

## PHYSICAL CHARACTERISTICS REPORT FOR LAND AT WEEFORD QUARRY

An Agricultural Land Classification of approximately 36 hectares of land to the south of the existing quarry at Weeford, was carried out in November 1989.

The survey was undertaken using a 5cm Dutch auger. The soils were augered at 100 metres grid intersections to a depth of 100cm, or to an impenetrable layer if closer to the surface. Additional profiles were augered and pits dug as necessary, to give a density of one observation per 0.89 hectares.

The agricultural land is mapped as Sub grade 3b and the wood non-agricultural. Two main soil units have been identified.

### 1. Land Use

The majority of the agricultural land was fallow after potatoes and barley. Grass was grown in the east. The southern part of the site was covered by mature coniferous woodland.

### 2. Site Details and Limitations

#### 2.1 Climatic limitations

The site receives an average annual rainfall of 716mm (approximately 28 inches) and has an accumulated temperature (January to June) of 1309 degrees. This combination of rainfall and accumulated temperature puts the site on the climatic border between grades 1 and 2.

#### 2.2 Location and site limitations

The site lies south of Weeford to the east of the A38, south of and adjacent to the existing quarry. The land lies on the crest of a hill at about 150 metres (494 feet). Most of the site slopes very gently to the west but moderate slopes fall to the north west corner of the site and to the north eastern boundary. Only in these small areas does gradient affect the use of precision agricultural equipment. The moderate slopes could not be graded higher than sub grade 3b but most of the site is not limited by gradient.

#### 2.3 Geology and Soil Limitations

The area is underlain by Bunter Sandstone and Pebble Beds on which stony, sandy soils have developed.

Surface horizons are typically stony, loamy sand or sandy loam which contain 15-20% of rounded quartzite pebbles larger than 2cm. The stones affect the use of precision equipment and cause extra wear and tear on machinery. They limit the classification of the land to Sub grade 3b. In the extreme north west and east, topsoil stones greater than 2cm account for up to 30% of the soil volume. The soils become more stony and sandy below 30cm and stones often account for at least 30% of the soil profile. In places

iron pans or weathering sandstone limit the rooting depth to about 60cm, whilst in other areas sand and gravel occurs to at least 120cm.

In the wood a 5-10cm litter and humus layer has built up. The soil profile shows evidence of podzol features in the form of a leached sand horizon below the humus layer, and an iron stained organic rich deposition horizon at depths of about 35cm. Below this depth the soils are similar to the ones in agricultural use.

The soils have no slowly permeable layer and are free draining, falling into Wetness Class I.

#### 2.4 Interactive limitations

Soil wetness and droughtiness are affected by the interactions between climate, site and soil. This land is free draining and wetness is not a problem. Droughtiness is however a serious limitation to the use of the land because the soils are sandy and stony. The susceptibility to drought is determined by the difference between the amount of water the soil can hold in the profile (AP) typically 50-70mm for wheat and 50-60mm for potatoes on this site, and the medium moisture deficit (MD) which has developed by the end of the critical part of the growing season. The MD on this site is 91mm for wheat and 77mm for potatoes. The moisture balance (the difference between these two figures) indicates the susceptibility to drought of soils for a given area.

Erosion is not a problem on this site, except on the moderately sloping areas. No further down grading is warranted.

### 3. Agricultural Land Classification

The area is mapped as sub-grade 3b and non agriculture.

#### 3.1 Sub grade 3b

This grade accounts for 100% of the agricultural area and 46.2% of the site. It is mapped over 16.5 hectares of land. The soils are mapped as Sub grade 3b because of the moderately high stone content in the top 25cm. Typically soils have 15-25% of stones larger than 2cm. The moisture balance of these soils is between -20 and -50mm for wheat and -10 to -55mm for potatoes. The sandy soils are therefore prone to drought in most years and yields will be reduced. An iron pan and sandstone reduce the rooting depth in some areas to about 60cm.

Isolated areas of sub grade 3a occur on site where soils which have less than 15% of stones greater than 2cm in the top 25cm have deeper loamy sand or sandy loam topsoils, which hold slightly higher reserves of water in the profile. These areas could not be mapped separately.

### 3.2 Non agricultural

This classification is placed over 19.2 hectares and 53.8% of the site. It is mapped to include a mature coniferous wood.

## 4. Soil Resources

All the soils are sandy and stony but separate units have been identified.

### 4.1 Unit 1

This unit is mapped over the majority of the site. Typically 30cm of very dark brown (10YR 2/2) loamy sand overlies brown (7.5YR 4/4) to strong brown (7.5YR 5/6) loamy sand and occasionally sand. Strong brown to yellow red (7.5YR 5/8 to 6/6) sand occurs below about 55cm. In some areas black (5YR 2.5/1) iron cementing occurs in this horizon, forming an impenetrable sandstone layer. The soil structure is moderately porous, weakly formed, medium to coarse subangular blocky in the topsoil, and very weak, coarse subangular blocky to single grain between 30 and 55cm. Most of the soils are loose to very friable and very porous. Below 55cm structure varies from massive to a very firm consistency in areas of iron cementing and sandstone, to single grain with a loose consistency elsewhere.

The top 25cm is moderately stony and usually contains 20-30% of stones greater than 5mm, of which 15-20% are between 2 and 6cm long. Subsoil stones account for up to 40% of the volume of the soil. Most stones are rounded or subrounded quartzite pebbles, but occasional subangular blocks of sandstone were seen.

Plant roots and occasional worms occur throughout the profile except where they are restricted by the cemented sand.

The pH and organic matter levels are typical of sandy soils growing arable crops. pH ranges from 6.0 to 6.5 in the topsoil to 6.5 to 6.9 in the subsoils. Organic matter in the topsoil ranges from 2.5 to 3.6%.

### 4.2 Unit 1a

In the wood an organic litter and humus layer has built up over the mineral soil, consisting of whole to fully decomposed pine needles. This layer is between 5 and 10cm thick. Below the organic layer the soils are very similar to those in unit 1. These soils are very acid and have typical pH values of 3.7 to 4.0.

### 4.3 Unit 2

This unit is mapped over part of the wood to include soils with a podzolised profile and very sandy soils.

Typically 5cm of black litter and humus overlies the mineral soils. Pinkish grey (10YR 6/2) sand or loamy sand overlies a strong brown (7.5 YR 5/6) loamy sand deposition horizon at about 30cm. Reddish yellow (7.5 YR 6/6) sand occurs in most profiles below 45cm.

The soil structure is weakly formed, medium to coarse subangular blocky to 45cm and single grain below this depth. Most of the soils have a loose or very friable consistency but iron cementing has created a massive structure with a firm consistency in some areas. The soils are at least moderately porous throughout.

The litter layer contains no stones but the mineral soil has at least 20% of rounded quartzite pebbles greater than 5mm in the top 25cm and at least 25% below this depth, in the vicinity of the pit.

The pH of these soils ranges from 3.7 to 4.0. The nutrient content is much lower than the adjacent arable soils and fertiliser and lime should be applied to these soils if they are put into storage mounds.

## 5. Summary

The agricultural land has been classified as Sub grade 3b due to the high stone content and droughty nature of the sandy soils. Two separate units have been identified, with an organic variant under the wood.

### 1. Summary of ALC

Grade	Area (ha)	% total site	% agricultural land
3b	16.5	46.2	100
Non agricultural	19.2	53.8	-
Total	35.7	100.0	100

### 2. Summary of soil units

Unit	Depth (cm)	Texture	Stones	Organic Matter	pH
1	0-30/40	LS-SL	15-30%	3.0	6.3
	30/40-55	LS	30-40%	1.0	6.5
	55-100	S	10-40%	0.7	6.7
A1	10-0	peat	0	humus	3.7
	0-100	as unit 1		1.5	4.0

Unit	Depth (cm)	Texture	Stones	Organic Matter	pH
2.	5-0	peat	0	humus	3.7
	0-30	LS-S	20%	1.1	3.9
	30-45	LS	25%	1.9	4.0
	45-100	S	25%	-	-

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