LAND CLASSIFICATION AND SOIL PHYSICAL CHARACTERISTICS REPORT FOR LAND COVERED BY THE PROPOSED SAND AND GRAVEL SITE AT BEECH

1. Introduction

A Land Classification and Soil Physical Characteristics Survey of approximately 103 ha of land to the east of the M6 near Stone, was carried out in July and August 1991, using the guidelines contained in the Ministry of Agriculture Fisheries and Food Publication 'Agricultural Land Classification of England and Wales - Revised Guidelines and Criteria for Grading the Quality of Agricultural Land'.

The survey was undertaken using a hand held 5cm Dutch auger. The land was augered at 100m grid intersections to a depth of at least 100cm or to an impenetrable layer if closer to the surface, to give a density of 1 boring per ha. Additional profiles were augered as necessary to determine land classification and soil unit boundaries.

The land is underlain by Permian and Triassic deposits and is mapped as Grades 2, 3a and 3b. One soil unit has been identified covering all the site.

2. Site Details and Limitations

2.1 Climatic Limitation

The main parameters used in the assessment of the climatic limitation are average annual rainfall, as a measure of overall wetness; and accumulated temperature, as a measure of the relative warmth of the locality. Accumulated temperature is the excess of daily air temperatures above a select threshold (for ALC purposes this is taken to be 0°C). The site receives an average annual rainfall of approximately 809mm and has an accumulated temperature (January to June) of 1263°C. This combination of

accumulated temperature and rainfall limits the area to Grade 2, the land being too moist and cool for a higher grade.

2.2 Location and Site Limitations

The land lies to the east of Beech between Harley Thorns Wood in the north and Cliffords Wood in the South. The site is bordered by Harley Thorns Lane and the A519 in the east. By woods and agricultural land in the north and south and by agricultural land in the west.

The land lies at an altitude of about 160m in the West, rising to 210m along the eastern boundary. Most of the site has a south west aspect.

Slopes of 2 to 5 degrees are typical on most of the site and gradient is generally a neutral factor in the classification of the land. South of Harley Thorn Wood gradients of 8 or 9 degrees limit the land to Sub-grade 3b.

2.3 Geology and Soil Limitations

The area is underlain by Permian and Triassic sandstones which in places are overlain by a sandy stony drift. In small areas a red marl occurs within the generally sandy subsoil. The resulting soils typically have a sandy loam or sandy clay loam topsoil to 30 or 40cm which is underlain by similar textured subsoil. Most of the soils are at least slightly stony in the topsoil and moderately stony in the subsoil. In many areas stones larger than 2cm account for 10 to 15% of the topsoil, limiting the land to Sub-grade 3a and in small areas stone contents in excess of 15% limit land to Sub-grade 3b. The high subsoil stone content of some soils has made them prone to drought in dry years.

In areas where clay loam or clay occurs within 80cm a slowly permeable layer causes seasonal wetness. These soils show signs of impeded drainage and typically fall into wetness class III or IV. Their distribution is very limited.

2.4 Interactive limitations

The physical limitations which result from inter-actions between climate, site and soil are soil wetness, droughtiness and erosion. Soil wetness expresses the extent to which excess water imposes restrictions on crop growth and cultivations, whilst drougtiness indicates the degree to which a shortage of soil water influences the range of crops which may be grown and the level of yield which may be achieved.

On this site soil wetness is only a limiting factor where clay loam and clay subsoils occur. For land classification purposes soil wetness assessment takes account of:-

1. The climatic regime (expressed as median field capacity days).

2. The soil wetness regime (expressed as soil wetness classes).

3. The texture of the top 25cm of soil.

This area is at field capacity for 194 to 197 days. Despite the relatively high field capacity day range most of the soils fall into wetness class I or II because generally they are not gleyed and do not have a slowly permeable layer.

Soil droughtiness is a limiting factor in small areas where high subsoil stone contents reduce the amount of water available to plants. The susceptibility to drought is determined by the difference between the amount of water the

soils can hold (available water capacity) AWC) and the median moisture deficit (MD) which has developed by the end of the critical part of the growing season. The moisture balance (MB) that is the difference between these two figures, indicates the susceptibility to drought of soils in a given area. In this area the median MD for wheat is about 75mm and for potatoes is about 60mm.

2.5 Land Use

The majority of the site supports wheat, potatoes and grass.

3. Agricultural Land Classification

Land quality ranges from Grade 2 to Sub-grade 3b.

3.1 *Grade 2*

Land in this grade is found mainly to the south of Harley Thorn House and to the south of the Sheepcotes. It accounts for 16.6 ha and 16.1% of the area. The soils typically have either a sandy silt loam, sandy loam or sandy clay loam texture overlying further depths of sandy loam, loamy sand, sandy clay loam or sand. These soils fall into wetness class I or II and some soils which are eligible for Grade 1 have been downgraded due to the climatic limitation.

3.2 Grade 3

This grade is sub-divided into Sub-grade 3a and 3b.

3.2.1 Sub-grade 3a

This land is widespread over the site accounting for 76.2 ha and 73.8% of the site. The soils typically either have a sandy silt loam, sandy loam or sandy clay loam texture overlying sandy clay loam, sandy

loam, loamy sand or sand. The topsoil stone content is the main limiting factor to the agricultural use of this land and excludes it from Grade 2. An undulating area with a valley feature to the north of Old Waste Plantation has soils of Grade 2 quality, but is down-graded to Sub-grade 3a on micro-relief limitation.

3.2.2 Sub-grade 3b

This grade accounts for 10.3 ha and 10% of area. It is found close to Harley Thorn Lane and the A519 road where the topsoil stone content is a limiting factor to the agricultural use of the land. The soils typically have a sandy loam texture with a topsoil stone content exceeding 15%.

To the south west of Harley Thorn House a small area has been classified as Sub-grade 3b, where the slope exceeds 7° and is a limiting factor.

A further small area of land is also classified as Sub-grade 3b where soil wetness is a limitation. Observations of gleying and the depth of the slowly permeable layer indicate wetness class IV, which in combination with the topsoil texture and field capacity day figure results in a classification of Sub-grade 3B.

3.3 Summary of Land Classifications

Grade	Area (ha)	%
2	16.6	16.1
3a	76.2	73.8
3b	10.3	10.0
Water	0.1	0.1
	103.2	100.0

4. Soil Resources

4.1 Unit 1

One soil unit is identified covering the whole site. The topsoil texture is variable and typically includes sandy silt loam, sandy loam and medium clay loam with depths of between 30 and 40 cm. The topsoil textures, although in different textural classes typically have a clay content shown by particle size analysis to be within a range of 5%. Below this an upper subsoil of either sandy loam, loamy sand, or sandy clay loam to depths of between 50 and 70 cms and then a lower subsoil of sandy clay loam or sand to 100 cms. Within the soil unit there are small areas where clay is present at depth. Where possible the clay should be handled and stored separately from lighter textured sub-soils.

Several soil pits were dug on the site to examine the physical characteristics of structure. Typically the topsoil has a weakly or moderately developed fine or medium sub angular blocky structure overlying a weakly developed medium or coarse sub angular blocky subsoil structure. Topsoil stone content ranges from 2% up to about 17% with subsoil stone content of up to 30% in places. Many plant roots are present in the top 55 cm with fewer below this depth.

4.2 Summary of soils

Unit	depth(cm)	texture	stones
1	0 - 30	SL	5 - 17%
	30 - 60	LS - SCL	5 - 30%
	60 - 100	S - C	0 - 20%