

# Highway Project: M25 Junction 28 Redevelopment



# Leca® Lightweight Fill within Highway Development

In highway development and Leca® Lightweight Aggregate (LWA) is commonly used as a light fill material to reduce subgrade settlement and to improve stability of structures and areas of weak and unstable ground. It serves the similar targets when used in pedestrian and bicycle ways, railway yards and different platform and embankment structures.



In highway development Leca® Lightweight Expanded Clay Aggregate can be applied to repair settlement defects, to increase levelling and to improve bearing capacity. In addition, with the help of Leca® Lightweight Expanded Clay Aggregate roads that require widening can be constructed with minimal effect due to increased loading to the existing structure.

Embankments and Widening Highways Construction of embankments over weak and compressible soil deposits, where the loading of the embankment causes soil consolidation and settlement, is common.

Depending on the height of the embankment, the depth of the weak soil deposit and the consolidation properties of the soil strata, total settlements can be very deep and problematic in terms of road evenness, function and durability of the road construction. In the most difficult cases, various combinations of soil strengthening techniques are available, for example, preloading, vertical drainage and deep stabilisation with piles all of which are time consuming and costly to install.

## More than 70 years developing innovative projects

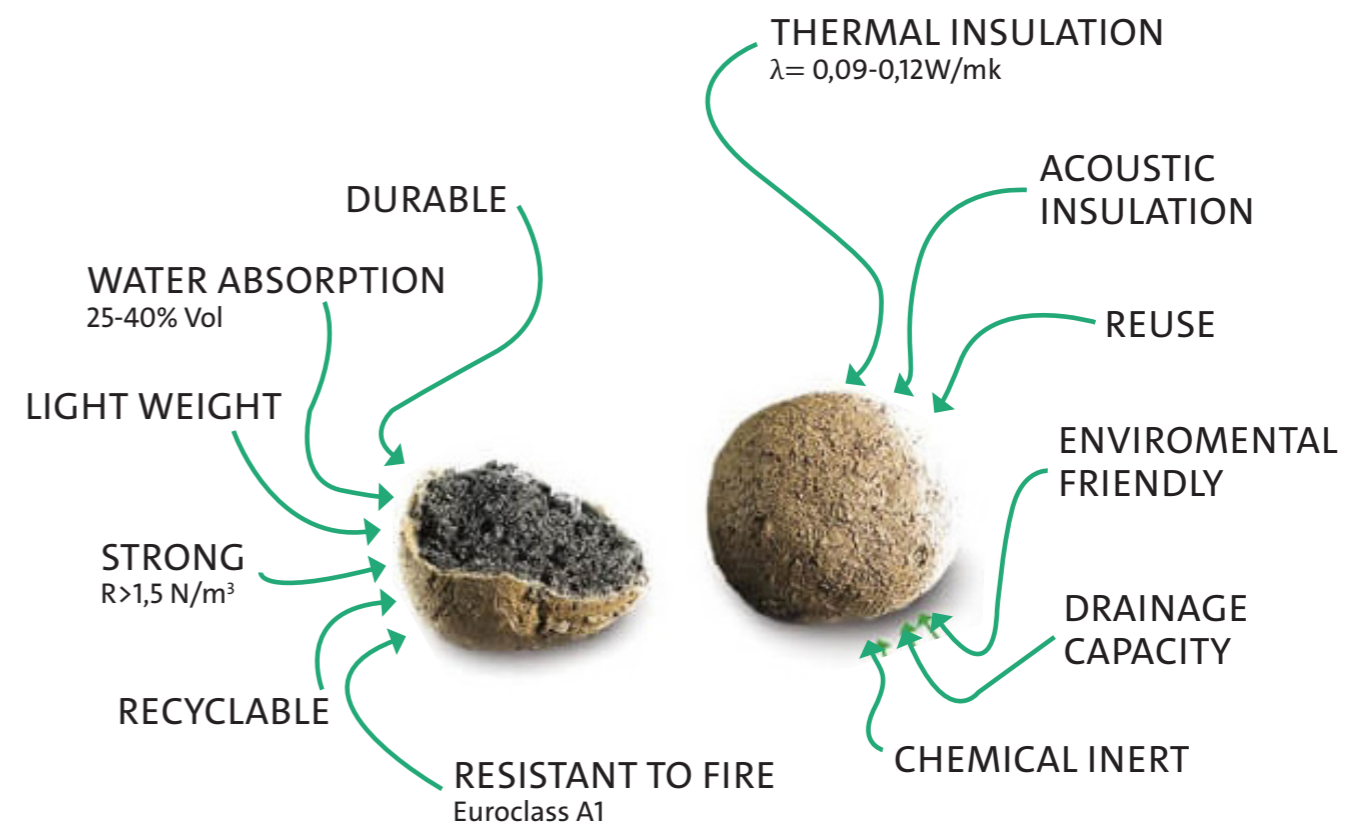
The 'pull out' resistance of Leca® LWA makes it an ideal solution for reinforced soil retaining walls. Particularly when constructed over weak sub-soils or voids, this method has been proven to cut overall construction costs considerably. Leca® LWA is used extensively to reduce vertical loading. Structures such as underground parking, tunnels or roof garden benefit greatly from the reduction in pressure and avoid additional costs of strengthening.

Being light weight and round in nature, Leca® LWA can be transported and placed more easily than that of traditional fill in these difficult to access areas



## Overview

- Stability – reduces the risk of embankment landslide and deformation
- Reduced settlements - less damage to road structures, rail beds, pipelines and other structures
- Reduced earth pressure - in structural backfill against foundations, retaining walls and bridge abutments
- Drainage - on sports grounds, fields, slopes and roads
- Insulation - protection for roads surface, structure, pipelines and service mains
- Frost stability - in road and rail beds
- Limited compaction – Exerted energy during compaction is minimal with a reduction in volume of approximately 10 - 12%.
- Low density and ease of handling, coupled with consistent high quality, make Leca® LWA a highly competitive alternative to other lightweight materials





# M25 JUNCTION 28 UPGRADE PROJECT

The works involved the creation of a new two-lane loop road, for traffic travelling from the M25 northbound carriageway onto the A12 eastbound carriageway.

The M25 junction 28 is a critical interchange, connecting the M25 motorway with the A12 and providing access to Brentwood via the A1023. As one of the busiest junctions in the UK, it experiences up to 7,500 vehicles per hour at peak times, with traffic congestion frequently leading to delays and poor air quality.

By 2037, traffic levels are expected to rise by 30%, necessitating infrastructure improvements to accommodate increased demand.

The National Highways upgrade project aims to enhance the junction's capacity by constructing a new two-lane loop road

for traffic traveling from the M25 northbound to the A12 eastbound. The scheme also includes:

- Construction of four new bridges (Alder Wood, Duck Wood, Maylands and Grove) and an underpass (Grove Farm Underpass).
- Realignment of the A12 eastbound off-slip road via a new bridge (Maylands Bridge) crossing the Ingrebourne River.
- Widening of the M25 anti-clockwise carriageway to improve traffic flow.

National Highways appointed GRAHAM as principal contractor for this ambitious highway development.

Grace Jackson, GRAHAM Section Engineer, provided an overview of the key construction elements:

*"The works involved the creation of a new two-lane loop road, for traffic travelling from the M25 northbound carriageway onto the A12 eastbound carriageway. This includes three new bridges (Alder Wood, Duck Wood and Grove) and an underpass (Grove Farm Underpass). The associated realignment of the existing A12 eastbound off-slip road is via a new over bridge (Maylands Bridge) and across the Ingrebourne River."*

One of the major engineering challenges faced



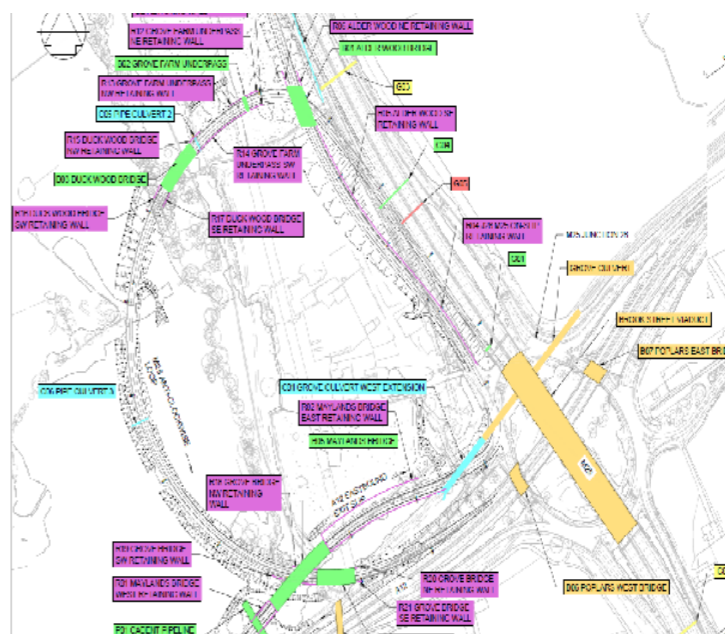
by GRAHAM was the extension of the Grove Culvert, an 88m-long drainage structure carrying the Ingrebourne River under the junction. A lightweight and stable groundwork solution was required to minimise settlement and structural loadings. To address this, Leca® Lightweight Expanded Clay Aggregate (LWA) was selected as the preferred geotechnical material.

## Why Leca® LWA Was Chosen

The extension of the Grove Culvert required a backfill material that could provide stability while limiting additional load on the underlying soil.

GRAHAM Section Engineer, Grace Jackson emphasized the selection criteria:

*"The river had an existing culvert carrying it under J28 and its slip roads. As part of the new off slip, an extension to Grove Culvert was required. Leca® LWA was chosen as a geotechnical solution at the location of the 88m culvert extension to allow the road to cross the Ingrebourne River."*



## Project information

**Amount of material:** 5600m<sup>3</sup> of LECA® LWA (10-20mm)

**Interesting Fact:** The extension of the Grove Culvert required a backfill material that could provide stability while limiting additional load on the underlying soil.

**Delivery Method:** Walking Floor  
**Main Contractor:**  
 GRAHAM CIVIL ENGINEERING



**Leca® LWA was identified as the optimal solution due to the following properties:**

- **Lightweight Composition:** Weighing less than 5kN/m<sup>3</sup>, Leca® LWA significantly reduces ground pressure compared to conventional fill materials.
- **Ease of Placement:** The material can be efficiently placed without requiring specialized equipment, streamlining the construction process.
- **Proven Performance:** Leca® LWA has a strong track record in highway infrastructure projects, ensuring approval from National Highways despite its absence from existing UK highway standards.
- **Efficient Load Management:** The material minimizes differential settlement, a crucial factor in supporting the extended culvert and preventing long-term structural issues.



**GRAHAM Engineering Manager, Jonathan Graham highlighted:**

*“The design approach required a robust lightweight fill material, with a proven record to enable approval from National Highways as it is a material that is not covered by existing Highway standards.”*

*“Leca® LWA was chosen as it is lightweight (less than 5kN/m<sup>3</sup>) and easy to place, requiring no specialist plant or equipment, while ensuring that settlement in the area of the culvert extension is maintained within acceptable limits.”*

**Project Execution and Results**

Over 5,600m<sup>3</sup> of Leca® LWA was delivered to the site and placed around the precast culvert extension units before the required earthworks and road formation were constructed. This enabled the necessary ground stability while maintaining acceptable settlement levels.

*“Approximately 5000m<sup>3</sup> of Leca® LWA was placed around the precast units before the required earth-*

*works and road formation could be constructed over the top to connect onto the junction.” – Grace Jackson, GRAHAM Section Engineer.*

To ensure efficient material supply and delivery, Walking Floor Trucks were utilized:

- **Walking Floor Trucks –** Up to 70m<sup>3</sup> per delivery, sourced directly from Wisbech.

**Stakeholder Perspectives**

**GRAHAM Section Engineer, Grace Jackson reflected on the implementation and efficiency of Leca® LWA:**

*“As intended in the design process, the Leca® LWA backfill was easy and efficient to place. Also, coordination with the LECA UK logistics team led to the product always being delivered when required and in the quantities required, helping us meet our programme targets. LECA UK has facilitated the delivery of 5000m<sup>3</sup> over the course of our project to date.”*

**GRAHAM Contracts Director Dave Brown empha-**

**sized the collaborative nature of the project:**

*“We are pleased to have begun work on the M25 junction 28 upgrade. National Highways is a valued and longstanding client, and this scheme will play a major role in improving journey times for thousands of motorists.”*

**National Highways Project Manager Zachary Pepper highlighted the long-term benefits:**

*“We would like to thank the construction team and the supply chain for the complex planning and significant progress of this much needed improvement scheme. These upgrades will improve capacity and driver safety and reduce congestion around the junction by improving the connectivity between the M25 and A12.”*

**GRAHAM Engineering Manager, Jonathan Graham also noted previous successful applications of Leca® LWA:**

*“We have previously used Leca® LWA in situations where loadings from backfill had to be kept to a minimum (e.g. Poynton Relief Road, Reading RBT).”*



*“We would have no hesitation in using Leca® LWA should a suitable scenario present itself. Indeed, given its benefits regarding reduction in loads, it is actively considered in respect of piled solutions or where consolidation is otherwise anticipated to exceed permissible limits.”*

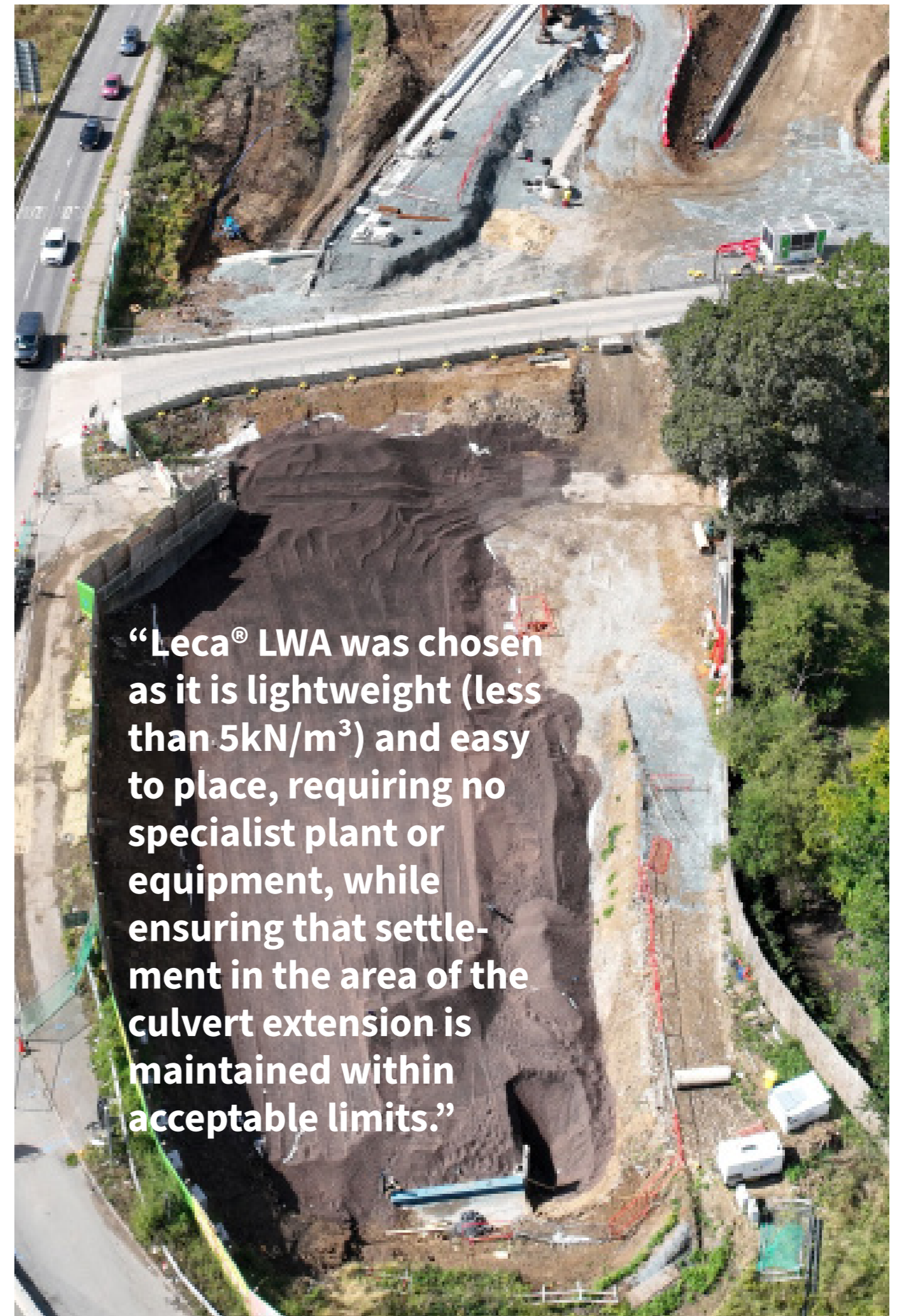
**Conclusion: A Successful Geotechnical Solution**

The integration of Leca® LWA at M25 Junction 28 has demonstrated the value of lightweight fill solutions in addressing complex geotechnical challenges.

The material’s ease of

placement, lightweight properties, and supply efficiency ensured that project milestones were met while maintaining structural integrity.

With a proven record on previous projects, Leca® LWA continues to be a preferred choice for highway infrastructure improvements where load management is a key factor.



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## 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<sub>2</sub> footprint 50% by 2030, in comparison with 2017, is only our initial goal, we want to go beyond this. And for LECA sustainability is much more than CO<sub>2</sub> 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.

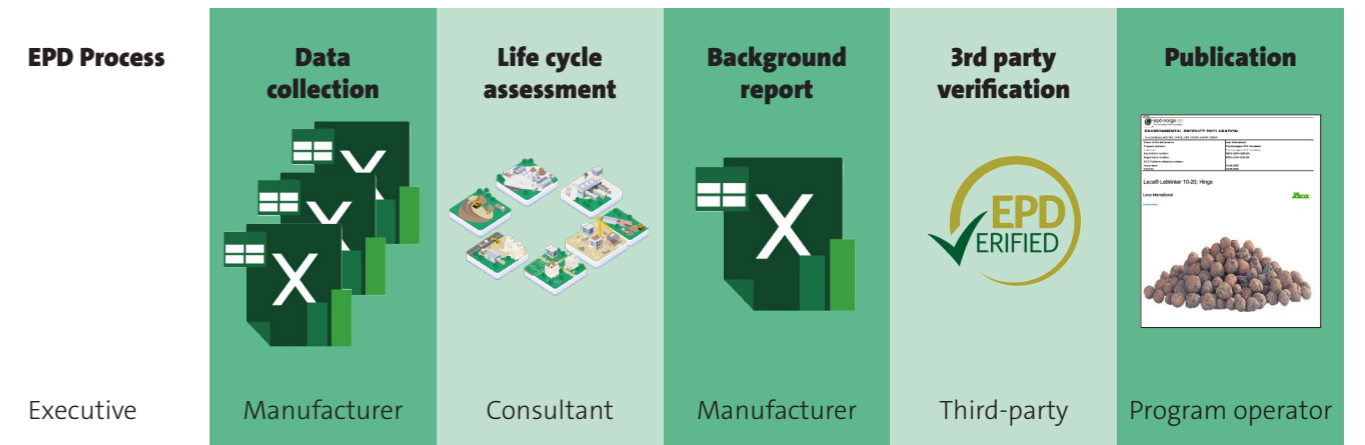
LECA® LWA is a product of today, with a strong history, and fully prepared for the needs and challenges of tomorrow. But we are not resting on our laurels. We want to take an active part in creating a sustainable future with a sustainable product.



**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 1m<sup>3</sup> of clay into 5m<sup>3</sup> 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



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.co.uk](http://leca.co.uk)