

Case study summary

Tyre bales in an embankment

This case study relates to the manufacture of tyre bales and their first use in house building in GB; to secure an embankment for the construction of new houses in a residential area on the outskirts of Inverness. A 100 metre embankment utilised approximately 21,000 tyres weighing 160 tonnes.

Key points

- This case study relates to the first use of tyre bales in house building in Great Britain.
- Tyre bales were used as an alternative to concrete and brick retaining walls in the construction of an embankment to support new residential housing.
- Improved drainage and slope stabilisation were achieved.
- Costs savings of up to £25,000 were estimated.
- A 100 metre embankment utilised approximately 21,000 used car and light commercial vehicle tyres, weighing 160 tonnes.
- Environmental impact was reduced through the displacement of virgin aggregates and energy-intensive cement and bricks, and through reduced emissions from the transportation of materials. The application also assists the creation of markets for recycled tyres which can no longer be disposed of to landfill in the UK.
- Cost and environmental benefits for the use of tyre bales in civil engineering projects are likely to be greater in the Highlands of Scotland, the location of this project, due to the limited availability of lightweight aggregates and the greater transportation distances.



Overview

Conversion of post-consumer tyres into bales^a is currently a process managed under the Waste Management Licensing Regulations 1994. In Scotland, depending on the amounts involved, the process of baling of waste tyres is deemed to be an exempt activity under the Regulations, though transporting bales requires a Waste Transfer Note. Once manufactured, the specific use of bales in construction is generally deemed a low risk activity.

Northern Tyre Recycling Ltd (NTR), located near Dingwall, Inverness, is an importing agent for tyre baling machines into the UK. NTR collects all categories of used tyres from garages and tyre fitters across the Highlands and the Scottish Islands. Some local councils now also supply tyres brought in to civic amenity sites. Where arisings of more than 3,000 tyres are found, the company can move their mobile baler to the site to minimise transportation costs. To date, they have baled tyres at nine different sites in the Highlands and on the Scottish Isles.

Case study: Tyre bales in an embankment for residential development

This case study relates to the first use of tyre bales in house building in the UK, specifically to secure a 100m embankment to minimise erosion and land slip on a new homes construction site located on a hillside overlooking Inverness. Conventional construction would have been through the use of a drained brick wall with a 600 mm concrete base to secure the embankment. Instead the embankment was built on two layers of tyre bales.

All major baling companies in the UK currently use the same standard baling equipment, and the process is as follows: 100 to 110 tyres are placed in a herringbone pattern in layers into the bale chamber. Each layer of tyres is compacted at ca.65 tonnes pressure for 10 to 20 seconds per cycle. When the bale chamber

^a During 2007 a Publicly Available Specification (PAS) document of tyre bales will be released. This PAS 108:2007 will specify the minimum technical and quality requirements for tyre bales when used for construction applications.

is full, high tensile galvanized wires fix the bale by use of a quick lock mechanism.

The total embankment comprised 190-200 tyre bales. The bales are covered with topsoil, graded to attain the required slope, and finished with appropriate landscaping

Because the construction project at Inverness was the first of its kind in the UK, some initial "learning by doing" was evident, and the first 30 metres of the embankment took as long to complete as the last 70 metres.

Benefits

Cost: An estimated £25,000 was saved by using this build method: build costs were around 20% and raw material costs about 11% of an equivalent 100m brick, mortar and concrete wall, and there were some transport savings.

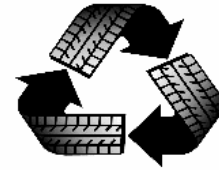
Environmental: Around 21,000 tyres were diverted from landfill; concrete, bricks and virgin aggregate have been displaced, hence giving decreased carbon emissions and less pressure on virgin quarried materials. Lightweight aggregates are in short supply in Scotland: by substituting with tyre bales from a local supplier and by transporting more volume per load carried (due to reduced weight compared to an equivalent volume of displaced material) less transport was required leading to lower carbon emissions.

Details of parties

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