

## eden project

(/)

# Architecture at Eden



## Key info

- Architecture inspired by nature
- Context-specific designs
- Low-energy buildings

The breathtaking sight of bubble-like Biomes nestling in a former clay mine has drawn millions of visitors from around the world. Many other examples of unique and sustainable architecture can be found across the Eden site, including the plant-inspired Core building.



Each hexagonal window has three layers of ETFE.



## Video

Documentary by Grimshaw Architects



Watch this fascinating story about how Eden was built



## Video

Timelapse of Biome and Core build



Watch these iconic structures go up.

## Biome architecture

Designed by Grimshaw Architects, our two Biome buildings - the Rainforest Biome and the Mediterranean Biome - each consist of several domes joined together, and are joined in the middle by the Link building.

### Inspiration

Grimshaw's starting point was the geodesic system made famous by the American architect Buckminster Fuller, who designed the Montreal Biosphere in Canada. Before Eden, Grimshaw had designed a similar structure for Waterloo International Station in London. The geodesic concept provided for least weight and maximum surface area on the curve – with strength.

[See our Pinterest board of other geodesic architecture \(https://www.pinterest.com/EdenProject/geodesic-architecture/\)](https://www.pinterest.com/EdenProject/geodesic-architecture/)

The moment we saw it we loved it, because it felt natural – a biological response to our needs, but forged in materials that would allow us to explore the cultivation of plants in a way never before attempted

Tim Smit, Eden co-founder on seeing Grimshaw's initial Biome model

### Design and materials

The clay pit was still being mined when the Biomes were designed. In the face of this constantly shifting landscape, Grimshaw hit on the idea of soap bubbles. Remember blowing bubbles as a kid? They adapt to any surface they settle on. And, when two or more bubbles join, the line of the join is always exactly perpendicular (straight up and down). Basing the 'lean-to' Biome structures on soap bubbles was a perfect way to build on the uneven and shifting sands of the pit.

Each dome has what's known as a hex-tri-hex space frame with two layers. The outer layer is made of hexagons (the largest is 11 metres across), plus the odd pentagon. The inner layer comprises hexagons and triangles bolted together. The steelwork weighs only slightly more than the air contained by the Biomes. The structures are more likely to blow away than down, so are tied into the foundations with ground anchors, a bit like tent pegs.

The transparent 'windows' in each hexagon and pentagon are made of ethylene tetrafluoroethylene copolymer (ETFE), or 'cling film with attitude', as we like to call it. Each window has three layers of this incredible stuff, inflated to create a two-metre-deep pillow. Although our ETFE windows are very light (less than 1% of the equivalent area of glass) they are strong enough to take the weight of a car. What's more, ETFE can transmit UV light, and is non-stick, self-cleaning and lasts for over 25 years.

[Find out about sustainable construction at Eden \(https://www.edenproject.com/eden-story/behind-the-scenes/sustainable-construction-at-eden\)](https://www.edenproject.com/eden-story/behind-the-scenes/sustainable-construction-at-eden)

## **The Core architecture**

### **Inspiration**

The word 'biomimicry' describes the process of humans borrowing designs and systems from nature to create their own technology. Jolyon Brewis of Grimshaw Architects did exactly that when he based the architecture of our Core education centre on the growth blueprint of plants. He used opposing spirals mathematically based on Fibonacci's sequence (0, 1, 1, 2, 3, 5, 8, 13, 21, 34 ...) where every number is the sum of the previous two. The spirals on a pinecone, pineapple and sunflower, like the Core roof, usually represent two consecutive numbers in this sequence.

The brief asked the architect for the building to be fit for purpose, future-proof, made with responsibly sourced materials, energy efficient, and constructed with minimal waste.

### **Design and materials**

The structure is made of double-curved glulam (glued laminated) timber beams (the timber is endorsed by the Swiss Forestry Stewardship Council).

We traced the supply chain of the copper for the roof from a single Rio Tinto mine, known for its high environmental and social standards, all the way to Eden. This unusual initiative has led to much more work on the minerals supply chain.

Elsewhere in the Core, you'll find recycled wood, plant-based floorings (Marmoleum from flax, carpets from maize), and concrete from china-clay sand (low carbon footprint). The little green tiles are made from recycled Heineken bottles.

[Find out more about the sustainable construction features of the Core \(https://www.edenproject.com/eden-story/behind-the-scenes/how-we-built-the-core\)](https://www.edenproject.com/eden-story/behind-the-scenes/how-we-built-the-core)

## Facts and figures

- The Rainforest Biome covers about 16,000m<sup>2</sup> and is 50m high - you could fit the Tower of London inside it! The structure weighs 465 tonnes and contains 426 tonnes of air (dry air at standard temperature and pressure).
- The Mediterranean Biome covers about 6540m<sup>2</sup> and is 30m high.
- Together our Outdoor Gardens, Rainforest Biome and Mediterranean Biome cover about 13 hectares - the same as over 35 football pitches!
- We used 2,000, 11m-long rock anchors to stabilise the sides of the clay pit.
- In building the Biomes, we got into the Guinness Book of Records for using the most scaffolding, 230 miles of it!
- During the build 43 million gallons of rainwater fell in 90 days.

"Eden shows you can achieve what you set your heart on. Wonderful thank you."

Visitor comments

Image © Hufton+Crow

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