Landform & Soil Factors in Translocation Practices: Planning & Assessment Framework

Soil Management for Biodiversity: Current Practice in Ecological Restoration and Biological Conservation

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A Translocation Framework - Planning & Assessment Tool

Techniques have been developed over the last 40 years

We know that they can work

Used in Ecological Rescue & Restoration and Biological Conservation

Question is which one and where can they be reliably used?

The following is a Planning & Assessment Framework**

***Based on MAFF's (1988) ALC guidelines & criteria for grading the quality of agricultural land*

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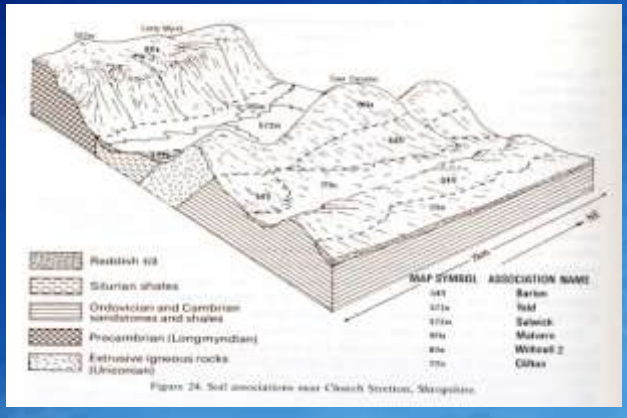
Landform & Soils: Upland Context & Variation



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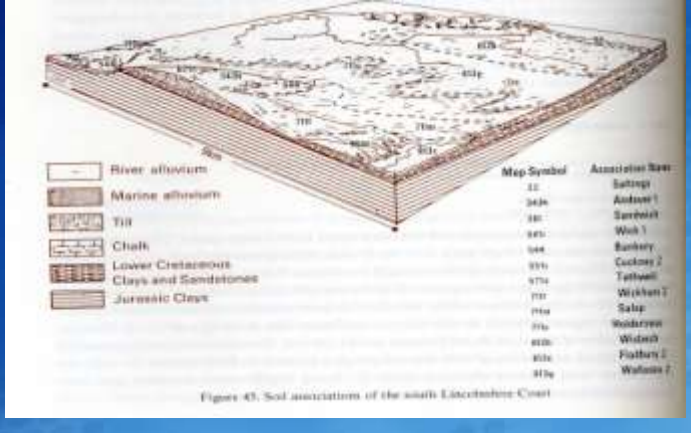
Landform & Soils: Lowland Context & Variation



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Translocation Methods: Herbaceous & Dwarf Shrub Vegetation

Intact Turf

- Lifting blocks of topsoil and turf layer
- Replaced as continuous 'carpet' or as patches

2 methods:

- Slicing/undercutting using front loading flat blade bucket
- Digging using backhoe bucket

Turf Fragments

- Cultivation of upper/topsoil and turf layer in 50mm fragments
- Replaced as continuous carpet

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Intact Slicing/undercutting: Selar Farm

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Intact Digging: Nant Helen

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Turf Fragments: Keepershield

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Merits of Techniques

Intact Turf

- *Limitations*: gradient, micro-relief, stoniness, soil dryness
- *Advantages*: maintains higher plant component, soil macro-fauna and soil structure
- *Disadvantages*: costly, operationally more complex

Turf fragments

- *Limitations*: soil wetness
- *Advantages*: cost effective, operationally simple
- *Disadvantages*: may result in loss of some higher plant components, macro-fauna and soil structure, may be prone to weed regeneration & invasion

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Gradient Limitations: Operational Efficiency & Safety (machinery)

Intact Turf

- 1:5 (11%)

Turf Fragments

- 1:2 (>18%)

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Micro-relief: Operational efficiency (quality of translocation)

Intact Turf

- Irregular pattern (cf gradient & regular)
- <5m lateral & >1m vertical amplitude

Turf Fragments

- Usually not limiting

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Flooding: Operational efficiency (access & timing)

Intact Turf

- Timing, number & capacity of machinery

Turf Fragments

- Timing, number & capacity of machinery

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Soil Texture: Operational efficiency

Intact Turf

- Not limiting per se

Turf Fragments

- Not limiting per se

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Soil Horizon Thickness: Operational efficiency (choice of method)

Intact Turf

- >150mm & <450mm thick (per horizon)
- Maintains integrity of horizons

Turf Fragments

- Topsoil > 50mm
- Subsoil – not limiting
- Mixing of horizons?

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Stoniness: Operational efficiency (integrity & quality)

Intact Turf

- < 35% small (<20mm)
- < 20% large (>60mm)

Turf Fragments

- Technique can be adjusted
- Small not limiting
- < 50% large (> 60mm)
- < 35% boulders (> 600mm)

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Wetness, Dryness & Texture: Operational efficiency (choice of method)

Intact Turf

- Techniques to overcome bearing capacity limitations
- Suited to wet soils above plastic limit
- Limited when heavy clay & silt soils at or near shrinkage limit

Turf Fragments

- Limited by bearing capacity to support machinery during cultivations
- Suited to soils below plastic limit and at and near shrinkage limits

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Examples of Matched Methods and Landform & Soil Factors: Soils & Limitations

Site	Method	Soil Association	Limitations
Burrowine (wet heath)	D & F	Rowanhill	Shallow, stony
Keepershield (limestone grassland)	F	Wick 1	Shallow, stony, micro-relief
Stony Heap (wet grassland)	F	Brickfield 3	Gradient, shallow, stony
Derwenthorpe (neutral grassland)	F	Bishampton 2	Micro-relief
Erin (wetland)	D	Bardsey	Saturated/inundated
Bleak House (wet heath)	S & F	Clifton	Shallow, stony
Nant Helen (mire)	D	Gelligaer (Crowdy)	Bearing capacity
Selar (grassland)	S & F	Wilcocks 1	Gradient, shallow, stony
Parc Slip (wet grassland)	F	Wilcocks 1	Shallow, micro-relief

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Examples of Matched Methods and Landform & Soil Factors: Spread of Sites

Extremely Stony	Keepershield F				
			Stony Heap Burrowine F		
Stoniness			Selar F/S		
			Bleak House F/S		
		Derwenthorpe F	Parc Slip F	Nant Helen D	Erin D
Stone Free/Dry		*Wetness*			**Saturated**

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Planning & Assessment Framework

(F=Turf fragments; S/D = slice or dug Intact Turf; Note - S & D gradient, dryness and micro-relief limited – F wetness limited)

Extremely Stony	F	F	F	D	D
	F	F	F	D	D
Stoniness	F/S	F/S	F/S	S/D	D
	F/S	F/S	F/S	S/D	D
	F/S	F/S	F/S	S/D	D
Stone Free/Dry		*Wetness*			**Saturated**

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