



## EMBANKMENT WIDENING | SHAP, CUMBRIA



The use of Leca® Lightweight Expanded Clay Aggregate for the widening of a railway embankment on the 'rooftop of England' provided a solution to ground stability and drainage challenges. The scheme to widen the embankment carrying the West Coast Main Line to its highest point at Shap, Cumbria, involved the use

of some 600m<sup>3</sup> of Leca® Lightweight Expanded Clay Aggregate in the first major use of the product in a UK rail infrastructure project. The work, carried out by Birse Rail Limited to a design by consultants Scott Wilson for Network Rail, involved the widening of a 150 metre length of embankment to ease goods train movements onto a quarry branch line adjacent to the main line. Sub-contractors for the work were J. Murphy & Sons Limited. The Leca® Lightweight Expanded Clay Aggregate was required as the embankment was founded on peat and soft organic clays.

Loading of this ground, which remains saturated for most of the year, had to be kept to a minimum to reduce settlement. The sequence of construction involved the placing of a dual-purpose drainage blanket/shear key followed by the installation of Prefabricated Vertical Drains (PVD's). The PVD's were required to increase the rate of settlement occurring within the construction period. A layer of traditional granular fill was then placed and compacted on the lower slope followed by Leca® Lightweight Expanded Clay Aggregate for the upper slope closest to the track. Explained a member of the Network Rail Engineering Team, responsible for specifying Leca® Lightweight Expanded Clay Aggregate : “We required a lightweight fill material which would display the same frictional characteristics as a granular soil; would be easy to model and would limit settlement in a critical area.”

In calculating loadings, the consultant engineers worked on an assumed unit weight of 5kN/m<sup>3</sup> for Leca® Lightweight Expanded Clay Aggregate, compared with a typical density of 20kN/m<sup>3</sup> for crushed rock aggregates. In addition to reducing the loadings on the existing embankment, and the widened toe, the reduced unit weight allowed easier manual handling and, combined with the free-draining nature of the material, meant that compaction was possible using a tracked vehicle which could operate in all weather conditions.

Explained a spokesman for Scott Wilson:“This was an unusual situation and one where we didn't want settlement continuing over a number of years. The combination of the Leca® Lightweight Expanded Clay Aggregate and PVDs meant that the bulk of the settlement, around 95 per cent, was designed to occur within the first three months.”

## FACTS

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**Amount of material:** 600m<sup>3</sup>

**Interesting Fact:** Loading of this ground, which remains saturated for most of the year, had to be kept to a minimum to reduce settlement.

**Delivery Method:** Walking Floor

**Main Contractor:** Birse Rail Limited