# Leca® Lightweight Aggregate (LWA) with Geotextiles Solutions

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# **Technical Overview Guide:** Leca® Lightweight Aggregate (LWA) with Geotextiles

This document provides a comprehensive technical overview of how Leca® Lightweight Aggregate (LWA) is used in combination with geotextiles across a wide range of UK geotechnical projects. Developed specifically for architects, civil engineers, and geotechnical specialists, the guide explores best-practice design principles, performance characteristics, and installation methods—supported by a series of detailed UK case studies demonstrating proven results in real-world environments.

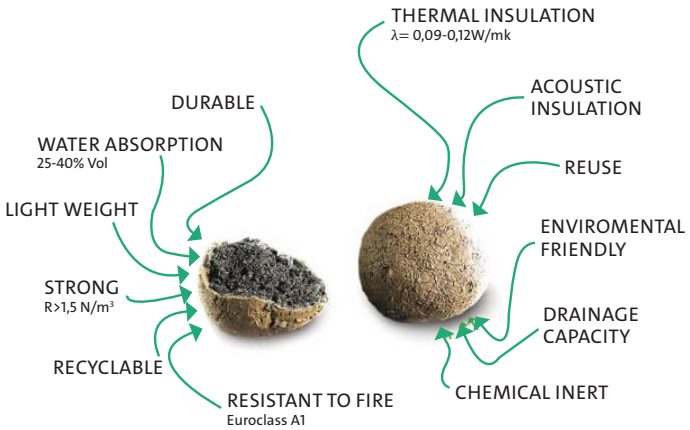
As geotechnical design evolves to meet the challenges of climate resilience, ground improvement, and sustainable infrastructure delivery, the pairing of Leca® LWA with geotextile systems has become an increasingly trusted and effective engineering solution.

## Why Leca® LWA + Geotextiles?

Leca® LWA is a lightweight, expanded clay aggregate that offers superior performance for load reduction, drainage, and ground stabilisation. When combined with geotextiles—whether for separation, filtration, drainage, or reinforcement—the result is a highly engineered composite system that improves performance across multiple project types.

### This guide highlights how this paired solution helps:

- Reduce ground pressure on soft or variable soils
- Stabilise embankments, retaining walls, and cuttings
- Improve filtration and drainage, particularly in water-sensitive areas
- Minimise settlement across infrastructure and landscape installations
- Enhance load distribution where traditional aggregates would be too heavy
- Increase durability and lifespan of geotechnical systems
- Enable rapid installation on sites with restricted access



## Technical Performance Overview

### Load Reduction & Stability

- Leca® LWA reduces vertical and horizontal loads by up to 75% compared to traditional fill materials. When paired with geotextiles, load is distributed uniformly, reducing differential settlement and enhancing ground stability.

### Separation & Filtration

- Geotextiles prevent fines from migrating into the Leca® layer, maintaining permeability and long-term performance. This is essential in drainage layers, soft soils, and waterlogged conditions.

### Drainage Efficiency

- Leca® LWA's open structure provides excellent hydraulic conductivity, while geotextiles act as a filtration barrier—improving both vertical and horizontal drainage pathways.

### Reinforcement

- Where reinforcement is required, specific geotextile grades increase shear resistance and structural integrity, supporting stable embankments and retaining systems even under heavy loading.

### Durability & Material Stability

- Leca® is chemically inert, rot-proof, frost-resistant, and dimensionally stable. When wrapped or separated with geotextiles, it retains long-term performance even under variable environmental conditions.

## Core Applications Featured in This Guide

This technical document explores the use of Leca® LWA and geotextiles within the following UK project categories:

- Highway embankments and road widening schemes
- Rail infrastructure upgrades requiring settlement control
- Retaining and reinforced earth structures
- Bridge abutment backfill to reduce lateral loads
- Culvert, pipeline, and tunnel protection
- Slope stabilisation and erosion control
- Ground improvement over weak soils or brownfield sites

Each application section is supported by real UK case studies that demonstrate performance outcomes, installation methods, and long-term behaviour.

By minimizing earth pressure, structures can be designed more efficiently and cost-effectively.

# GEOCELL-REINFORCED EMBANKMENTS: A SMARTER, SAFER SOLUTION FOR THE A595 UPGRADE

## How Geocells and Leca® LWA Worked Together to Deliver Stability, Efficiency and Long-Term Performance

The first phase of work began in late 2022, mainly off-road to minimise disruption. A.E. Yates constructed new embankments, upgraded drainage to capture hillside runoff, and created open channels and a filtration pond to improve water quality entering Lowca Beck—boosting biodiversity and reducing future flood risk.

Contracts Manager Ruairi Flynn MCIOB noted, "Leca's technical data gave us confidence—it performed exactly as predicted."

Two compounds were established on each side of the A595, where micro-tunnelling delivered new drainage tunnels with minimal disturbance. The second phase required a full road closure to relocate a gas pipeline and complete the drainage improvements.

Over 11,000m³ of Leca® LWA was shipped to nearby Workington port, significantly reducing transport miles, emissions and costs. Its rapid installation helped maintain the project timeline, avoiding delays from alternatives such as piling or bridge construction.

**Geocells: A Critical Part of the Design**

Due to the steep embankments on both sides of the A595, geocells played a crucial structural role. Combined with Leca® LWA, they created a stable, confined system that prevented material movement on the steep slopes. This confinement made it possible to safely transport and place LWA using small and large skips, ensuring efficient installation.

Geocells were essential in locking the lightweight aggregate into position, maintaining long-term embankment stability and reducing the risk of settlement or deformation under traffic loads.

Engineering Innovation
By lightening the embankment and reducing ground pressure, Leca® LWA—enhanced by geocell reinforcement—removed the need for extensive soil strengthening. The solution improved stability, reduced horizontal earth pressures and supported critical flood-management objectives.

Ruairi Flynn concluded: “We’d certainly consider Leca LWA again where appropriate—I’d highly recommend it.”

## Project information

**Client:** National Highways

**Contractor:** A.E Yates

**Delivery Method:** Direct Ships to Workington/ 7 mile distance on Walking Floor

**Product:** 11,000m3 Leca LWA (10-20mm)

# GEOTEXTILE-REINFORCED LECA® LWA: DELIVERING STABILITY AND STRENGTH FOR THE SALFORD RISE BRIDGE

**Geotextile Grid Reinforcement Ensuring Secure, Stable and Long-Lasting Structural Performance**

As part of the major Salford Rise regeneration scheme, more than 3,000m³ of Leca® Lightweight Aggregate (LWA) was specified for the construction of a new elevated bridge walkway. Positioned beside the University of Salford, the development aims to remove long-standing physical barriers and create seamless links between local neighbourhoods and the expanding innovation district. Supported by £13.17m from the Levelling Up Fund, the project represents a significant investment in Greater Manchester's urban transformation.

The construction of the bridge abutments introduced notable geotechnical challenges, as the ground conditions demanded a solution that could minimise settlement, reduce structural pressures and mitigate long-term risks such as sliding, tilting and bearing failure. Traditional fill materials were unsuitable due to their weight and the additional load they would impose on the structure. To overcome these constraints, the Eric Wright Group specified Leca® LWA for its exceptional strength-to-weight ratio, reducing the load on the abutments by up to 75% compared with conventional fills. Its high

permeability supported the integrated drainage design, while its ease of handling and installation accelerated construction and reduced time on site.

**Geotextile Comination**

A crucial element of the engineering solution was the use of geotextile grids to secure the Leca® LWA in place. These grids acted as a stabilising framework, confining the lightweight aggregate and preventing any lateral movement during placement and throughout the structure's lifespan. By holding the material firmly within a reinforced matrix, the geotextile grids ensured consistent compaction, enhanced load distribution and maintained the integrity of the abutments on challenging ground. This reinforcement was essential not only for immediate stability but also for long-term performance under dynamic loads from the elevated walkway.

The combination of Leca® LWA and geotextile reinforcement allowed for a leaner, more efficient structural design, reduced material use and minimised ground disturbance. The result is a resilient and sustainable engineering outcome that supports the wider goals of urban regeneration and improved connectivity.

The Salford Rise project demonstrates how geotextile-reinforced Leca® LWA offers a robust, forward-thinking solution for infrastructure projects facing complex geotechnical conditions, ensuring both stability and long-term structural reliability.

## Project information

**Amount of material:** 3000m3 of LECA LWA (10-20mm)

**Interesting Fact:** The project, located adjacent to the University of Salford, aims to remove longstanding physical barriers and establish seamless connectivity between surrounding communities and the evolving innovation district.

**Delivery Method:** Walking Floor

**Main Contractor:** Eric Wright Group

# GEOTEXTILE GRID REINFORCEMENT SECURES STABILITY FOR THE M6 JUNCTION 10 HIGHWAY UPGRADE

**How Geogrids and Leca® LWA Combined to Deliver a Safe, Reliable and Settlement-Resistant Embankment Solution**

More than 8,000m³ of Leca® Lightweight Aggregate (LWA) was specified for the M6 Junction 10 improvement scheme in Walsall, delivered by John Sisk & Sons Ltd for National Highways. The project required the construction of two new semi-integral bridges and an embankment built on a 20-degree skew, all within a heavily constrained area adjacent to live carriageways. Early geotechnical assessments identified the need for a lightweight, reinforced earth backfill solution to limit settlement, reduce loading on weak ground and minimise the extent of piled foundations.

During the design phase, Leca® LWA was evaluated and chosen for its engineering performance and logistical

advantages. After consultation with Leca® UK's technical team, it was agreed that the material should be classified as a Fill to Structures Class 6T (10–20mm lightweight expanded clay aggregate), requiring a manageable departure from the MCDHW Series 600 Specification. Previous successful installations on major UK highways strengthened confidence in its suitability, enabling the designer, Capita Pell Frischmann, to formally endorse Leca® LWA for this scheme.

**Geotextile Support**


## Project information

**Amount of material:** 8000m3 of LECA® LWA (10-20mm)

**Interesting Fact:** There were technical problems discovered and limited space due to existing live carriageways, which required a robust lightweight reinforced earth backfill for the abutments to reduce the total settlements at the formation level and to reduce piled foundations extents and to minimise differential settlement.

**Delivery Method:** Walking Floor

**Designer:** Capita Pell Frischmann

A critical element of the solution was the integration of geotextile geogrid reinforcement, to work in combination with the lightweight aggregate. The geogrids provided a stabilising framework that confined the Leca® LWA, locking it into place and preventing lateral movement—an essential requirement given the steep embankment geometry and restricted working conditions. This reinforced system ensured that the fill behaved as a stable, unified mass, delivering the required structural performance for the bridge abutments while significantly reducing settlement risks.

John Sisk & Sons Engineer Charles Jackson highlighted the effectiveness of the combined approach, noting that although the material was new to him, support from Leca® UK—including case studies, installation guidance and technical insight—made the process efficient and predictable. Logistically, adjustments to deliveries were handled smoothly, allowing the team to adapt quickly to changing on-site requirements.

Working beside a live motorway added further complexity, particularly when transporting material over the newly constructed 6m abutment. To manage this safely, long-reach machinery from WM Plant Hire was deployed, enabling precise placement of the Leca® LWA before compaction.

The successful use of geotextile grids together with Leca® LWA played a central role in delivering a lightweight, stable and high-performance embankment solution—ensuring long-term structural integrity while meeting the tight spatial and engineering constraints of the M6 Junction 10 upgrade.


# GEOTEXTILE GRID REINFORCEMENT SECURES STABLE EMBANKMENT CONSTRUCTION FOR THE SPALDING WESTERN RELIEF ROAD

**The robust and yet lightweight nature of Leca® LWA ensured that the development could progress for the widening of the new highway, through the reduced compaction rates typical when specifying Leca® LWA for groundwork reparations.**

Work was completed on the Spalding Western Relief Road, where more than 26,000m³ of Leca® Lightweight Aggregate (LWA) has been specified to support the bridge abutments for a new reinforced-soil embankment. This particular phase of the scheme included the construction of a bridge over the railway line, with visible progress as the new road took shape.

The relief road forms a key new route around the west side of Spalding, connecting the A1175 and A16 to the south and east with the B1356 to the north via the B1172 Spalding Common. Designed to ease pressure on the existing network, the development will improve journey times, strengthen west–south connectivity and reduce the impact of increasing freight movements through the area.

## Geotextile Grid Provides Added Stability

A crucial element of the engineering solution is the use of geotextile grids in combination with Leca® LWA. These grids provided essential confinement, securely holding the lightweight aggregate in place within the reinforced-soil structure. By stabilising the material and preventing lateral movement, the geotextile grids ensure the embankment remains strong, stable and capable of supporting the new bridge and surrounding infrastructure. This reinforcement is particularly important given the scale of the embankment and the performance demands of the highway.

The wider project aimed to support sustainable housing and commercial growth across South Holland, reduce town centre congestion, enhance public transport reliability, and promote walking and cycling by diverting traffic away from central routes. With improved air quality, reduced emissions and safer travel through Spalding, the relief road represents a major step forward for the region's long-term transport strategy.

### Project information

**Amount of material:** 28,000m3 of Leca® Lightweight Aggregate 10-20mm

**Interesting Fact:** The combination of Leca LWA with a Geotextil Grid System is a proven and robust combined solution

**Delivery Method:** Walking Floor

**Main Contractor:** Eurovia Contracting North

# Improving living conditions and protecting the environment

Our products are bringing a number of advantages to the construction market, within the housing, infrastructure and water management sectors. They cater for comfort and wellbeing through positive thermal and acoustic insulation within our homes and living spaces.

We also see the benefits for our products within infrastructure design creating load compensation, reduced load on structures and offering effective drainage properties. Furthermore, we see the positive impact our products on the work environment and transport due to its unique combined lightness and strength. Our sustainable products are often recognized as achieving more with less.

Our organizational ethos of sustainability and protecting the environment is more than the effective engineering results of specifying our products – it is also what we do in our manufacturing processes. We recognize the environmental impact generated within our industry and we are focused on improving our environmental footprint through consistent optimization within all industrial processes throughout the total life cycle of our products.

But we do not rest on laurels on where we are today, we have clear plans of where we want our industry to be tomorrow. Reducing our industrial $CO_2$ footprint 50% by 2030, in comparison with 2017, is only is only our initial goal, we want to go beyond this. And for LECA sustainability is much more than $CO_2$ footprint and that is why we are developing transparent information on the full life cycle of our products.

We use energy to expand our aggregate but we are looking at the benefits in the total life cycle of our product – accounting for all the benefits generated during transport, installation and the user phase we believe we go far beyond the basic energy consumed to produce our products.

Through assessing the life cycle of our products it is clear that we are producing a sustainable building material. And importantly, not forgetting the end of the life-cycle of our lightweight aggregate, which can be removed and simply reused in the future, thanks to the material's unique and highly sustainable properties.

LECA® LWA is a product of today, with a strong history, and fully prepared for the needs and challenges of tomorrow. But we are not resting on our laurels. We want to take an active part in creating a sustainable future with a sustainable product.

***Kim Rosenbom***
*Business Development and Sustainability Director*

# Focus
# on the Environment

LECA has a strong commitment to the environment. Every day we extract clay from nature to produce our main product, Leca® LWA (Lightweight Aggregate). Even if we transform 1m³ of clay into 5m³ of sustainable construction material it is fundamental for us to understand the full life cycle impact of our products. Therefore, we are working on the Life Cycle Assessment (LCA) of our products which will allow us generate the Environmental Product Declarations (EPDs) – a transparent way to present the cradle to grave information for all our products, from all our

| EPD Process | Data collection | Life cycle assessment | Background report | 3rd party verification | Publication |
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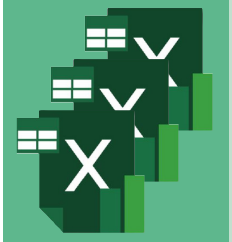
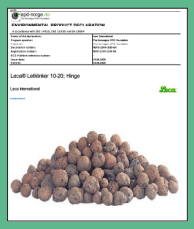
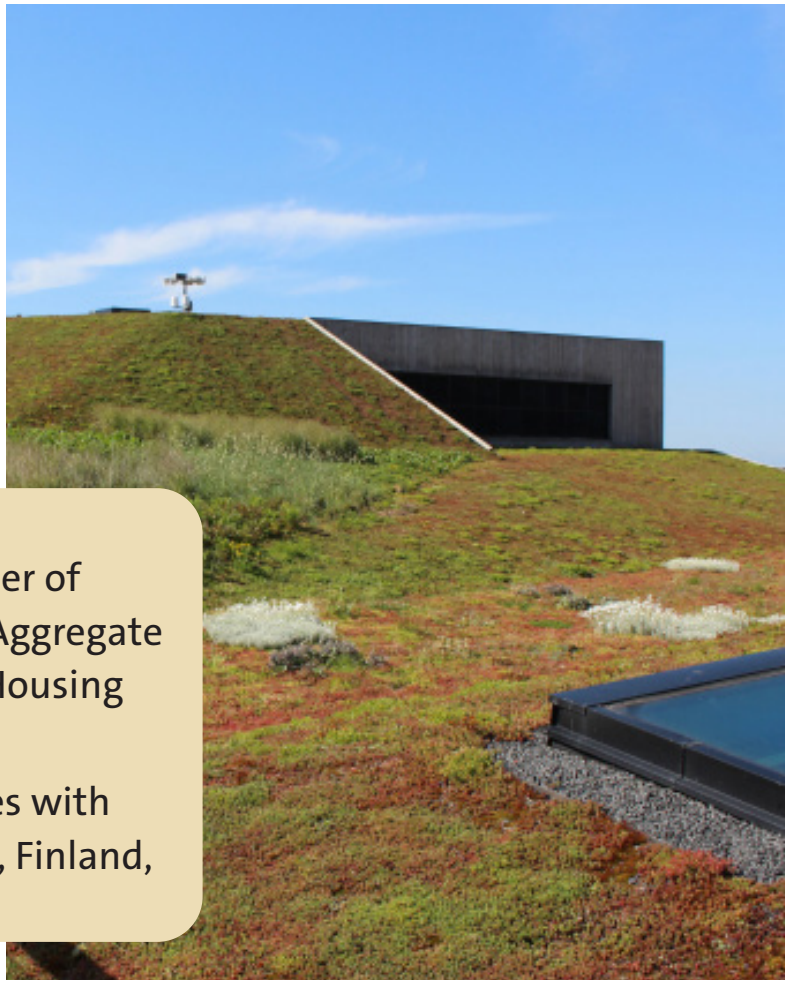
| |  |  |  |  |  |
| Executive | Manufacturer | Consultant | Manufacturer | Third-party | Program operator |

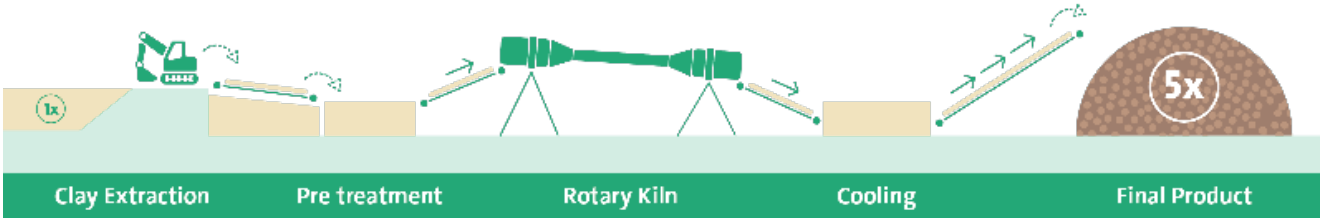
An EPD is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products in a credible way. EPDs are produced accordingly with the ISO International Standards, ISO 14025, based on the Product Category Rules. For Lightweight Expanded Clay the related CEN Standard is: EN 15804:2012 + A1:2013.



We are the number #1 supplier of Expanded Clay Lightweight Aggregate in Europe in Infrastructure, Housing and Water Management.

We are present in 12 countries with production sites in Denmark, Finland,

# Leca® LWA **production process**




**Clay extraction:** The clay is extracted from clay pits normally located close to the plants, thus keeping haulage costs and carbon emissions to a minimum. The clay pits are restored and rehabilitated to both preserve biodiversity and create new natural habitats.

**Pretreatment:** The clay goes to the production line where the mechanical treatment took place and some additives are added to the clay.

**Rotary kiln:** The kilns are heated to temperatures up to 1.150°C and this process transforms the clay into various sized lightweight aggregates with a hard ceramic shell and a porous core. The raw material is expanded approximate 5 times during the kiln process.

**Cooling:** A correct cooling process is essential to ensure a high-quality product. This process is made with air.

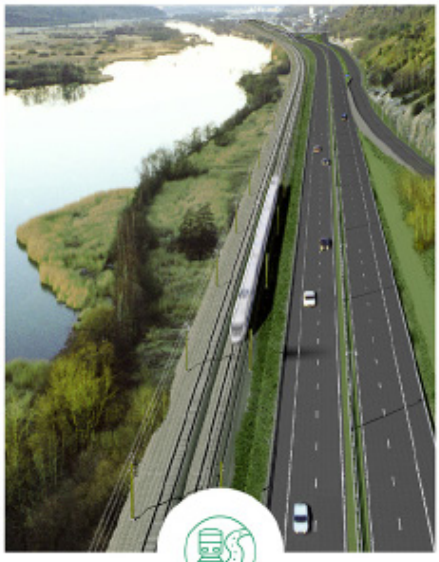
**Final product:** A sustainable light weight aggregate made for housing, infrastructure or water management applications.

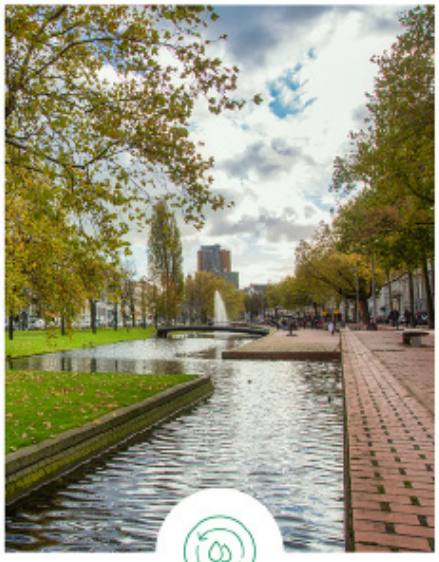
Comparing to traditional filling material Leca® LWA is fast and easy with the following characteristics:

- Lightweight
- Resistant
- Durable
- Improve drainage
- Thermal insulation

# Leca® In-Office CPD
# **Available Now**

We offer UK wide in-office CPD seminars (with lunch included) which provides an in depth study of Leca® LWA and its unique properties within structural and geotechnical applications.





Visit [www.leca.co.uk](http://www.leca.co.uk) to organise a free appointment

Key areas covered:

**Geotechnical Engineering** (Highways, Rail, Bridges, Pneumatic Infill of Redundant Structures)

**Water Management** (Landscaping, Flood Prevention)

**Coastal Protection** (Sheet Pile, Caisson Structures)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