | - | - | - | M | Good | None obs | Yes | |

Profile Gleyed From: -

Depth to Slowly Permeable Horizon: -

Wetness Class: 1

Wetness Grade: 1

NL3361

Available Water Wheat: 109 mm

Potatoes: 109 mm

Moisture Deficit Wheat: 101 mm

Potatoes: 92 mm

Moisture Balance Wheat: 8 mm

Potatoes: 17 mm

Droughtiness Grade: 2 (Calculated to 50 cm)

Final ALC Grade: 2a

Main Limiting Factor(s): Drought

Remarks:

Drought grade calculated on depth of rootable materia.