

AGRICULTURAL LAND CLASSIFICATION

Axis PED

Kronospan, Chirk



Our Ref: SES/AP/KPC/#1

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Client:

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AGRICULTURAL LAND CLASSIFICATION

Kronospan, Chirk

A report prepared on behalf of ***Soil Environment Services*** by:

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DRAWING 1 ALC Grade and survey points

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STATEMENT OF COMPETENCE

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1. INTRODUCTION

An Agricultural Land Classification (ALC) has been carried out on ~15 ha of land north of the current Kronospan site at Chirk (Drawing 1). The site is centred on Grid Ref: 328744,339307. The survey was conducted on the 4th April 2022 and classified the land into one or more of the below grades (see Drawing 1). On the survey date, the site was mainly in agricultural use.

1.1 Methodology

Agricultural land is classified into the following grades according to the 1988 guidelines¹.

Grade	Description
1	Excellent quality agricultural land with no or very minor limitations to agricultural use.
2	Very good quality agricultural land with minor limitations which affect crop yield, cultivation or harvesting.
3a 3b	Good quality agricultural land capable of producing moderate to high yields of a narrow range of arable crops or moderate yields of a wider range of crops. Moderate quality agricultural land capable of producing moderate yields of a narrow range of crops or lower yields of a wider range of crops.
4	Poor quality agricultural land with severe limitations which significantly restrict the range of crops and/or level of yields.
5	Very poor quality agricultural land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

The classification includes an initial desktop investigation to examine previously mapped soil types and to note the drift and solid geology followed by the field survey consisting of auger borings at one every 100 m in general and a pit excavated in each of the main soil types to confirm the structures and stone content if needed. Laboratory analysis of soil textures is undertaken if needed in order to confirm textures such the *heavy/medium* clay and *medium/fine* sand categories or stone content. All site survey profile data is listed in Appendix A.

All of the potential limitations are assessed and then the most limiting factor dictating the ALC grade was determined for this site and is detailed in Table 2.

1.2 Previous ALC gradings

Grading on the Welsh Predictive ALC map indicated the site is located on ALC Grade 3b land. No detailed surveys have previously been undertaken.

2. CLIMATIC LIMITATIONS

2.1 Overall climate

The climatological data for the site is detailed in Table 1.

Table 1 Climatological information³		
Factor	Units	Value
Altitude AOD	m	90
Accumulated temperature	day°C (Jan-June)	1383.1
Average Annual Rainfall	mm	846.5
Field Capacity Days	days	199.9
Moisture Deficit Wheat	mm	89.9
Moisture Deficit Potatoes	mm	77.5
Overall climate ALC Grade	Grade 1	

Overall climate will not result in the most significant limiting factor for this site.

2.2. Local climate

Local climate will not result in a significant limiting factor for this site.

3 SITE LIMITATIONS

3.1 Gradient

The gradient will in general not result in a significant limiting factor for this site. Two locations: near Boring 1 and in an arc following the river from Boring 2 to 7 indicate a gradient just in excess of 7° and hence an ALC Grade of 3b.

3.2 Microrelief

The microrelief will generally not result in a significant limiting factor for this site other than for the slopes in excess of 7° as detailed above creating a wider of area of issue due to machinery use around the slopes.

3.3 Flooding

No risk of flooding from rivers or surface water has been identified across the site (<https://naturalresources.wales/flooding/...>).

4 SOIL LIMITATIONS

4.1 Texture and structure

The soils have medium clay loam topsoils over mainly heavy silty clay loam or clay subsoils with moderately developed, high packing density, coarse prismatic structure below ~ 30 cm depth. Some slight non significant variation exists across the site due to slope and proximity to the stream.

The site has previously been mapped as having soils of the Brickfield 3 Association. These soils are mapped as: *Slowly permeable seasonally waterlogged fine loamy fine loamy over clayey and clayey soils.*

(www.landis.org.uk).

Superficial Geology – 1:50 000 scales

Till, Devensian - Diamicton. Superficial Deposits

Bedrock Geology - 1:50 000 scale bedrock geology description

1:50 000 scale bedrock geology description: Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltstone And Sandstone.

4.2 Depth

Soil depth will not result in a significant limiting factor for this site.

4.3 Stoniness

Stoniness is not a direct significant limiting factor for soils noted on site.

4.4 Chemical

Chemical contamination is not present and will not result in a significant limiting factor for this site..

5. INTERACTIVE LIMITATIONS

5.1 Wetness

The combination of a Wetness Class of IV for the soils (see Appendix A) with the Field Capacity Days of 199.9 and a topsoil texture of medium clay loam results in a wetness limitation and hence ALC Grade 3b.

5.2. Droughtiness

The Available Water Capacity which subsequently when considered with respect to the Moisture Deficit for wheat and potatoes results in a Moisture Balance giving no droughtiness limitation for both wheat or potatoes.

5.3 Erosion

Erosion will not result in a significant limiting factor for this site.

6. AGRICULTURAL LAND CLASSIFICATION

6.1 Most limiting factor/s

Grade 3b

The site is limited by Wetness to ALC Grade 3b but also in a few places by gradient to 3b.

6.2 Current grading

This survey has resulted in an Agricultural Land Classification of the following grades (Drawing 1):

Table 2. ALC gradings and limitations			
Grade	ha	%	Limitation
1			
2			
3a			
3b	12.5	83.3	Wetness/ gradient
4			
5			
Non-agricultural land	2.5	16.7	Woodland or industrial
Total	15	100%	

DRAWING 1

ALC Grade

Key

ALC Grades

- Grade 1
- Grade 2
- Grade 3a
- Grade 3b
- Grade 4
- Grade 5
- Non agricultural land

- Boring
- Pit

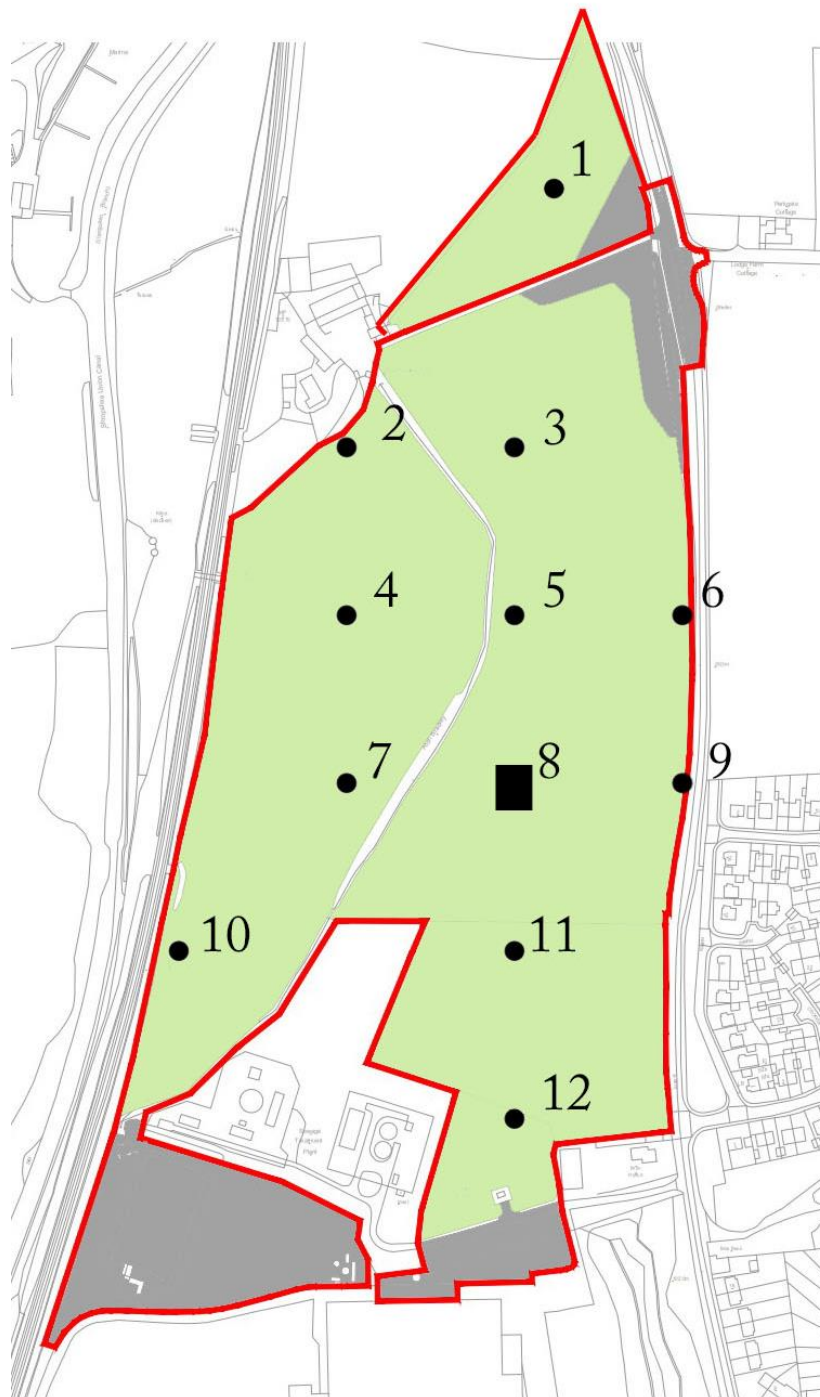
Soil Environment Services

Drawing Title: ALC Grade

Drawing No.: 1

Scale: 1:~5000

Date: 13/04/2022



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APPENDIX A

Soil profile data

Notes

1. All abbreviations relating to soil parameters are standard and derived from the guidance documents:

Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land. MAFF. 1988.
Soil Survey Field Handbook. Technical Monograph No.5. Soil Survey of England and Wales.1976.
2. The pit data is detailed in this table and information on structure and stone content copied to the appropriate boring profiles.
3. Any blanks or zeros in the cells indicate the data is not needed or appropriate for that cell.
4. If 'NA' is inserted in a cell the information is not appropriate on this occasion.
5. Boring or pit locations are directly (within 2 m accuracy) on the grid reference corresponding to the points on the map unless otherwise stated.
6. A point directly marked on a track, boundary or other feature will be moved 2-3 m off the point or omitted if surrounding points and soil types allow.
7. Borings that are potentially within 15 m of a gas pipeline are limited to 0.4 m depth and the strata description in the data table below this depth will be extrapolated from nearby borings and upper strata characteristics.
8. The *Observation Density* is 1 per ha on a 100 m grid using a semi *Free Survey* method if appropriate*. The letter 'B' in the second column of the data table refers to an observation point at which a boring may have been undertaken. In some situations it is not possible to visit the location due to for example crop status or animals in a field. In some cases the location is visited and observation of the soils at the surface is sufficient. In all cases the soil, geology, topography, flood risk and aerial crop patterns are assessed from published sources and the soils will be subject to a full 120 cm depth boring either side of a non-visited or non-bored point. If all data sources are agreeable, a soil pattern can be established.

* British Society of Soil Science. Working With Soil – The Professional Competency Scheme. Agricultural Land Classification: England and Wales. How2 sheet 4.2.4. 2018.
9. For moisture balance calculations, *strongly*, *moderately* and *well developed* structure will equate to *good*, *moderate* or *poor* structure terms respectively in Table 14 of the guidelines.
10. Pit information in addition to that listed in the table below will be detailed in Section 4.1 and 4.3 if needed.

Obs point	Grid ref. if off intersection	Boring or Pit	(Bap) pe:G	Base Depth (cm)		Text.	Calc	Matrix colour	Mott / black ferro. conc. % / depth	Mott colour or ferro. conc. if blank	Ped face colour	Stns %	Stns type	Porosity	Struct (F=firm consistence)	Degree of development	SPL depth (cm)	Gleying depth (cm)	SWC	Grade (wetness)	TAv	EAv	StTAv	StEAv	MBW	Grade (Drought: WHEAT)	MBP	Grade (Drought: POTATOES)
1	328827 339555	B	s7	25		MZCL	N	10YR32	2/10	10YR46		2	HR				25	25	IV	3b	19		1		39.18	1	34.89	1
				55		MZCL		10YR51	10/25	10YR46		5	HR	P	CP	MD					17	10	1	0.5				
				120		HZCL		2.5Y52	15/55	7.5YR46		5	HR	P	M	WK					12	6	1	0.5				
				120								0									0	0	0	0				
2		B	s7	30		MCL	N	10YR31	2/10	7.5YR46		2	HR				30	30	IV	3b	18		1		37.08	1	27.02	1
				52		HCL		10YR52	5/30	10YR56		10	HR	P	CP	MD					16	10	1	0.5				
				120		C		7.5YR54	10/52	10YR56	7.5YR53	10	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
3		B	s7	25		MCL	N	10YR22				2	HR				25	25	IV	3b	18		1		37.57	1	29.29	1
				55		C		7.5R43	10/25	7.5YR46	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		C		2.5Y52	20/55	7.5YR46		15	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
4		B	s7	30		MCL	N	10YR31	2/10	7.5YR46		2	HR				30	30	IV	3b	18		1		37.08	1	27.02	1
				52		HCL		10YR52	5/30	10YR56		10	HR	P	CP	MD					16	10	1	0.5				
				120		C		7.5YR54	10/52	10YR56	7.5YR53	10	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
5		B	s7	25		MCL	N	10YR22				2	HR				25	25	IV	3b	18		1		37.57	1	29.29	1
				55		C		7.5R43	10/25	7.5YR46	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		C		2.5Y52	20/55	7.5YR46		15	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
6		B	s7	20		MCL	N	10YR22				2	HR				20	20	IV	3b	18		1		36.59	1	28.31	1
				55		C		7.5R43	10/20	7.5YR46	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		C		2.5Y52	20/55	7.5YR46		15	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
7		B	s7	25		MCL	N	10YR31	2/10	7.5YR46		2	HR				25	25	IV	3b	18		1		35.50	1	25.44	1
				52		HCL		10YR52	5/25	10YR56		10	HR	P	CP	MD					16	10	1	0.5				
				120		C		7.5YR54	10/52	10YR56	7.5YR53	10	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
8		P	s7	25		MCL	N	10YR22				2	HR				25	25	IV	3b	18		1		37.57	1	29.29	1
				55		C		7.5R43	10/25	7.5YR46	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		C		2.5Y52	20/55	7.5YR46		15	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
9		B	s7	25		MCL	N	10YR22				2	HR				25	25	IV	3b	18		1		37.57	1	29.29	1
				55		C		7.5R43	10/25	7.5YR46	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		C		2.5Y52	20/55	7.5YR46		15	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
10		B	s7	20		MCL	N	10YR42	2/10	7.5YR46		2	HR				20	20	IV	3b	18		1		40.62	1	28.50	1
				50		HCL		2.5Y52	5/20	7.5YR46		2	HR	P	CP	MD					16	10	1	0.5				
				120		HZCL		2.5Y53	10/50	10YR46		2	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
11		B	s7	25		MCL	N	10YR42				2	HR				25	25	IV	3b	18		1		40.23	1	28.82	1
				50		HCL		10YR43	5/25	7.5YR56	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		HCL		10YR53	10/50	7.5YR56		5	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				
12		B	s7	25		MCL	N	10YR42				2	HR				25	25	IV	3b	18		1		40.23	1	28.82	1
				50		HCL		10YR43	5/25	7.5YR56	7.5YR53	2	HR	P	CP	MD					16	10	1	0.5				
				120		HCL		10YR53	10/50	7.5YR56		5	HR	P	M	WK					12	7	1	0.5				
				120								0									0	0	0	0				

SES Ltd undertake several dozen Agricultural Land Classification (ALC) or Land Capability Classifications for Agriculture (LCCA-Scotland) surveys a year and have worked on sites up to 1000 ha including housing, roads, solar farm and mineral extraction developments.. We have been undertaking ALC surveys for 25 years and have won many contracts to supply Land Classification reports to local authorities as part of their strategic development plans. A number of our staff have attended the training course Agricultural Land Classification: England and Wales. Working with Soil – The IPSS Professional Competency Scheme. BSSS & DEFRA.

DR ROBIN DAVIES BSc PhD F.I.SoilSci. (Managing Director)

- Fellow of The British Society of Soil Science
- Council Member of The Institute of Professional Soil Scientists for 4 years.
- PhD Soil Physics - Agricultural land drainage - University of Newcastle upon Tyne
- Founder and Managing Director of Soil Environment Services Limited for 25 years.

Selected peer reviewed scientific papers:

- * **Soil nitrogen depletion - the threat from soil stockpiling.** Environmental Scientist: Journal of The Institution of Environmental Sciences, 1997.
- * **Nitrogen loss from a soil, restored after surface-mining.** Journal of Environmental Quality, 1995
- * **The influence of soil factors on the growth of a grass/clover sward on a restored site in Northumberland.** Grass & Forage Science, 1994.
- * **The effect of post-restoration cropping regime on some physical properties of a restored soil.** Soil Use & Management, 1994
- * **Water availability in a restored soil.** Soil Use & Management, 1992.
- * **A laboratory Method for Investigating the Stabilisation of Mole Channels.** J.Agric.Eng.Res.1991.

LOUISE TAVASSO BSc (Hons) . (Soil surveyor/ Environmental Consultant)

Member of British Society of Soil Science

Postgraduate short course Contaminated Land Risk assessment – LQM Nottingham University

Worked for Soil Environment Services Limited for 16 years. Environmental consultant with initial work in contaminated land risk assessment and since 2011 as assistant soil surveyor with last three years as lead consultant on agricultural land classification surveys. All work areas have required field survey and identification and description of soils combined with an understanding of soil processes for reporting.

Completed the BSSS Agricultural Land Classification Course – 2021.



Main areas of specialisation

1 **Agricultural Land Classification**

Soil survey and Agricultural Land Classification for planning applications –, roads, housing, solar parks. Fully conversant with the procedures of the *Agricultural Land Classification of England and Wales, Guidelines and criteria for grading the quality of agricultural land*, 1988, MAFF, London.

2 **Soil survey for habitat restoration**

Soil survey and nutrient analysis assessment for conversion of farmland to species rich grassland.

3 **Contaminated land risk assessment**

Phase 1 site survey risk assessment of contaminated land; site investigation, on-site monitoring; risk analysis, modelling and communication; recommendations for Phase 2 and remediation options.

Examples of Agricultural Land Classification (ALC or LCCA Scotland) consultancy work

Kier Mining. Greenburn Opencast Coal Site. Soils and deep peat survey for LCCA report soil resources planning. 2011

Newcastle International Airport Ltd. ALC survey for solar park development. 2021.

Examples of soil survey habitat creation consultancy work

BSG Ecology. Backwork Estate – farmland conversion to wildflower meadow. 2020.

Private garden owner. Soil survey and recommendation for drainage system design. 2021

Examples of contaminated land consultancy work

Numerous risk assessments on petrol stations for hydrocarbon leakages (2006-2019)

Farm building risk assessments for conversion to residential housing (2006-2019)

GENERAL INFORMATION SOURCES

1. ***Agricultural Land Classification of England and Wales***. Revised guidelines and criteria for grading the quality of agricultural land. MAFF. 1988.
2. ***Soil Survey Field Handbook***. Technical Monograph No.5. Soil Survey of England and Wales.1976.
3. ***Climatological Data for Agricultural Land Classification***, The Met. Office 1989
4. ***Soil Map of England and Wales: 1:250 000***. Soil Survey of England and Wales, Harpenden.
5. ***Soils and Their Use in Wales***. Soil Survey of England and Wales,
6. ***Agricultural Land Classification Map*** 1:250 000. MAFF 1983.
7. ***Risk of Flooding***: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>
8. ***Geology of Britain Viewer***. Reproduced with the permission of the British Geological Survey ©NERC. All rights Reserved
9. ***Butler, B E. Soil Classification for Soil Survey Monographs on Soil Survey (1980)*** Clarendon Press, Oxford
10. ***Munsell Soil Colour Charts***, Munsell Colour, Grand Rapids 1994.

GLOSSARY

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1997).

1. Terms used on computer database, in order of occurrence.

GRID REF: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

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

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

GLEYS, SPL: Depth in centimetres to gleying or slowly permeable layer.

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

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

DRT: Best grade according to soil droughtiness.

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				

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

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)

MOTTLE COL: Mottle colour using Munsell notation.

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%+

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.

PED. COL: Ped face colour using Munsell notation.

GLEY: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

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 or metamorphic rock	

Stone contents are given in % by volume for sizes >2cm, >6cm and total stone >2mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

<u>Degree of development</u>	WA: Weakly developed Adherent	WK: Weakly developed
	MD: Moderately developed	ST: Strongly developed
<u>Ped size</u>	F: Fine	M: Medium
	C: Coarse	VC: Very coarse
<u>Ped Shape</u>	S: Single grain	M: Massive
	GR: Granular	AB: Angular blocky
	SAB: Sub-angular blocky	PR: Prismatic
	PL: Platy	

CONSIST: Soil consistence is described using the following notation:

L: Loose	VF: Very Friable	FR: Friable	FM: Firm
VM: Very firm	EM: Extremely firm	EH: Extremely Hard	

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

V: Visual	S: Sieved	D: Displacement
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MOTTLE SIZE:

EF:	Extremely fine <1mm	M:	Medium 5-15mm
VF:	Very fine 1-2mm	C:	Coarse >15mm
F:	Fine 2-5mm		

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (OM) or grey (GM).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' might also be noted as RRC.

MANGANESE CONCRETIONS: Assessed by volume

N:	None	M:	Many	20-40%
F:	Few	VM:	Very Many	>40%
C:	Common			

POROSITY:

P:	Poor	- less than 0.5% biopores at least 0.5mm in diameter
G:	Good	- more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per 100cm ² :		Very Fine and Fine	Medium and Coarse
F:	Few	1-10	1 or 2
C:	Common	10-25	2 - 5
M:	Many	25-200	>5
A:	Abundant	>200	

ROOT SIZE

VF:	Very fine	<1mm	M:	Medium	2 - 5mm
F:	Fine	1-2mm	C:	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp:	<0.5cm	Gradual:	6 - 13cm
Abrupt:	0.5 - 2.5cm	Diffuse:	>13cm
Clear:	2.5 - 6cm		

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*

* See Soil Survey Field Handbook (Hodgson, 1997) for details.