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West Sussex Minerals Plan
Site C : Waterbeach
Agricultural Land Classification
ALC Map and Report
April 1995

AGRICULTURAL LAND CLASSIFICATION REPORT

WEST SUSSEX MINERALS PLAN SITE C: WATERBEACH

1. Summary

- 1.1 ADAS was commissioned by MAFF's Land Use Planning Unit to provide information on land quality for a number of sites in West Sussex. The work forms part of MAFF's statutory input to the West Sussex Minerals Plan.
- 1.2 Site C comprises 38.2 hectares of land to the south-east of Goodwood House, at Waterbeach, West Sussex. An Agricultural Land Classification (ALC) survey was carried out during April 1995. The survey was undertaken at a detailed level of approximately one boring per hectare. A total of 39 borings and two soil inspection pits were described in accordance with MAFF's revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988). These guidelines provide a framework for classifying land according to the extent to which its physical or chemical characteristics impose a long term limitation on its use for agriculture.
- 1.3 The work was carried out by members of the Resource Planning Team in the Guildford Statutory Group of ADAS.
- 1.4 At the time of the survey the land was growing barley. Land mapped as non-agricultural comprises a track.
- 1.5 The distribution of grades and subgrades is shown on the attached ALC map and the areas and extent are given in the table below. The map has been drawn at a scale of 1:10,000. It is accurate at this scale, but any enlargement would be misleading.

Table 1 : Distribution of Grades and Subgrades

Grade	Area (ha)	% of Site	% of Agricultural Land
3a	9.3	24.3	24.7
3b	28.4	74.3	<u>75.3</u>
Non-agricultural	<u>0.5</u>	<u>1.4</u>	100.0 (37.7 ha)
Total area of site	38.2	100.0	

- 1.6 Appendix I gives a general description of the grades, subgrades and land use categories identified in the survey. The main classes are described in terms of the type of limitation that can occur, the typical cropping range and the expected level and consistency of yield.

- 1.7 Land classified as Subgrade 3a, good quality, is restricted by moderate soil droughtiness limitations. Topsoils comprise medium silty clay loams which overlie similarly textured upper subsoils and heavier lower subsoils, typically heavy silty clay loam or clay. The topsoils and upper subsoils are slightly stony; though to the south of the site upper subsoils tend to be moderately stony. In association with underlying gravel deposits, the subsoils become increasingly stony with depth. The interaction between these soil properties and the prevailing local climate acts to impart moderate soil droughtiness limitations. This may lead to the soil available water being insufficient to fully meet crop needs.
- 1.8 Land classified as Subgrade 3b, moderate quality, is restricted by soil droughtiness and/or topsoil stone content limitations. Within these profiles the stonier subsoils occur at shallower depths, thus reducing the amount of soil available water. Consequently this land is subject to significant soil droughtiness limitations. Parts of this land are also limited by topsoil stoniness. Large flints within the topsoil act to impede cultivation, harvesting and crop growth, and may increase implement and tyre wear.

2. Climate

- 2.1 The climatic criteria are considered first when classifying land as climate can be overriding in the sense that severe limitations will restrict land to low grades irrespective of favourable site or soil conditions.
- 2.2 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall, as a measure of overall wetness, and accumulated temperature, as a measure of the relative warmth of a locality.
- 2.3 A detailed assessment of the prevailing climate was made by interpolation from a 5km gridpoint dataset (Met. Office, 1989). The details are given in the table below and these show that there is no overall climatic limitation affecting the site. However, climatic factors do interact with soil properties to influence soil wetness and droughtiness limitations. At this locality both the field capacity days and soil moisture deficits are relatively high in a regional context. These factors respectively increase the likelihood of soil wetness and soil droughtiness limitations.

Table 2 : Climatic Interpolation

Grid Reference	SU 896 079
Altitude (m)	35
Accumulated Temperature (degree days, Jan-June)	1508
Average Annual Rainfall (mm)	828
Field Capacity (days)	174
Moisture Deficit, Wheat (mm)	111
Moisture Deficit, Potatoes (mm)	106
Overall Climatic Grade	1

2.4 No local climatic factors such as exposure or frost risk are believed to affect the site.

3. Relief

3.1 The site is relatively flat, lying at approximately 40 m AOD along the northern site boundary and 30 m AOD along the southern site boundary.

4. Geology and Soil

4.1 British Geological Survey (1972) Sheet 317, Chichester, shows the entire site to be underlain by valley gravel.

4.2 The published Soil Survey map (SSGB, 1967) shows the Charity Series across the site. Soils profiles are mapped as being extremely flinty to the north of the central track; undifferentiated to the south. Soils of the Charity Series are described as 'well drained fine silty and fine silty over clayey soils, locally very flinty, some shallow over flint gravel' (SSGB, 1967).

4.3 Detailed field examination found soils derived from valley gravel deposits and consistent with those described in paragraph 4.2.

5. Agricultural Land Classification

5.1 Table 1 provides the details of the area measurements for each grade and the distribution of each grade is shown on the attached ALC map.

5.2 The location of the soil observation points are shown on the attached sample point map.

Subgrade 3a

5.3 Land classified as Subgrade 3a, good quality, is principally limited by soil droughtiness, though discrete areas are also restricted by topsoil stoniness. Topsoils comprise non-calcareous medium silty clay loams. These overlie similarly textured upper subsoils and heavier lower subsoils, typically heavy silty clay loam and clay. Topsoils are slightly stony, generally containing about 5-8% flints larger than 2cm and 12-15% total flints by volume. Upper subsoils are slightly to very stony, containing approximately 10-40% total flints by volume. These profiles are well drained (Wetness Class I). Due to underlying gravelly deposits, the stony nature of these profiles resulted in these auger borings proving impenetrable to a soil auger between 50 and 80 cm depth. Consequently a soil inspection pit (Pit 2) was dug to assess soil properties at depth. From this pit it could be seen that lower subsoils are very stony, containing approximately 60% total flints by volume. All subsoils were deemed to be moderately structured. The presence of flints reduces the available water capacity of the soils and makes them more drought prone. The interaction between these flint contents, soil textures and subsoil structures with the prevailing local climate results in a moderate soil droughtiness limitation, using

soil moisture balance calculations. This reduces the level and consistency of crop yields, such that this land can be classified as no higher than Subgrade 3a.

- 5.4 Some of the topsoils within this mapping unit contained a greater percentage of larger flints within the top 25 cm from the surface. Flints larger than 2 cm (approximately 11-14% by volume) and larger than 6 cm (approximately 5% by volume) act to increase wear and tear to implements and tyres, plus impede cultivation, harvesting and crop growth.

Subgrade 3b

- 5.5 Land classified as Subgrade 3b, moderate quality, is limited by soil droughtiness and/or topsoil stoniness. Topsoils comprise non-calcareous medium silty clay loams. These generally overlie similarly textured upper subsoils. Topsoils are moderately stony, typically containing 13-20% of flints larger than 2 cm, 5-11% of flints larger than 6 cm and 20-30% total flints by volume. Upper subsoils are moderately or very stony, containing approximately 30-40% total flints by volume. Due to underlying gravelly deposits, the stony nature of these profiles resulted in auger borings proving impenetrable to a soil auger between 35 and 45 cm depth. Consequently a soil inspection pit (Pit 1) was dug to assess soil properties at depth. From this pit it could be seen that lower subsoils are very stony, increasing from 50% to 65% total flints by volume at approximately 55 cm depth. All of the subsoils were deemed to be moderately structured. In comparison to soil, flints retain much less water for uptake by crop roots. Consequently the interaction between the high flint contents, soil textures and subsoil structures with the prevailing local climate means that this land is subject to significant soil droughtiness limitations, using soil moisture balance calculations. This land will be prone to lower and less consistent crop yields.
- 5.6 Topsoil stoniness is limiting to land quality where significant percentages of larger flints occur within 25 cm depth of the surface. Flints larger than 2 cm (approximately 15-20% by volume) and larger than 6 cm (approximately 10-11% by volume) act to significantly increase wear and tear to implements and tyres, plus impede cultivation, harvesting and crop growth.

ADAS Ref: 4203/064/95
MAFF Ref: EL42/228

Resource Planning Team
Guildford Statutory Group
ADAS Reading

SOURCES OF REFERENCE

British Geological Survey (1967), Sheet No. 317, Chichester, 1:63,360 (drift edition).

MAFF (1988), Agricultural Land Classification of England and Wales : Revised guidelines and criteria for grading the quality of agricultural land.

Meteorological Office (1989), Climatological Data for Agricultural Land Classification.

Soil Survey of Great Britain (1967), Sheet SU80, Soils of the West Sussex Coastal Plain, 1:25,000 and accompanying maps.

APPENDIX I

DESCRIPTION OF THE GRADES AND SUBGRADES

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 or horticultural crops can usually be grown but on some land of this 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 land.

Grade 3 : Good to Moderate Quality Land

Land with moderate limitations which affect the choice of crops, the timing and type of cultivation, harvesting or the level of yield. When 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 the 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 severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

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: private parkland, public open spaces, sports fields, allotments and soft-surfaced areas on airports. 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, eg. buildings in large grounds, and where map scale permits, the cover types may be shown separately. Otherwise, the most extensive cover type will be shown.

APPENDIX II

FIELD ASSESSMENT OF SOIL WETNESS CLASS

SOIL WETNESS CLASSIFICATION

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six soil wetness classes are identified and are defined in the table below.

Definition of Soil Wetness Classes

Wetness Class	Duration of Waterlogging ¹
I	The soil profile is not wet within 70 cm depth for more than 30 days in most years. ²
II	The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but only wet within 40 cm depth for 30 days in most years.
III	The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer present within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31-90 days in most years.
IV	The soil profile is wet within 70 cm depth for more than 180 days but not wet within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer present within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.
V	The soil profile is wet within 40 cm depth for 211-335 days in most years.
VI	The soil profile is wet within 40 cm depth for more than 335 days in most years.

Soils can be allocated to a wetness class on the basis of quantitative data recorded over a period of many years or by the interpretation of soil profile characteristics, site and climatic factors. Adequate quantitative data will rarely be available for ALC surveys and therefore the interpretative method of field assessment is used to identify soil wetness class in the field. The method adopted here is common to ADAS and the SSLRC.

¹The number of days specified is not necessarily a continuous period.

²'In most years' is defined as more than 10 out of 20 years.

APPENDIX III

SOIL PIT AND SOIL BORING DESCRIPTIONS

Contents :

Soil Abbreviations - Explanatory Note

Soil Pit Descriptions

Database Printout - Boring Level Information

Database Printout - Horizon Level Information

SOIL PROFILE DESCRIPTIONS : EXPLANATORY NOTE

Soil pit and auger boring information collected during ALC fieldwork is held on a computer database. This uses notations and abbreviations as set out below.

Boring Header Information

1. **GRID REF** : national 100 km grid square and 8 figure grid reference.

2. **USE** : Land use at the time of survey. The following abbreviations are used.

ARA : Arable	WHT : Wheat	BAR : Barley
CER : Cereals	OAT : Oats	MZE : Maize
OSR : Oilseed rape	BEN : Field Beans	BRA : Brassicae
POT : Potatoes	SBT : Sugar Beet	FCD : Fodder Crops
LIN : Linseed	FRT : Soft and Top Fruit	FLW : Fallow
PGR : Permanent Pasture	LEY : Ley Grass	RGR : Rough Grazing
SCR : Scrub	CFW : Coniferous Woodland	DCW : Deciduous Wood
HTH : Heathland	BOG : Bog or Marsh	FLW : Fallow
PLO : Ploughed	SAS : Set aside	OTH : Other
HRT : Horticultural Crops		

3. **GRDNT** : Gradient as estimated or measured by a hand-held optical clinometer.

4. **GLEYSPL** : Depth in centimetres (cm) to gleying and/or slowly permeable layers.

5. **AP (WHEAT/POTS)** : Crop-adjusted available water capacity.

6. **MB (WHEAT/POTS)** : Moisture Balance. (Crop adjusted AP - crop adjusted MD)

7. **DRT** : Best grade according to soil droughtiness.

8. If any of the following factors are considered significant, 'Y' will be entered in the relevant column.

MREL : Microrelief limitation	FLOOD : Flood risk	EROSN : Soil erosion risk
EXP : Exposure limitation	FROST : Frost prone	DIST : Disturbed land
CHEM : Chemical limitation		

9. **LIMIT** : The main limitation to land quality. The following abbreviations are used.

OC : Overall Climate	AE : Aspect	EX : Exposure
FR : Frost Risk	GR : Gradient	MR : Microrelief
FL : Flood Risk	TX : Topsoil Texture	DP : Soil Depth
CH : Chemical	WE : Wetness	WK : Workability
DR : Drought	ER : Erosion Risk	WD : Soil Wetness/Droughtiness
ST : Topsoil Stoniness		

Soil Pits and Auger Borings

1. **TEXTURE** : soil texture classes are denoted by the following abbreviations.

S :	Sand	LS :	Loamy Sand	SL :	Sandy Loam
SZL :	Sandy Silt Loam	CL :	Clay Loam	ZCL :	Silty Clay Loam
ZL :	Silt Loam	SCL :	Sandy Clay Loam	C :	Clay
SC :	Sandy Clay	ZC :	Silty Clay	OL :	Organic Loam
P :	Peat	SP :	Sandy Peat	LP :	Loamy Peat
PL :	Peaty Loam	PS :	Peaty Sand	MZ :	Marine Light Silts

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

F :	Fine (more than 66% of the sand less than 0.2mm)
M :	Medium (less than 66% fine sand and less than 33% coarse sand)
C :	Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content: **M** : Medium (<27% clay) **H** : Heavy (27-35% clay)

2. **MOTTLE COL** : Mottle colour using Munsell notation.
3. **MOTTLE ABUN** : Mottle abundance, expressed as a percentage of the matrix or surface described.

F : few <2% **C** : common 2-20% **M** : many 20-40% **VM** : very many 40% +

4. **MOTTLE CONT** : Mottle contrast

F : faint - indistinct mottles, evident only on close inspection
D : distinct - mottles are readily seen
P : prominent - mottling is conspicuous and one of the outstanding features of the horizon

5. **PED. COL** : Ped face colour using Munsell notation.
6. **GLEYS** : If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.
7. **STONE LITH** : Stone Lithology - One of the following is used.

HR :	all hard rocks and stones	SLST :	soft oolitic or dolimitic limestone
CH :	chalk	FSST :	soft, fine grained sandstone
ZR :	soft, argillaceous, or silty rocks	GH :	gravel with non-porous (hard) stones
MSST :	soft, medium grained sandstone	GS :	gravel with porous (soft) stones
SI :	soft weathered igneous/metamorphic rock		

Stone contents (>2cm, >6cm and total) are given in percentages (by volume).

SOIL PIT DESCRIPTION

Site Name : W SUSSEX MINS SITE C Pit Number : 1P

Grid Reference: SU89600810 Average Annual Rainfall : 828 mm
 Accumulated Temperature : 1508 degree days
 Field Capacity Level : 174 days
 Land Use : Barley
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 25	MZCL	10YR43 00	14	25	HR		WKCSAB	FR		
25- 40	MZCL	10YR54 00	0	40	HR			FR	M	
40- 55	MZCL	10YR54 00	0	50	HR			FR	M	
55- 65	MZCL	10YR54 00	0	65	HR			FR	M	

Wetness Grade : 1 Wetness Class : I
 Gleying : cm
 SPL : No SPL

Drought Grade : 3B APW : 68 mm MBW : -43 mm
 APP : 72 mm MBP : -34 mm

FINAL ALC GRADE : 3B
 MAIN LIMITATION : Droughtiness

SOIL PIT DESCRIPTION

Site Name : W SUSSEX MINS SITE C Pit Number : 2P

Grid Reference: SU89500770 Average Annual Rainfall : 828 mm
 Accumulated Temperature : 1508 degree days
 Field Capacity Level : 174 days
 Land Use : Barley
 Slope and Aspect : degrees

HORIZON	TEXTURE	COLOUR	STONES >2	TOT.STONE	LITH	MOTTLES	STRUCTURE	CONSIST	SUBSTRUCTURE	CALC
0- 30	MZCL	10YR43 00	8	15	HR		WKCSAB	FR		
30- 46	MZCL	10YR44 00	0	5	HR		MDCSAB	FR	M	
46- 70	C	10YR54 00	0	15	HR	M	MDCSAB	FM	M	
70-120	C	10YR54 00	0	60	HR	M		FM	M	

Wetness Grade : 1 Wetness Class : I
 Gleying : 046 cm
 SPL : No SPL

Drought Grade : 3A APW : 112mm MBW : 1 mm
 APP : 108mm MBP : 2 mm

FINAL ALC GRADE : 3A
 MAIN LIMITATION : Droughtiness

SAMPLE NO.	GRID REF	ASPECT USE	--WETNESS--		-WHEAT-		-POTS-		M.REL		EROSN EXP	FROST DIST	CHEM LIMIT	ALC COMMENTS	
			GRDNT	GLEYSPL	CLASS	GRADE	AP	MB	AP	MB					DRT
1	SU89300820	BAR			1	1	67	-44	67	-39	3B		ST	3B	I50 flinty zc1
1P	SU89600810	BAR			1	1	68	-43	72	-34	3B		DR	3B	Flinty 40
2	SU89400820	BAR			1	1	63	-48	63	-43	3B		DR	3B	I45flinty Re1P
2P	SU89500770	BAR		046	1	1	112	1	108	2	3A		DR	3A	Flinty 70
3	SU89500820	BAR			1	1	64	-47	64	-42	3B		DR	3B	I45flinty Re1P
4	SU89600820	BAR	E	01	1	1	82	-29	88	-18	3B		ST	3A	Imp 60 flinty
5	SU89700820	BAR			1	1	89	-22	95	-11	3B		DR	3B	Chalk 55
6	SU89800820	BAR			1	1	49	-62	49	-57	4		DR	3B	I35flinty Re1P
7	SU89300810	BAR			1	1	51	-60	51	-55	4		ST	3B	I40flinty Re1P
8	SU89400810	BAR			1	1	52	-59	52	-54	4		ST	3B	I40flinty Re1P
9	SU89500810	BAR			1	1	50	-61	50	-56	4		ST	3B	I40flinty Re1P
10	SU89600810	BAR			1	1	53	-58	53	-53	4		DR	3B	I40flinty Re1P
11	SU89700810	BAR			1	1	48	-63	48	-58	4		DR	3B	I35flinty Re1P
12	SU89800810	BAR			1	1	53	-58	53	-53	4		ST	3B	I40flinty Re1P
13	SU89300800	BAR			1	1	54	-57	54	-52	4		ST	3B	I40flinty Re1P
14	SU89400800	BAR			1	1	54	-57	54	-52	4		ST	3B	I40flinty Re1P
15	SU89500800	BAR			1	1	51	-60	51	-55	4		ST	3B	I40flinty Re1P
16	SU89600800	BAR			1	1	52	-59	52	-54	4		ST	3B	I40flinty Re1P
17	SU89700800	BAR			1	1	59	-52	59	-47	4		ST	3B	I45flinty Re1P
18	SU89800800	BAR			1	1	60	-51	60	-46	4		ST	3B	I45flinty Re1P
19	SU89300790	BAR			1	1	65	-46	65	-41	3B		DR	3B	I50 flinty zc1
20	SU89400790	BAR			1	1	54	-57	54	-52	4		DR	3B	I40flinty Re1P
21	SU89500790	BAR			1	1	49	-62	49	-57	4		DR	3B	I35flinty Re1P
22	SU89600790	BAR			1	1	65	-46	65	-41	3B		DR	3B	I50 flinty zc1
23	SU89700790	BAR			1	1	51	-60	51	-55	4		ST	3B	I40flinty Re1P
24	SU89800790	BAR			1	1	53	-58	53	-53	4		ST	3B	I45flinty Re1P
25	SU89400780	BAR		045	1	1	88	-23	98	-8	3B		DR	3A	I70flinty Re2P
26	SU89500780	BAR		045	1	1	134	23	110	4	2		DR	2	
27	SU89600780	BAR			1	1	67	-44	67	-39	3B		DR	3B	I50 flinty clay
28	SU89700780	BAR			1	1	57	-54	57	-49	4		ST	3B	I45flinty Re1P
29	SU89800780	BAR			1	1	57	-54	57	-49	4		ST	3B	I45flinty Re1P
30	SU89400770	BAR		045	1	1	104	-7	112	6	3A		DR	3A	I75flinty Re2P
31	SU89500770	BAR		045	1	1	101	-10	110	4	3A		DR	3A	I75flinty Re2P
32	SU89600770	BAR		030	2	2	96	-15	102	-4	3A		DR	3A	I80flinty Re2P
33	SU89700770	BAR			1	1	59	-52	59	-47	4		DR	3B	I40flinty Re1P
34	SU89800770	BAR		030	2	2	68	-43	68	-38	3B		DR	3B	I50 flinty clay
35	SU89600760	BAR		055	1	1	92	-19	98	-8	3A		DR	3A	I60flinty Re2P
36	SU89700760	BAR		050	1	1	80	-31	84	-22	3B		DR	3A	I60flinty Re2P
37	SU89800760	BAR			1	1	82	-29	87	-19	3B		ST	3A	I50 flinty zc1
38	SU89900760	BAR			1	1	77	-34	77	-29	3B		DR	3A	I50 flinty zc1
39	SU89500762	BAR		030	2	2	77	-34	77	-29	3B		DR	3A	I50 flinty zc1

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED		----STONES----			STRUCT/ CONSIST	SUBS						
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH		TOT	STR	POR	IMP	SPL	CALC	
1	0-27	mzc1	10YR43 00						15	9	HR	25							
	27-50	mzc1	10YR54 00						0	0	HR	30		M				Impen 50 flinty	
1P	0-25	mzc1	10YR43 00						14	5	HR	25	WKCSAB	FR					
	25-40	mzc1	10YR54 00						0	0	HR	40		FR M					
	40-55	mzc1	10YR54 00						0	0	HR	50		FR M					
	55-65	mzc1	10YR54 00						0	0	HR	65		FR M					
2	0-27	mzc1	10YR43 00						12	6	HR	20							
	27-40	mzc1	10YR54 00						0	0	HR	30		M					
	40-45	mzc1	10YR54 00						0	0	HR	35		M				Impen 45 flinty	
2P	0-30	mzc1	10YR43 00						8	2	HR	15	WKCSAB	FR					
	30-46	mzc1	10YR44 00						0	0	HR	5	MDCSAB	FR M					
	46-70	c	10YR54 00	10YR58 00 M				10YR53 00 Y	0	0	HR	15	MDCSAB	FM M				pale ped faces	
	70-120	c	10YR54 00	10YR58 00 M				10YR53 00 Y	0	0	HR	60		FM M				pale ped faces	
3	0-40	mzc1	10YR43 00						14	10	HR	25							
	40-45	mzc1	10YR54 00						0	0	HR	30		M				Impen 45 flinty	
4	0-25	mzc1	10YR43 00						11	4	HR	20							
	25-50	zc	10YR54 00						0	0	HR	3		M					
	50-60	zc	10YR54 00						0	0	HR	15		M				Impen 60 flinty	
5	0-30	mzc1	10YR43 00						11	0	HR	18							
	30-55	mzc1	10YR74 81						0	0	CH	50		M			Y		
	55-70	ch	10YR81 74						0	0	HR	5		P			Y	Impen 60 hard/dry	
6	0-30	mzc1	10YR43 00						13	5	HR	25							
	30-35	mzc1	10YR54 00						0	0	HR	40		M				Impen 35 flinty	
7	0-27	mzc1	10YR43 00						17	11	HR	30							
	27-40	mzc1	10YR54 00						0	0	HR	40		M				Impen 40 flinty	
8	0-27	mzc1	10YR43 00						20	10	HR	30							
	27-40	mzc1	10YR54 00						0	0	HR	35		M				Impen 40 flinty	
9	0-25	mzc1	10YR43 00						18	11	HR	30							
	25-40	mzc1	10YR54 00						0	0	HR	40		M				Impen 40 flinty	
10	0-25	mzc1	10YR43 00						14	5	HR	25							
	25-40	mzc1	10YR54 00						0	0	HR	35		M				Impen 40 flinty	
11	0-25	mzc1	10YR43 00						15	7	HR	25							
	25-35	mzc1	10YR54 00						0	0	HR	35		M				Impen 35 flinty	
12	0-28	mzc1	10YR43 00						17	8	HR	25							
	28-40	mzc1	10YR54 00						0	0	HR	40		M				Impen 40 flinty	

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED	----STONES----			STRUCT/	SUBS	IMP	SPL	CALC
				COL	ABUN	CONT	COL.	GLE	>2	>6	LITH	TOT			
13	0-28	mzc1	10YR43 00					17	10	HR	25				
	28-40	mzc1	10YR54 00					0	0	HR	35	M		Impen 40 flinty	
14	0-27	mzc1	10YR43 00					16	8	HR	25				
	27-40	mzc1	10YR54 00					0	0	HR	35	M		Impen 40 flinty	
15	0-25	mzc1	10YR43 00					19	11	HR	30				
	25-40	mzc1	10YR54 00					0	0	HR	35	M		Impen 40 flinty	
16	0-25	mzc1	10YR43 00					16	6	HR	25				
	25-40	mzc1	10YR54 00					0	0	HR	40	M		Impen 40 flinty	
17	0-25	mzc1	10YR43 00					16	8	HR	25				
	25-45	mzc1	10YR54 00					0	0	HR	35	M		Impen 45 flinty	
18	0-28	mzc1	10YR43 00					16	3	HR	25				
	28-45	mzc1	10YR54 00					0	0	HR	35	M		Impen 45 flinty	
19	0-27	mzc1	10YR43 00					15	7	HR	25				
	27-40	mzc1	10YR54 00					0	0	HR	35	M			
	40-50	mzc1	10YR54 00					0	0	HR	40	M		Impen 50 flinty	
20	0-27	mzc1	10YR43 00					14	6	HR	25				
	27-40	mzc1	10YR54 00					0	0	HR	35	M		Impen 40 flinty	
21	0-30	mzc1	10YR43 00					14	5	HR	25				
	30-35	mzc1	10YR54 00					0	0	HR	40	M		Impen 35 flinty	
22	0-25	mzc1	10YR43 00					15	8	HR	25				
	25-50	mzc1	10YR54 00					0	0	HR	35	M		Impen 50 flinty	
23	0-28	mzc1	10YR42 00					18	6	HR	30				
	28-40	mzc1	10YR54 00					0	0	HR	40	M		Impen 40 flinty	
24	0-25	mzc1	10YR42 00					27	15	HR	35				
	25-45	mzc1	10YR54 56					0	0	HR	40	M		Impen 45 flinty	
25	0-28	mzc1	10YR42 00					10	5	HR	15				
	28-45	mzc1	10YR53 54					0	0	HR	20	M			
	45-70	mzc1	10YR53 52 10YR56 00 C					Y	0	0	HR	35	M		Impen 70 flinty
26	0-28	mzc1	10YR42 00					8	2	HR	12				
	28-45	mzc1	10YR54 00					0	0	HR	20	M			
	45-60	hzc1	10YR53 00 10YR56 00 C					Y	0	0	HR	5	M		
	60-120	c	10YR52 00 10YR56 00 C				00MN00	00	Y	0	0	HR	5	M	
27	0-25	mzc1	10YR42 00					10	2	HR	15				
	25-50	mzc1	10YR54 00 10YR56 00 F					0	0	HR	40	M		Impen 50 flinty	

SAMPLE	DEPTH	TEXTURE	COLOUR	----MOTTLES-----			PED COL.	----STONES----			STRUCT/ CONSIST	SUBS STR POR IMP SPL CALC		
				COL	ABUN	CONT		GLE	>2	>6			LITH	TOT
28	0-25	mzc1	10YR42 00					20	8	HR	30			
	25-45	mzc1	10YR54 00					0	0	HR	35	M Impen 45 flinty		
29	0-30	mzc1	10YR42 00					18	8	HR	30			
	30-45	hzc1	10YR54 56					0	0	HR	40	M Impen 45 flinty		
30	0-30	mzc1	10YR42 00					5	0	HR	10			
	30-45	mzc1	10YR54 00	00MN00	00	F		0	0	HR	10	M		
	45-55	mzc1	10YR53 00	10YR56	00	C		Y	0	0	HR	10	M	
	55-75	hzc1	10YR53 52	10YR56	00	C		Y	0	0	HR	15	M Impen 75 flinty	
31	0-30	mzc1	10YR42 00					5	0	HR	10			
	30-45	mzc1	10YR54 00	10YR56	00	F		0	0	HR	10	M		
	45-60	hzc1	10YR53 00	10YR58	00	C		Y	0	0	HR	15	M	
	60-75	c	25Y 52 00	10YR56	00	C	00MN00	00	Y	0	0	HR	15	M Impen 75 flinty
32	0-30	mzc1	10YR42 00					6	1	HR	15			
	30-55	hzc1	10YR53 00	10YR56	00	C	00MN00	00	Y	0	0	HR	20	M
	55-80	c	25Y 53 00	10YR58	00	M		Y	0	0	HR	25	M Impen 80 flinty	
33	0-28	mzc1	10YR42 00					12	0	HR	20			
	28-40	mzc1	10YR44 54					0	0	HR	25	M Impen 40 flinty		
34	0-30	mzc1	10YR42 00					12	5	HR	20			
	30-50	c	10YR53 00	10YR56	00	C		Y	0	0	HR	35	M Impen 50 flinty	
35	0-30	mzc1	10YR42 43					5	1	HR	8			
	30-55	hzc1	10YR54 00	10YR56	00	F		0	0	HR	5	M		
	55-60	c	10YR53 00	10YR56	00	C	00MN00	00	Y	0	0	HR	40	M Impen 60 flinty
36	0-30	mzc1	10YR42 43					7	5	HR	12			
	30-50	mzc1	10YR54 00					0	0	HR	35	M		
	50-60	mzc1	10YR54 00	10YR56	00	C	00MN00	00	Y	0	0	HR	40	M Impen 60 flinty prob pale peds
37	0-30	z1	10YR43 00					14	4	HR	20			
	30-40	hzc1	10YR44 00					0	0	HR	35	M		
	40-60	c	75YR46 00					0	0	HR	40	M Impen 60 flinty		
38	0-30	mzc1	10YR43 00					5	1	HR	10			
	30-40	mzc1	10YR44 00					0	0	HR	20	M		
	40-50	mzc1	10YR44 00					0	0	HR	35	M Impen 50 flinty		
39	0-30	mzc1	10YR42 43					6	2	HR	12			
	30-45	c	10YR53 00	10YR56	00	C	00MN00	00	Y	0	0	HR	10	M
	45-50	c	10YR53 00	10YR56	00	C	00MN00	00	Y	0	0	HR	50	M Impen 50 flinty