Leca® Lightweight Fill within Highway Construction

Leca®
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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

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

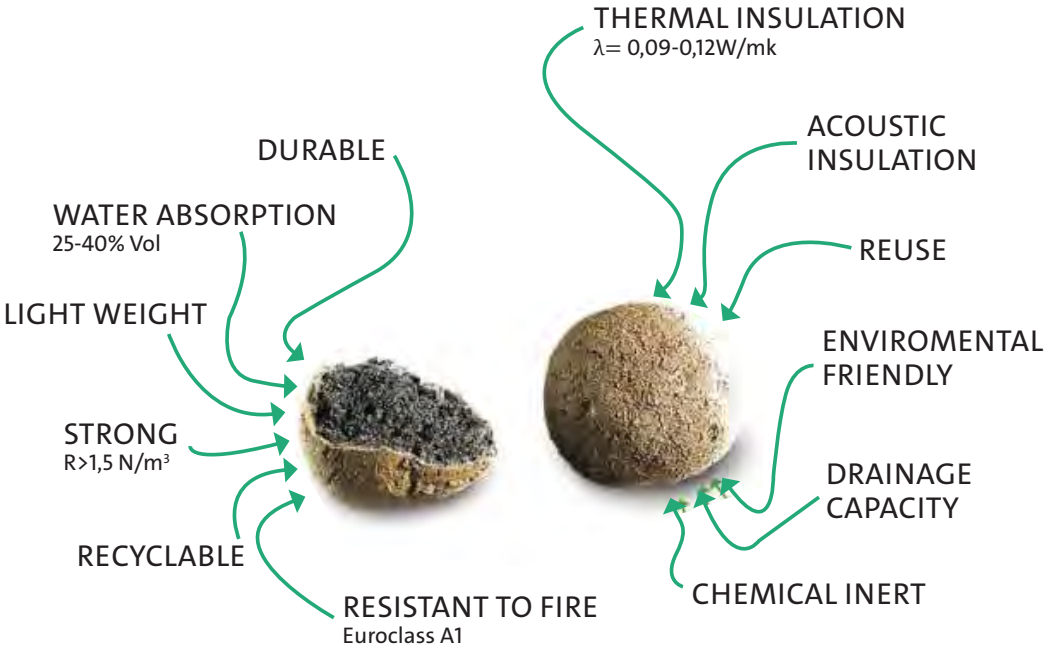
The 'pull out' resistance of Leca® LWA makes it an ideal solution for reinforced soil retaining walls. Particularly when constructed over weak sub-soils or voids, this method has been proven to cut overall construction costs considerably.

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



M9 WINCHBURGH JUNCTION HIGHWAY DEVELOPMENT

Work has continued for the M9 Winchburgh development, where over 9000m3 of LECA® LWA 10-20mm (Lightweight Fill) has been specified as a solution for poor groundwork conditions.

The new motorway junction on the M9 was developed to provide access for an expanding residential community at Winchburgh. The motorway will enable over 3,800 homes including 750 affordable homes, of which 450 will be for social rent to address the critical shortage of housing in the area. This includes the delivery of green, open spaces such as the 78 acre Auldcathie Park, Daisy Park and a new marina on the Union Canal, to provide a more aesthetically pleasing and functional environment for the local residents.

This new sustainable development has been initiated by RJ McLeod Ltd on behalf of Winchburgh Developments Ltd to alleviate traffic congestion on the local roads; whilst creating improved access to the motorway within the region. Due to poor groundwork conditions, Leca® LWA was specified to provide a lightweight and structurally robust solution for the new highway.

Pull Out Resistance

The 'pull out' resistance of Leca® LWA makes it an geotechnical solution for poor groundworks. Particularly when

constructing over weak sub-soils or voids, this method has been proven to cut overall construction costs considera-bly. Leca® LWA is used extensively to reduce vertical loading.

As a fill material, Leca® LWA can effectively decrease the earth pressure. Due to its lightness the vertical earth pres-sure impacting the structure is up to 75% lower that induced by the natural rock fill. Lower earth pressure enables optimized dimensioning of supporting structures; and therefore application of Leca® LWA as backfill in these circumstances is usually a cost-efficient solution.

Robert Branford (National Sales Manager at LECA UK) said "It is great to be specified for this new highway develop-ment in Winchburgh. As a company we have a strong history within Scottish infrastructure and this project only supports this. We were especially proud to be able to offer a sustainable delivery solution for Leca® LWA material for this project; through our direct shipping delivery to Leith Port, which was locally stockpiled to limit the number of trucks required on the road; travelling long distances and polluting the local roads in the area. The reduction in CO2 emissions in transport for this development supports our robust sustainability aims and initiatives as a company. We are excited to see this development progress."

Project information

Amount of material:9,000m3 of Leca®LWA (10-20mm)

Interesting Fact: The material was shipped directly to Leith Port to minimise road miles and reduce CO2 emissions for the project.

Delivery Method: 4-Wheel Tippers

Main Contractor: RJ McLeod

CALDER AND HEBBLE JUNCTION CORRIDOR A629

GRAHAM Construction, responsible for the creation of the Murrayfield tram stop as part of the Edinburgh Trams Project, faced challenges on the project not least of all the ability to raise the structure seven metres above the existing ground level.

Work is now underway to transform the Calder and Hebble junction corridor of the A629 near Halifax - the largest individual civil engineering project ever undertaken to date by Calderdale Council. – where 3,500m3 of Leca® LWA has been specified as a lightweight fill for a new highway de-velopment.

The works are set to improve the Calder and Hebble junction and form a significant phase of a wider scope project to improve the A629 between Halifax and Huddersfield. The project aims to improve journey times between Huddersfield and Halifax by up to 30%

This project will include a new link road, which will be created via a bridge spanning the Calder and Hebble Navigation to a roundabout on Stainland Road. The project is fully funded by the West Yorkshire Combined Authority through the West Yorkshire Plus Transport Fund.

New Link Road Development

The ability to reduce settlement of an embankment when incorporating Leca® LWA can offer huge benefits;

educing timescales from years to a few months and even, in some instances, eliminate settlement periods altogether.

Leca® LWA provided a robust water management system for the Rising Main where Leca® LWA has the properties to effectively manage rising water levels and prevent flooding.

Using free draining Leca® Lightweight Expanded Clay Aggregate as a structural material within a civil engineering development will intercept the percolating water and water rising by capillary action from the sub-formations and direct the rising water away from the upper construction layers to improve load bearing capacity.

Construction of embankments over weak and compressible soil deposits, where the loading of the embankment causes soil consolidation and settlement, is common. This major scheme will see the current road layout completely transformed, with improvements to road safety and journey times along the A629.

One of the most significant and complex parts of the project will involve the construction of a new road bridge spanning the Calder and Hebble Navigation to a roundabout on Stainland Road.

Significant preparation work has been carried out ahead of the works to reduce disruption as much as possible. The benefits of the investment include improved walking, cycling and public transport access, improved air quality and safer journeys, particularly for cyclists and pedestrians.

The project is fully funded by the West Yorkshire Combined Authority through the West Yorkshire Plus Transport Fund.

Project information

Amount of material: 3,500m3 of Leca®LWA (10-20mm)

Interesting Fact: The project aims to improve journey times between Huddersfield and Halifax by up to 30%.

Main Contractor: SISK,

PRESTON WESTERN DISTRIBUTOR ROAD (PHASE 1: LEA VIADUCT)

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 un-derpasses and a cattle creep.
The development is hoped to promote new housing and business de-velopment 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

Fundamental Properties of Leca® LWA provides Key Groundworks Solution

Due to the key properties of Leca® LWA including reduced compaction rates, cost effectiveness, low density and phi values, Leca® LWA was select-ed as a key engineering solution for this ambitious redeveloping project.

Project information

Amount of material: 2400m3 of Leca® lightweight fill (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

Main Contractor: Costain

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

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."

To read about all 4 phases please visit: PWDR Video Case Study

A47 GUYHIRN ROUNDABOUT HIGHWAY DEVELOPMENT

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.

Over 2600m3 of Leca® Lightweight Fill (LWA) was specified for the A47 highway development. The A47 is a trunk road in near Norwich, linking Birmingham to Lowestoft, Suffolk. The £17m scheme marks the beginning of six significant schemes and almost half a billion pounds of investment to improve the 115-mile route between Peterborough and Great Yarmouth.

The main works for the £17m year-long project has seen the junction widened with additional approach lanes. The pur-pose of which was to ease the flow of traffic by incorporating a third lane towards the existing roundabout on the A47 Guyhirn junction.

Leca® LWAwas specified by SWECO to widen the approach lanes to the roundabout, as a solution fill material due to poor groundwork conditions during the assessment of developing a road widening development

Feedback from Contractor
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.

Furthermore, due to the nearby River, the immediate surrounding area would be subject to rising water levels, a material was required which would not create any adverse effect in the long term and minimise the potential high risk of flooding, whilst preventing the risk of deformation in the future for this busy road.

Danny Hind, a Contractor from CR Civil Engineering provided some quote and feedback on the use of Leca® LWA within this project. “The speed to which it was delivered & and how easy it was to deliver and compact, reduced the need for any operatives to monitor. We successfully sourced and received the total quantity, which was required to keep the program going and the Leca® LWA material was successful as a solution for the poor groundwork conditions in the area”

The A47 Guyhirn junction was officially opened by Baroness Vere, Under-Secretary of State for Transport and Downing Street chief of Staff Stephen Barclay.

road

Project information

Amount of material: 2600m3 of Leca® LWA (10-20mm)

Interesting Fact: According to National Highways, there is now 18 percent more capacity at the A47 Guyhirn junction, with journey times expected to shrink by four minutes.

Delivery Method: Pneumatic Delivery

Main Contractor: CR Civil Engineering

HIGHWAY DEVELOPMENT – VIKING ENERGY FARM, SHETLAND

In an ambitious infrastructure development in Shetland, Viking Energy, which is owned by SSE Renewables, has collaborated with RJ McLeod (Contractors) Limited to develop a new 1.4 mile highway.

This infrastructure will support delivery of components to the Viking Wind Farm project, which will consist of 103 wind turbines set around the central Mainland of Shetland. It will also facilitate delivery of components to SSE Networks' Shetland HVDC link project, which will connect Shetland to the wider national electricity grid for the first time.

Following the wind farm's construction, the road is to be handed over to the Local Roads Authority (Shetland Islands Council) to provide a new, more efficient and safer, 2-way single carriageway road for public use.

During the design development stage of VikingWind Farm, it was identified that road upgrade works were required to facilitate component deliveries to the Kergord region of the site. Options were explored to upgrade the existing road (B9075), however following discussion with the Roads Authority, the preferred solution was an offline upgrade which eliminated disruption to the existing road. Floating Road Developments

Overview of Project

5500m3 of Leca® LWA was specified to form a Lightweight Floating road con-struction. Thanks to the lightweight and robust nature of the material, this material was deemed suitable to provide the necessary engineering support for the difficult groundwork conditions where the highway was proposed to be constructed.

It was important for Viking Energy to ensure that this new highway devel-opment would not give rise to any significant or unacceptable environ-mental effects, specifically upon the landscape, biodiversity (wildlife and ecology), geology cultural heritage, noise and air quality and traffic and transportation. The Leca® LWA was shipped directly into Lerwick Harbour and then delivered directly to site. The lightweight nature of the Leca® LWA means that up to 70m3 of material can be delivered per truck, requiring less trucks to move the material onto site when compared to tra-ditional fill material.

Leca® was able to provide the sup-porting evidence required to ensure that these engineering factors could be accommodated. This included a real-life highway case study where Leca® LWA was specified. For this ex-ample of highway development, a se-ries of settlement studs were insert-ed into a completed pavement and monitored after one year. The studs were installed in the three different sections of the road:

- Pavement overlays
- Reconstructed pavements, and Leca® LWA lightweight fill.

Settlements in the Leca® lightweight fill sections varied from 0.8mm to 5.0mm following the initial year. The settlements outside of the light-weight fill sections varied up to 15mm after one year and no pavement defects had been observed.

This provided the factual evidence highlighteing the ability of Leca® LWA to be installed and to not consolidate or creep in a real-life highway situation.

As Leca® LWA had never been speci-fied by Shetland Islands Council previ-ously, many assurances were required to ensure that the material would be suitable to accommodate the new highway scheme. One key question was the long-term performance of Leca® LWA within a highway struc-ture. The developers required the con-fidence to ensure that that the Leca® LWA would be inert and would not consolidate or creep over time.

Project information

Amount of material: 5500m3 of Leca® LWA (10-20mm)

Interesting Fact: This infrastructure will support and help to feed the Viking Wind Farm project which will consist of 103 wind turbines set around the central Mainland of Shetland.

Delivery Method: Walking Floor

Main Contractor: SSE plc

HIGHWAY WIDENING - N18 BUNRATTY BYPASS. CO. CLARE, IRELAND

THE WEST BOUND SECTION OF THE DUAL CARRIAGEWAY HAD SETTLED QUITE SUBSTANTIALLY IN FIVE AREAS ALONG THE STRETCH ADJACENT TO BUNRATTY CASTLE.

The N18 was constructed in 1990 over soft subsoils which were thought to be where the local river used to flow. The west bound section of the dual carriageway had settled quite substantially in five areas along the stretch adjacent to Bunratty Castle. Leca® LWA 10-20mm was used to re-place the heavy road construction materials originally installed to the underside of sub-base.

The Leca® LWA was delivered by a 5000m3 capacity ship directly into the port of Foynes, not far from the site, and then transported over a pe-riod of two days in 60m3 high sided articulated tipper vehicles and loose tipped into a storage bund local to site.

Whilst the repairs were taking place, the westbound N18 traffic was tem-porarily moved onto the east bound carriageway reducing the N18 into a single carriageway. For this reason, time was limited and speed of instal-lation was essential.

Once Clare County Council had excavated the first of the five areas that needed to be re-levelled, the Leca® Lightweight Expanded Clay Aggregate was transported from the storage bund and tipped directly into the void. The Leca® LWA was then compacted in one metre layers using a 360° excavator, the same equipment that was being used to distribute and level the Leca® LWA across the sub-formation. The use of Leca® LWA provided a simple lightweight solution. The design is expected to achieve a minimum of 20 year sustained design life.

The installation was very quick and simple and the contractor, Clare County Council Works Department, was happy with the speed in which they were able to carry out the works and re-open the busy N18 to traffic.

Leca® LWA within Highway Development

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.

By lightening the embankment in highway development with Leca® Lightweight Expanded Clay Aggregate, subsoil strengthening and lengthy settlement can be reduced or even avoided altogether. Using Leca® Lightweight Expanded Clay Aggregate 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. 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.

Project information

Amount of material: 5000m3 of Leca® LWA (10-20mm)

Interesting Fact: Leca® LWA 10-20mm was used to replace the heavy road construction materials originally installed to the underside of sub-base.

Delivery Method: 4-Wheel Articulated Tippers

Customer: Clare County Council

LECA® LIGHTWEIGHT FILL SPECIFIED FOR M6 JUNCTION 10

THE NEW HIGHWAY PROJECT INVOLVED THE DEVELOPMENT OF TWO NEW SEMI-INTEGRAL BRIDGES ALONG-SIDE AN EMBANKMENT WITH A 20 DEGREE SKEW.

Over 8000m3 of Leca® LWA was specified for the latest Highways Eng-land project on the M6 Junction 10 improvements in Walsall, designed and construction by Main Contractor John Sisk & Sons Ltd.

The new highway project involved the development of two new semi- integral bridges alongside an embank-ment with a 20 degree skew. There were technical problems discovered and limited space due to existing live carriageways, which required a robust lightweight reinforced earth back-fill for the abutments to reduce the total settlements at the formation level and to reduce piled foundations extents and to minimise differential settlement.

From further investigation from the designers, Leca® LWA was selected as a suitable solution for many engi-neering and logistical reasons. It was during the design phase, the main questions sought from the Clients Representative included the earth-work material classification for Leca® LWA and whether the specification of Leca® LWA would require a departure from the MCDHW Specification for Highway Works – Series 600

cation. Through discussions with the technical representative Robert Branford at Leca® UK, it was concluded that there would be a departure required and that the Leca® LWA could be classified as Fill to Structures Class 6T, lightweight expanded clay aggregate (10-20mm).

Through multiple recent case studies in the UK, where Leca® LWA was successfully installed on similar highway projects involving the development of integral bridge abutments, a departure was successfully submitted by Main Contractor's Designer Capita Pell Frischmann to specify Leca® LWA for the M6 Junction 10 development. The key case studies highlighted included the A41 Stone Bridge, River Thane, Aylesbury; the A120 Stansted to Braintree developmet; the A4146 Fenny Stratford Southern Bypass over the River Ouzle, Buckinghamshire; the A27 Southerham to Beddingham Improvement and the A2/ A282 Dartford Improvement.

Feedback from Main Contractors

Charles Jackson, Engineer at John Sisk & Son Limited who were awarded the role of contractors for this project said "Leca® LWA was utilised on our site due to the need of minimising loadings onto the existing ground. The nature of the material made the installation process unchartered for me as an engineer."

Charles Jackson, Engineer at John Sisk & Son Limited continues "This process was made much easier by Robert Branford (Geotechnical Sales Manager) and his team with explanations, case studies, photographs and videos from previous projects which gave us an insight into how that material can be transported, installed and compacted."

For the development, the Geogrid system from Tensar was applied in combination with Leca® LWA (See image). Through the previous combination of Leca® LWA with Tensar to lock the fill in place, this provided the developers the confidence to continue with the development.

Charles Jackson, Engineer at John Sisk & Son Limited provides comment on the logistical requirements of the project, "Delivery of the material was seamless, conversations between myself, Leca UK and Hargreaves meant we were able to make amendments to the delivery numbers as and when required with short notice periods."

"For installation, we were working within a confined area on the edge of a live carriageway. We also had to transport the material up and over a newly installed 6m abut-ment which made the task a highly sensitive one. Due to these con-straints we opted to use WM Plant Hire who specialise in long reach excavators. We used a CAT 321D which had a zero-tail swing, the op-erator used a clam shell bucket to lift the material from ground level and into the works area ready for compaction."

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

Main Contractor: John Sisk & Sons Ltd

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.

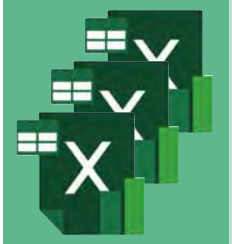
Through assessing the life cycle of our products it is clear that we are producing a sustainable building material. And importantly, not forgetting the end of the life-cycle of our lightweight aggregate, which can be removed and simply reused in the future, thanks to the material's unique and highly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

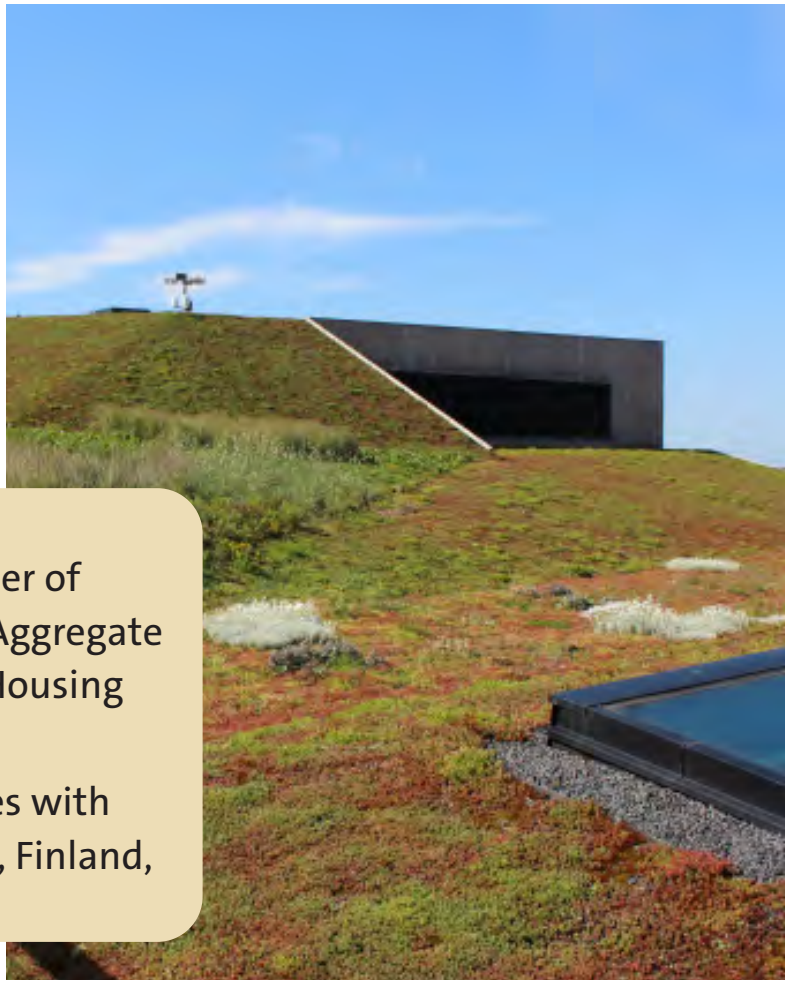
Kim Rosenbom
Business Development and Sustainability Director

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
					
Executive	Manufacturer	Consultant	Manufacturer	Third-party	Program operator

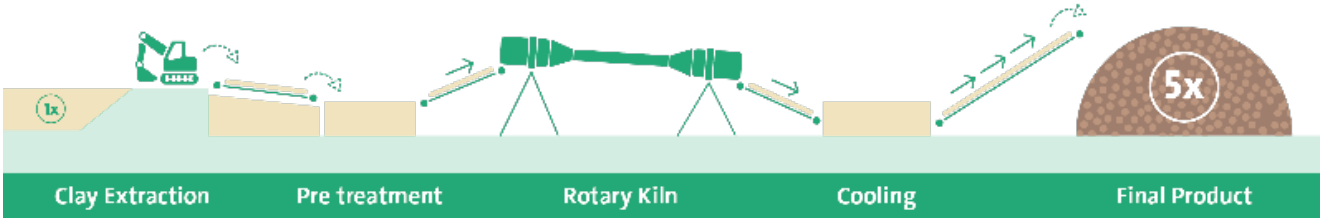
An EPD is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products in a credible way. EPDs are produced accordingly with the ISO International Standards, ISO 14025, based on the Product Category Rules. 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 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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