8FCS 4467

3/91

# GREAT LEMHILL FARM, LECHLADE, GLOUCESTERSHIRE

## GOLF COURSE APPLICATION

### Land Quality

In February 1991, a detailed Agricultural Land Classification (ALC) survey was carried out on two agricultural blocks around Great Lemhill Farm, near Lechlade in Gloucestershire. A total of 22 hectares was surveyed, with a soil observation approximately every 100 metres; three soil pits were examined to enable subsoil structural conditions and stone contents to be described in detail.

The surrounding land was affected by a golf course application, and the two areas surveyed were proposed on sites for the clubhouse and a village development. An ALC assessment had been submitted with the application which indicated Grade 2 and Sub-grade 3A on both these sites affected by hard development.

MAFF's ALC results broadly confirm the consultant's findings; similar soil types have been identified, producing similar gradings. The area is composed of grades 2 and 3A but slightly different boundaries mean a difference in the detailed distribution of the grades. MAFF has also identified some non-agricultural land and urban categories omitted by the consultant.

| Grade | Area (ha) | % of Area |
|---|---|---|
| 3A | 11.2 | 54.9 |
| 2 | 7.5 | 36.8 |
| Non-Agric | 0.4 | 2.0 |
| Agric Bldgs | 1.3 | 6.3 |
| | 20.4 ha | 100% |

### Eastern Block

Grade 2: These soils experience workability as the single most limiting factor. Typically, they are deep, stone-free, calcareous medium silty clay loams that exhibit evidence of gleying at shallow depths. They fall into Wetness Class II (ie they are wet within 70 cm for more than 30 days in most years) and, with the prevailing Field Capacity Day value of 154 days, are limited to Grade 2. Soil Pit III is typical of these soils.

Sub-grade 3A: Pit II describes those soils that experience a significant droughtiness limitation. This is related to the presence of sandy subsoils with high stone contents (50%). Root penetration is possible to depth but the total available water in the profile limits these soils to 3A. Evidence of deep gleying suggests a groundwater problem, but the soils have been placed in Wetness Class I.

Western Block

Grade 2: These soils are in the same mapping unit as the grade 2 soils in the western block.

Sub-grade 3A: Pit I describes these soils. The most limiting factor is soil wetness. There is a slowly permeable layer occurring at varying depths below 40 cm, with gleying occurring within but not above the SPL. This leads to a wetness class of 3 (ie they are wet within 70 cm for 91-180 days most years), which in conjunction with the field capacity days value of 154 days, leads to an ALC grade of 3A. The soils are stone-free with a medium clay loam topsoil overlying a clay subsoil.

# DESCRIPTION OF THE GRADES AND SUBGRADES

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. In practice, the grades are defined by reference to physical characteristics and the grading guidance and cut-offs for limitation factors in Section 3 enable land to be ranked in accordance with these general descriptions. The most productive and flexible land falls into Grades 1 and 2 and Subgrade 3a and collectively comprises about one-third of the agricultural land in England and Wales. About half the land is of moderate quality in Subgrade 3b or poor quality in Grade 4. Although less significant on a national scale such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in Grade 5, which mostly occurs in the uplands.

Descriptions are also given of other land categories which may be used on ALC maps.

### 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 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 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 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: golf courses, private parkland, 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.

### Woodland

Includes commercial and non-commercial woodland. A distinction may be made as necessary between farm and non-farm woodland.

### 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.

## SOIL PROFILE DESCRIPTIONS: EXPLANATORY NOTE

### (i) TEXTURE:-

Soil texture classes are denoted by the following abbreviations (all Upper case*):

| | |
|---|---|
| **S** | Sand |
| **LS** | Loamy Sand |
| **SL** | Sandy Loam |
| **SZL** | Sand Silt Loam |
| **ZL** | Silt Loam |
| **MZCL** | Medium Silty Clay Loam |
| **MCL** | Medium Clay Loam |
| **SCL** | Sandy Clay Loam |
| **HZCL** | Heavy Silty Clay Loam |
| **HCL** | Heavy Clay Loam |
| **SC** | Sandy Clay |
| **ZC** | Silty Clay |
| **C** | Clay |

For the sand, loamy sand, sandy loam and sandy silt loam classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

| | |
|---|---|
| **F** | fine (more than $\frac{2}{3}$ of sand less than 0.2 mm) |
| **C** | coarse (more than $\frac{1}{3}$ of sand greater than 0.6 mm) |
| **M** | medium (less than $\frac{2}{3}$ fine sand and less than $\frac{1}{3}$ coarse sand) |

The sub-divisions of clay loam and silty clay loam classes according to clay content are indicated as follows:-

| | |
|---|---|
| **M** | medium (less than 27% clay): |
| **H** | heavy (27-35% clay) |

Other possible texture classes include:

| | |
|---|---|
| **P** | Peat |
| **SP** | Sandy Peat |
| **LP** | Loamy Peat |
| **PL** | Peaty Loam |
| **PS** | Peaty Sand |
| **MZ** | Marine Light Silts |

* There are two exceptions to the Upper Case rule:-

- The prefix "**Calc**" is used to identify naturally calcareous soils containing more than 1% Calcium Carbonate
- For organic mineral soils, the texture of the mineral fraction is prefixed by "**Org**".

**(ii) STRUCTURE:-**

Nature and size of structural units are denoted by the following abbreviations:

| | |
|---|---|
| **SAB** | Subangular Blocky |
| **AB** | Angular Blocky |
| **P** | Prismatic |
| | (single grain, granular and platy are not abbreviated) |
| **F** | Fine |
| **M** | Medium |
| **C** | Coarse |
| **VC** | Very Coarse |

eg Weak **MSAB** = Weakly developed medium subangular blocky

**(iii) OTHER**

| | | | |
|---|---|---|---|
| **f** | = few | = | less than 2% of the matrix or surface described |
| **c** | = commom | = | 2-20% of the matrix or surface described |
| **m** | = many | = | 20-40% of the matrix or surface described |
| **vm** | = very many | = | +40% of the matrix or surface described |
| **f** | = faint | = | indistinct mottles, evident only on close examination |
| **d** | = disinct | = | although not striking, the mottles are readily seen |
| **p** | = prominent | = | the mottles are conspicuous, and the mottling is one of the outstanding features of the horizon |
| **gm** | = grey mottling | | |
| **om** | = ochreous mottling | | |

eg ***cdom*** = *common distinct ochreous mottles*

| | |
|---|---|
| **ppf** = | pale ped faces |
| **mn** = | manganese |
| **st** = | stones 6 cm |
| **sst** = | stones 2-6 cm |
| **vsst=** | stones 2 cm |
| **WC** = | Wetness Class (use Roman numerals, eg WC IV) |
| **SPL** = | Slowly Permeable Layer |
| **WT** = | Water Table |
| **I** = | Impenetrable if used in Depth Column |
| **IMP** = | Impenetrable if used in soil profile notes |

(**IMP 2 x 40 cm** = 2 additional borings, both impenetrable at 40 cm)

**ASP** = Auger Sample Point

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | Av Rainfall :- 703 m | PARENT MATERIAL |
|---|---|---|---|---|---|
| Great Lemhill Golf Course Gloucs | 1 | Flat | Winter Cereal | ATO :- 1425° days<br>FC Days :- 154 days<br>Climatic grade:- 1 | |
| | DATE: 12/2/91 | GRID REFERENCE: SP 206019 | | | |

| Horizon Number | Lowest Av Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Top | 27 | 10YR43 | MCL | - | - | Medium, weak subangular blocky | > 0.5% | - | Friable | | - | - | Distinct smooth |
| Sub 1 | 41 | 2.5Y54 | C | - | - | Medium, Moderate angular blocky | > 0.5% | Moderate | Firm | | - | - | Distinct smooth |
| Sub 2 | 70+ | 2.5Y52 | C | - | common, distinct, ochreous - 10YR56 | Coarse, Moderate angular blocky | < 0.5% | Poor | Firm | | - | - | - |

Depth to Slowly Permeable Horizon :- 41 c

Wetness Class :- 3

Wetness Grade :- 3

RPG-0023/WJC

Available Water Wheat :-

Potatoes :-

Moisture Deficit Wheat :-

Potatoes :-

Moisture Balance Wheat :-

Potatoes :-

Droughtiness Grade :- 1

Final ALC Grade :- 3a

Main Limiting Factor(s) :- Wetness

Remarks :- This pit is borderline 3a/3b. However, it represents the wettest auger boring site, so the mapping unit is 3a.

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Great Lemhill Golf Course Gloucs | 2 | Flat | Winter Cereal | Av Rainfall :- 703 mm<br>ATO :-1425° days<br>FC Days :- 154<br>Climatic grade:- 1 | River Alluvium |
| | DATE: 12/2/91 | GRID REFERENCE: SP 213017 | | | |

| Horizon Number | Lowest Av Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topsoil | 0-25 | 10YR33 | MCL | 2% vsst; hard, visual | None | - | + 0.5% | - | - | | | | |
| Sub 1 | 25-40 | 10YR53 | MCL | 50% vsst;hard; water displacement | None | | + 0.5% | Moderate | | | | | |
| Sub 2 | 40-65 | 10YR74 | LMS | 53% vsst;hard water displacement | None | Weak massive | + 0.5% | Moderate | Friable | | | | |
| Sub 3 | 65-120+ | 10YR74 | LMS | 50% vsst;hard water displacement | Ochreous bands | Weak massive | + 0.5% | Moderate | Friable | | | | |

Depth to Slowly Permeable Horizon :- None present
Gleyed from 65 cm

Wetness Class :- I

Wetness Grade :- 1

RPG-0023/WJC

Available Water Wheat :- 79 mm
Potatoes :- 68 mm

Moisture Deficit Wheat :- 103 mm
Potatoes :- 94 mm

Moisture Balance Wheat :- -24 mm
Potatoes :- -26 mm

Droughtiness Grade :- 3B

Final ALC Grade :- 3B

Main Limiting Factor(s) :- Droughtiness

Remarks :- At the pit, the auger could not penetrate below 40 cm; nearby borings permitted deeper penetration and suggest lower stone contents. The pit (which is 3A/B borderline) is placed into a 3A map unit.

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Great Lemhill Golf Course Gloucs | 3 | Flat | Winter Cereal | Av Rainfall :- 703 mm<br>ATO :- 1425° days<br>FC Days :- 154<br>Climatic grade:- 1 | River Alluvium |
| | DATE: 12/2/91 | GRID REFERENCE: SP 214018 | | | |

| Horizon Number | Lowest Av Depth | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topsoil | 0-25 | 10YR53 | MCL | Negligible | None | | | | | | | | |
| Sub 1 | 25-38 | 10YR72 | MZCL | None | None | Weak CSAB | + 0.5% | Moderate | Friable | | Yes | | |
| Sub 2 | 38-75 | 10YR81 | MZCL | None | cdom | Weak CSAB | + 0.5% | Moderate | Friable | | Yes | | |
| Sub 3 | 75-120+ | 2.5Y62 | HCL | 5% vsst;hard, visual | cdogm | Weak MSAB | + 0.5% | Moderate | Friable | | Yes | | |

Depth to Slowly Permeable Horizon :- None present
Gleyed from 38 cm

Wetness Class :- II

Wetness Grade :- 2

RPG-0023/WJC

Available Water Wheat :- 155 mm
Potatoes :- 122 mm

Moisture Deficit Wheat :- 103 mm
Potatoes :- 94 mm

Moisture Balance Wheat :- +52 mm
Potatoes :- +28 mm

Droughtiness Grade :- 1

Final ALC Grade :- 2

Main Limiting Factor(s) :- Wetness

Remarks :-