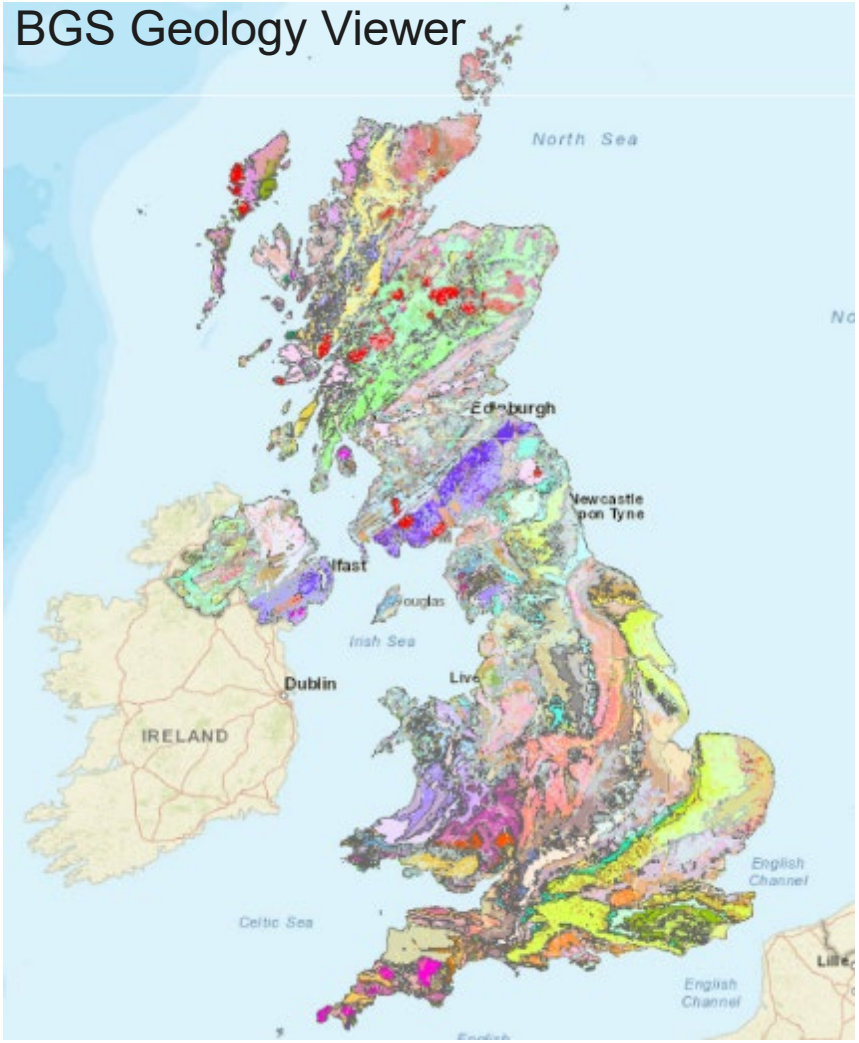
ARCADIS Design & Consultancy for natural and built assets

SOILS FOR GRASSLAND CREATION AND RESTORATION

Bruce Lascelles | June 2019

Soil forming factors

BGS Geology Viewer

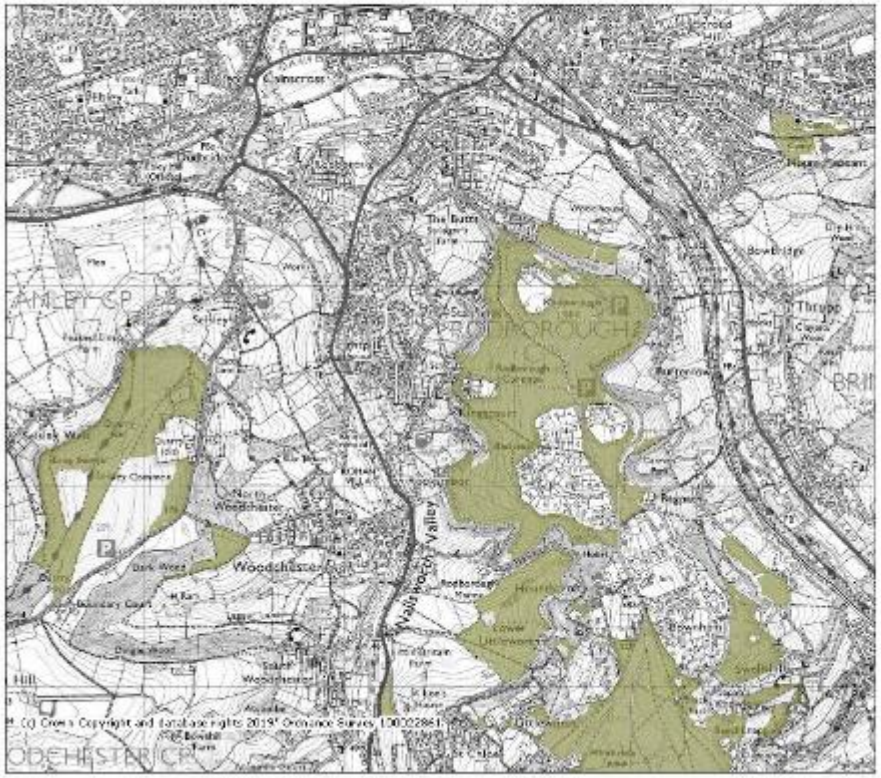


UK Soil Observatory

Soil forming factors

MAGiC

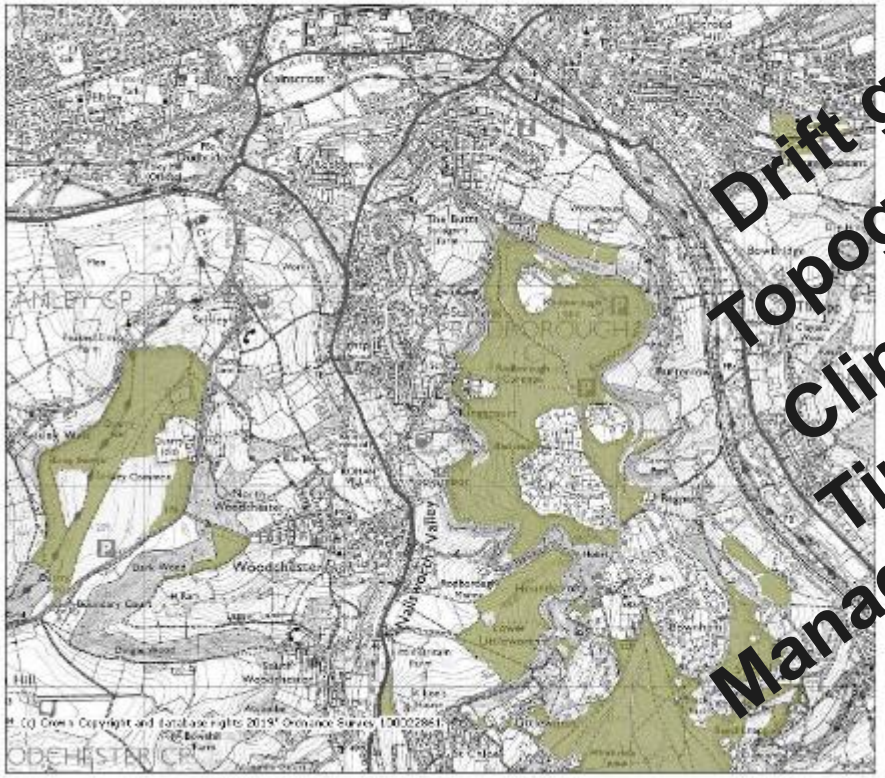
Lowland calcareous grassland



Soil forming factors

MAGIC

Lowland calcareous grassland



Drift geology

Topography

Climate

Time

Management

Soil variability

Soil variability

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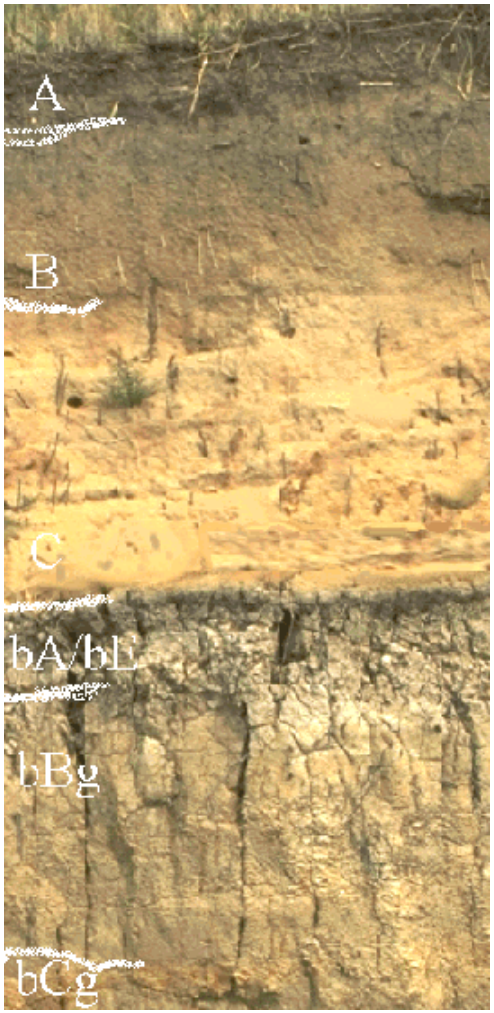
Understand the soils you have

What characteristics are important?

- Total depth/horizon thickness
- Texture
- Structure
- Plant rooting / faunal mixing
- Nutrient status / chemical properties
- Hydrology

Total depth / horizon thickness



Texture

SAND → CLAY

Structure

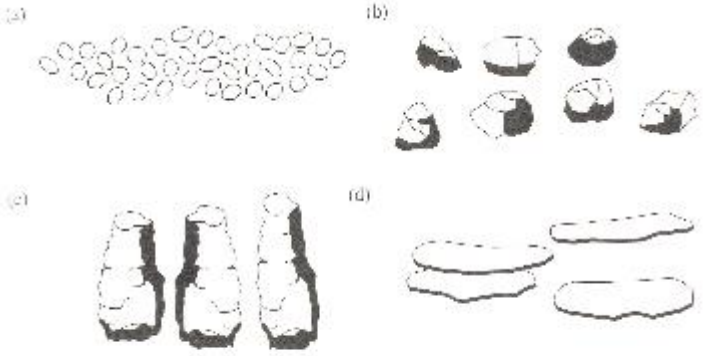


Figure 2.14 The main groups of ped morphology: (a) spheroidal, (c) blocky;

Plant rooting

Soil chemistry

- pH
- Available P
- Available K
- Available Mg
- Available NO_3

+ check if needed …

- Conductivity
- Contaminants / foreign materials
- Etc.

3.4 **Species-rich Grassland Topsoil** shall be used for calcareous grassland and semi-improved grassland establishment only. It is not appropriate for agricultural areas, woodland and hedgerow planting or wetland meadow areas.

3.4.1 All Species-rich Grassland Topsoil shall comply with the requirements listed below:

Parameter	Unit	Lower Limit	Upper Limit
pH Value	Unit	5.5	8.5
Electrical conductivity	µS/cm	-	<1500
Organic matter	%	2.5	-
Total nitrogen	%	0.10	-
Extractable phosphorus	mg/l	-	15
Extractable potassium	mg/l	60	600
Extractable magnesium	mg/l	50	500
Max stone content	% by weight	-	25
Max stone size in any dimension	mm	-	50

3.5 **Wetland Meadow Topsoil** shall be used for wetland meadow areas only. It is not appropriate for agricultural areas, woodland and hedgerow planting, calcareous grassland or semi-improved grassland establishment

3.5.1 All Wetland Meadow Topsoil shall comply with the requirements listed below:

Parameter	Unit	Lower Limit	Upper Limit

Sample Reference	pH			Total Organic Carbon	S.O.M (Calc)			Exch. Magnesium			Exch. Potassium			Stone Content			Nitrogen			Conductivity u S/cm	Extractable Phosphate		
	Units			% M/M	% M/M			mg/l			mg/l			%			%			µS/cm	mg/l		
HPC 13575K28 Haul Rd 22nd Layer Placed Material	8.3			-	-			-			-			-			-			-	-		
HPC 13618K23C South Stockpile Topsoil Position1	8.5	8.5	8.5	2.20	3.79	3.79	3.79	149	149	149	394	394	394	<0.1	<0.1	<0.1	0.27	0.27	0.27	2580	69.1	69.1	69.1
HPC 13639K23C South Stockpile Topsoil Position 2	8.3	8.3	8.3	2.30	3.97	3.97	3.97	139	139	139	372	372	372	<0.1	<0.1	<0.1	0.27	0.27	0.27	2560	74.2	74.2	74.2
HPC 13640K23C South Stockpile Topsoil Position 3	8.2	8.2	8.2	2.00	3.5	3.5	3.5	170	170	170	409	409	409	<0.1	<0.1	<0.1	0.29	0.29	0.29	2540	81.0	81.0	81.0
HPC 13641K23C South Stockpile Position 4	7.9			1.84	3.17			149			376			<0.1			0.25			2590	78.4	78.4	78.4
HPC 13642K23C South Stockpile Topsoil Position 5	7.9	7.9	7.9	1.90	3.28	3.28	3.28	159	159	159	405	405	405	7.7	7.7	7.7	0.25	0.25	0.25	2500	93.4	93.4	93.4
HPC 13643K23C South Stockpile Sub Soil Position1	8.2			0.46	0.79			-			-			19.8			-			-	-		
HPC 13644K23C South Stockpile Sub Soil Position 2	8.2			0.58	0.97			-			-			5.2			-			-	-		
HPC 13645K23C South Stockpile Sub Soil Position 3	8.1			0.59	1.02			-			-			7.1			-			-	-		
HPC 13646K23C South Stockpile Sub Soil Position 4	8.3			0.52	0.9			-			-			10.3			-			-	-		
HPC 13647K23C South Stockpile Sub Soil Position 5	8.3			0.36	0.62			-			-			20.3			-			-	-		
HPC 13648K23C West Stockpile Topsoil Position 1	7.9	7.9	7.9	2.51	4.33	4.33	4.33	138	138	138	461	461	461	5.9	5.9	5.9	0.27	0.27	0.27	2580	316	316	316
HPC 13649K23C West Stockpile Topsoil Position 2	7.7	7.9	7.9	1.87	3.22	3.22	3.22	117	117	117	418	418	418	22.5	22.5	22.5	0.24	0.24	0.24	2560	230	230	230

Acceptance Criteria	pH	Organic matter	Extractable magnesium	Extractable potassium	Max stone content	Total Nitrogen	Conductivity	Extractable phosphorus
	-	%	mg/l	mg/l	% by weight	%	µS/cm	mg/l
Woodland topsoil	5.5-8.5	>2.5	50.0-500.0	60.0-600.0	<35	>0.10	<1500	5.0-45.0
Species-rich grassland topsoil	5.5-8.5	>2.5	50.0-500.0	60.0-600.0	<25	>0.10	<1500	<15
Wetland Meadow topsoil	5.5-7.5	>5.0	50.0-500.0	60.0-600.0	<15	>0.10	<1500	<15
Subsoil	5.5-8.5	<1.5	-	-	<35	-	<1500	-
OTH	5.5-8.5	<1.5	-	-	<35	-	<1500	-

Leigh Guided Busway

- Very limited topsoil and subsoil available
- Large quantities of potentially suitable soil forming materials

- Material acceptability criteria set
- Methodology devised to create required soil profiles for woodland and grassland
- Collaboration with contractor to find the best workable soil handling solution

Wet grassland creation - Somerset

- Soil characteristics acceptable
- Land drainage had lowered the water table

- Drainage altered to raise water table
- Land surface altered to recreate historical depressions / drainage lines

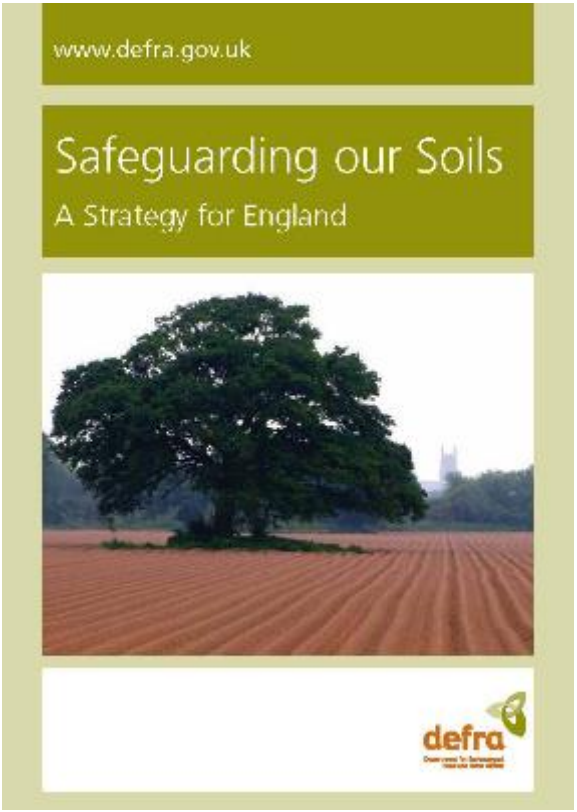
Hinkley Point C

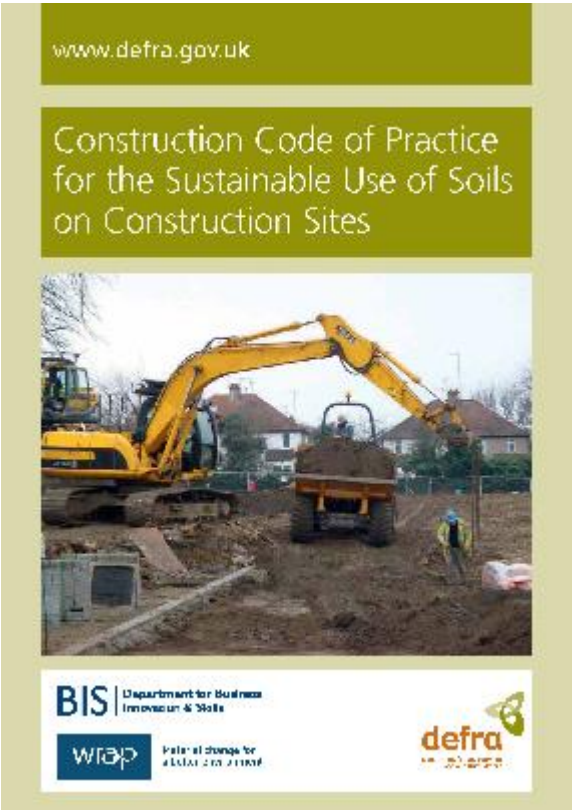
- Very heavy soil
- Large plant
- Soils recovered from across the site for re-use

- Acceptibility criteria set
- Soils tested
- Detailed methodology set out
- Works supervised

Best Practice approaches

Follow key guidance





Guidance is well established – but we lack primary legislation on soils



World Congress of Soil Science 2022

31st July – 5th August 2022
Glasgow, Scotland, UK

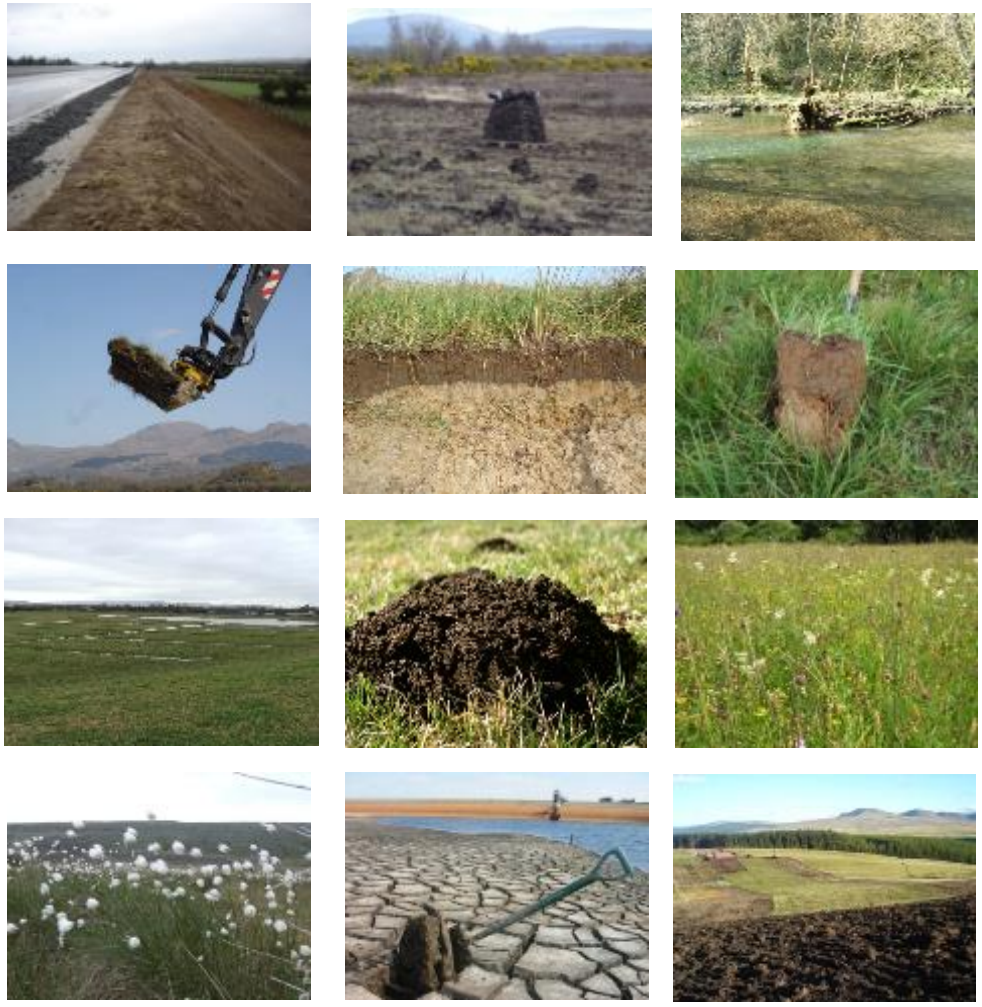
SEC Scottish Event Campus

BSSS BRITISH SOCIETY OF SOIL SCIENCE

International Decade of Soils 2015-2024

PEOPLE MAKE GLASGOW

Questions?



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