



Appendix 1 Land Capability Classification for Agriculture (LCCA)

Howpark Solar Farm

Eurowind Energy Limited

SLR Project No.: 428.V64539.00001

***LAND CAPABILITY CLASSIFICATION
for AGRICULTURE***

SLR Consulting Limited

Howpark Solar PV Farm



Our Ref: SES/SLR/HSF/#1

Date: 3rd March 2023

Client:

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***LAND CAPABILITY CLASSIFICATION
for AGRICULTURE***

Howpark Solar PV Farm

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Drawing 1 LCCA Class

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1. INTRODUCTION

A Land Capability Classification for Agriculture (LCCA) has been carried out on c.23 ha of land at Howpark Farm (Drawing LCCA/1). The site is centred on Grid Ref. 383756, 666256.

Agricultural land is classified into the following categories according to the 1991 guidelines!:

Class	Description
1	Land capable of producing a very wide range of crops
2	Land capable of producing a wide range of crops
3	Land capable of producing a moderate range of crops <i>Division 1.</i> Land capable of producing high yields of a narrow range of crops (cereals & grass) and/or moderate yields of a wider range. <i>Division 2.</i> Land capable of average production, high yields of grass, barley and oats are often achieved.
4	Land capable of producing a narrow range of crops <i>Division 1.</i> Land suited to rotations, primarily of long ley grassland but also, forage crops and cereals for stock feed. <i>Division 2.</i> Primarily grassland with some potential for other crops.
5	Land capable of use as improved grassland <i>Division 1.</i> Land well suited to reclamation and to use as improved grassland <i>Division 2.</i> Land moderately suited to reclamation and to use as improved grassland. <i>Division 3.</i> Land marginally suited to reclamation and to use as improved grassland.
6	Land capable only of use as rough grazing <i>Division 1</i> High grazing value. <i>Division 2</i> Moderate grazing value. <i>Division 3.</i> Low grazing value
7	Land of very limited agricultural value

The survey was conducted in accordance with the current guidelines on the 1st March 2023 and classifies the land into one or more of the above classes.

On the survey date the site was in agricultural use.

2. METHODOLOGY

Land Capability Classification for Agriculture (LCCA) is undertaken strictly in accordance with:

Land Capability Classification for Agriculture. Macaulay Land Use Research Institute. 1991.

The classification includes an initial desktop investigation to examine previously mapped soil types and to note the drift and solid geology. This included consultation of:

Soil Survey of Scotland 1:250 000
British Geological Survey 1:50 000 solid and drift map.

The survey consisted of carrying out a number of hand auger borings to a depth of 1.2 m (where possible), undertaken on a 100 m grid to examine soil conditions using soil survey methods. This data was used to map the principal soil types for determining the LCCA.

All soil horizons and cropping surfaces removed were carefully replaced following excavation. The soil removed during the augering was examined in accordance with:

Soil Survey Field Handbook
Describing and Sampling Soil Profiles
Soil Survey of England and Wales, Technical Monograph No. 5, 1976

Soil Classification for Soil Survey
Monographs on Soil Survey
Butler, B E (1980) Clarendon Press, Oxford

Climatological data¹ was used to determine the overriding site limitation and for interaction with soil parameters (Appendix A). The above information was cross referenced with geological surveys, previous soil surveys and the 1:50 000 series LCCA survey relevant for this site to substantiate the findings. The LCCA class was then determined for this site and for the current survey and is detailed on Drawing 1.

Other factors used for LCCA classes, but which give no limitation at this site, are not discussed.

3. BASELINE CONDITIONS

3.1. Climate and flooding

The climatological data for the site has been calculated using information from weather stations nearest to the site and can be found in Table 1 below.

Factor	Units	Whitchester	Marchmont	Haddington	Site
Altitude AOD	m	255	152	49	225
Acc temp. lower qtre	day°C (Jan-June)	1022	1125	1219	1073.5*
PSMD med of max	mm	ND	ND	166	137.5
Field Capacity Days		150-175	150-175		150-175

*Estimate based on the site location between/near the given weather stations.

The LCCA class limitation according to climate is Class 2 as assessed to be between Whitchester and Marchmont from which locations the meteorological data has been used. An average of PSMD data for nearby weather stations Haddington and Gladhouse Reservoir put and average PSMD for the site at 137.5.

The site is not at risk from flooding from surface water, rivers or seas (<https://map.sepa.org.uk/floodmaps/FloodRisk/Risk>).

3.2. Soils, geology and topography

3.2.1. Soils

One general soil type was noted for the purposes of LCCA grading.

The soils are mapped as *Ettrick soils; brown earths with deep, poorly drained soils drifts derived from Lower Paleozoic greywackes and shales. Foothills and undulating lowlands with gentle and strong slopes. Sandy silt loam within topsoil but finer textures e.g. clay loam at depth. Drift deposits are slightly coarser in texture. Slightly stony.*

Map unit 206 Brown forest soils; some brown forest soils with gleying. Landforms include foothills and undulating lowlands with gentle and strong slopes.

Map unit 209 Brown forest soils with gleying, some noncalcareous gleys. Landforms include foothills and undulating lowlands with gentle and strong slopes.

Map unit 229 Peaty podzols, some peaty gleys. Landforms include hills with simple convex steep and strong slopes.

Source: *Soil Survey of Scotland - Eastern Scotland 1982 MLURA*

This study has identified the soils to be generally heavy silty clay loam, silt loam or peat topsoil over clay loam or silt loam subsoils which are slightly to moderately stony at depth across the site. Textural variation does exist but is not generally significant in influencing the class.

3.2.2. Geology

Superficial Geology *1:50 000 scale superficial deposits description:*

East of the site - *Alluvium - Silt, sand and gravel.*

No information available for the west of the site

Bedrock Geology *1:50 000 scale bedrock geology description:*

Gala Group – Wacke

BGS <https://mapapps.bgs.ac.uk/geologyofbritain/>

3.2.3. Topography

The site is assessed to have no significant topographical issues which would limit the LCCA classification. The survey area has gradients which were not in excess of 7 degrees which would result in an LCCA Class of 2.

3.3 Current agriculture

At the time of the survey, the site was in agricultural use as arable and grazing land.

4. FIELDWORK RESULTS AND CALCULATIONS

4.1. Descriptions of soil types

A summary of the features of the dominant soil type is listed in Table 2 with all field data in Appendix A.

Table 2 Soil type key features

	Topsoil	Subsoil
Type 1	Generally silt loam or silty clay loam textures with mottling from 25 cm	Generally weak or massive structured at depth silty clay loam textures with gleying to depth and high packing density. Slowly permeable layer below 25 cm. Moderately stoney from approximately 45 cm.
Type 2	Peat topsoil with mottling from 10 cm	Generally weak or massive structured at depth silty loam or silty clay loam textures with gleying to depth and high packing density. Slowly permeable layer below 15 cm. Moderately stoney from approximately 55 cm.

4.2. Wetness limitation

Type 1 soils are	Wetness Class IV
Depth to impermeable layer	25
Retained water capacity	Medium
Field capacity days	175-200
Workability/trafficability class	e

Type 2 soils are	Wetness Class V
Depth to impermeable layer	15
Retained water capacity	High
Field capacity days	175-200
Workability/trafficability class	f

For Type 1 soil this results in a LCCA Class Limit of 4 based on the above parameters.

For Type 2 soil this results in a LCCA Class Limit of 5 based on the above parameters.

4.3. Droughtiness limitation

The soils have only a slight droughtiness limitation for wheat and potatoes.

5. LAND CAPABILITY CLASSIFICATION FOR AGRICULTURE

5.1. Regional 1:50 000 map class

Classification on the 1:50 000 Land Capability Classification for Agriculture partial cover map indicated **LCCA Class 4.1 and 5.1** across the entire site with a small area of **3.1 on the north-west** (ref: *Land capability for agriculture (partial cover) | Scotland's soils (environment.gov.scot)*).



Source: https://map.environment.gov.scot/Soil_maps/?layer=5#

5.2. Current class

This survey has resulted in a Land Capability Classification for Agriculture of the following classes (Drawing 1):

Table 4. LCCA Classes and limitations		
Class	Area (ha)	Limitation
4.1	14	Wetness
5.1	9	Wetness

DRAWING 1

LCCA Class

Legend

-  LCCA class 4.1
-  LCCA class 5.1

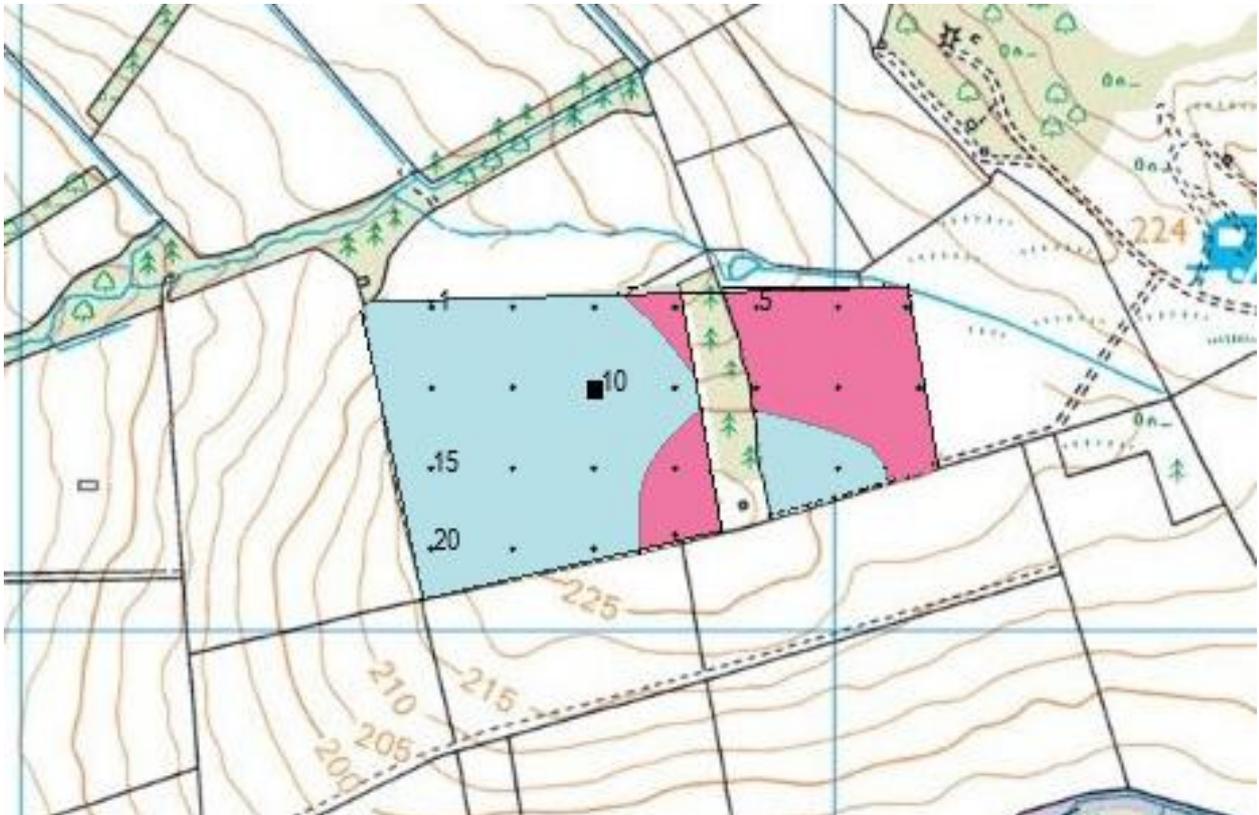
Soil Environment Services

Drawing Title: LCCA class

Drawing No.: 1

Scale: 1:10000

Date: 01/03/2023



APPENDIX A

Site Survey Field Notes

Obs point	Grid ref. # of intersection	Bearing or Pit	Grad. (deg)	Base Depth (cm)	Text.	Calc	Matrix colour	Motts. %/ depth	Mott colour	Ped face colour	Stns %	Stns type	Porosity	Struct (F=firm consistency)	Degree of development	SPL depth (cm)	Gleying depth (cm)	SWC
1		B	≤7	28	MCL	N	10YR31				10	HR				28		IV
				45	HCL		10YR42	30/28	10YR56	15	HR	P	CAB	WK				
				120	SCL		7.5YR43	35/45	10YR56	25	HR/MSST	P	M	WK				
				120						0								
2		B	≤7	25	MCL	N	10YR32				10	HR			25		IV	
				45	HCL		10YR42	25/25	10YR56	15	HR	P	CAB	WK				
				120	SCL		7.5YR43	35/45	10YR56	20	HR	P	M	WK				
				120						0								
3		B	≤7	25	HZCL	N	10YR42				5	HR			25		IV	
				50	HCL		7.5YR42	15/25	10YR56	10	HR	P	CAB	WK				
				120	HCL		7.5YR43	20/50	10YR56	30	HR/MSST	P	M	WK				
				120						0								
4		B	≤7	25	HZCL	N	10YR42				10	HR			25		IV	
				55	HCL		7.5YR42	15/25	10YR56	15	HR	P	CAB	WK				
				120	HCL		7.5YR53	25/50	10YR56	25	HR/MSST	P	M	WK				
				120						0								
5		B	≤7	15	P	N	7.5YR2.5/1				10	HR			15		V	
				70	ZL		10YR42	15/15	10YR56	15	HR/MSST	P	M	WK				
				120	ZL		10YR41	15/70	10YR56	30	HR/MSST	P	M	WK				
				120						0								
6		B	≤7	15	P	N	7.5YR2.5/1				10	HR			15		V	
				70	ZL		10YR42	10/15	10YR56	15	HR	P	M	WK				
				120	ZL		10YR42	15/70	10YR56	30	HR/MSST	P	M	WK				
				120						0								
7		B	≤7	15	P	N	7.5YR31				10	HR			15		V	
				75	ZL		10YR42	15/15	10YR56	20	HR	P	M	WK				
				120	ZL		10YR43	15/75	10YR56	25	HR/MSST	P	M	WK				
				120						0								
8		B	≤7	28	MCL	N	10YR31				15	HR			28		IV	
				50	HCL		10YR42	25/28	10YR56	15	HR	P	CAB	WK				
				120	HCL		7.5YR43	35/50	10YR56	20	HR	P	M	WK				
				120						0								
9		B	≤7	25	MCL	N	10YR31				10	HR			25		IV	
				45	HCL		10YR42	20/25	10YR56	15	HR	P	CAB	WK				
				120	HZCL		7.5YR42	30/45	10YR56	20	HR	P	M	WK				
				120						0								
10		P	≤7	25	HZCL	N	10YR42				10	HR			25		IV	
				50	HCL		7.5YR42	15/25	10YR56	15	HR	P	CAB	WK				
				120	HCL		7.5YR43	20/50	10YR56	25	HR/MSST	P	M	WK				
				120						0								
11		B	≤7	25	HZCL	N	10YR42				10	HR			25		IV	
				50	HZCL		7.5YR42	15/25	10YR56	15	HR	P	CAB	WK				
				120	HCL		7.5YR42	20/50	10YR56	30	HR/MSST	P	M	WK				
				120						0								
12		B	≤7	15	P	N	7.5YR2.5/1				10	HR			15		V	
				75	ZL		10YR42	15/15	10YR56	15	HR	P	M	WK				
				120	ZL		10YR43	15/75	10YR56	25	HR/MSST	P	M	WK				
				120						0								
13		B	≤7	15	P	N	7.5YR2.5/1				10	HR			15		V	
				75	ZL		10YR42	15/15	10YR56	15	HR/MSST	P	M	WK				
				120	ZL		10YR43	15/75	10YR56	25	HR/MSST	P	M	WK				
				120						0								
14		B	≤7	15	P	N	7.5YR31				10	HR			15		V	
				55	MSZL		5YR43	15/15	10YR56	10	HR	P	M	WK				
				120	MSZL		5YR43	15/75	10YR56	30	HR/MSST	P	M	WK				
				120						0								
15		B	≤7	25	ZL	N	10YR42				10	HR			25		IV	
				50	MCL		10YR42	15/25	10YR56	15	HR	P	CAB	WK				
				120	MZCL		7.5YR43	20/50	10YR56	25	HR/MSST	P	M	WK				
				120						0								
16		B	≤7	25	ZL	N	10YR31				10	HR			25		IV	
				50	MCL		10YR42	15/25	10YR56	10	HR	P	CAB	WK				
				120	MZCL		7.5YR43	20/50	10YR56	25	HR/MSST	P	M	WK				
				120						0								
17		B	≤7	28	MCL	N	10YR21				15	HR			28		IV	
				45	HCL		10YR42	20/28	10YR56	15	HR	P	CAB	WK				
				120	SCL		10YR42	35/45	10YR56	20	HR	P	M	WK				
				120						0								
18		B	≤7	15	P	N	7.5YR31				10	HR			15		V	
				75	MZCL		10YR31	10/15	10YR56	10	HR	P	CAB	WK				
				120	MZCL		10YR42	10/75	10YR56	30	HR/MSST	P	M	WK				
				120						0								
19		B	≤7	28	HCL	N	10YR31				10	HR			28		IV	
				45	SCL		7.5YR42	15/28	10YR56	15	HR	P	CAB	WK				
				120	HZCL		7.5YR43	15/45	10YR56	25	HR	P	M	WK				
				120						0								
20		B	≤7	28	MZCL	N	10YR32				10	HR			28		IV	
				45	HCL		10YR42	35/28	10YR56	15	HR	P	CAB	WK				
				120	SCL		7.5YR43	35/45	10YR56	20	HR	P	M	WK				
				120						0								

INFORMATION SOURCES

1. *Land Capability Classification for Agriculture*. Macaulay Land Use Research Institute, 1991.
2. *Soil Survey of Scotland: Sheet 5, South Eastern Scotland*. 1:250 000. Land Capability for Agriculture. Macaulay Land Use Research Institute, 1983.
3. *Soil survey Field Handbook*. Technical Monograph No.5. Soil Survey of England and Wales, 1976.
4. *Land Capability Classification for Agriculture Map* 1:250 000. Macaulay Land Use Research Institute, 1991.
5. *British Geological Survey* 1:50 000 national map.
6. *SEPA Flood Maps* 1:19,000 (Available at: <http://map.sepa.org.uk/floodmap/map.htm>)

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.

GLEY, 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.

GLEYS: 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

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 <2%	VM: Very Many	>40%
C: Common 2-20%		

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.