

Reclaiming soils for trees and biomass

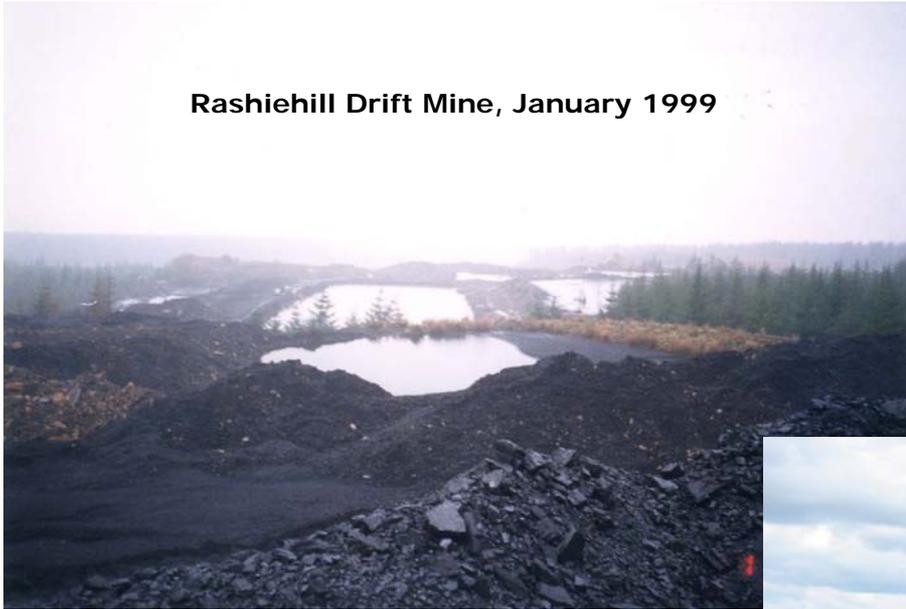
Making it work using compost

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Technical Development

August 2014

Rashiehill Drift Mine, January 1999



After reclamation, August 2003



Low quality, disturbed, compacted soils



Poor quality 'soil forming materials'



Variable mining spoil



'Fresh start'





No / shallow 'topsoil'



High stone content



Rubble, artificial SFM (contamination?)



Compacted spoil



Compacted 'soils'



High clay content

PHYSICAL

- **Compaction:** poor root penetration, poor drainage (& *water retention*), lack of air: **CULTIVATE ~ 1m**
- **Lack of nutrients:** e.g. primary (N P K) and **organic matter: GREEN COMPOST (etc) ~ 50 cm**
- **Other:** pH, PTEs, salinity, lack of fines etc

REGULATION & BEST PRACTICE

- **Controlled Activities Regulations, NVZs**
- **Forests & Water guidelines, Forestry EI Regs**
- **Waste Management Licensing Regulations**
(if not PAS/SEPA compliant)
- **Planning consent etc**

Professional advice

Using quality compost to reclaim land for forestry and woody biomass

APPLICATION OF SEWAGE SLUDGES AND COMPOSTS

and residues on ground conditions including slope and the water environment.

Compliance with the Code is a requirement of the Compost Quality Protocol.

The legislation and guidance is examined in more detail below:

Forests and Water UK Forestry Standard Guidelines 2011

Compliance with the Forests and Water UK Forestry Standard Guidelines¹⁰ is a mandatory requirement for all forestry operations and grant schemes throughout the UK, regulated by Forestry Commission in Scotland and England, Natural Resources Wales and the Forest Service in Northern Ireland. The guidelines cover all aspects of forestry operations including drainage, cultivation, planting, maintenance, chemicals and rearing. In the event of any pollution incident involving forestry or forest land, non-compliance with the guidelines would be a material factor in respect of prosecution under any relevant legislation.

The Forests and Water guidelines are considered to be a practice that must be complied with in application of the Quality in England, Wales and Northern Ireland. The guidelines include including those that are also General Binding Rules under it Regulations in Scotland.

Plans for land reclamation involving forestry should be approved by the relevant forestry regulator.

For Forests and Water UK Forestry Standard Guidelines (see the relevant specifications for forest work that may affect) (see the site).

The main provisions relevant to land reclamation involving cut the Forests and Water UK Forestry Standard Guidelines, such as the following (see specifications annexes as an organic fertilizer and

Cultivation and application of compost

The soil cultivation level enables 2 m of any surface water spring, well or borehole or is well-situated

Provision and maintenance and consider the impacts of soil operations involving cultivation and drainage.

Forestry Commission (2011). Forests and Water UK Forestry Standard Guidelines, 1

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Using quality compost to reclaim land for forestry and woody biomass

Release compaction, rutting and erosion during operation

Do not apply compost to land in excess of the nutrient needs of the crop

Plan compost applications with attention to weather and ground conditions

Consider drainage infrastructure constraints applications to avoid nutrient losses

Do not apply compost on land that is

- within 2 m of any drainage ditch or
- within 5 m of any surface water or wetland
- sloping 30° or of any spring, well or borehole
- within 10 m of any surface water or wetland
- within 15 m of any spring, well or borehole, or
- has an average soil depth of less than 30 cm and contains ground or forested rock

Do not apply compost on land that is

- within 10 m of any surface water or wetland
- within 15 m of any spring, well or borehole, or
- has an average soil depth of less than 30 cm and contains ground or forested rock.

Drains

Drains should be sealed by their owner in discharged drains that regulated both in Scotland and England, Wales and Northern Ireland and ensure that runoff is discharged in such a way as to prevent the risk of pollution.

Provision buffer areas are defined for the width of the bed of the natural watercourse they protect. Buffer 20 m or less is a 10 m buffer > 20 m or less is a 10 m buffer. Larger buffers may be allowable for watercourse beds > 1 m, especially in drier ground.

Do not connect or divert surface water courses into drains, including roadside drains, or into any tank or fast-flow water supply (except the natural catchment).

Align drains on-slope with a slope of 1:50 (2%) or less on any available soils.

Fuel and oil

- **Fill the storage, transportation and handling of fuel, oil and oil products safely and pollution of watercourse; ensure a contingency plan is in place to mitigate any accidental spillage.**
- **A minimum of 50 m fuel should be stored on site and where it is necessary temporarily use double-walled or bunded, security enclosures tanks.**
- **Others relating to operational practices including machinery.**

The provisions of the Guidelines above must be considered in relation to local requirements.

Forestry Commission (2011). Forests and Water UK Forestry Standard Guidelines, FWS 0306a, See Table 5.1

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Patersons Quarries



1 season, October 2008



PAS 100 Green Compost



No compost (L) & 25%/ 600tph compost (R)
at 5 yrs (25/6/13)



Scottish Coal, Hargreaves Services



Typical 'soil'



'Soil' / compost mix (lab')



Cultivated / compost plot

LP / SS Planting May 2009



5 years, March 2014



Uncultivated ground, August 2014



Cultivated but no compost
6th season, August 2014



Cultivated, 25% compost
6th season, August 2014



Cultivation plots, January 2011



PAS 110 Anaerobic digestate



Cultivated / compost & AD plots
SBI Planted, April 2011



PAS 100 Green compost
300 tph, August 2014



PAS 110 Anaerobic digestate
200 tph, August 2014



Cultivated but no compost / AD
August 2014



Cultivation plots, January 2011



**West Lothian
Recycling**



Start 1st season, April 2011



Mid 1st season, June 2011



End 3rd season, August 2013



Scottish Coal
Hargreaves Services



4 species, 340 tph compost, 2 methods

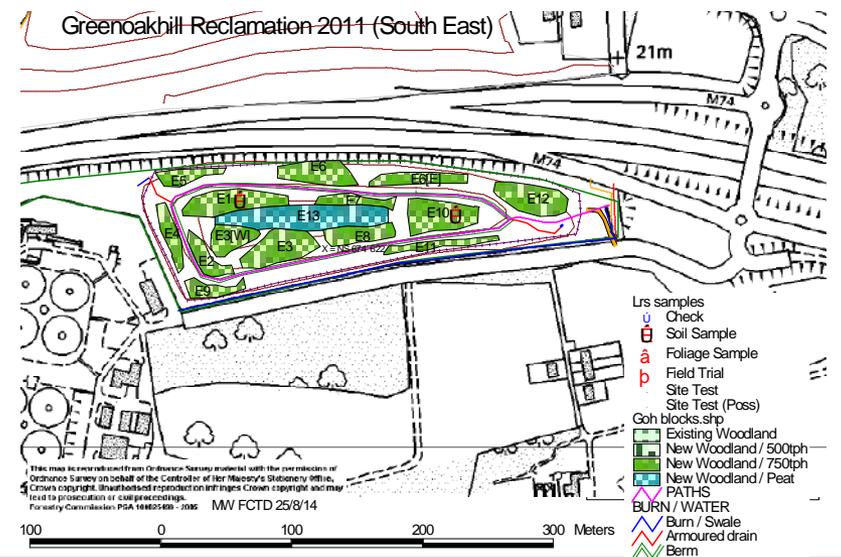
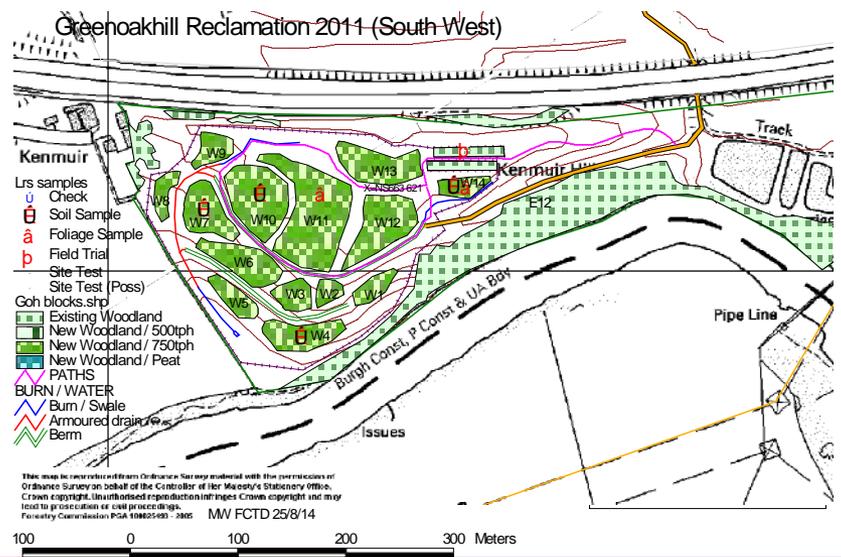
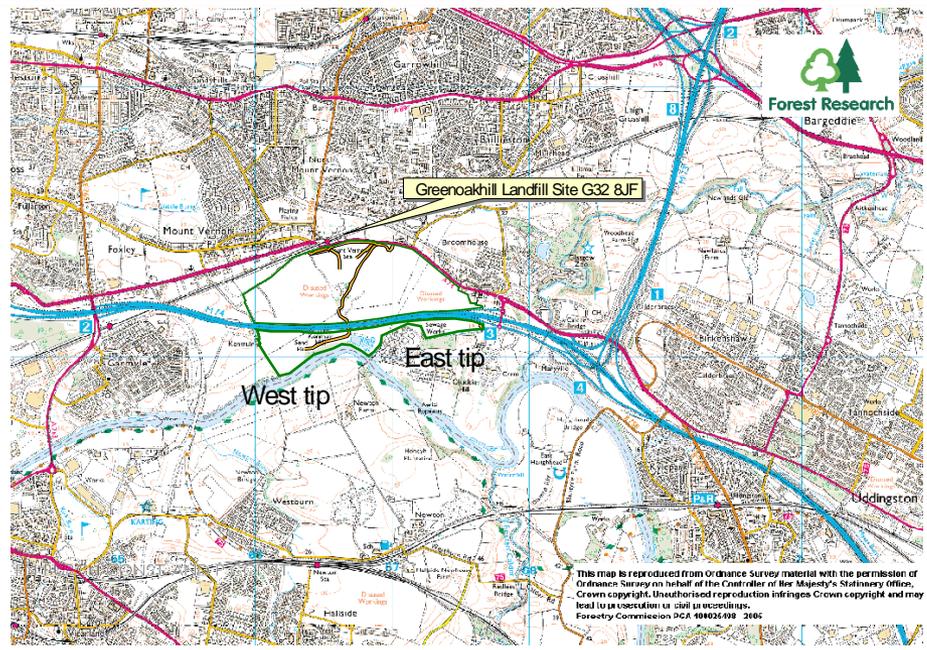


2nd season, Willow & Common alder
Sitka spruce & Downy birch behind, August 2014



Close spacing 'SRF' (1 m * 1 m)

- **Complete cultivation** is essential – ideally in dry weather
- **Good drainage** is required - follow best practice
- Compost /AD much **improves growth** – up to limit for 'site'
- **Optimum** application rate varies - by site
e.g. 200 tph (loose, wet sites) to 450 tph (firm, dry sites) fresh compost (less if AD)
- Expect vigorous **weeds** - grass seed, tubes, ops budget
- **Avoid excess** - problems with stability, weeds, rushes, nitrate pollution risk
- **Multiple factors!** – soil/amendment analysis, species, exposure etc, etc





December 2006



June 2008



June 2013



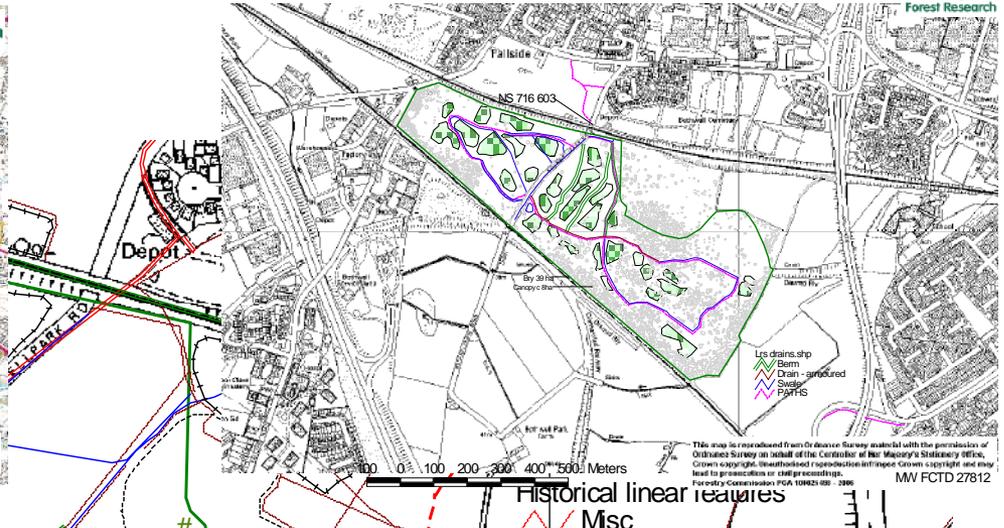
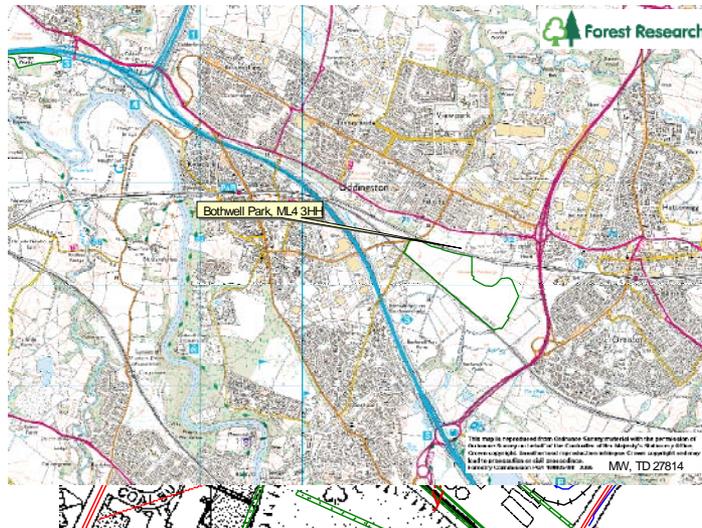
September 2011
1st season,



June 2013
3rd season



Bothwell Park reclamation 2011/12



Mid 1st season, June 2012

3rd season, July 2014



MW FCTD 27812



Very case dependent!

- Cultivation & compost - e.g. £10k to >£15k / net ha
- Plus - civil engineering – enabling, berms, drains, taps, ponds, swales etc
- Plus 'forestry' – fencing, seeding, planting, tubes, weeding & maintenance
- SRDP forestry grant (2014) – approx. £1¹/₂ - £4¹/₂k + fencing contribution

Planning & management, site assessment / SI, community engagement & infrastructure also in addition

- **Initial fast growth**

- helps capture nutrients released from 'compost'
- competes with weeds
- rapid green cover
- roots & humus helps develop the soil ecosystem
- ~ 10m³ / ha p.a. (~ 8 a.d. tonnes)

- **Trees - SRC / SRF**

- harvest and regenerate / replace after 3-4 or 10+ years
- or, retain / thin for longer term
- choice of suitable species e.g. birch, alder, aspen, sycamore, willow, poplar, [ash, pine]
- cost issues
- an early, *albeit partial*, return on investment

Short Rotation Forestry c.f. Short Rotation Coppice

- single stemmed
- rougher ground
- conventional harvesting
- year round harvest
- store outside, dry on site
- cost issues
- may need chipping
- may need replanting after harvest



Poplar SRF, Ellesmere Port, 2004

Thank you

