

USING COMPOST IN LAND RESTORATION MAKES GOOD COMMERCIAL SENSE

Compost and the Regeneration of the Royal Ordnance Factory, Chorley

Background

The Mersey Forest is managing a series of WRAP (the Waste & Resources Action Programme) funded trials to demonstrate the benefits of using compost to produce healthy soils on brownfield land in the North West. The aim of the project is to create sustainable end markets for compost within the region. The Mersey Forest is working in partnership with Liverpool John Moores University, the Clean Merseyside Centre and the Forestry Commission, along with the support of local businesses and environmental organisations. The largest of these demonstration trials is taking place in partnership with BAe Systems Property & Environmental Services Ltd. at the Royal Ordnance site in Chorley.

The Royal Ordnance Factory at Chorley produced explosives between 1936 and 1990. With the total closure of the site that followed, 265 hectares of land became available for redevelopment, making it one of the largest brownfield sites in the region. As part of a drive in the North West to restore brownfield land, BAe Systems Ltd has driven a £400 million programme to transform the factory into the village of Buckshaw, complete with its own business park.

To ensure that no residual munitions in the form of cartridges or shells remained on the site, topsoil was stripped from the entire area to a minimum depth of 300mm and was buried onsite in a specially constructed landfill. There was insufficient topsoil available locally within economical haulage distance to provide for all landscaping needs. Yet rapid development of the site and construction of a new link road with the A6 meant that large volumes of topsoil would need to be sourced quickly.

It was decided that the most practical and economically viable solution was to import



BSI PAS 100 compost to mix with subsoils on-site which were geotechnically unsuitable for building on, but were useful soil forming materials.

Objectives

The trial set out to demonstrate the commercial and practical benefits of using compost in land restoration. Quality topsoil was produced on-site using compost and cost savings were realised by recycling and re-using certain materials arising from the demolition of the original munitions works – materials which would otherwise have been sent to landfill.

Methodology

To provide for all the landscaping needs of the Chorley site, including the creation of roadside verges, playing fields, parks and natural woodland areas, it was determined that 14,000 tonnes of manufactured topsoil would need to be created. Some 7,036 tonnes of BSI PAS 100 compost screened at 0-28mm were sourced from a local supplier, WRS Composting Limited of Formby, Sefton – situated about 18 miles from the Royal Ordnance site. The compost

was mixed on-site with 7,036 tonnes of sandy clay loam subsoil in a series of batches using the bucket of a 360° excavator which blended separate piles of compost and subsoil.

In parallel, growing trials were conducted to ensure the resulting topsoil was fit for purpose.

Results

The aim was to produce a material equivalent to manufactured economy grade topsoil (BS3882). The untreated subsoil was very deficient in organic matter and nitrogen, phosphate and potassium, with an unacceptably high pH of 8.5-11.00 – conditions that would limit plant growth. When mixed with compost, the pH fell to 8.0, and glasshouse germination and growth trials on vegetables confirmed that the new soil would be ideal.

Preliminary trials to test the longer term efficacy of the manufactured topsoil to support species-rich wildflower grassland and growth of trees were undertaken at Ness Botanic Gardens. Initial results after one growing season demonstrated that, with no addition of fertiliser, the manufactured topsoil had supported excellent growth of two different grassland species mixes, substantially better than subsoil and at least as good as, if not better than, Ness Gardens' own loam soil. Early results from the tree trial have shown that growth on manufactured topsoil was superb, producing compact, healthy trees with dark green foliage and demonstrating greater tolerance of early summer drought due to improved topsoil moisture retention.

Yet perhaps the most significant conclusion of this project was the commercial benefits demonstrated by the trial. The following tables show the cost savings made by using compost to manufacture topsoil on-site rather than importing ready-made topsoil.

1 Creation of soil on-site using subsoils and compost

ACTIVITY	COST
7,036t of PAS 100 compost including haulage	£49,252.00
7,036t of subsoil to landfill	£0.00
Handling costs for receiving compost and mixing compost/subsoils	£36,909.50
Total cost for compost/subsoil based 'made' soil ready for use on-site	£86,161.50
Total cost per tonne of 'made' soil (14,072t of 'made' soil in total)	£6.12

Note: From delivery of compost to completion of mixing took 49 working days.

2 Importation of topsoil and disposal of subsoil

ACTIVITY	COST
Landfill gate fee for uncontaminated inert material (guide price £6/t + £2 landfill tax)	£56,000.00
Subsoil (7,000t) haulage to landfill (approx £3/t)	£21,000.00
Importation of 14,000t topsoil only. Price dependent on quality and availability. Cost based on 'made' economy grade topsoil at £8/t including haulage	£112,000.00
Total cost for final topsoil importation (14,000t) and subsoil disposal	£189,000.00
Total cost per tonne of topsoil (ready for use on site) including subsoil disposal	£13.50

Note: This table does not include handling costs for subsoil transfer to haulage vehicles or the receipt of topsoil when delivered to site.

This trial clearly demonstrates the economic advantage of using compost in this way. The decision to mix compost with available subsoil on-site to create a good quality soil rather than importing topsoil saved the project £102,838.50.

"The made topsoils saved the project money on the cost of importing topsoil and on the cost of disposal of the subsoils."

Dr David Hackett (Landscape Architect/Ecologist, Cass Associates)

Key benefits:

- The use of compost in topsoil manufacture offers significant cost savings
- Soil generated using on-site subsoil will be closer to native soil than imported soil, providing a steady source of nutrients for grasses, herbaceous plants, shrubs and trees. The soil can also be tailored to meet the specific needs of the intended vegetation
- BSI PAS 100 compost is free from weed seeds, soil pathogens and roots, meaning that weed growth is reduced and herbicide sprays are largely unnecessary during the critical early establishment period for trees and wildflowers leading to further cost and labour savings
- There is a sustainable supply of compost
- The process allows the positive use of unsuitable geotechnically unstable material on-site avoiding the cost and environmental impact of diverting to landfill
- Soil manufactured using compost and mixed on-site is more consistent in quality and physical/chemical properties than imported topsoil

The Future

The next step for Buckshaw village is to use the soil to create public recreation areas, wildflower grassland and broadleaved woodland.

To monitor progress, the project team is developing a 'toolbox' of soil health descriptors which will be used to assess the quality of soil health at brownfield sites.

This project should increase the demand for compost across the North West. Local authorities across the region are collecting increasing amounts of garden waste for composting and the region will benefit economically from the creation of new businesses and jobs in the composting supply chain.

Contacts and information sources

The Compost Supplier Directory, which details suppliers of BSI PAS 100 compost, can be found by visiting www.wrap.org.uk/organics. A final report from this project will also be made available on the WRAP website.

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WRAP

Compost supply information.
Tel 0808 100 2040
www.wrap.org.uk

The Mersey Forest
Project information
Tel 01925 816 217

www.merseyforest.org.uk



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