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MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 7, Annex 7.2: Soil survey data technical report

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Image of an offshore wind farm

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Acronyms

Acronym	Description
ALC	Agricultural Land Classification
MAFF	Ministry of Agriculture, Fisheries and Food
MHWS	Mean High Water Springs

Units

Unit	Description
cm	centimetres
kv	Kilovolts

1 Soil survey data technical report

1.1 Introduction

1.1.1.1 This technical report provides the results of hand auger boring soil surveys undertaken to inform Volume 3, Chapter 7: Land use and recreation of the Environmental Statement.

1.2 Survey area

1.2.1.1 The survey area comprised areas of agricultural land located within the Mona Onshore Development Area, landward of Mean High Water Springs (MHWS) where:

- There would be a permanent loss of agricultural land associated with the location of the Onshore Substation and associated earthworks
- Areas of land along the Onshore Cable Corridor and 400 kV Grid Connection Cable Corridor where representative locations of several main soil types were identified.

1.2.1.2 The location and geographic extent of the survey area is provided in Figure 1.1, Figure 1.2 and Figure 1.3 of this technical report.

1.3 Methodology

1.3.1.1 The soils survey were undertaken using a 1.2 m Dutch hand auger to examine soil samples on site at approximately 100 m intervals within the survey area in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF) Agricultural Land Classification (ALC) of England and Wales, Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988).

1.3.1.2 The location of representative auger boring surveys were chosen to reflect the main soil types identified within the Mona Onshore Development Area, according to the desktop information presented in Volume 7, Annex 7.1: Published soils and agricultural land classification data technical report of the Environmental Statement.

1.3.1.3 In addition, the auger boring data has been supplemented by the examination of dug archaeological trenches available at the time of survey, together with the excavation of three further soil pits to identify soil structural characteristics and other soil profile characteristics noted during the auger boring survey in the main soil types. Further information regarding the archaeological investigations undertaken to date can be found in Volume 7, Annex 5.5: Trial trenching technical report of the Environmental Statement.

1.3.1.4 Soils sample textural analysis is provided in Appendix A at the end of this technical report.

1.3.2 Summary of ALC Survey Findings

1.3.2.1 The ALC survey work undertaken has identified a high overall level of consistency between the predicted ALC grades indicated on the Welsh Government predictive ALC mapping.

1.3.2.2 In terms of the ALC limitations identified, a slightly climatic limitation has been identified at the higher altitudes in excess of approximately 110- 120m where the overall ALC

grade cannot be higher than Grade 2. However, climate has not formed an overriding limitation within the areas surveyed in detail.

1.3.2.3 Within the areas of land surveyed as part of the ES, no areas have been separately identified as being limited by steep gradients in excess of 7 degrees. At the northern end of the survey, slopes steepen close to Auger Borings 11 and 12 as the land rises from here south into Gwrych Castle Wood. Similarly, south of Moelfre Isaf around auger borings 33 and 34, slopes are between 5 – 6 degrees.

1.3.2.4 At the northernmost part of the survey areas, to the north of Gwyrch Castle, the soil profiles are characteristic of the Abergele Soil series. Typically profiles comprise medium clay loam with approximately 10% tosoil stone >2cm in diameter, overlying increasingly stony medium and heavy clay loams upper subsoils and impenetrable stony layers. These profiles are limited by their stone contents, a droughtiness and/or depth limitation to Subgrade 3a.

1.3.2.5 Where the land begins to rise to the south closer to Gwyrch Castle Woods, the soils become shallower and stonier typically overlying bedrock below typically at 25-30cm depth. These soil profiles are limited by depth over the underlying bedrock and a reduced water holding capacity and droughtiness limitation. At the time of survey, these slopes were being cultivated for stubble turnips and it was notable that as the soils became increasingly shallow that the turnips were being pushed up above the soil surface where there was limited opportunity for the crop to develop in the soil horizon.

1.3.2.6 To the south of Llys Awel, the highest quality land within the areas surveyed has been identified. Deep soils of the Pentreath series have been identified where medium clay loam soils overlay similar upper subsoils and tend to become sandier with depth. These profiles are slightly limited by soil wetness to Grade 2. To the south of the main area of Grade 2 land identified, profiles become slightly heavier in texture with slowly permeable clays at depths of 60-65cm. These profiles typically fall into Wetness Class II or III and are limited to Subgrade 3a according to a soil wetness limitation.

1.3.2.7 An area of the Denbigh soil series was surveyed south of Moelfre Isaf. There is some variation in the Denbigh soils, which tend to be identified as Subgrade 3a within the predictive mapping. Soils are variable in terms of depth and stone content overlying bedrock. Where profiles are shallower and stonier (typically 30cm thickness above the shattered rock) then these profiles are more severely limited by soil depth and droughtiness to Subgrade 3b. Where profiles deepen and generally comprise 40-45cm of medium/heavy clay loam, these profiles are limited by soil depth and droughtiness to Subgrade 3a land.

1.3.2.8 The land at the proposed onshore substation site is dominated by soils of the Cottam soil series. Soil profiles typically comprise medium clay loam topsoils, overlying gleyed heavy clay loam upper subsoils and slowly permeable clayey lower subsoils at depths of 35-45cm. These profiles fall into Wetness Class IV and are limited to Subgrade 3b according to a soil wetness limitation.

1.3.2.9 On the south-western fringe of the onshore substation area the land begins to rise and the soils become drier and shallow as the soils thin over the underlying bedrock. Profiles typically comprise medium clay loam topsoils over heavy clay loam upper subsoils that become increasingly stony and impenetrable at depth. These profiles are limited by a slight droughtiness and/or depth limitation to Subgrade 3a.

1.4 Survey data

1.4.1 Key to auger boring data

Table 1.1: Key to Auger Boring Data.

Abbreviation	Definition
Textures	
Mcl	Medium clay loam
Scl	Sandy clay loam
Hcl	Heavy clay loam
C	Clay
Colours	
Db	Dark brown
Dgb	Dark greyish brown
B	Brown
Rb	Reddish brown
Yb	Yellowish brown
Others	
Cdom	Common distinct ochreous mottles
Fdom	Few distinct ochreous mottles
Mn concs	Manganese concretions
IMP	Impenetrable
SPL	Slowly permeable layer
TS	Topsoil Sample

1.4.2 Table of soil auger borings

Table 1.2: Summary of key desktop sources

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
1.	0 – 29	Db	10 YR 4/3	Mcl		Abergele	3a				Wetness	3a
	29 – 47	Gb	10 YR 5/2	Hcl	Fdom			Y	III/IV	N/A		
	47 – 70+	Rb	5 YR 5/4	C	Cdgm (Trench Adjacent) SPL							
2.	0 – 27	Db	10 YR 4/3	Mcl	10 % stone >2cm diameter(Trench observed)	Abergele	3a		I	2/3a MB Wheat -12 MB Potatoes 2	Droughtiness	3a
	27 – 40	B	10 YR 5/3	Mcl	15% stone (total)	(Gower)						
	40 – 55	Rb	5 YR 5/4	Mcl	Stony 20-30% (total)							
	IMP				Stony layer clear in trench							
3.	0 – 27	Db	10 YR 4/3	Mcl	10 % stone > 2cm in diameter (Trench observed)	Abergele	3a		I	3a MB: Wheat -17	Droughtiness	3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
										MB: Potatoes - 4		
	27 – 40	B	10 YR 5/3	Mcl	15% total stone	(Gower)						
	40 – 50	Rb	5 YR 5/4	Mcl	Stony 20-30%							
	IMP				Stony layer clear in trench							
4.	0 – 24	Db	10 YR 4/3	Mcl	10% stone >2cm (TS 2)	Abergele	3a		I	3b/3a	Depth/Droughtiness	3a (within 3a unit)
	24 – 35	Rb	5 YR 5/4	m/hcl	10-15% stone							
	35 – 42	Rb	5 YR4/4	C	Mn, brown mottles and stony 20%+							
	IMP											
5.	0 – 27	Db	10 YR 4/3	Mcl	10 % stone >2cm in diameter (Trench observed)	Abergele	3a		I	3a MB: Wheat -15 MB: Potatoes - 2	Wetness /Droughtiness	3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	27 – 40	B	10 YR 5/3	Mcl	15% total stone	(Gower)						
	40 – 50	Rb	5 YR 5/4	Mcl	Stony 20-30%							
	IMP				Stony layer clear in trench							
6.	0 – 20	Dgb	10YR 4/2	Hcl	5 – 10% > 2cm in diameter stone (shallow top)		3a	N/A	I	3b	Reduced topsoil layer – evidence Disturbance	
	20 – 40	Gb	10 YR 5/2	Hcl/c	Cdom 10% stone							
	IMP				Stony layer below – this profile is odd one in context of field – farmer comment that some of the land on the north side had had topsoil stripped and sold.		3a					3b (disturbed and heavier) (Maintained within overall area of Subgrade 3a
												WC III

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
7.	0 – 25	Drb	5 YR 5/3	Mcl/Scl	5-10% > 2cm diameter stone	Abergele/ Gower	3a/3b		I	MD Wheat -22 Potatoes -7	Depth/ Droughtiness	3a/3b (in 3a unit)
	25 – 35	Rb	5 YR 5/4	Mcl	Becoming stony							
	IMP											
7a	0 – 26	Drb	5 YR 5/3	Scl	10% > 2cm diameter stone	Abergele/ Gower	3a/3b		I	MD Wheat -21 Potatoes --10	Depth/ Droughtintess	3a/3b (in 3a unt)
	26 – 40	Rb	5 YR 5/4	Mcl	10-15% total (some larger limestone rocks)							
	40+	IMP										
8.	0 – 26	Drb	5 YR 5/3	Scl	10% + >2cm diameter stone	Abergele/ Gower	3a/3b		I	MD Wheat -20 Potatoes -7	Depth/ Droughtiness/Wetnes	3a/3b (in 3a unit)
	26 – 42	Rb	5 YR 5/4	Mcl	10-15% total (some larger limestone rocks)							
	42+	IMP										

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
9.	0 – 26	Db	10 YR 4/3	Mscl	10-15% plus large limestone flags. Notably stony and shallower moving uphill	Gower	3b		I	3b drought MD: Wheat – 39 Potatoes - 24	Depth/Droughtiness	3b
	Imp											
10.	0 – 25	Db	10 YR 4/3	Mscl	10-15% > 2cm diameter plus large limestone flags	Gower	3b		I	3b drought (as for 10)	Depth/Droughtiness	3b
	Imp											
11.	0 – 26	Db	10 YR 4/3	m/hcl	10-15% >2cm diameter plus large limestone flags	Gower	3b		I	3b drought/depth (as for 10)	Depth/Droughtiness	3b
	Imp											
12.	0 – 26	Db	10 YR 4/3	Hcl	10-15% >2cm diameter plus large limestone flags	Gower	3b		I	3b drought/depth (as for 10)	Depth/Droughtiness	3b
	Imp				(TS 1)							

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
13.	0 – 26	Db	10 YR 4/3	Mscl	10-15% >2cm diameter plus large limestone flags	Gower	3b		I	3b drought/depth	Depth/Droughtiness	3b
	26 – 30	Rb	5 YR 5/4	Mcl	Very stony							
	IMP											
14.	0- 22	Drb	5 YR 5/3	Msl	5-10% > 2cm diameter stone	Gower	3b		I	3b drought/depth	Depth/Droughtiness	3b
	22-28	Drb	5 YR 5/3 5/4	Mscl	Stony							
	IMP											
15.	0- 22	Drb	5 YR 5/3	Msl	10% > 2cm diameter stone	Gower	3b		I	3b drought/depth	Depth/Droughtiness	3b
	22-28	Drb	5 YR 5/3 5/4	Mscl	stony							
	IMP											
16.	0 – 28	Drb	5 YR 5/3	Mcl	<5% stone (TS 3)	Pentreath	2		WCI	N/A	Wetness	2
	28 – 45	Rb	5 YR 5/4	Mcl	<5% stone							
	45 – 60	Rb	5 YR 5/4	Msl	Gritty and mn concs							

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	60 – 95+	Rb/yb		Scl	Brownish mottles							
17.	0 – 27	Drb	5 YR 5/3	Mcl	<5% stone	Pentreath	2		WCI	N/A	Wetness	2
	27 – 45	Rb	5 YR 5/4	Scl	<5% stone							
	45 – 55	Rb	5 YR 5/4	Msl	Gritty and mn concs							
	55 – 95+	Rb/yb		Scl	Brownish mottles							
18.	0 – 29	Drb	5 YR 5/3	Szl		Pentreath	2		WCI	N/A	Wetness	2
	29 – 42	Rb	5 YR 5/4	Mcl								
	42- 70	Rb	5 YR 5/4	Mcl	5-10% stone, mn concs; stony at base							
	IMP											
19.	0 – 28	Drb	5 YR 5/3	Mcl	<5% stone	Pentreath	2		WCI	N/A	Wetness	2
	28 – 45	Rb	5 YR 5/4	Scl	<5% stone							
	45 – 55	Rb	5 YR 5/4	Msl	Gritty and mn concs							
	55 – 95+	Rb/yb	5YR 5/4 10 YR 5/6	Scl	Brownish mottles							
20.	0 – 27	Db	10 YR 4/3	Mcl		Pentreath	2	Y	WCIII	N/A	Wetness	3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	27 – 40	B	10 YR 5/3	Mcl								
	40 – 60	Yb/rb	5YR 5/6 5YR 5/4	Scl	Mix of reddish brown Hclwith the scl; few brown mottles							
	60 – 80+	y/rb	5 YR 5/6 5YR 5/4	C	Thick reddish clay; cdom in matrix							
21.	0 -26	Drb	5 YR 5/3	Scl	5% stone	Pentreath	2		WCI	N/A	Wetness	2
	26 – 50	Rb	5 YR 5/4	Scl	5-10% stone, increasing at the base							
	IMP											
22.	0- 28	Drb	5 YR 5/3	Mcl	2-3% stone	Pentreath	2		WCI	N/A	Wetness	2
	28 – 45	Rb	5 YR 5/4	Mcl	2-3% stone							
	45 – 90+	Rb	5 YR 5/4	mcl	5% stone gritty throughout							
23.	0- 28	Drb	5 YR 5/3	Mcl	2-3% stone	Pentreath	2		WCI	N/A	Wetness	2
	28 – 45	Rb	5 YR 5/4	Mcl	2-3% stone							
	45 – 90+	Rb	5 YR 5/4	mcl	5% stone gritty throughout							

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
24.	0 -26	Db/drb	5 YR 5/3	hcl	TS 4	Dinorbin/LLysfaen	3a		WCIII	N/A	Wetness	3a
	26-42	B	10 YR 5/3	hcl								
	42 – 65	Rb	5 YR 5/4	Hcl	cdom			Y				
	65+	Gb	10 YR 5/2	C	Cdom: SPL							
25	0 – 27	Drb	5 YR 5/3	Hcl/mcl		Dinorbin/LLysfaen	2/3a		WCI	N/A	Wetness	2/3a
	27 – 45	Rb	5 YR 5/4	hcl								
	45 – 75	Rb	5 YR 5/4	Sc/hcl	Mixed material with fdom and mn							
	75 – 95+	R	2.5YR 5/6	C+sc mixed	Mn concs							
26.	0- 28	Drb	5 YR 5/3	Mcl		Llysfaen	2		WCI	N/A	Wetness	2
	28 – 55	Rb	5 YR 5/4	mcl								
	55 – 85+	Rb	5 YR 5/4	Hcl	Slightly stony							
27.	0 – 27	Drb	5 YR 5/3	Mcl		Denbigh/LLysfaen	2/3a		WC II/III	N/A	Wetness	3a
	27 – 55	Rb	5 YR 5/4	Mcl								

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	55 – 65	Rb/yr	5YR 5/6	hcl								
	65-80+	Reddish	2.5 YR 5/6	C	Thick – wet ground here. SPL							
28.	0 – 26	Drb	5 YR 5/3	Mcl	5-10% stone > 2cm diameter	Denbigh/LLysfaen	2/3a		WCIII	N/A	Wetness	3a
	26 – 40	Rb	5 YR 5/4	Mcl	5% total stone							
	40 – 60	R	5YR 5/6	Hcl	5% stone							
	60 – 80+	Gb/rb		C	Cdom; mn (dug at base of trench) SPL							
29.	0 - 26	Db	10 YR 4/3	Mcl	5 – 10%> 2cm diameterstone	Denbigh	3a		WC II/III	N/A	Wetness	3a
	26 – 40	Rb	5 YR 5/4	Mcl/hcl	5% stone							
	40 – 60	Gb	10 YR 5/2	Hcl	Cdom; mn gritty stony at base							
	IMP											
30.	0 - 26	Db	10 YR 4/3	Mcl	5 – 10% >2cm diameter stone	Denbigh	3a		I	3a MB:Wheat -12 Potatoes 2	Depth/droughtiness	3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	26 – 43	Rb	5 YR 5/4	Mcl/hcl	5 – 10% total stone becoming stony at base							
	IMP											
31.	0 – 22	Dgb	10 YR 4/2	Mcl	10+% > 2cm diameter stone	Denbigh shallow	3b/4		I	3b droughitness MB Wheat -41 MB Potatoes -32	Depth/droughtiness	3b
	22 – 28	Gb	10 YR 5/2	Hcl	Stony (15% total)							
	IMP											
32.	0 – 20	Dgb	10 YR 4/2	Mcl	10+% > 2cm diameter stone	Denbigh shallow	3b/4		I	3b (as for 31)	Depth/droughtiness	3b
	22 – 28	Gb	10 YR 5/2	Hcl	Stony (15% total)							
	IMP											

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
33.	0 – 22	Dgb	10 YR 4/2	Mcl	10+% > 2cm diameter stone	Denbigh shallow	3b/a		I	3b (as for 31)	Depth/droughtiness	3b
	22 – 30	Gb	10 YR 5/2	Hcl	Stony (15% total)							
	IMP											
34.	0 – 22	Dgb	10 YR 4/2	Mcl	10+% > 2cm diameter stone	Denbigh shallow	3b/a		I	3b (as for 31)	Depth/droughtiness	3b
	22 – 28	Gb	10 YR 5/2	Hcl	Stony (15% total)							
	IMP											
35.	0 - 26	Db	10 YR 4/3	Mcl	5 – 10% > 2cm diameter stone	Denbigh	3a		I	3a MB:Wheat -12 Potatoes 2	Depth/droughtiness	3a
	26 – 43	dgb	10 YR 4/2	Mcl/hcl	10% total stone becoming stony at base							
	IMP											
36.	0 - 26	Db	10 YR 4/3	Mcl	5 – 10% > 2cm diameter stone	Denbigh	3a		I	3a	Depth/droughtiness	3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
										MB:Wheat -12 Potatoes 2		
	26 – 43	dgb	10 YR 4/2	Mcl/hcl	10% total stone becoming stony at base							
	IMP											
37.	0 – 22	Dgb	10 YR 4/2	Mcl/hcl	10+% > 2cm diameter stone	Denbigh shallow	3b/a		I	3b (as for 31)	Depth/droughtiness	3b
	22 – 30	Gb	10 YR 5/2	Hcl	Stony (shallow again here) (15% total)							
	IMP											
38.	0 – 22	Dgb	10 YR 4/2	Hcl	10+% > 2cm diameter stone	Denbigh shallow	3b/a		I	3b (as for 31)	Depth/droughtiness	3b
	22 – 30	Gb	10 YR 5/2	Hcl	Stony (15% total)							
	IMP											
Substation												
S1	0 -27	Db	10 YR 4/3	Mcl	Fdom; mn	Cottam	3b					3b

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	27 – 40	gb	10 YR 4/2	Hcl	Cdom; mn concs			Y	WC IV	N/A	Wetness	WC IV
	40 – 70+	Gb/rb	10 YR 5/2 5 YR 5/4	C	Cdom; mn SPL							
S2	0 – 25	Dgb	10 YR 4/2	Mcl	Wet; fdom	Cottam	3b		WC IV	N/A	Wetness	3b
	25 – 35	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	35 – 70+	G	5 YR 5/1	C	Cdom SPL							
S3	0 – 25	Dgb	10 YR 4/2	Mcl	Wet; fdom	Cottam	3b		WC IV	N/A	Wetness	3b
	25 – 33	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	33 – 70+	G	5 YR 5/1	C	Cdom SPL							
S4	0 – 26	Dgb	10 YR 4/2	m/hcl		Cottam	3b		WC IV	N/A	Wetness	3b
	26 – 35	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							
S5	0 – 25	Dgb	10 YR 4/2	Mcl	Wet; fdom	Cottam	3b		WC IV	N/A	Wetness	3b
	25 – 33	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	33 – 70+	G	5 YR 5/1	C	Cdom SPL							
S6	0 – 26	Dgb	10 YR 4/2	Mcl		Cottam	3b		WC IV	N/A	Wetness	3b
	26 – 45	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	45 – 70+	Gb	10 YR 5/2 (6/2)	C	Cdom SPL							
S7.	0 – 26	Dgb	10 YR 4/2	Mcl		Cottam	3b		WC IV	N/A	Wetness	3b
	26 – 45	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	45 – 70+	Gb	10 YR 5/2	C	Cdom SPL							

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
S8	0- 26	Dgb	10 YR 4/2	Mcl		Cottam	3b		WC IV	N/A	Wetness	3b
	26 – 35	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	35 – 60+	Gb	10 YR 5/2	C	Plastic (wet above the horizon); cdom;SPL							
S9.	0 - 25	Dgb	10 YR 4/2	Mcl		Cottam	3b		WC IV	N/A	Wetness	3b
	25 – 35	Gb	10 YR 5/2	Hcl	Cdom; mn			Y				WC IV
	35 – 60+	Gb	10 YR 5/2	C	Plastic ; cdom; SPL							
S10.	0 – 26	Dgb	10 YR 4/2	m/hcl		Cottam	3b		WC IV	N/A	Wetness	3b/4
	26 – 35	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							
S11.	0 – 28	Db	10 YR 4/3	Mcl	5 – 10% > 2cm stone stone	Flint	3b/a		WCI	3a droughtiness (just)		3a

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
										MB Wheat -8 Potatoes 8		
	28 – 55	B	10 YR 5/3	Hcl	5% total stone							
	55 – 60	B	10 YR 5/3	Hcl	Becoming stony (15% total)							
	IMP											
S12	0 – 28	Db	10 YR 4/3	Mcl	5- 10% > 2cm diameter stone	Flint	3b/a		WC I	3a drought MB: Wheat -18 Potatoes - 7	Droughtiness/dept	3a
	28 – 45	B	10 YR 5/3	Hcl	5% total stone							
	45 - 50	B	10 YR 5/3	Hcl	Becoming stony (15% total stone)/							
	IMP											
S13.	0 – 28	Db	10 YR 4/3	Mcl	fdom	Cottam	3b		WCIV	N/A	Wetness	3b
	28 – 45	B	10 YR 5/3	Hcl	Cdom; 5% stone							WCIV
	45 – 65	Gb	10 YR 5/2	Hcl/c	Cdom; SPL			Y				
	65 – 80+	Gb	10 YR 5/2	C	Cdom; plastic							

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
S14.	0 -28	Db	10 YR 4/3	Mcl								
	28 – 42	Gb	10 YR 5/2	Hcl	Cdom; mn	Cottam	3b	Y	WCIV	N/A	Wetness	3b
	42 – 70+	Rb	5 YR 5/4	C	Common brown mottles; mn; SPL							WCIV
S15.	0 -28	Db	10 YR 4/3	Mcl								
	28 – 40	Gb	10 YR 5/2	Hcl	Cdom; mn	Cottam	3b	Y	WCIV	N/A	Wetness	3b
	40 – 70+	Rb	5 YR 5/4	C	Common brown mottles; mn; SPL							WCIV
S16	0 – 28	Db		Mcl	10% > 2cm in diameter stone	Flint	3b/a		WC I	3a/3b Drought MB: Wheat -20 Potatoes -10	Droughtines/depth	3a
	28 – 45	B		Hcl	10% + total stone							
	45 - 50	B		Hcl	Becoming stony (15% total)							
	IMP											

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
S17.	0 – 26	Dgb	10 YR 4/3	Hcl/c	TS 5	Cottam	3b		WCIV	N/A	Wetness	3b (4)
	26 – 35	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							
S18.	0 – 25	Dgb	10 YR 4/3	mcl		Cottam	3b		WCIV	N/A	Wetness	3b
	25 – 34	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							
S19	0 – 28	Db	10 YR 4/3	Mcl	5% total stone	Flint / Cottam	3b/3a		WCII	N/A	Wetness	3a
	28 – 60	B	10 YR 5/3	Hcl	5% total stone							
	60 – 85+	Rb	5 YR 5/4	Hcl	Cdom; slightly stony							
S20	0 – 26	Dgb	10 YR 4/3	m/hcl		Cottam	3b		WCIV	N/A	Wetness	3b

Number	Depth	Colour	Munsell	Texture	Description	Soil Series	Welsh Government Predictive Grade	Gleyed	Wetness Class	Droughtiness	ALC Limitation	Site Survey ALC Grade
	26 – 35	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							
S21	0 – 26	Dgb	10 YR 4/3	Hcl/C		Cottam	3b		WCIV	N/A	Wetness	3b (4)
	26 – 35	Gb	10 YR 5/2	C	Cdom; mn (heavier texture)			Y				WCIV
	35 -80+	Rb	5 YR 5/4	C	Thick; common brown mottles; mn; SPL							

Table 1.3: Soil auger borings within the Mona Onshore Development Area.

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
1	0 – 29	Db	Mcl		Abergele	3a	3a
	29 – 47	Gb	Hcl	fdom			WC III/IV
	47 – 70+	Rb	C	Cdgm (Trench Adjacent) SPL			
2	0 – 27	Db	Mcl	10 % stone (Trench observed)	Abergele	3a	3a

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
	27 – 40	B	Mcl	15% stone	(Gower)		
	40 – 55	Rb	Mcl	Stony 20-30%			
	IMP			Stony layer clear in trench			
3	0 – 27	Db	Mcl	10 % stone (Trench observed)	Abergele	3a	3a
	27 – 40	B	Mcl	15% stone	(Gower)		
	40 – 50	Rb	Mcl	Stony 20-30%			
	IMP			Stony layer clear in trench			
4	0 – 24	Db	Mcl	10% stone (TS 2)	Abergele	3a	3a
	24 – 35	Rb	m/hcl	10-15% stone			
	35 – 42	Rb	C	Mn, brown mottles and stony 20%+			
	IMP						
5	0 – 27	Db	Mcl	10 % stone (Trench observed)	Abergele	3a	3a
	27 – 40	B	Mcl	15% stone	(Gower)		
	40 – 50	Rb	Mcl	Stony 20-30%			
	IMP			Stony layer clear in trench			
6	0 – 20	Dgb	Hcl	5 – 10% stone (shallow top)			
	20 – 40	Gb	Hcl/c	Cdom 10% stone			
	IMP			Stony layer below – this profile is odd one in context of field – farmer comment that some of the land on the north side had had topsoil stripped and sold.		3a	3b (potentially disturbed and heavier)

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
							WC III
7	0 – 25	Drb	Mcl/Scl	5-10% stone	Abergele/ Gower	3a/3b	3a/3b
	25 – 35	Rb	Mcl	Becoming stony			
	IMP						
7a	0 – 26	Drb	Scl	10% stone	Abergele/ Gower	3a/3b	3a
	26 – 40	Rb	Mcl	10-15% (some larger limestone rocks)			
	40+	IMP					
8	0 – 26	Drb	Scl	10% + stone	Abergele/ Gower	3a/3b	3a/3b
	26 – 42	Rb	Mcl	10-15% (some larger limestone rocks)			
	42+	IMP					
9	0 – 26	Db	Mscl	10-15% plus large limestone flags	Gower	3b	3b
	Imp						
10	0 – 25	Db	Mscl	10-15% plus large limestone flags	Gower	3b	3b
	Imp						
11	0 – 26	Db	m/hcl	10-15% plus large limestone flags	Gower	3b	3b
	Imp						
12	0 – 26	Db	Hcl	10-15% plus large limestone flags	Gower	3b	3b
	Imp			(TS 1)			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
13	0 – 26	Db	Mscl	10-15% plus large limestone flags	Gower	3b	3b
	26 – 30	Rb	Mcl	Very stony			
	IMP						
14	0- 22	Drb	Msl	5-10% stone	Gower	3b	3b
	22-28	Drb	Mscl	stony			
	IMP						
15	0- 22	Drb	Msl	10% stone	Gower	3b	3b
	22-28	Drb	Mscl	stony			
	IMP						
16	0 – 28	Drb	Mcl	<5% stone (TS 3)	Pentreath	2	2
	28 – 45	Rb	Mcl	<5% stone			
	45 – 60	Rb	Msl	Gritty and mn concs			
	60 – 95+	Rb/yb	Scl	Brownish mottles			
17	0 – 27	Drb	Mcl	<5% stone	Pentreath	2	2
	27 – 45	Rb	Scl	<5% stone			
	45 – 55	Rb	Msl	Gritty and mn concs			
	55 – 95+	Rb/yb	Scl	Brownish mottles			
18	0 – 29	Drb	Szl		Pentreath	2	2
	29 – 42	Rb	Mcl				

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
	42- 70	Rb	Mcl	5-10% stone, mn concs; stony at base			
	IMP						
19	0 – 28	Drb	Mcl	<5% stone	Pentreath	2	2
	28 – 45	Rb	Scl	<5% stone			
	45 – 55	Rb	Msl	Gritty and mn concs			
	55 – 95+	Rb/yb	Scl	Brownish mottles			
20	0 – 27	Db	Mcl		Pentreath	2	3a
	27 – 40	B	Mcl				WC III
	40 – 60	Yb/rb	Scl	Mix of reddish brown Hcl with the scl; few brown mottles			
	60 – 80+	y/rb	C	Thick reddish clay; cdom in matrix			
21	0 -26	Drb	Scl	5% stone	Pentreath	2	2
	26 – 50	Rb	Scl	5-10% stone, increasing at the base			
	IMP						
22	0- 28	Drb	Mcl	2-3% stone	Pentreath	2	2
	28 – 45	Rb	Mcl	2-3% stone			
	45 – 90+	Rb	mcl	5% stone gritty throughout			
23	0- 28	Drb	Mcl	2-3% stone	Pentreath	2	2
	28 – 45	Rb	Mcl	2-3% stone			
	45 – 90+	Rb	mcl	5% stone gritty throughout			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
24	0 -26	Db/drb	hcl	TS 4	Dinorbin/LLysfaen	3a	3a
	26-42	B	hcl				WCIII
	42 – 65	Rb	Hcl	cdom			
	65+	Gb	C	cdom			
25	0 – 27	Drb	hcl		Dinorbin/LLysfaen	2/3a	2
	27 – 45	Rb	hcl				
	45 – 75	Rb	Sc/hcl	Mixed material with fdom and mn			
	75 – 95+	R	C+sc mixed	Mn concs			
26	0- 28	Drb	Mcl		Llysfaen	2	2
	28 – 55	Drb	mcl				
	55 – 85+	Rb	Hcl	Slightly stony			
27	0 – 27	Drb	Mcl		Denbigh/LLysfaen	2/3a	3a
	27 – 55	Rb	Mcl				WC II/III
	55 – 65	Rb/r	hcl				
	65-80+	Reddish	C	Thick – wet ground here. SPL			
28	0 – 26	Drb	Mcl	5-10% stone	Denbigh/LLysfaen	2/3a	3a
	26 – 40	Rb	Mcl	5% stone			WC III
	40 – 60	R	Hcl	5% stone			
	60 – 80+	Gb/rb	C	Cdom; mn (dug at base of trench) SPL			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
29	0 - 26	Db	Mcl	5 – 10% stone	Denbigh	3a	3a
	26 – 40	Rb	Mcl/hcl	5% stone			WC III
	40 – 60	Gb	Hcl	Cdom; mn gritty stony at base			
	IMP						
30	0 - 26	Db	Mcl	5 – 10% stone	Denbigh	3a	3a
	26 – 43	Rb	Mcl/hcl	5 – 10% stone becoming stony at base			
	IMP						
31	0 – 22	Dgb	Mcl	10+% stone	Denbigh shallow	3b/4	3b
	22 – 28	Gb	Hcl	stony			
	IMP						
32	0 – 20	Dgb	Mcl	10+% stone	Denbigh shallow	3b/4	3b
	22 – 28	Gb	Hcl	stony			
	IMP						
33	0 – 22	Dgb	Mcl	10+% stone	Denbigh shallow	3b/a	3b
	22 – 30	Gb	Hcl	stony			
	IMP						
34	0 – 22	Dgb	Mcl	10+% stone	Denbigh shallow	3b/a	3b
	22 – 28	Gb	Hcl	stony			
	IMP						

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
35	0 - 26	Db	Mcl	5 – 10% stone	Denbigh	3a	3a
	26 – 43	dgb	Mcl/hcl	10% stone becoming stony at base			
	IMP						
36	0 - 26	Db	Mcl	5 – 10% stone	Denbigh	3a	3a
	26 – 43	dgb	Mcl/hcl	10% stone becoming stony at base			
	IMP						
37	0 – 22	Dgb	Mcl/hcl	10+% stone	Denbigh shallow	3b/a	3b
	22 – 30	Gb	Hcl	Stony (shallow again here)			
	IMP						
38	0 – 22	Dgb	Hcl	10+% stone	Denbigh shallow	3b/a	3b
	22 – 30	Gb	Hcl	stony			
	IMP						

Table 1.4: Soil auger borings within the Onshore Substation.

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
S1	0 -27	Db	Mcl	Fdom; mn	Cottam	3b	3b
	27 – 40	gb	Hcl	Cdom; mn concs			WC IV
	40 – 70+	Gb/rb	C	Cdom; mn SPL			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
S2	0 – 25	Dgb	Mcl	Wet; fdom	Cottam	3b	3b
	25 – 35	Gb	Hcl	Cdom; mn			WC IV
	35 – 70+	G	C	Cdom SPL			
S3	0 – 25	Dgb	Mcl	Wet; fdom	Cottam	3b	3b
	25 – 33	Gb	Hcl	Cdom; mn			WC IV
	33 – 70+	G	C	Cdom SPL			
S4	0 – 26	Dgb	m/hcl		Cottam	3b	3b
	26 – 35	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			
S5	0 – 25	Dgb	Mcl	Wet; fdom	Cottam	3b	3b
	25 – 33	Gb	Hcl	Cdom; mn			WC IV
	33 – 70+	G	C	Cdom SPL			
S6	0 – 26	Dgb	Mcl		Cottam	3b	3b
	26 – 45	Gb	Hcl	Cdom; mn			WC IV
	45 – 70+	Gb	C	Cdom SPL			
S7	0 – 26	Dgb	Mcl		Cottam	3b	3b
	26 – 45	Gb	Hcl	Cdom; mn			WC IV
	45 – 70+	Gb	C	Cdom SPL			
S8	~~0~~ 1 – 26	Dgb	Mcl		Cottam	3b	3b

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
	26 – 35	Gb	Hcl	Cdom; mn			WC IV
	35 – 60+	Gb	C	Plastic (wet above the horizon); cdom;SPL			
S9	0 - 25	Dgb	Mcl		Cottam	3b	3b
	25 – 35	Gb	Hcl	Cdom; mn			WC IV
	35 – 60+	Gb	C	Plastic ; cdom; SPL			
S10	0 – 26	Dgb	m/hcl		Cottam	3b	3b
	26 – 35	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			
S11	0 – 28	Db	Mcl	5 – 10% stone stone	Flint	3b/a	3a
	28 – 55	B	Hcl	5% stone			
	55 - 60	B	Hcl	Becoming stony			
S12	0 – 28	Db	Mcl	5- 10% stone	Flint	3b/a	3a
	28 – 45	B	Hcl	5% stone			
	45 - 50	B	Hcl	Becoming stony			
	IMP						
S13	0 – 28	Db	Mcl	fdom	Cottam	3b	3b
	28 – 45	B	Hcl	Cdom; 5% stone			WCIV
	45 – 65	Gb	Hcl/c	Cdom; SPL			
	65 – 80+	Gb	C	Cdom; plastic			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
S14	0 -28	Db	Mcl				
	28 – 42	Gb	Hcl	Cdom; mn	Cottam	3b	3b
	42 – 70+	Rb	C	Common brown mottles; mn; SPL			WCIV
S15	0 -28	Db	Mcl				
	28 – 40	Gb	Hcl	Cdom; mn	Cottam	3b	3b
	40 – 70+	Rb	C	Common brown mottles; mn; SPL			WCIV
S16	0 – 28	Db	Mcl	10% stone	Flint	3b/a	3a
	28 – 45	B	Hcl	10% + stone			
	45 - 50	B	Hcl	Becoming stony			
	IMP						
S17	0 – 26	Dgb	Hcl/c	TS 5	Cottam	3b	3b
	26 – 35	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			
S18	0 – 25	Dgb	mcl		Cottam	3b	3b
	25 – 34	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			
S19	0 – 28	Db	Mcl	5% stone	Flint / Cottam	3b/3a	3a
	28 – 60	B	Hcl	5% stone			WC II
	60 – 85+	Rb	Hcl	Cdom; slightly stony			

Number	Depth (cm)	Colour	Texture	Description	Soil Series	Welsh Government Predictive ALC Grade	Site Survey ALC Grade
S20	0 – 26	Dgb	m/hcl		Cottam	3b	3b
	26 – 35	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			
S21	0 – 26	Dgb	Hcl/C		Cottam	3b	3b
	26 – 35	Gb	C	Cdom; mn (heavier texture)			WCIV
	35 -80+	Rb	C	Thick; common brown mottles; mn; SPL			

1.4.3 Table of soil auger borings

Table 1.5: Soil pit descriptions.

Soil pit number	Location	Depth (cm)	Description
1	Close to Auger Boring 3 – excavation of archaeological trench	0-27 cm	Dark brown (7.5 YR 4/2) medium clay loam; moist; abundant grass roots; 10 – 15% stone with >10% >2cm in diameter.
		27-40 cm	Brown (10YR 5/3) medium clay loam; fewer grass roots; moderate medium sub angular blocky structure.
		40-50 cm	Reddish brown (5YR 4/3) heavy clay loam; very few roots; stone content much higher >20% >2cm in diameter; moderate medium angular blocky structure; stony limestone layer.
2	Close to Auger Boring 15	0-22 cm	Dark reddish brown (5YR 3/3) medium sandy clay loam; > 10% stone >2cm diameter; old arable roots.
		22-28 cm	Reddish brown (5YR 4/3); becoming very stony with limestone and some flags present; shallow layer with structure indeterminant; few roots present; limestone layer.
3	Close to Auger Boring 22	0-28 cm	Dark reddish brown(5YR 3/3) medium clay loam; 2% stone; arable roots; moist.
		28-50 cm	Reddish brown (5YR 4/3) medium clay loam; 2% stone; well-developed medium to coarse subangular blocky; few arable roots; moist.
		50-70 cm +	Reddish brown (5YR 4/3) medium to heavy clay loam; slightly gritty with 3-5% stone; moderate medium angular blocky; moist.
4	Close to Auger Boring 30 – open trench	0-26 cm	Dark brown (7.5 YR 3/3) medium to heavy clay loam; few arable roots present; total stone approximately 10%, predominantly >2cm in diameter; moist.
		26-40 cm	Brown (7.5YR 3/2) heavy clay loam; few roots; 10% stone but increasing notably at base of the horizon; moderate medium subangular blocky structure.
		40-55 cm	Brown (7.5 YR 3/2) very stony horizon with hcl within matrix (excavated within trench with difficulty).
5	Cottam at Substation – Close to S4	0-25 cm	Dark grey brown (10 YR 4/3) heavy clay loam; common distinct ochreous mottles; few small manganese concretions; common grass roots; very moist.
		25-35 cm	Grey, brown (10 YR 5/2) clay; common distinct ochreous mottles; common small manganese concretions; few grass roots; coarse angular blocky structure; very moist.
		35 cm +	Grey and reddish brown (5 YR 4/3); common distinct ochreous mottles; common small manganese concretions; weak coarse prismatic structure; plastic.

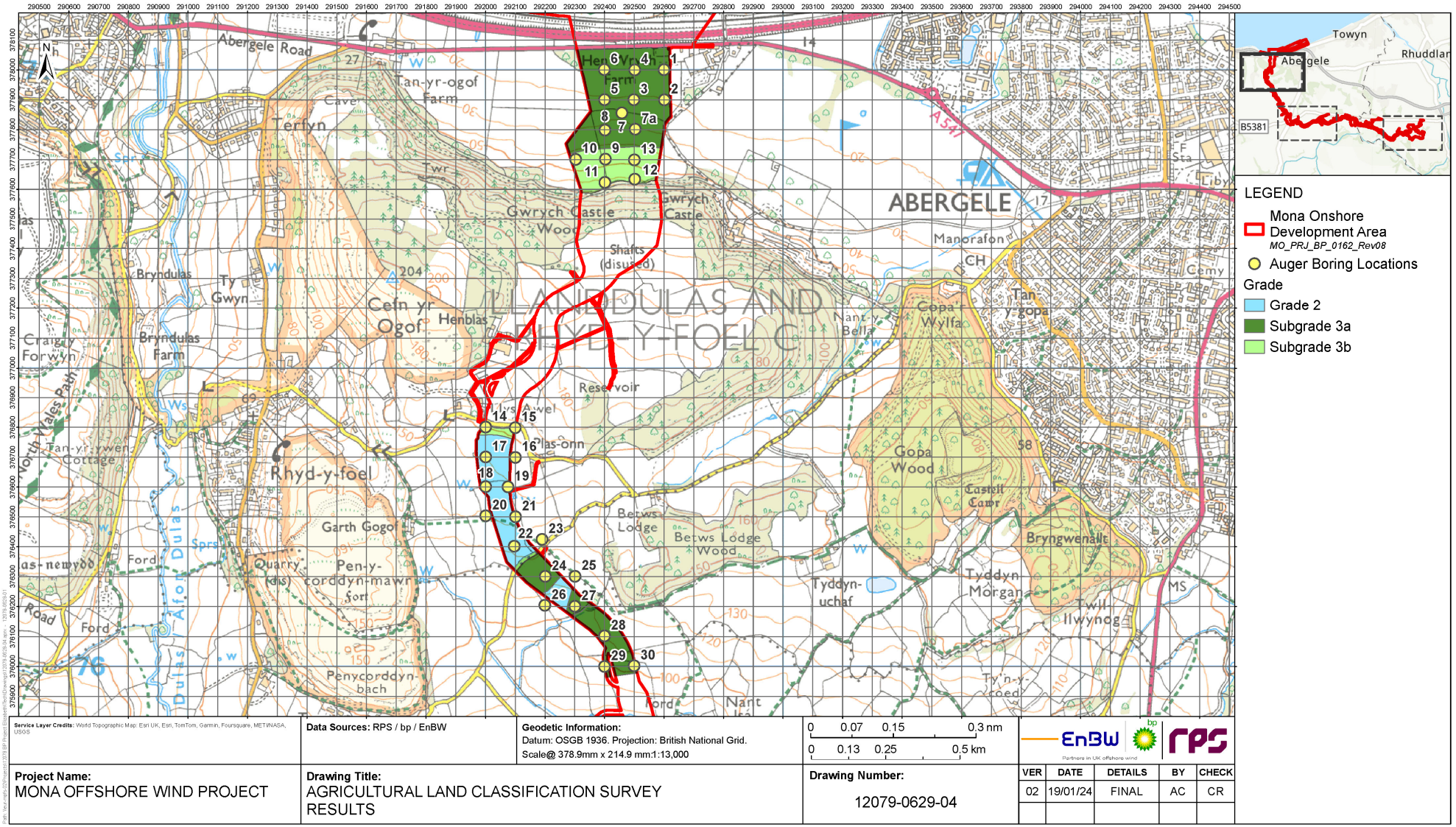

Figure 1.1: Results of soil surveys and ALC grade (sheet 1).

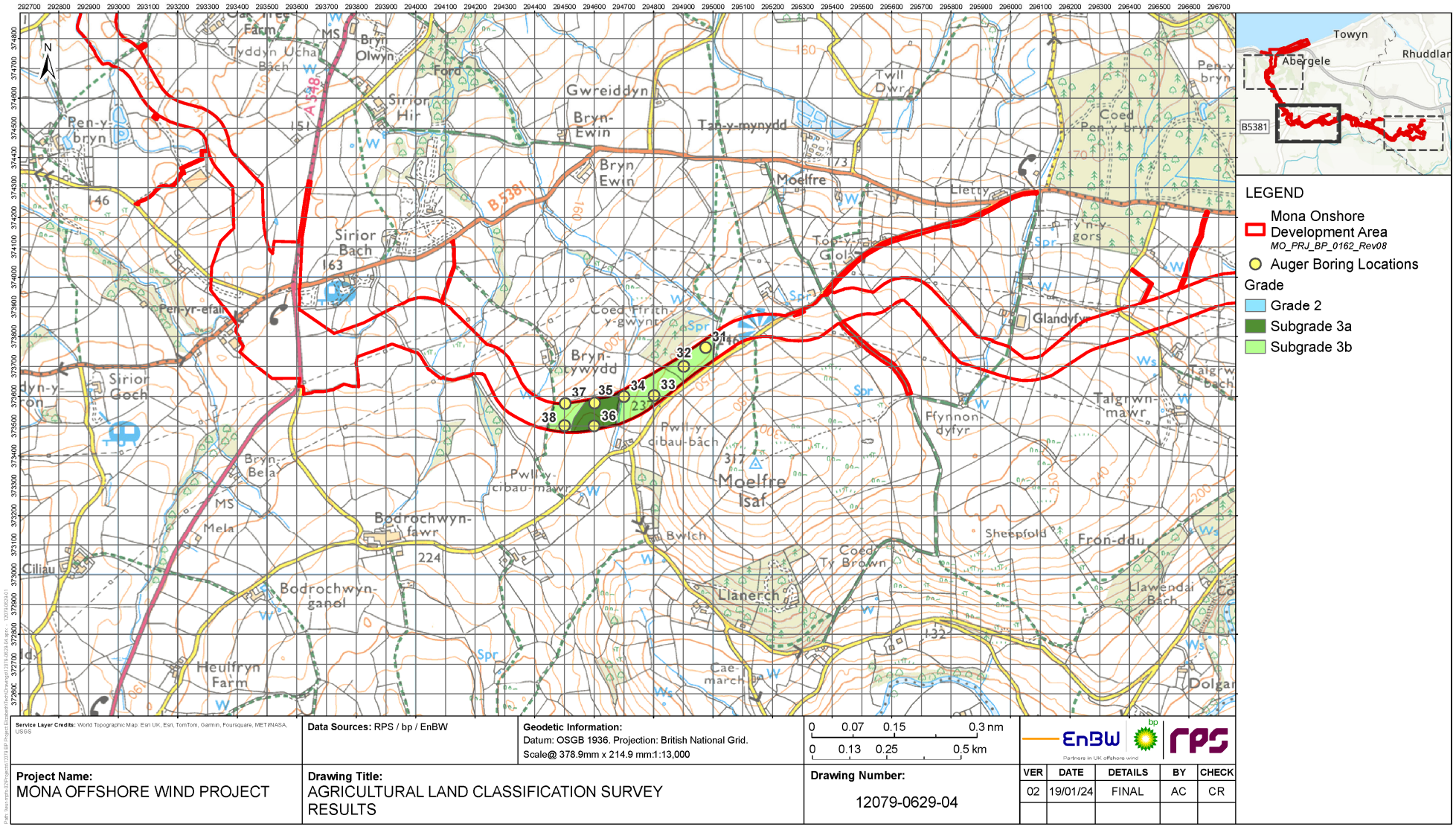

Figure 1.2: Results of soil surveys and ALC grade (sheet 2).

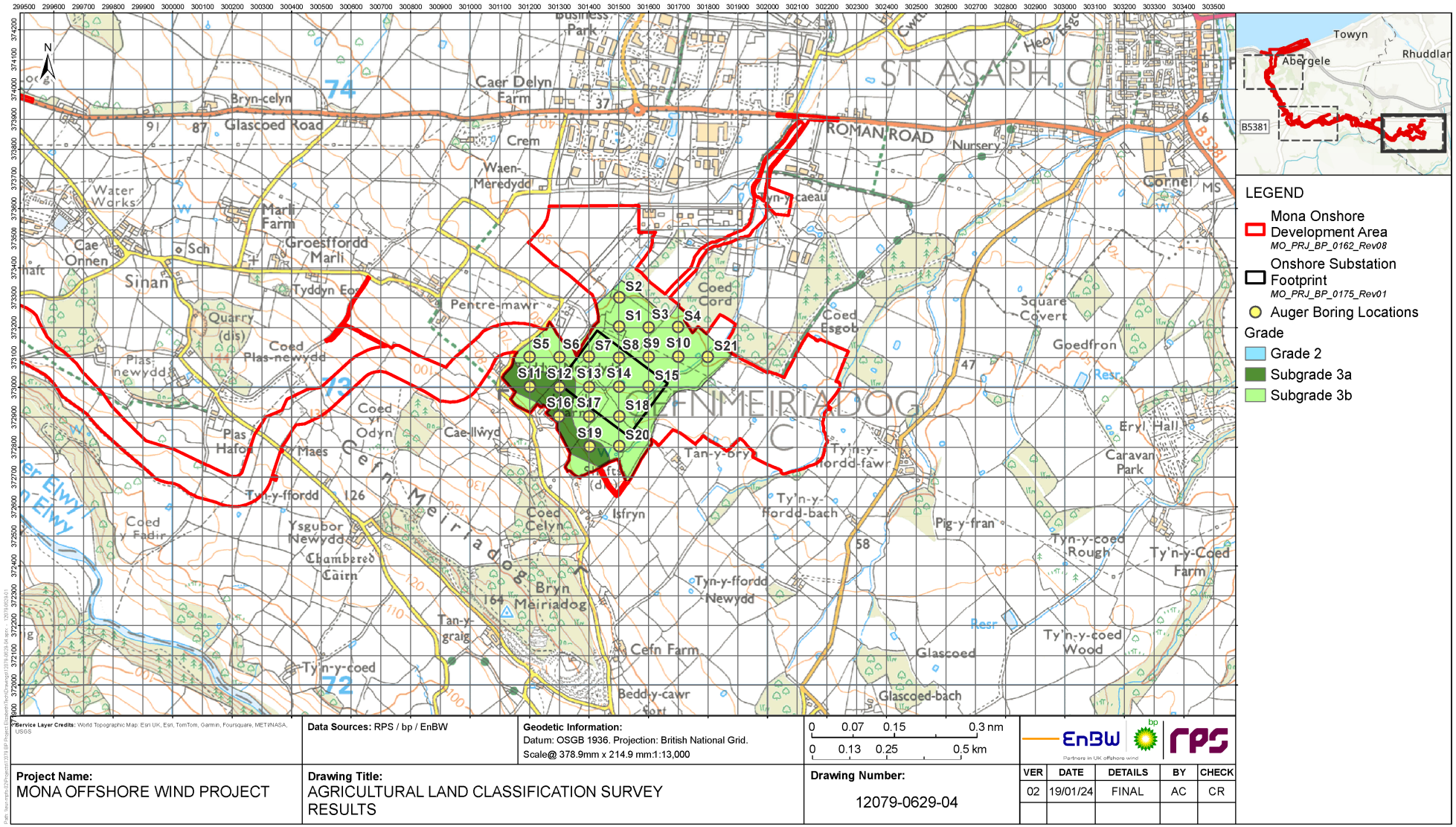

Figure 1.3: Results of soil surveys and ALC grade (sheet 3).

1.4.4 References

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

Appendix A

A.1. Soil sample textural analysis report

ANALYSIS REPORT

Contact : [redacted]

P682

Please quote the above code for all enquiries

Client : MONA

Sample Matrix : Agricultural Soil

Laboratory Reference

Card Number [redacted]

Date Received	12-Oct-23
Date Reported	25-Oct-23

SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details			Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details	Soil pH	P	K	Mg	P	K	Mg
389631/23	1	**MONA 1** *No cropping details given*	7.3	3	2+	3	35.4	184	123
389632/23	2	**MONA 2** *No cropping details given*	7.5	4	2-	2	53.4	123	92
389633/23	3	**MONA 3** *No cropping details given*	7.0	3	2+	2	41.2	197	90
389634/23	4	**MONA 4** *No cropping details given*	6.4	2	1	2	18.8	120	77
389635/23	5	**MONA 5** *No cropping details given*	5.6	0	3	3	7.6	384	111

If general fertiliser and lime recommendations have been requested, these are given on the following sheets.
The analytical methods used are as described in DEFRA Reference Book 427
The index values are determined from the AHDB Fertiliser Recommendations RB209 9th Edition.

Released by [redacted] On behalf of NRM Date 25/10/23

MICRO NUTRIENT REPORT

DATE **25th October 2023**

SAMPLES FROM **MONA**

[redacted]

Reference: **74015/389631/23**	Field Name: **MONA 1**	**Result**	**(*)**
Sand (2.00 - 0.063mm) %		36	
Silt (0.063 - 0.002mm) %		33	
Clay (< 0.002mm) %		31	
Textural Classification		Clay Loam	1

Reference: **74015/389632/23**	Field Name: **MONA 2**	**Result**	**(*)**
Sand (2.00 - 0.063mm) %		43	
Silt (0.063 - 0.002mm) %		33	
Clay (< 0.002mm) %		24	
Textural Classification		Clay Loam	1

Reference: **74015/389633/23**	Field Name: **MONA 3**	**Result**	**(*)**
Sand (2.00 - 0.063mm) %		42	
Silt (0.063 - 0.002mm) %		32	
Clay (< 0.002mm) %		26	
Textural Classification		Clay Loam	1

Reference: **74015/389634/23**	Field Name: **MONA 4**	**Result**	**(*)**
Sand (2.00 - 0.063mm) %		24	
Silt (0.063 - 0.002mm) %		42	
Clay (< 0.002mm) %		34	
Textural Classification		Clay Loam	1

Reference: **74015/389635/23**	Field Name: **MONA 5**	**Result**	**(*)**
Sand (2.00 - 0.063mm) %		22	
Silt (0.063 - 0.002mm) %		39	
Clay (< 0.002mm) %		39	
Textural Classification		Clay	1

Notes (*)

(1) In calcareous soils the sand, silt and clay sized fractions are likely to contain particles of carbonate which may result in the incorrect classification of soil type.

ANALYSIS REPORT

DATE 25th October 2023
SAMPLES FROM MONA

SAMPLED BY

Report reference [redacted]

[redacted]
Fax:

Fertiliser Recommendations

The phosphate and potash recommendations shown below, are those required to replace the offtake and maintain target soil indices. The larger recommended applications for soils below target index will allow the soil to build up to this target index over a number of years. Not applying fertiliser to soils which are above target index will allow the soil to run down over a number of years to the target index.
The recommendation should be increased or decreased where yields are substantially more or less than that specified. The amount to apply can be calculated using the expected yield and values for the offtake of phosphate and potash per tonne of yield given in the RB209 9th edition.
All recommendations are given for the mid-point of each Index.
Where a soil analysis value (as given by the laboratory) is close to the range of an adjacent Index, the recommendation may be reduced or increased slightly taking account of the recommendation given for the adjacent Index. Small adjustments of less than 10 kg/ha are generally not justified.
Efficient use of P and K is most likely to be achieved on soils that are well structured and enable good rooting.
For visual evaluation of soil structure (VESS), a score on 1 or 2 would be considered adequate.
Don't forget to deduct nutrients applied as organic manures.
For Nitrogen recommendations please refer to the RB209 9th edition or seek advice from an FACTS qualified adviser.
Target Indices:
Arable, Forage, Grassland and Potato Crops: P Index 2, K Index 2-
(In rotations where most crops are Autumn-sown, soils are in good condition and P is applied annually, high index 1 can be an adequate target.)
Vegetables and Bulbs: P Index 3, K Index 2+
(If vegetables are only grown occasionally as part of an arable rotation, it would be most economic to target index 2 for arable and forage crops.)
Fruit Vines and Hops: P Index 2, K Index 2, Mg Index 2
(Note: Cider apples respond to K Index 3, Mg Index 3)
A lime recommendation is usually for a 20cm depth of cultivated soil or a 15cm depth of grassland soil. Where soil is acid below 20 cm and soils are ploughed for arable crops, a proportionately larger quantity of lime should be applied. However, if more than 10 t/ha is needed, half should be deeply cultivated into the soil and ploughed down, with the remainder applied to the surface and worked in.
For established grassland or other situations where there is no, or only minimal soil cultivation, no more than 7.5 t/ha of lime should be applied in one application.
In these situations, applications of lime change the pH below the surface very slowly. Consequently, the underlying soil should not be allowed to become too acidic because this will affect the root growth and thus limit nutrient and water uptake, which will adversely affect yield.

Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime (Arable)*	*(Grass)*
MONA 1	**Not Given / Not Given**	*Units/Acre*				*T/Ac*	**0**	**0**
389631 / Medium		*Kg/Ha*				*Te/Ha*	**0**	**0**
Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime (Arable)*	*(Grass)*
MONA 2	**Not Given / Not Given**	*Units/Acre*				*T/Ac*	**0**	**0**
389632 / Medium		*Kg/Ha*				*Te/Ha*	**0**	**0**
Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime (Arable)*	*(Grass)*
MONA 3	**Not Given / Not Given**	*Units/Acre*				*T/Ac*	**0**	**0**
389633 / Medium		*Kg/Ha*				*Te/Ha*	**0**	**0**
Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime (Arable)*	*(Grass)*
MONA 4	**Not Given / Not Given**	*Units/Acre*				*T/Ac*	**0.8**	**0**
389634 / Medium		*Kg/Ha*				*Te/Ha*	**2.1**	**0**
Field Name / Ref / Soil Type	*Last Crop / Next Crop*		*P2O5*	*K2O*	*MgO*		*Lime (Arable)*	*(Grass)*
MONA 5	**Not Given / Not Given**	*Units/Acre*				*T/Ac*	**3.6**	**1.5**
389635 / Heavy		*Kg/Ha*				*Te/Ha*	**8.8**	**3.6**

Fertiliser recommendations are based on **AHDB RB209 (Ninth Edition).** If a nutrient is deficient and no recommendation is given, either no recommendation is given in RB209 or we have insufficient data to give a recommendation. Apply Lime to the nearest half Ton / Tonne.
NRM is a UKAS accredited laboratory to ISO/IEC 17025