



PRESTON WESTERN DISTRIBUTOR ROAD (PHASE 1-4)



LECA® Lightweight Fill (LWA) was specified for 4 sections of the development of the major new road - the Preston Western Distributor, which will link Preston and southern Fylde. These 4 sections formed part of the complete development and the use of LECA LWA provided a fundamental role in the speed and stability of

this new road scheme.

This £200m road scheme is the biggest new road programme in the Preston, South Ribble and Lancashire City Deal.

The development includes a new motorway junction to the M55 together with temporary soil storage and contractor areas, cycle track alongside all highways, water attenuation ponds, diversion/stopping up of public rights of way, landscaping and ecology mitigation areas, construction of two bridges, two viaducts, two underpasses and a cattle creep.

The development is hoped to promote new housing and business development in the area, while increasing capacity on the existing local road network.

The Preston Western Distributor will link the A583 and the M55 motorway and will involve the construction of:

- a new motorway junction
- four new bridges, and
- three underpasses

FACTS

Amount of material: Over 14,000m³ of [LECA® LWA \(10-20mm\)](#)

Interesting Fact: This £200m scheme is being undertaken by Costain Group PLC on behalf of Lancashire County Council and will link North West Preston and the Fylde to the M55 motorway.

Delivery Method: Walking Floor

LECA LWA for 4 phases of the Development

The scheme also includes two new roads connecting to new and existing housing areas of North West Preston and Cottam. The new East-West Link Road and Cottam Link Road will provide convenient access to the Preston Western Distributor, avoiding already congested local routes.

LECA Lightweight Fill was specified for 4 specific bridge sections of the Preston Western Distributor Road project, where the developers and designers faced groundwork issues:

- **Savick Brook** – (Over 2400m³ of LECA® Lightweight Fill was used for the bridge abutment section of the development, providing a lightweight solution offering robust stability over delicate ground conditions.)
- **Beconsall Bridge** (6800m³ of LECA LWA was delivered without the need for any road closures for the traffic intensive M55 motorway)
- **Lea Viaduct** (Over 3500m³ of LECA® lightweight fill was used for the bridge abutment section of the development)
- **Bartle Lane Bridge** (1000m³ LECA® lightweight fill was used for the bridge abutment section of the development)



Alternative Solutions to LECA LWA on the market:

There were many proposed materials available for the structural backfill requirements for this project and this included traditional rock aggregates and alternative solutions, but as with many projects where LECA has been specified as a design solution.

LECA's robust lightweight properties provided the key added value required for the poor groundwork conditions of this project, Rosey Thurling goes on to explain that "there is an alternative product available on the market however it is not as lightweight as LECA. This low density property of LECA gave it an advantage over its competitor."





Simple and Efficient Placement of Material:

Leca® LWA can be placed in the same way as other conventional aggregates. This can be either by tipping and spreading using a tracked dozer, or tracked excavator. However, a value adding property (unique to LECA LWA) is the ability for vehicles to continue operations over the placed material without the risk of potential surface crushing of the placed material. Compaction of Leca® LWA material requires substantially less compaction effort when compared to conventional fills - layer depths can be greater, typically up to 1000mm. Compaction should be conducted using a vibrating plate compactor with a maximum ground bearing pressure of 50kN/m². Typically, 3-4 passes of this vehicle are required to limit potential surface crushing of the Leca® LWA compaction layer. Compaction is expected to provide a reduction in volume of 8-12% with the average being approximately 10%.

This ease of compaction, following the placement of the material through the traditional placement method of using a combination of Excavator/ Dozer, provided further value for the engineering team at Costain, Rosey Thurling goes onto explain, “Following the guidance from the manufactures instructions the material was easy to place, it can be tripped straight from the delivery wagon into position, and compacted with just a few passes of a standard tracked machine. The ordering and delivery system was also easy to arrange and any questions were answered quickly from the knowledgeable team at LECA.”

Low Density Design Solution Properties:

The specification of Leca® LWA on large scale cut and fill operations and construction on soft soils or bad ground can overcome stability problems, reducing the risk of landslide and deformation. When used in road embankments, Leca® LWA exerts much lower horizontal earth pressures compared with other backfill materials, helps improve stability and reduce the need for counterfill.

The developers recognised that Leca® LWA has an installed bulk density of approximately 20% of that of general fill materials and will considerably reduce settlement of the road or rail carriageway, both

immediately and in the long term. Widening and replacing existing carriageways is also simplified by using Leca® LWA with no specialist techniques necessary. Because the compaction of Leca® LWA material requires substantially less compaction effort when compared to conventional fills - layer depths can be greater, typically up to 1000mm. “The main property for the use of LECA on PWDR was its low density enabling the structural design to be as efficient as possible. The phi value (angle of repose) of the material was also an important factor when choosing this material for use at Becconsall Bridge in particular.”

Confidence was established when similar case studies were provided which presented the effectiveness of LECA LWA in similar scale bridge projects, when installed behind abutments, including the FARRR’s project where 27,000 m³ was installed in a MSE system. And a similar bridge refurbishment project, where the old back fill had overloaded the abutments, causing the bridge deck to hog – creating a bridge failure - the solution was to remove and replace the abutment back fill with the Leca®LWA 10-20mmR.



Cost effective Solution with LECA LWA

All the material for the four phases for the PWDR project where LECA was specified was successfully delivered and applied - providing a key solution for the groundwork issues faced for the completion of the PWDR Project. Rosey Thurling concluded the project and looked to the use of LECA LWA for future projects where structural ground work issues would be faced, “I would use LECA again for the properties mentioned above and the opportunity to value engineer the structures at the design phase. At the start of 2022, due to changes in availability of materials and delivery options in the UK, the cost of LECA was cheaper than its competitors. This would also influence my decision to use this material on future projects.”

Sustainability and Carbon Emission Targeting

Thanks to the lightweight nature of LECA LWA, this provided the designers the opportunity to positively contribute to their own sustainable initiatives to tackle the impact of co2 emissions for this project. Rosey Thurling goes onto explain, “Also as the material is lightweight it can be transported in large volumes using up to 70m³ on Walking Floors. This therefore takes a number of delivery vehicles off the roads and therefore reduced the carbon impact the project has on the local environment.”

Furthermore, work has continued for LECA’s own sustainability initiative and overall ambitions to become carbon neutral by 2050 and this includes the use of solar panel technology at the facility which manufactured the material used at the PWDR project. This solar power facility was an investment from Saint-Gobain, who have multiple sustainability initiatives and investments to achieve carbon neutrality by 2050.