

Wider application

The success at Athersley Memorial Park, on a site with a history of acidification and vegetation failure, shows the benefits of using the correct biosolids product for reclamation prior to tree planting or grass seeding. Liquid sludge is not suitable for this purpose due to problems of run-off and poor resulting soil structure. By contrast, a solid composted product provides sufficient humus and beneficial organisms to create a stable and self-maintaining planting medium.

Research has shown that where pyrite-rich shales are a problem, 100mm of biosolids (700 - 900 tonnes dry matter per hectare) is the minimum amount needed for success. Where biosolids are being employed merely as a nutrient addition, rather than for soil formation, 100 dry tonnes per hectare may be sufficient, but at this lower rate, newly planted trees may benefit from the addition of mycorrhizal organisms.

Footnote: all spreading of biosolids on land is covered by legislation, and it is essential that the Environment Agency is in agreement with the proposals. The local water company may be able to assist with this agreement, and with the supply of suitable material.

Further information

National Urban Forestry Unit

This leaflet is one of a series produced by the National Urban Forestry Unit. NUFU is a charitable trust and it provides a national focus for the exchange of information and good practice in urban forestry. If you would like further information on other case studies, or if you have examples of good practice to share, please contact:

National Urban Forestry Unit
The Science Park
Stafford Road
Wolverhampton WV10 9RT

Tel: +44 (0)1902 828600
Fax: +44 (0)1902 828700
Email: info@nufu.org.uk
Website: www.nufu.org.uk

Barnsley Metropolitan Borough Council

Contact: Andrew Bannister • Tel: 01226 772556 • Email: andrewbannister@barnsley.gov.uk

Yorkshire Water

Contact: Ian Fairless • Tel: 01274 691111 • Email: ian.fairless@yorkshirewater.co.uk

Sludge Consultant

Contact: Jim Walker • Tel: 01535 665829 • Email: jimwalker@mistral.co.uk

Further reading

Chambers BJ, Royle SM, Hadden SW, Maslen S. (November 2000) *Use of Biosolids as a soil forming material*. CIWEM/Aqua Enviro 5th European Biosolids Conference Wakefield

Bellett-Travers DM (June/July 2002) *Biosolids for planting*, Garden Design Journal

Metcalfe B (1994) *The use of consolidated sewage sludges as soil substitutes in colliery spoil reclamation* PhD thesis (unpublished), University of Nottingham

Metcalfe B and Lavin JC (1989) *Consolidated sewage sludges as soil substitutes in colliery spoil reclamation in Alternative uses for sewage sludge* (Ed Hall JE) pp83-101, Pergamon Press, Oxford

Water Research Centre Report UC 2904 (November 1999) *Manual of Good Practice for the Use of Sewage Sludge in Land Reclamation*

Acknowledgement: Marcus Bellett-Travers, Imperial College, London.

Photographs: (Reclamation) Yorkshire Water Services, (Recent) Jim Walker

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Urban Forestry in Practice

Reclaiming derelict land using biosolids



CASE STUDY

Reclaiming derelict land using biosolids

Introduction

Many of the sites offered for urban forestry are derelict and require reclamation as part of the landscape works. Where there is no topsoil or soil-making material available and/or there is a problem with colliery shale, the use of biosolids (composted sewage sludge cake) can create a sustainable growing medium which provides large reserves of plant nutrients and locks up pollutants. Choosing the correct biosolids product minimises smell and health risks and eliminates the need to revisit the reclamation.

Specific example

Project name and location

ATHERSLEY MEMORIAL PARK (formerly the colliery tip for Warnccliffe Woodmoor Pits 1, 2 & 3).
Barnsley, South Yorkshire. Grid reference SE 360 100

Project partners

- Barnsley Metropolitan Borough Council
- Yorkshire Forward



100mm of biosolids spread ready for incorporating into waste-tip surface

Project objectives

- To reclaim the failed area of the previously reclaimed colliery spoil tip
- To exploit biosolids for their soil structure and fertility-building capabilities
- To provide an amenity for the local area
- To improve the image of Barnsley

Site description

The 30ha Warnccliffe Woodmoor colliery waste tip is surrounded on three sides by council housing. When it closed in 1966, it was eventually reclaimed and landscaped. There was minimal topsoil available on the site and after an initial flush of surface greening, the vegetation on the tip area partly failed due to acidification.

Project design

In South Yorkshire, colliery waste contains a significant amount of pyrites in the shale and as this weathers, it produces sulphuric acid leading to low pH values. This in turn allows phytotoxic elements to become available to plants. On very old undisturbed tips, weathering and leaching at the surface can sometimes lead eventually to a lessening in acidity, allowing some plants to establish themselves. Unfortunately, during reclamation, ground remodelling inevitably brings fresh pyrites to the surface, leading once more to weathering, lowered pHs and phytotoxicity.

The common practice of applying lime and topsoil to acidic shales provides only a temporary solution, as the alkalinity of the lime is eventually overwhelmed by the acid leachate. Acidification then leads to plant die-back and erosion. Because of the high cost and scarcity of topsoil, only a thin layer can generally be afforded and this is not sufficient to buffer the acidity. Repeated small applications of lime can help to try to stabilise the situation. However, this is impractical where trees are to be planted, and the cost of such return visits is very unlikely to be covered by the original funding for the scheme.

At Warnccliffe Woodmoor, the tip had been re-formed but conventional reclamation and regeneration had failed. In 1990, it was decided to reclaim and regenerate the tip once more. Barnsley Council's experience with previous successful schemes led them to use biosolids from Yorkshire Water to restore the failed areas. The material was prepared by composting a mixture of digested sludge cake and straw. After several months of regular mixing, aeration and maturing in stockpiles, the material was delivered to Warnccliffe Woodmoor.



Excellent tree establishment on colliery waste-tip 6 years after treatment

The low cost of the biosolids allowed a layer 100mm thick to be spread. This was then thoroughly mixed with the top 100mm of the shale to give a 200mm thick layer which derived physical strength and structure from the shale, and humus and plant nutrients from the biosolids. Experience on other sites which had been reclaimed to farmland showed that the reserves of slow release fertiliser in the biosolids were sufficient to provide good crops of grass for many years without further fertilisation. In addition, the thickness and buffering capacity of the biosolids completely prevented acidification and a second failure.

Some 30% of the area of the reclamation has been devoted to forestry with the remainder put to grass which is managed agriculturally.

Results

Warnccliffe Woodmoor pit is now known as Athersley Memorial Park. The grassed areas and the newly planted woodland are growing strongly. Local people use the area heavily but there is little evidence of litter and the trees have not been vandalised. An estate of private houses has now been built adjacent to the reclaimed colliery waste tip, confirming the improvement of the area's image.