

8 FCS 4518

22/92

**EYSEY MANOR FARM, CRICKLADE, WILTSHIRE:
SAND AND GRAVEL EXTRACTION**

STATEMENT OF SITE PHYSICAL CHARACTERISTICS

1. INTRODUCTION

MAFF was informally consulted in October 1991 about a potential sand and gravel extraction site at Eysey Manor Farm, Cricklade in Wiltshire, by Tarmac Roadstone Limited (Southern). The likely restoration was to agriculture/nature conservation and MAFF was asked to comment on the agricultural implications of the proposals.

The site lies close to the Wiltshire/Gloucestershire county boundary and detailed Agricultural Land Classification (ALC) work had recently taken place on adjacent land in connection with MAFF's statutory input to the preparation of the Upper Thames Minerals Local Plan. The latter had indicated extensive areas of grades 2 and 3A and, in the light of the high quality of agricultural land in the vicinity, it was felt to be appropriate to conduct detailed ALC and soils surveys.

Survey work was conducted by members of the Resource Planning Group (South West Region), with an approximate coverage of one soil observation per hectare. A total of 121 auger borings and seven soil pits was described. Many of the soils on the site are affected by the presence of a groundwater table; normally, the soil resource would be described for the top 120 cm but, where the groundwater table is shallow, only the physical characteristics of the profile above the water table have been noted.

Details of the land quality are provided in Section 2 below. The results classify the stony, sandy soils on the eastern part of the site as 3A with soil droughtiness as the main limiting factor. The remainder of the site has been classified as 3B with soil wetness as the downgrading limitation on these heavier soils which generally contain clay subsoil horizons which impede drainage.

Details of the topsoil and subsoil resources are provided in Section 3. Three topsoil resource units have been identified to enable separate handling of the medium clay loam, heavy clay loam and clay horizons. Two broad subsoil resource units have been identified and distinguish the clay subsoils from those with lighter, stonier textures.

MAFF's definition of "gravel" relates to horizons with >70% stones, by volume. Stone contents were measured on site for the representative pits and confirmed the absence of "gravel". MAFF considers the stony, sandy lower horizons as a distinct soil resource.

2. AGRICULTURAL LAND CLASSIFICATION

Climate: The climatic criteria are considered first when classifying land as they may be overriding in the sense that severe climatic limitations will restrict land to low grades irrespective of favourable soil or site conditions.

A detailed estimate of the prevailing climate has been made by interpolation from a 5km grid dataset. The latter is held in LandIS, a computer-based land information system developed by the SSLRC and funded by MAFF.

The parameters used in assessing the impact of overall climate are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness). Together, these show that there is no overall climatic limitation affecting the site.

Table 1: Climatic Interpolations

Grid Reference	SU 108 951	SU 120 948
Altitude (m)	80	79
Average Annual Rainfall (mm)	683	681
Accumulated Temperature (° days)	1436	1437
Field Capacity (days)	155	154
Moisture Deficit, Wheat (mm)	104	105
Moisture Deficit, Potatoes (mm)	96	97
Overall Climatic Grade	1	1

Table 2 : Distribution of ALC Grades and Sub-grades

Grade	Area (ha)	% of Survey Area	% of Agricultural Area
3A	71.64	47.82	49.44
3B	73.26	48.91	50.56
Non Agric	3.44	2.30	<u>100%</u>
Urban	1.46	0.97	
Total	<u>149.80</u>	<u>100%</u>	

Sub-grade 3A: Pits 1, 2, 3 and 7 are typical of the range of soil profiles that fall within this grade. The majority of the soils are droughty, caused by the presence of shallow stony, sandy horizons that extend to depth. Topsoils are uniform, with Heavy Clay Loam layers overlying deep subsoils of Loamy Coarse Sand texture which contain stone contents in the range 36-51%. These layers are well structured from the point of view of root penetration to extract available water, but the amount of available water is significantly limited by the sandy and stony nature of the subsoil.

At the time of survey (early March, after a dry winter) the level of the groundwater table was at or within 80 cm, and

evidence of roots was found to approximately this depth. The soils have been placed into Wetness Class II on the assumption that they will be wet within 70 cm in most years for more than 90 days (ie with the water table at 80 cm in early March after a dry winter, it would be probable that an average winter period would see the table within 70 cm for all of its duration).

The seasonal pattern of roots owes much of its development to the variation in height of the groundwater table. If the table was high for part of the critical spring growth period the roots would not need to extend to depth because they would have an adequate shallow source of available water. However, should the water table drop quickly in the summer period the rooting system would not be able to develop deep enough to tap the available water. Given the uncertainty in the rooting depths, a number of droughtiness calculations were performed on the droughty pits. These show a possible range from 3B to 2 and suggest that sub-grade 3A is the most appropriate classification for these soils. Pit 1 represents the driest example which exhibits coarse sandy textures and high stone contents immediately below the topsoil. Pit 3 represents the least droughty of this range of soils which exhibits an upper subsoil of Heavy Clay Loam down to 44 cm before becoming typically stony and sandy. This upper subsoil is extremely variable and, as the subsoil resource sections illustrate, cannot be mapped separately.

Sub-grade 3B: Pits 4, 5 and 6 are typical of the range of profiles that fall within this grade, with soil wetness as the most limiting factor. The water table was distinctly shallower in this area than in the 3A map unit at the time of survey, measured between 45-55 cm in the three pits, and the soils have been placed in a worse wetness category, no better than Wetness Class III.

The two pits north of the canal (Pits 4 and 6) are described as groundwater gleys.

The subsoils may contain clay horizons but these are often not thick enough to be called slowly permeable layers (SPLs) and are of moderate structure. There is, however, evidence of shallow gleying which suggests that the profile is wet for significant periods of most years (see attached definitions of wetness classes in terms of the duration of waterlogging). Below these clay layers, the subsoil is stony and sandy as described in the 3A map unit.

Pit 5 is typical of the heavier clayey profiles south of the canal. These soils are described as surface water gleys and experience a wetness limitation that is caused by the presence of SPLs. These layers initiate a wetness problem immediately below the topsoil and are poorly structured to depth. Pit 5 has been placed in Wetness Class IV.

3. SOIL RESOURCES

3.1 **Topsoil Resource:** the topsoil relates to the more organic rich surface horizons. Three units have been identified on the basis of topsoil workability groupings (Medium Clay Loam, Heavy Clay Loam, Clay). Details of the materials and volumes are given in Table 3 below.

Table 3: Topsoil Materials and Volumes

Map Unit	Texture	Depth (cm)	Area (ha)	Volume (m ³)
A	MCL	22	9.39	20,658
B	HCL	30	117.15	351,450
C	C	22	18.46	40,612

Total Subsoil Resource: 412,720 m³

3.2 **Subsoil Resource:** the subsoil relates to the non-organic rich lower horizons. Given the variability in textures, stone contents and depths, only two subsoil units have been identified; these distinguish the sandy stony soils from those with deeper clay horizons. Details of the materials and volumes are given in Table 4 below. Map Unit A is generally of a Loamy Coarse Sand texture (with inclusions of Medium Sandy Loam and Medium Sand and some Heavy Clay Loam and Clay) with approximately 50% stone in the profile. Given the very high stone content, the texture variation is not considered to be significant. Map Unit B contains clay textures with inclusions of 20-30% stone in the base of the horizon.

Table 4: Subsoil Materials and Volumes

Map Unit	Texture	Depth (cm)	Area (ha)	Volume (m ³)
A	LCS*1	50	108.41	542,050
B	C*2	70	36.59	256,130

Total Subsoil Resource: 798,180 m³

*1 With inclusions of MSL, MS, HCL and C

*2 With inclusions of 20-30% stone in the lower subsoil

EYSEY MANOR MINERALS

Pit Number : 1P

Grid Reference : SU10989502 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Cereals
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 28	HCL	25 Y52 00	0	2		MCSAB
28- 42	LCS	10YR64 00	0	36		WMG
42- 80	LCS	10YR73 00	0	48		WMG

Wetness Grade : 2 Wetness Class : I
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 3B APW : 71 mm MBW : -33 mm
 APP : 072 mm MBP : -24 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Droughtiness

EYSEY MANOR MINERALS

Pit Number : 2P

Grid Reference : SU10999485 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Cereals
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 30	HCL	25Y 52 00	0	1		WCSAB
30- 40	C	10YR61 62	0	2	C	MCSAB
40- 80	MSL	25Y 72 00	0	50	C	MMSAB

Wetness Grade : 3A Wetness Class : II
 Gleying : 030 cm
 SPL : No SPL

Drought Grade : 3A APW : 098 mm MBW : -7 mm
 APP : 096 mm MBP : -1 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Wetness

EYSEY MANOR MINERALS

Pit Number : 3P

Grid Reference : SU11299463 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Cereals
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 25	HCL	10YR43 00	0	2		WMSAB
25- 44	HCL	10YR54 00	0	5	C	MCSAB
44- 80	CSL	10YR73 00	0	50		

Wetness Grade : 3A

Wetness Class : II
 Gleying : 025 cm
 SPL : No SPL

Drought Grade : 3A

APW : 95 mm MBW : -9 mm
 APP : 95 mm MBP : -1 mm

FINAL ALC GRADE : 3A

MAIN LIMITATION : Wetness

EYSEY MANOR MINERALS

Pit Number : 4P

Grid Reference : SU10409459 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Permanent Grass
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 20	C	10YR42 51	0	1	C	MCSAB
20- 28	HCL	10YR62 00	0	30		
28- 50	LCS	10YR82 00	0	60		

Wetness Grade : 3B

Wetness Class : III
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 4

APW : 050 mm MBW : -55 mm
 APP : 050 mm MBP : -47 mm

FINAL ALC GRADE : 3B

MAIN LIMITATION : Wetness

EYSEY MANOR MINERALS

Pit Number : 5P

Grid Reference : SU10789440 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Permanent Grass
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 15	HCL	25Y 52 00	0	0		MMSAB
15- 33	C	10YR61 00	0	0	M	WVCAB
33- 52	C	25YN07 00	0	0	A	WCSAB
52- 70	HCL	25YN07 00	0	20	C	WMSAB

Wetness Grade : 3B

Wetnesss Class : IV
 Gleying : 015 cm
 SPL : 015 cm

Drought Grade : 3A

APW : 100 mm MBW : -5 mm
 APP : 111 mm MBP : 14 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Wetness

EYSEY MANOR MINERALS

Pit Number : 6P

Grid Reference : SU10489506 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Cereals
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 24	C	10YR42 00	0	1		MCSAB
24- 52	C	25Y 62 00	0	0	M	MVCSAB
52- 70	MS	10YR72 00	0	56		

Wetness Grade : 3B Wetnesss Class : II
 Gleying : 024 cm
 SPL : No SPL

Drought Grade : 3A APW : 087 mm MBW : -18 mm
 APP : 090 mm MBP : -7 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Wetness

EYSEY MANOR MINERALS

Pit Number : 7P

Grid Reference : SU11179515 Average Annual Rainfall : 683 mm
 Accumulated Temperature : 1436 degree days
 Field Capacity Level : 155 days
 Land Use : Cereals
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	MOTTLES	STRUCTURE
0- 23	HCL	10YR43 00	0	2		WCSAB
23- 38	HCL	10YR54 00	0	10		WMSAB
38- 65	LMS	10YR64 00	0	42		WMSAB
65- 72	LMS	10YR73 00	0	51		WFG

Wetness Grade : 3A Wetnesss Class : II
 Gleying : 000 cm
 SPL : No SPL

Drought Grade : 3B APW : 076 mm MBW : -28 mm
 APP : 79 mm MBP : -17 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Wetness