

Sustainability & Earth Building

Sustainable design is a key aspiration for many projects and rammed earth, earth blocks and other materials like *CobBauge* offer designers a way to address several important aspects:

1. Introduce thermal mass into lightweight buildings

Compressed earth has high thermal mass properties with a specific heat capacity around **20%** higher than concrete. It can also be load-bearing or provide thermal insulation.

2. Reduce embodied carbon

Earth is the ultimate low carbon material. Its limited processing requirements, minimal transportation and use of local materials/natural fibres result in very low embodied carbon.

3. Reduce site waste

Excavation waste can be readily reused on site, supporting policy aims e.g. the London Plan's target of 95% of excavation to useful purposes.

4. Achieve "Circularity"

At the end of the building life, earth can re-used or reprocessed with ease, again and again.

A tried & tested solution

Integration and Rammed Earth Consulting / ebuki were part of the team for the completed *Arbour* residential scheme in London with developers *GSB* and architects *Studio Anyo*. The scheme comprises 9 carbon-negative mews homes. The lightweight timber structure is complemented by exposed thermal mass from an earth brick feature wall as shown in the adjacent image.

[Read the case study.](#)

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Earth building: An opportunity to reduce overheating through sustainable design.

How do I get started?

The local soil typology will lend itself to certain approaches. Early site investigations and testing is advisable to set out design options. However, other materials can be brought to site to make up shortfalls. For instance, adding clay or, where soil is too clay rich, adding sand. Soil can be processed on site, where space and planning allow, or taken off-site for processing. Where required, ready-made earth build materials can also be used. Overheating simulations can determine where thermal mass is required to surpass the Part O standards.

What are the limitations?

Earth structures are water resistant but not waterproof. With the benefits of thermal mass, internal use represents one of the best opportunities. However, layering and mixture can be varied for water proofing or structural loading if required.

Will this work for my scheme?

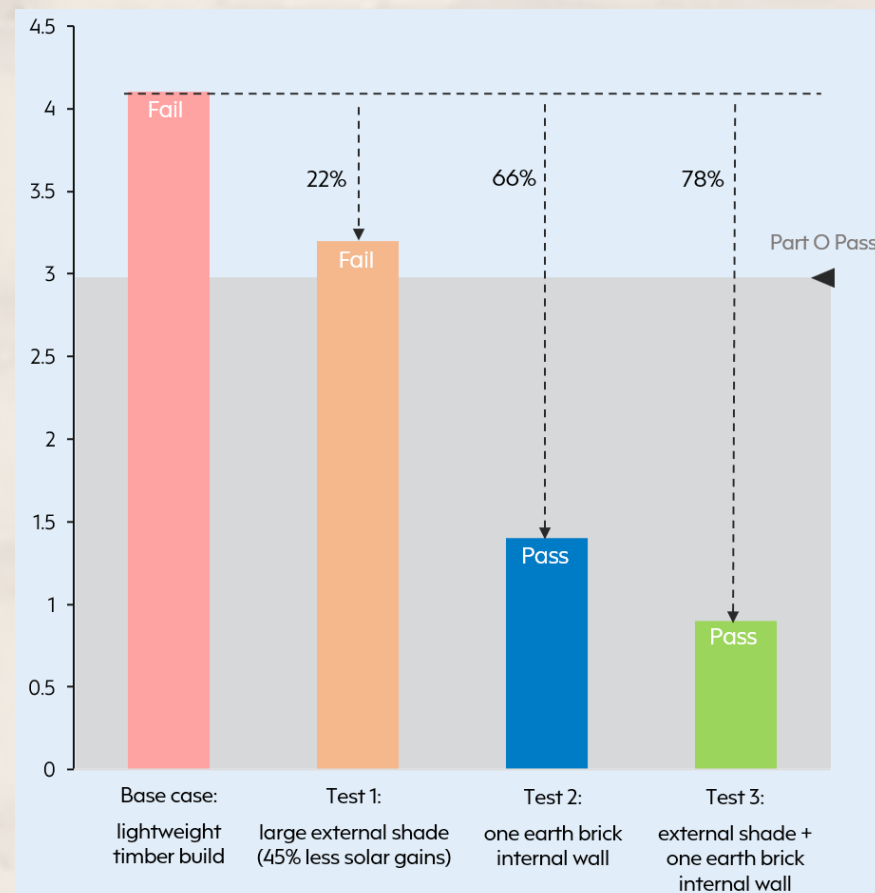
Most schemes involve excavation and local soil can be used as either all or part of an earth build material mix.

How is it made and what are the costs?

Earth building is either masonry or monolithic. Masonry elements, brick, block and mortar, can be site fabricated or factory produced. Timber frames are also effective with clay infills of either mass or light earth elements. Costs vary but all factors need to be considered such as offsets from waste avoidance and from designing out active cooling.

What finishes can be achieved?

A wide variety of natural textures can be achieved through varied structural methods such as formwork finishes. Colour variations occurs naturally, but natural colours can be added to provide a wide range of effects to either earth structures or to finishes such as earth plasters or washes.



How much can an earth build feature wall reduce overheating?

A study by *Integration* used dynamic thermal modelling to quantify the benefit of adding one 100mm thick earth-build internal "feature wall" to a living / dining space within new-build modular timber homes in London. The addition of this thermal mass was shown to achieve a **66%** reduction in overheating hours and significantly outperformed a large external solar shade.

This solution can help designers address some of the risks arising from a warming climate and meet the recent Part O Building Regulations (which applies to all new-build dwellings and care homes in England) in a sustainable way.

How do local soil variations affect the design options?

Soil types vary across the country including a wide range of clays, silts, sands, gravels and rocks. The main types are clay or chalk. Clay is used as a binder for all earth technologies while chalk is mainly used in rammed and mass earth and earth plasters.

