

Technical Guide: Leca® Lightweight Aggregate (LWA) within City Landscape Design



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This overview guide has been developed to support landscape architects, civil engineers, and geotechnical professionals in understanding the wide-ranging benefits of using Leca® Lightweight Aggregate (LWA) in UK landscape design. With a growing emphasis on sustainable, low-carbon infrastructure and multifunctional green spaces, material selection plays a critical role in both the structural and environmental success of a project.

Leca® Lightweight Aggregate (LWA) is a well-established geotechnical material that addresses many of the challenges faced by architects and engineers today. Manufactured by expanding natural clay at high temperatures, Leca® LWA is a lightweight, durable, and versatile aggregate with excellent load-bearing and drainage properties. It is extensively used across the UK in both soft and hard landscape schemes, from podium gardens and green roofs to embankments, retaining structures, and urban tree pits.



Inside this document, you'll find a series of real-world case studies from across the UK, demonstrating how Leca® LWA has been effectively applied in challenging landscape scenarios—proving its value as a go-to solution for lightweight fill, drainage, and sub-base engineering.



Why Choose Leca® LWA for Landscape Design?

Leca® LWA is a natural, lightweight expanded clay aggregate produced by firing clay at high temperatures to create a hard, porous structure. It is widely used across landscape and geotechnical applications for its exceptional combination of light weight, load-bearing capacity, drainage performance, and long-term durability.

This guide will show how Leca® LWA can help:

- Overcome ground loading restrictions on rooftops and podium structures
- Improve drainage in green roofs and tree pits
- Reduce lateral pressure behind retaining walls
- Enable sustainable urban drainage systems (SuDS)
- Simplify logistics and installation on restricted-access sites



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What This Guide Includes

- Technical overview of Leca® LWA material properties
- Performance benefits specific to landscape design
- Installation and design considerations for UK-based projects
- A curated selection of case studies from across the UK, showcasing successful use in both soft and hard landscaping applications
- Sustainability highlights, including circular economy potential and Environmental Product Declarations (EPDs)

Geotechnical Advantages

- **Low Unit Weight:** Reduces ground stress—ideal for use over soft ground, basements, culverts, or utility corridors.
- **Rapid Installation:** Can be pneumatically blown into hard-to-access areas using long-reach hoses (up to 50m).
- **Cost-Efficient:** Lower haulage costs due to reduced tonnage, and faster installation reduces time on site.
- **Proven Durability:** Chemically inert, rot-proof, and unaffected by time, moisture, or pests.
- **Thermal and Acoustic Benefits:** Provides insulation properties when used in green roof systems or around sensitive foundations.

Sustainability Credentials

- Recyclable and reusable
- Supports BREEAM/LEED certification
- Available with EPDs (Environmental Product Declarations) to verify lifecycle emissions



LIGHTWEIGHT LANDSCAPE ENGINEERING: LECA[®] LWA TRANSFORMS COURTYARD DESIGN IN RESTRICTED-ACCESS RESIDENTIAL DEVELOPMENT

A high-performance solution for architects and civil engineers, Leca[®] Lightweight Aggregate delivers reduced structural loading, superior drainage, and effortless installation through pneumatic delivery—enabling safe, sustainable and resilient landscape design in confined urban environments.

A housing development in Warrington required the infill of an internal courtyard as part of a new nursing home scheme. The original proposal—using crushed concrete (MOT/6F2)—proved impractical once access constraints became clear. Transporting heavy aggregate through the building risked damage to newly completed structures, and the use of cranes or excavators within the confined space

would have introduced additional safety and logistical challenges.

To resolve this, over 120 m³ of Leca[®] Lightweight Expanded Clay Aggregate (10–20 mm) was specified as a landscape fill material. Its low density and ease of handling offered major advantages over traditional aggregates, both in terms of installation and environmental performance.

Lightweight Aggregate Supporting Modern Landscape Architecture

For architects and civil engineers, Leca[®] LWA provided a solution that aligned seamlessly with high-quality courtyard design:

Its lightweight structure reduced imposed loads on the surrounding



foundations and slab constructions—critical when creating landscaped spaces above sensitive residential units.

Its natural drainage properties support healthy planting schemes and permeable landscape surfaces, improving stormwater management within the courtyard.

Its free-draining granular behaviour prevents waterlogging and reduces hydrostatic pressure on retaining elements, making it well suited to courtyard podiums, roof gardens and elevated landscape zones.

These characteristics make Leca® LWA a strategic material for integrating soft landscape features into tight, urban residential settings without compromising structural safety.

Pneumatic Delivery for Restricted Access

Using Leca's pneumatic blowing system, three large deliveries—each carrying around 55 m³—were able to place the material directly into the courtyard from up to 40 metres away. This eliminated the need for cranes, barrow runs, or heavy machinery inside the building footprint. Compared to crushed concrete, which would have required eleven separate deliveries, Leca® LWA drastically reduced vehicle movements, CO₂ emissions and disruption to residents.

Scott Raftery, Operations Manager at DWM Plant Ltd, noted:

“Leca® lightweight expanded clay aggregate was very easy to install with minimal manpower. It saved significant time and labour, and the success of this project means we will always consider Leca® LWA for similar future works.”



Amount of material: 120m³ of LECA LWA (10-20mm)

Interesting Fact: It was discovered that with access limitations to the courtyard, crushed rock aggregate being barrowed through the property would have posed a serious risk to the new building development.

Delivery Method: Pneumatic Delivery

Main Contractor: DWM Plant Ltd



LIGHTWEIGHT LANDSCAPE DESIGN AT LIVERPOOL'S WATERFRONT: LECA® LWA ENABLES HIGH-PERFORMANCE PLANTERS AT ICONIC ALBERT DOCK DEVELOPMENT

A modern solution for architects and civil engineers, Leca® Lightweight Aggregate provides superior drainage, reduced structural loading, and efficient installation in restricted-access environments—enhancing planting design while supporting sustainable, resilient landscape architecture.

Facing the world-famous Albert Dock, the entrance to this new Liverpool residential development required a landscape solution that was both visually striking and technically robust. The Vermont Group sought to create large, elevated planters that would frame the building with a vibrant horticultural display, but the structural and access constraints of the site demanded a lightweight grow-

ing medium capable of performing beyond the limits of traditional soil.

To achieve this, over 60 m³ of Leca® Lightweight Expanded Clay Aggregate (LWA) was specified as the primary substrate within the newly constructed planters. As a landscape design material, Leca® LWA offers several advantages highly valued by architects and civil engineers:

- **Ultra-lightweight composition**—approximately one-seventh the density of crushed fill—significantly reduces loading on podium slabs, planter walls and underlying structural elements.
- **Superior drainage and aeration**, preventing waterlogging and reducing hydrostatic pressure within deep planters, particular-



- **Enhanced water retention capacity**, storing 70–80% of rainfall in summer and up to 25% in winter, thereby lowering irrigation demand and supporting long-term plant health.

- **Cleaner, easier handling** compared to traditional soils, enabling precision placement in densely built urban surroundings.

Optimised for Restricted Access

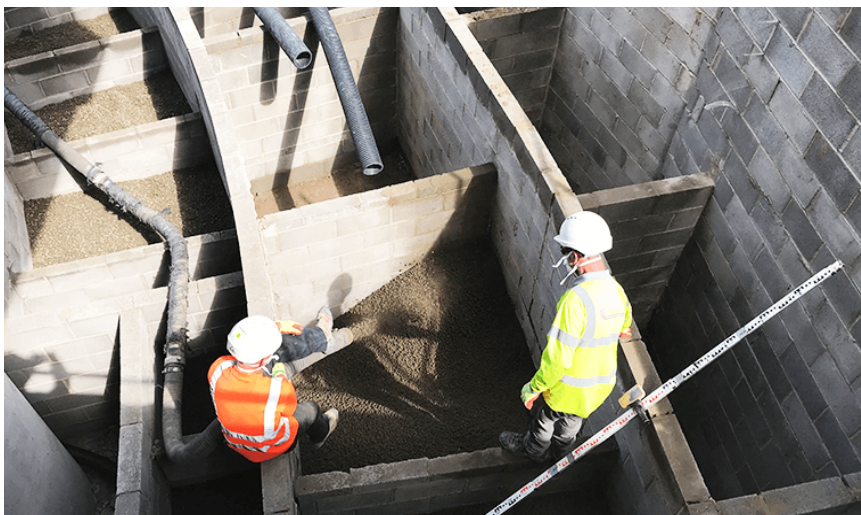
With limited ground-level access and the need to fill planters at varying heights, Leca's pneumatic blowing system provided an efficient and non-intrusive installation method. Using flexible delivery hoses, material was blown directly into each planter from the street-level truck, ensuring continuous delivery even into deep planter zones. This approach avoided the logistical challenges, safety risks and structural strain associated with transporting conventional soils through the development.

The pneumatic system enabled the full installation to be completed within a few hours, minimising disruption in a busy city-centre environment and reducing labour requirements.

Landscape Performance Benefits

The selection of Leca® LWA as the growing medium was not only driven by weight and access considerations. The landscape design incorporated plant species that thrive in well-drained, aerated root zones, making Leca® LWA an ideal horticultural substrate. Its free-draining structure supports plant vitality while mitigating flood-related issues common in urban planters, such as standing water, compaction and root rot.

By combining lightweight geotechnical performance with horticultural benefits, Leca® LWA allowed the Vermont Group to execute a high-quality landscape design without compromising structural integrity or long-term maintenance efficiency.



Project information

Amount of material: 60m³ of LECA® LWA (10-20mm)

Interesting Fact: The differing depths of the planters which at its deepest reached depths of 15 feet meant that the pneumatic delivery provided through the agile pneumatic delivery piping proved to be the most effective solution.

Delivery Method: Pneumatic Delivery



LANDSCAPE ENGINEERING AT LIVERPOOL ONE: LECA® LWA ENABLING HIGH- PERFORMANCE GREEN ROOF DESIGN

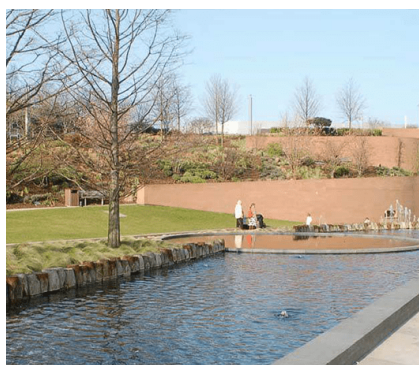
A versatile, free-draining and structurally efficient lightweight aggregate, Leca® LWA supports complex architectural landscapes by reducing load, enhancing water management, and enabling sculpted green roof forms without compromising building performance or waterproofing integrity.

To minimise structural loading across the Liverpool ONE development, Leca® Lightweight Expanded Clay Aggregate (LWA) was specified extensively as a geotechnical fill for the creation of new green roof landscapes. Working alongside Laing O'Rourke and landscape architects BDP,

Willerby Landscapes Ltd selected Leca® LWA for its proven performance in podium landscapes, intensive green roofs and large-scale planter installations—particularly where weight, drainage and shaping flexibility are critical design considerations.

Lightweight and Highly Controllable Landscape Medium

Leca® LWA, at roughly one-seventh the density of traditional crushed



fill, offered a significant structural advantage for the rooftop gardens and elevated landscape zones that define the centrepiece of Liverpool ONE. Its rounded pellet geometry provides low internal friction, making the aggregate extremely easy to mould into subtle contours, berms, and sculpted terrain—far more adaptable than rigid foam blocks or angular lightweight fills.

This property allowed the landscape architects to create complex landforms without imposing excessive loads on the roof slab. The material



Project information

Amount of material: 9000m³ of Leca LWA (10-20mm)

Interesting Fact: The original green roof design for the scheme included greater use of polystyrene, but a cost comparison and the various advantages of Leca® Lightweight Expanded Clay Aggregate when used as an intermediate fill, led to its specification.

Delivery Method: 4-Wheel Articulated Tipplers

Main Customer: WILLERBY LANDSCAPES

was installed alongside proprietary drainage layers and polystyrene blocks to achieve the required landscape profiles with a fraction of the weight of conventional soil systems.

As part of the wider attenuation scheme, excess water collected across the landscape is transferred into underground tanks for controlled release into the River Mersey—making Leca® LWA a functional component of the development's broader flood-management infrastructure.

Proven Performance for Waterproofing and Podium Landscapes

A major advantage identified by Willerby Landscapes was Leca® LWA's compatibility with sensitive waterproofing systems. Because the pellets are smooth and rounded, they do not puncture membranes, unlike sharp aggregates. This ensured long-term protection of the roof build-up and reduced risk during installation.

John Melmoe of Willerby Landscapes commented:

"We have used Leca® LWA extensively on previous projects, including roof gardens, and it performs extremely well. It doesn't damage waterproof membranes, and together with the weight advantage, it is an all-round cost-effective material."

Large-Scale Lightweight Application

Approximately 9,000 m³ of Leca® LWA was installed across the Liverpool ONE site, supporting the creation of elevated parks, plaza landscapes, raised planters and intensive green roof environments. Completed in 2008, the development now forms one of the UK's most significant urban regeneration schemes, comprising 46 architect-designed buildings and more than 200,000 m² of retail, leisure and public space.





GREEN ROOF IN HENLEY-ON-THAMES: LECA® LWA ENABLES HIGH-PERFORMANCE LANDSCAPE DESIGN OVER SENSITIVE STRUCTURES

Combining low structural loading, excellent drainage capacity and reliable installation in wet conditions, Leca® Lightweight Aggregate delivers a resilient, architecturally expressive green roof solution for mixed-use developments with strict weight and access constraints.

A new apartment development in Henley-on-Thames required a visually striking green roof to form a scenic, biodiverse entrance for residents. The project involved the transformation of an existing building into a car park beneath the new residential structure. This created immediate engineering limitations: the existing roof slab had restricted load-bearing capacity, and originally proposed EPS infill lacked the drainage capability essential for sustainable roof planting and long-term landscape performance.

To overcome these constraints, the architects and engineers specified Leca® Lightweight Expanded Clay Aggregate (LWA) as the primary fill and growing medium within the green

roof build-up. The material's unique combination of low density, high permeability, and soil-like structural behaviour made it particularly suited for a sensitive rooftop landscape where both load reduction and water management were critical.



Lightweight Green Roof Solution with Integrated Water Management

Unlike EPS, Leca® LWA provides both free drainage and moisture retention, enabling plants to thrive while protecting the roof structure from excess water and hydrostatic



Project information

Amount of material: 120m³ of Leca LWA (10-20mm)

Interesting Fact: The site itself had extremely limited access with the site being on a roof top, the delivery of Leca LWA in 2.2m³ bags provided a further useful solution for the contractors on site.

Delivery Method: 2.2m³ Bulk Bags

Main Contractor: Oliver Curran Construction Ltd

pressure. Its lightweight composition—around one-seventh the weight of traditional mineral fill—significantly reduced imposed loads on the refurbished car park roof, while its granular form created a stable substrate for planting, shaping and stormwater attenuation.

-At the same time, the material supports green roof performance by:

- Allowing rapid drainage during heavy rainfall, preventing saturation of the roof deck
- Retaining sufficient moisture within its porous internal structure to support planting during dry periods
- Reducing filtration stress on waterproofing membranes due to its rounded, non-abrasive pellets

This made Leca® LWA an ideal intermediate layer beneath growing soils in a green roof design that demanded both structural sensitivity and horticultural reliability.

Efficient Installation in a Highly Restricted Rooftop Site

With access restricted to crane delivery, 2.2 m³ bags of Leca® LWA were hoisted directly onto the rooftop. This method avoided the logistical challenges associated with transporting heavier materials through the building and allowed contractors to place the aggregate precisely where required.

Initial contractor hesitation stemmed from treating the material like Type 1 aggregate—assuming it could not be worked in wet conditions. However, during a period of torrential rain, the installation team discovered that Leca® LWA remained completely workable, compactable and structurally unaffected by saturation. This resilience to weather accelerated the programme and reduced delays that would typically halt conventional green roof construction.

Contractor Feedback: Reliability and Speed

Thomas McDonagh of Oliver Curran Construction praised the material's performance:

“We were very impressed by the lightweight nature of the material and the speed of installation. Despite serious rainfall, Leca® LWA remained fully workable, allowing the project to continue without delay. Its ease of use freed up time to focus on other areas of the build.”





LIGHTWEIGHT ROOFTOP SPORTS ENGINEERING: LECA® LWA DELIVERS HIGH-PERFORMANCE LANDSCAPE BUILD-UP FOR BIRMINGHAM'S ELEVATED FOOTBALL CENTRE

By combining ultra-low structural loading, exceptional drainage and natural self-compaction, Leca® Lightweight Expanded Clay Aggregate enables architects and civil engineers to create functional, green and recreational landscapes over complex rooftop structures—without heavy machinery or excessive structural reinforcement.

A landmark sports development in Birmingham has transformed the roof of a multi-storey car park—visible from the M6 motorway—into a state-of-the-art football centre consisting of ten five-a-side pitches. This ambitious project for Goals Soccer required a landscape build-up that could perform structurally, hydraulically and practically on top of an existing building with tight weight limitations and restricted access.

To meet these design challenges, Leca® Lightweight Expanded Clay Aggregate (LWA) was specified as the primary base layer beneath the artificial turf system. For architects and civil engineers, Leca® LWA offered a rare combination of attributes ideal for rooftop recreation and landscape design.

Lightweight Structural Performance for Rooftop Construction

Building a sports facility on top of a multi-storey structure demands extreme sensitivity to imposed loads. Leca® LWA, at around one-seventh the density of traditional aggregate, provided a structurally efficient base layer that reduced dead loads on the car park's existing slab and supporting frame.

This lightweight fill allowed the design team to avoid costly reinforcement upgrades or intrusive structural



interventions. Its use created the necessary build-up depth with minimal impact, supporting the installation of Edel Extreme artificial turf with sand-rubber infill.

Free-Draining Base Layer Supporting Flood-Resilient Design

Rooftop landscapes and sports pitches are particularly vulnerable to rain-water accumulation. Leca® LWA's highly permeable structure ensured rapid drainage of surface water, preventing saturation, reducing hydrostatic pressure and improving long-term performance of the pitch system.

For facilities required to withstand constant play, variable weather and intensive use, the material's ability to both drain quickly and retain shape under repeated loading was essential.

Self-Compaction for Zero-Plant Installation

One of the standout advantages for

Blakedown Sport & Play was Leca® LWA's natural self-compacting behaviour. The rounded shape of its lightweight pellets allows them to settle into a stable formation without the need for heavy compaction equipment. Contractors were able to level and prepare the pitch base using handheld rakes—avoiding the logistical, structural and safety challenges associated with bringing heavy machinery onto a rooftop.

Delivered in 2.2 m³ craneable bags, the material was easily positioned across the rooftop, streamlining installation and minimising disruption to the live site below.

Contract manager Tony Farmer summarised the material's value: "Building on an existing rooftop creates unique challenges. Leca® allowed us to overcome three at once—providing self-compacting fill, reduced structural load and excellent drainage. It helped us complete the contract quickly and within budget."

Landscape Engineering Beyond Green Roofs

This project demonstrates the versatility of Leca® LWA not only as a horticultural substrate but also as a lightweight geotechnical layer for recreational and landscaped environments constructed over buildings.

Architects and engineers can rely on the material to deliver:

- Structurally efficient build-ups on roofs, podiums and transfer decks
- Consistent drainage for sports, gardens and hardscaped landscapes
- Ease of installation in restricted-access or weight-sensitive sites
- Long-term resilience with minimal maintenance demands



Project information

Amount of material: 160m³ of LECA LWA (10-20mm)

Interesting Fact: Leca® Lightweight Expanded Clay Aggregate was employed as the base layer for the pitches, principally for the fact that its light weight reduced loadings on the existing structure, but also for its excellent drainage properties.

Delivery Method: 2.2m³ Bulk Bags

Main Contractor: Blakedown Sport & Play



LIGHTWEIGHT BACKFILL FOR HERITAGE LANDSCAPES: LECA® LWA ENABLES SENSITIVE GROUND REPAIRS AT HULL MINSTER

OFFERING MINIMAL LOADING, EXCELLENT COMPACTION BEHAVIOUR AND CLEAN, NON-INTRUSIVE INSTALLATION, LECA® LIGHTWEIGHT AGGREGATE PROVIDES ARCHITECTS AND CIVIL ENGINEERS WITH A HIGH-PERFORMANCE SOLUTION FOR LANDSCAPE AND GROUND REMEDIATION WITHIN HISTORIC AND ACCESS-RESTRICTED ENVIRONMENTS.

Hull Minster—England's largest parish church—required careful ground remediation following archaeological excavations. Engineers needed a backfill that would protect the fragile heritage fabric, support future landscaping, and allow installation within extremely tight access constraints.

Leca® Lightweight Expanded Clay

Aggregate (10–20 mm) was specified as the primary backfill due to its low density, predictable compaction behaviour and ability to minimise loading on sensitive excavation zones. This was especially important as the repaired ground would later support new paving and public-realm works.

Lightweight and Structurally Sensitive

Backfill

Approximately 140 m³ of Leca® LWA was required, with an anticipated 10% compaction reduction. Its lightweight nature—around one-seventh the weight of traditional fill—helped reduce settlement risk and limit stresses on archaeological layers and historic foundations. The rounded



pellets also distribute load evenly, supporting the stability of future surface treatments.

Compaction Control for Heritage Groundworks

Leca® LWA is easy to compact and requires far less energy than traditional materials. Typical pre-compaction settlement is around 5%, and depths of 300–600 mm require only three passes with a light vibrating plate to reach full stability. Below 300 mm, compaction is often unnecessary, with overlying layers naturally consolidating the aggregate.

This light-touch approach avoids the need for heavy compaction equipment—a major advantage when working over archaeological deposits or fragile structural elements.

Pneumatic Delivery for Restricted Access

Access around the Minster is severely limited, making conventional material handling impractical. Using Leca's pneumatic delivery system, the aggregate was blown directly into the excavation areas quickly and cleanly. This minimised manual handling, avoided machinery near the Grade I structure, and allowed safe working practices on a constrained urban site.

A Landscape Material Designed for Sensitive Sites

Leca® LWA's unique combination of low loading, easy placement, drainage capacity and non-intrusive installation makes it ideal for heritage and city-centre landscape works. It supports the stability of paving, soft landscaping and public realm features while protecting historic ground conditions.



Project information

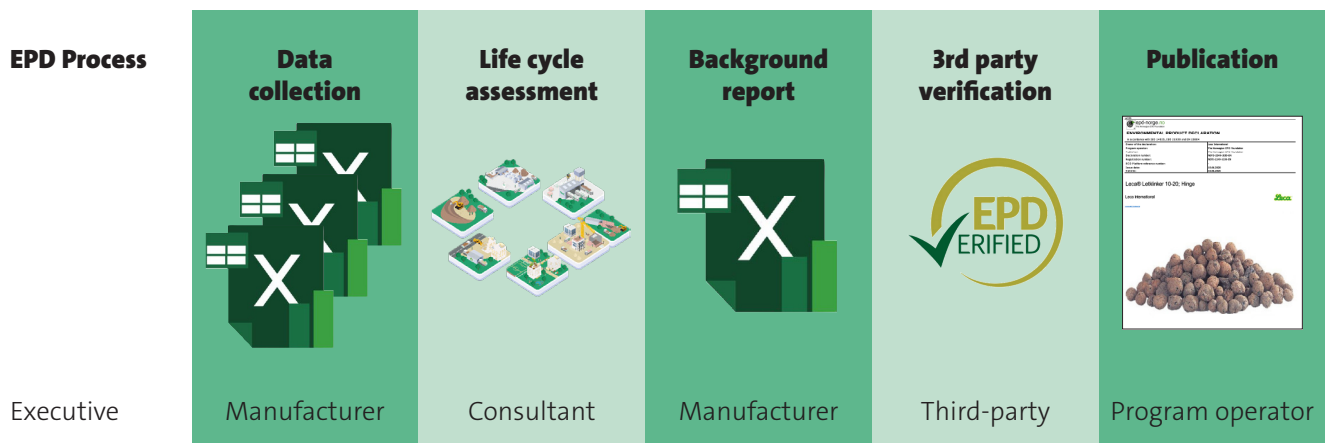
Amount of material: 140m³ of LECA® LWA (10-20mm)

Interesting Fact: Overcoming difficult access to this Grade 1 listed building and delivering at a rapid speed, which was crucial for this groundwork repair.

Delivery Method: Pneumatic Delivery

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



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.

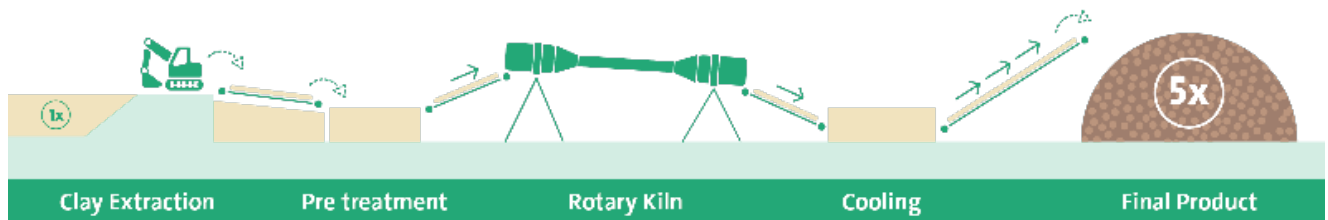


We are the number #1 supplier of Expanded Clay Lightweight Aggregate in Europe in Infrastructure, Housing and Water Management.

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.

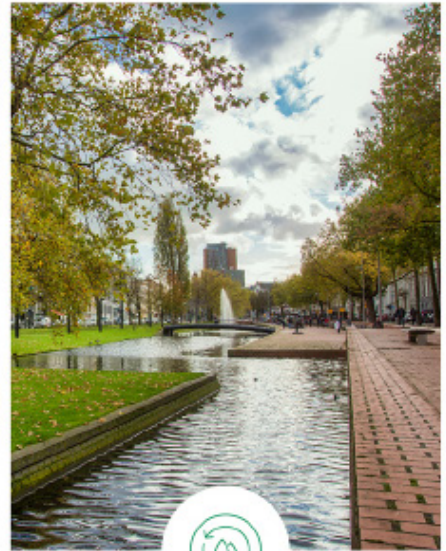
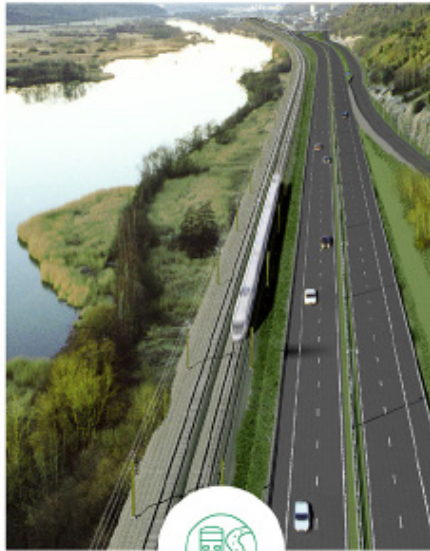
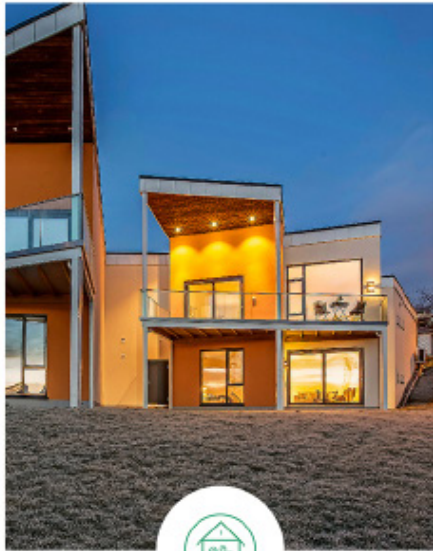


Comparing to traditional filling material Leca® LWA is fast and easy with the following characteristics:

- 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 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)



IN-OFFICE CPD PRESENTATION

LECA® Lightweight Fill
within Structural and Geotechnical Applications



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