

HUNTSMANS QUARRY, NAUNTON

AGRICULTURAL LAND CLASSIFICATION

Report of Validation Survey

1. INTRODUCTION

The site adjacent to the existing Huntsmans Quarry, Naunton is 37 hectares in size. A survey to validate the report prepared by Dr S McRae and to collect information for a Statement of Physical Characteristics was carried out in April 1994. Soils were examined by hand auger borings around the site and three soil profile pits were dug to examine the structure and stone contents of the soils on the site.

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 obtained for the site by interpolation from the Agricultural Climate Dataset (Meteorological Office 1989). The data are shown in Table 1. The data match that provided by Dr McRae.

The parameters used for assessing overall climatic limitations are accumulated temperature, (a measure of the relative warmth of a locality) and average annual rainfall, (a measure of overall wetness). The values shown in Table 1 reveal that there is AN overall climatic limitation which restricts the site to grade 2 at best. Climatic data on Field Capacity Days (FCD) and Moisture Deficits for wheat (MDW) and potatoes (MDP) are also shown.

No local climatic limitations were noted.

Table 1 Climatic Interpolations: Huntsmans Quarry

Grid Reference	SP 119 255
Height (m)	217
Accumulated Temperature (deg days)	1267
Average Annual Rainfall(mm)	798
Overall Climatic Grade	2
Field Capacity (days)	181
Moisture Deficit, Wheat (mm)	79
Moisture Deficit, Potatoes (mm)	62

3. RELIEF AND LANDCOVER

The site forms a dissected slope dipping to the south east. The height range is 205m AOD to 240m AOD. A dry valley runs through the centre of the site in a west east direction with a small tributary valley joining from the north. The slopes are steeper in the southern part of the site.

At the time of survey the southern fields were in cereals whilst the higher northern field had an emergent crop.

4. GEOLOGY AND SOILS

The geology of the site is mapped on the published 1:50,000 scale solid and drift, sheet 217 (Geological Survey of England and Wales 1981). The majority of the site is underlain by Stonesfield Slate formation of the Great Oolitic Limestone. In the valley bottom Fullers earth is mapped.

The Soil Survey of England and Wales published a 1:25,000 map of the Stow on the Wold area in 1978 which includes the site. Didmarton soils were mapped in the valley bottom with an area of Waltham soils on the southern slopes. The rest of the site is mapped as Sherborne soils. Didmarton and Waltham soils are deeper and less stony than the Sherborne which are shallow over limestone.

The survey carried out by Dr McRae shows the soils map to be an accurate portrayal of the soils at the site.

5. AGRICULTURAL LAND CLASSIFICATION

The auger borings carried out in the validation survey showed that most of the site is impenetrable at a shallow depth to the auger because of the stony nature of the soils. The texture of the topsoil at the site is heavy clay loams and clays. Dr McRae identified all the topsoils to be HCL whereas PSD analysis of the topsoils at the three pits dug showed textures of HCL, ZC and C. This would mean that some of the site would be 3b on workability where there are ZC or C topsoils.

Two pits were dug in the shallow Sherborne soils mapped by Dr McRae as Subgrade 3b. One was found to be 3b on droughtiness similar to the pit that he had dug but the other was a much deeper profile and was 3a on droughtiness. It is likely that the Sherborne soils are variable in terms of the depth of fractured rock and it was felt that to argue to change the grade of part of the site to 3a would be change for the sake of change rather than to add to the validity of the survey. A pit was dug in the deeper Waltham soils and this showed that topsoil texture was the limiting factor.

The distribution of ALC grades identified by Dr McRae is as shown below.

Subgrade 3a	12ha	32.3%
Subgrade 3b	<u>25.1ha</u>	<u>67.7%</u>
TOTAL	37.1ha	100%

6. CONCLUSION

The validation survey carried out in April 1994 confirmed that the land classification, soils data and maps in Dr McRae's report are a fair representation of the soils and land quality at the site.

HUNTSMANS QUARRY, NAUNTON

SITE PHYSICAL CHARACTERISTICS

1. SOIL PROPERTIES

Three soil types were mapped by the Soil Survey. In terms of the ALC survey carried out it is seen that the Waltham and Didmarton soils are sufficiently similar at the site to be dealt with as one soil type for the purposes of soil resources.

Soil type 1: Sherborne

This soil is formed over limestone which is fractured. The topsoils and subsoils have similar textures of heavy clay loam and silty clay. The soils are stony and well drained. The stone content of the soil is variable and in the range 15-40% in the topsoil and greater in the subsoil. The stone content increases with depth.

Soil type 2: Waltham and Didmarton

This soil is deeper than the Sherborne soils found either in the valley bottom (Didmarton) or on the valley side formed where banks of sandy limestone exist (Waltham). The topsoil and upper subsoils are much less stony than the Sherborne soils but at depth the soils become stonier. These soils are also well drained.

2. SOIL RESOURCES

Topsoil

Topsoil is defined as the organic rich surface horizon. Two types of topsoil exist across the site. The texture of both is slightly variable with heavy clay loam, silty clay and clay textures identified. The topsoil depth is variable with an average of 25cm.

The Sherborne soils have stone contents in the topsoil ranging from 15-40% of hard limestone. The soil is well rooted and generally is weakly developed structurally. The coarse subangular blocky peds break into fine peds and are porous.

The Didmarton and Waltham soils have low stone contents in the topsoil. The soil is generally moderately to strongly developed with a subangular blocky structure. The porosity of the soil is good.

A total topsoil resource is available at the site of 92750m³ distributed as shown below.

Distribution of Topsoil Resources

Soil Unit	Area (ha)	Depth (cm)	Soils	Stones%	Volume(m ³)
Sherborne	25.1	25	HCL/ZC/C	15-40	62750
Didmarton/ Waltham	12.0	25	HCL/ZC/C	neg	30000
TOTAL	37.1				927500

Subsoil

Subsoil is defined as the less organic rich lower horizons.

Sherborne subsoils can be divided into two. The upper subsoil is stony with high stone contents and heavy clay loam in texture. It is weakly developed structurally and has medium subangular blocky peds which are porous. There are common roots in this horizon. On average this horizon is thought to extend for a depth of about 10-15cm. The lower subsoil is very stony and gradually becomes fractured rock.

The Didmarton and Waltham soils have a deeper and less stony upper subsoils than the Sherborne soils. This is thought to be about 40cm in thickness. This subsoil is moderately developed with coarse subangular blocky structure. It is porous and well rooted. Below this is a similar horizon to the upper subsoil of the Sherborne soil. The depth of this horizon is likely to be deeper in the valley bottom and shallower on the valley side, but could be about 15cm thick. The lower subsoil is similar to the lower subsoil of the Sherborne soils, having a high stone content. This horizon is not required in order to restore these areas to Subgrade 3a.

A total subsoil resource of 352450m³ is available at the site. However much of the lower subsoil has very high stone contents and may well be fractured limestone rock and is not required for restoration.

Distribution of Subsoil Resources

Soil Unit	Area (ha)	Depth (cm)	Soils	Stones %	Volume (m ³)
Sherborne	25.1	25-40	HCL	50	37650
		40+	HCL	70+	200800
Didmarton/ Waltham	12.0	25-65	HCL	neg	48000
		65-80	HCL	50	18000
		80+	HCL	70+	48000
TOTAL					352450

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE	Av Rainfall: 798 mm	PARENT MATERIAL
Huntsmans Quarry	Pit 1	1° South	Cereals	ATO: 1262 day °C	Great Oolitic Limestone
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 181	SOIL SAMPLE REFERENCES
39/94	26/4/94	SP 119 255	G M Shaw	Climatic Grade: 2	RPT/GMS 395
				Exposure Grade:	

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	20	HCL	7.5YR34	8% Hard limestone >2cm 22% >2mm 30% Total	None	None	WCSAB	Friable	-	Good	Many F + VF	Yes	Smooth clear
2	48	HCL	7.5YR54	25% >2cm 24% >2mm 49% Total	None	None	WMSAB	Friable	Good	Good	CVF	Yes	Smooth clear
3	60	MCL	10YR76	Similar to Horizon 2	None	None	MMSAB	Friable	Good	Good	FVF observed to bottom of pit	Yes	

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3a

VP336-12

Available Water Wheat: 81 mm

Potatoes: 81 mm

Moisture Deficit Wheat: 79 mm

Potatoes: 62 mm

Moisture Balance Wheat: 2 mm

Potatoes: 19 mm

Droughtiness Grade: 3A (Calculated to 80 cm)

Final ALC Grade: 3a

Main Limiting Factor(s): Droughtiness/workability

Remarks:

Structure in Horizons 2 and 3 affected by stones. Bottom of pit not solid rock. Stone content appears similar, but difficult to dig through.

SITE NAME Huntsmans Quarry		PROFILE NO. Pit 2	SLOPE AND ASPECT 3° NE	LAND USE Cereals	Av Rainfall: 798 mm ATO: 1262 day °C FC Days: 181 Climatic Grade: 2 Exposure Grade:	PARENT MATERIAL Great Oolitic Limestone
JOB NO. 39/94		DATE 26/4/94	GRID REFERENCE SP 118 253	DESCRIBED BY G M Shaw		SOIL SAMPLE REFERENCES RPT/GMS 394,396

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	20	ZC	10YR43	Neg visual	None	None	MCSAB	Friable	-	Good	CF + VF		Clear smooth
2	30	C	7.5YR46	Neg visual	None	None	MCSAB	Friable	Moderate	Good	CF + VF		Clear smooth
3	48	C	7.5YR46	28% >2cm 8% >2mm 36% Total	None	None	WMSAB	Friable	Good	Good	FVF	Yes	Clear smooth
4	60	MCL	10YR76	35% >2cm 18% >2mm 53% Total	None	None	WFSAB	Friable	Good	Good	FVF	Yes	Clear smooth
5	75+	C	2.5Y66,74	5%	Fog	None	WCSAB	Friable	Moderate	Good	None	Yes	

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3b

VP336-12

Available Water Wheat: 99 mm

Potatoes: 103 mm

Moisture Deficit Wheat: 79 mm

Potatoes: 62 mm

Moisture Balance Wheat: 20 mm

Potatoes: 41 mm

Droughtiness Grade: 2 (Calculated to 80 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability

Remarks:

Stones more rounded than in Pits 1 and 3. Hard limestone rocks. Topsoil clay content 37%.

SITE NAME Huntsmans Quarry		PROFILE NO. Pit 3	SLOPE AND ASPECT 0°		LAND USE Emergent crop		Av Rainfall: 798 mm ATO: 1262 day °C		PARENT MATERIAL Great Oolitic Limestone				
JOB NO. 39/94		DATE 26/4/94	GRID REFERENCE SP 119 257		DESCRIBED BY G M Shaw		FC Days: 181 Climatic Grade: 2 Exposure Grade:		SOIL SAMPLE REFERENCES RPT/GMS 397				

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	20	C	10YR43	5% >2cm 15% >2mm 20% Total	None	None	MCSAB	Friable	-	Good	CF + VF	Yes	Clear smooth
2	42	HCL	7.5YR46	35% >2cm 22% >2mm 57% Total	None	None	WMSAB	Friable	Good	Good	MVF	Yes	Clear smooth
3	55+	MCL	10YR66	>70%	None	None		Friable	Good		CVF	Yes	

Profile Gleyed From: Not gleyed

Depth to Slowly Permeable Horizon: No SPL

Wetness Class: I

Wetness Grade: 3b

VP336-12

Available Water Wheat: 52 mm

Potatoes: 52 mm

Moisture Deficit Wheat: 79 mm

Potatoes: 62 mm

Moisture Balance Wheat: -27 mm

Potatoes: -10 mm

Droughtiness Grade: 3b (Calculated to 80 cm)

Final ALC Grade: 3b

Main Limiting Factor(s): Workability/droughtiness

Remarks:

Stones are hard limestone.