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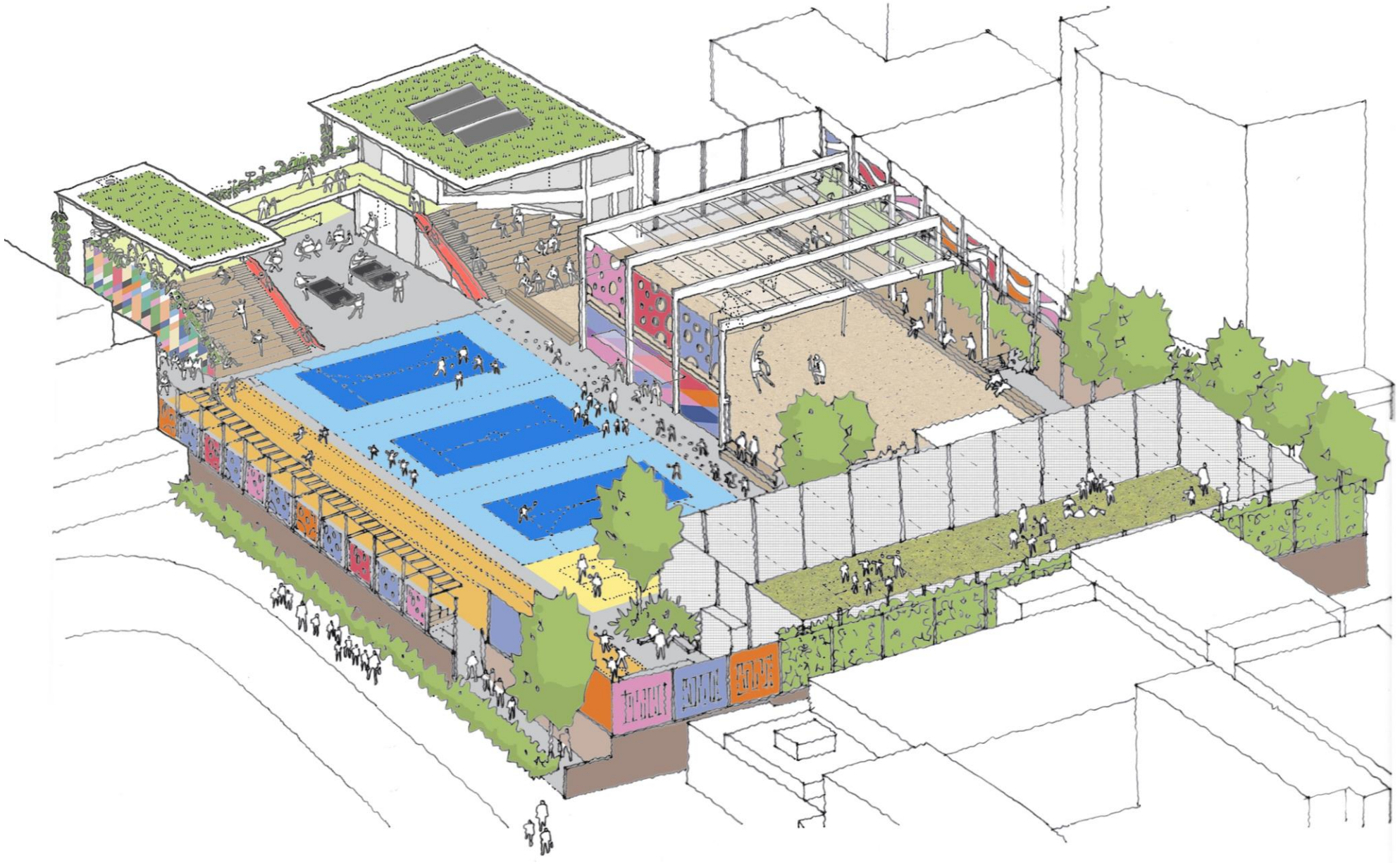
STUDIO

Cullinan Studio role on the ZAP project

- **Interviews with supply chain**
  - Looking at products we typically use and their plastic packaging
- **Testing methodology on Marlborough Sports Garden**
  - Context of pioneering circular economy brief- circular approach to all materials and systems, including plastics
- **Aim to provide practical guidance for built environment professionals**
  - Statutory environment and Emerging policy
  - Best practice

& Garden of Remembrance
Paupers' graveyard with memorial shrine
Maidstone Buildings Mews
Union St
Redcross Way
Union St
The Whisky Exchange - London Bridge Shop
Off Licence
King's London B
YourParkingSpace HQ - London Borough...
Union St
Borough High St
Marlborough Sports Garden
Richmond P
Deuce Beach Tennis
Guillotine Barbers London Bridge
Belushi's London Brid
Sainsbury's Local
The Dugout at Be London Bridge
KFC Borough - High Street
Fast food • £
St Joseph's Catholic Primary School, The...
Saviour &...
The Tanning Shop London Bridge
Art Academy
A3

The area has a high rate of childhood obesity



Marlborough Sports Garden, Southwark
for the Bankside Open Spaces Trust

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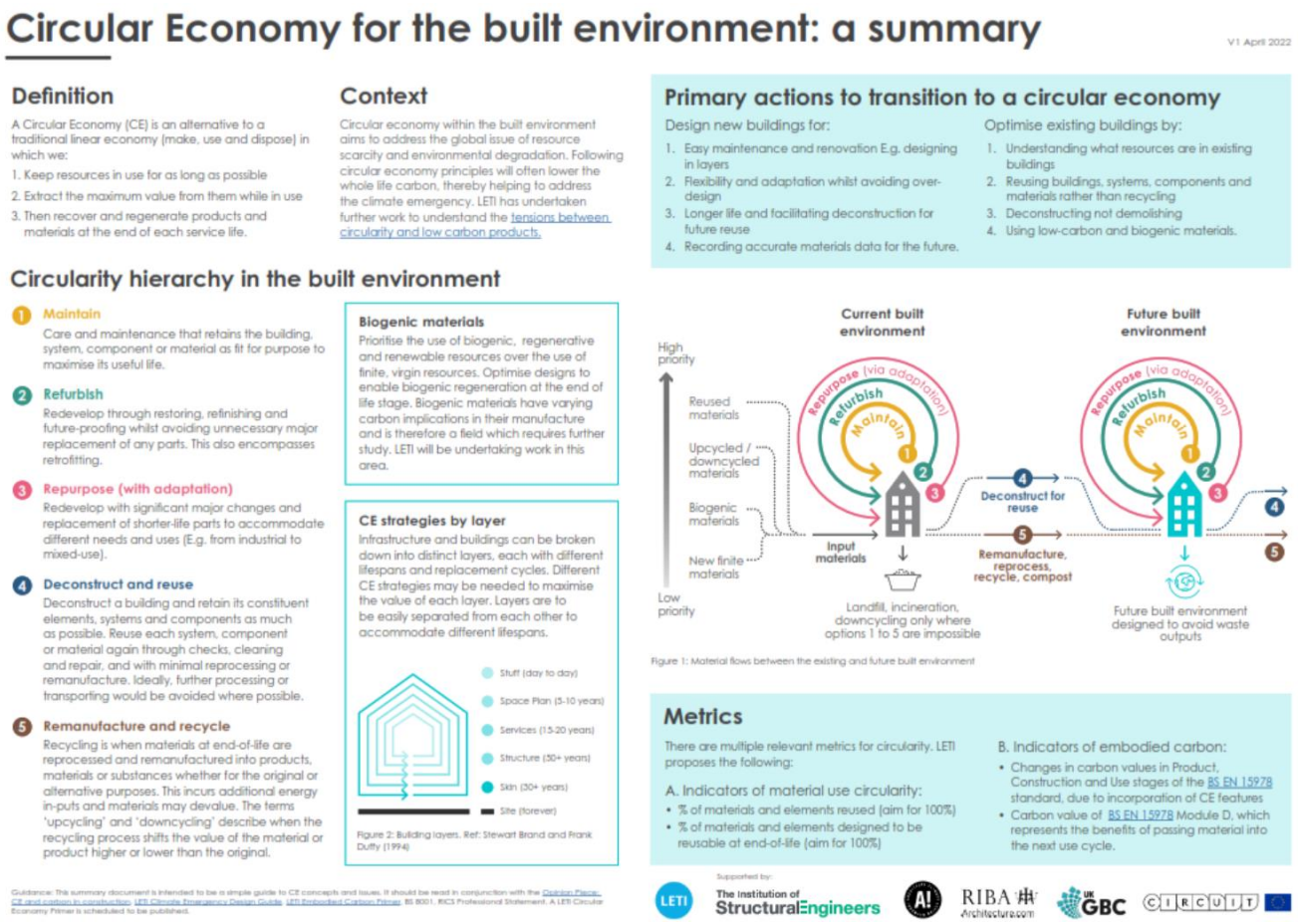

Circular Economy for the built environment: a summary

V1 April 2022

Definition

A Circular Economy (CE) is an alternative to a traditional linear economy (make, use and dispose) in which we:

1. Keep resources in use for as long as possible
2. Extract the maximum value from them while in use
3. Then recover and regenerate products and materials at the end of each service life.

Context

Circular economy within the built environment aims to address the global issue of resource scarcity and environmental degradation. Following circular economy principles will often lower the whole life carbon, thereby helping to address the climate emergency. LETI has undertaken further work to understand the tensions between circularity and low carbon products.

Circularity hierarchy in the built environment

1. **Maintain**
   Care and maintenance that retains the building, system, component or material as fit for purpose to maximise its useful life.
2. **Refurbish**
   Redevelop through restoring, refinishing and future-proofing whilst avoiding unnecessary major replacement of any parts. This also encompasses retrofitting.
3. **Repurpose (with adaptation)**
   Redevelop with significant major changes and replacement of shorter-life parts to accommodate different needs and uses (E.g. from industrial to mixed-use).
4. **Deconstruct and reuse**
   Deconstruct a building and retain its constituent elements, systems and components as much as possible. Reuse each system, component or material again through checks, cleaning and repair, and with minimal reprocessing or remanufacture. Ideally, further processing or transporting would be avoided where possible.
5. **Remanufacture and recycle**
   Recycling is when materials at end-of-life are reprocessed and remanufactured into products, materials or substances whether for the original or alternative purposes. This incurs additional energy in-puts and materials may devalue. The terms 'upcycling' and 'downcycling' describe when the recycling process shifts the value of the material or product higher or lower than the original.

Biogenic materials

Prioritise the use of biogenic, regenerative and renewable resources over the use of finite, virgin resources. Optimise designs to enable biogenic regeneration at the end of life stage. Biogenic materials have varying carbon implications in their manufacture and is therefore a field which requires further study. LETI will be undertaking work in this area.

CE strategies by layer

Infrastructure and buildings can be broken down into distinct layers, each with different lifespans and replacement cycles. Different CE strategies may be needed to maximise the value of each layer. Layers are to be easily separated from each other to accommodate different lifespans.

Figure 2: Building layers. Ref: Stewart Brand and Frank Duffy (1994)

Primary actions to transition to a circular economy

Design new buildings for:

1. Easy maintenance and renovation E.g. designing in layers
2. Flexibility and adaptation whilst avoiding over-design
3. Longer life and facilitating deconstruction for future reuse
4. Recording accurate materials data for the future.

Optimise existing buildings by:

1. Understanding what resources are in existing buildings
2. Reusing buildings, systems, components and materials rather than recycling
3. Deconstructing not demolishing
4. Using low-carbon and biogenic materials.

Figure 1: Material flows between the existing and future built environment

Metrics

There are multiple relevant metrics for circularity. LETI proposes the following:

A. Indicators of material use circularity:

- % of materials and elements reused (aim for 100%)
- % of materials and elements designed to be reusable at end-of-life (aim for 100%)

B. Indicators of embodied carbon:

- Changes in carbon values in Product, Construction and Use stages of the BS EN 15978 standard, due to incorporation of CE features
- Carbon value of BS EN 15978 Module D, which represents the benefits of passing material into the next use cycle.

Supported by: The Institution of Structural Engineers · RIBA Architecture.com · UKGBC · CIRCUIT

Guidance: This summary document is intended to be a simple guide to CE concepts and issues. It should be read in conjunction with the Design Piece, CE and carbon in construction, LETI Climate Emergency Design Guide, LETI Embodied Carbon Primer, BS 8001, RICS Professional Statement. A LETI Circular Economy Primer is scheduled to be published.

MAYOR OF LONDON

London Plan Guidance

Circular Economy Statements

March 2022

Emerging Guidance for Circular Economy Design

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MARLBOROUGH
SPORTS
GARDEN

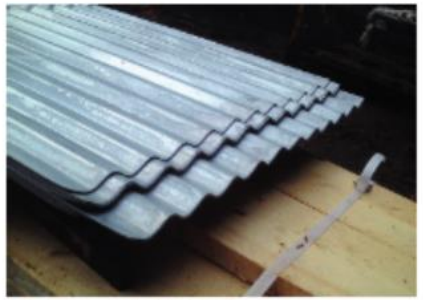
Materials research with Engenuiti

Site visit to Ashwells - Inspecting greenhart long length timber

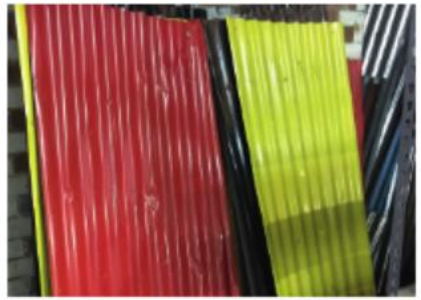
Site visit to Ashwells - Timber is cut to length on the worksite and comes out looking like new

Site visit to Ashwells - A shipment of 600m2 hardwood decking had recently come in.

Site visit to Ashwells - This large timber member was salvaged from London City Airport and has a lot of history attached, not



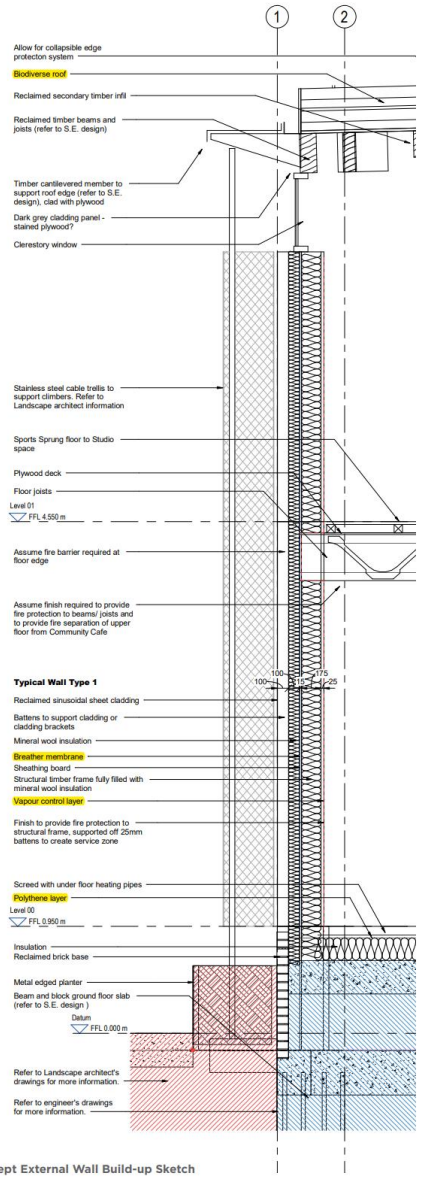
Reclaimed corrugated sheet metal



Reclaimed coloured corrugated sheet metal

Reclaimed plywood painted and weather treated

Existing front boundary brick wall



Concept External Wall Build-up Sketch

Products that contain plastic highlighted in yellow not shown are electrical conduit, plumbing pipe work, ventilation ducts, electrical fittings, drainage pipes, sealants, paint finishes. How can we further reduce plastic use in the specification?

Biodiverse Roof

Reclaimed Structural Timber

Sinusoidal Sheet Cladding

Reclaimed Brick

All products may be supplied with Plastic packaging.
What are supply chain doing to reduce amount, used, provide recyclable types, or provide collection schemes?

Typical External wall build-up

Our initial investigations into a robust and low carbon wall are outlined below and in the section to the left. Further investigation is required, especially to take into consideration circular economy principles

Typical External Wall
- Reclaimed sinusoidal sheet cladding
- Battens/cladding brackets to support cladding
- Mineral wool insulation
- Breather membrane
- Sheathing board
- Structural timber frame fully filled with mineral insulation
- Vapour control layer
- Internal finish TBC

Floor build-ups

Our initial concepts for the floor build-ups is as follows, however this too is subject to further investigation and sourcing availability applying circular economy principles

Café and toilets:
- Beam and block structure (as Structural Engineer design)
- Insulation (to achieve required U value)
- Vapour Control layer/ separating layer
- Liquid screed with underfloor heating pipes (UFH as M&E Engineer's design)
- Resin floor

Kitchen:
- Beam and block structure (as Structural Engineer design)
- Insulation
- Vapour Control layer/ separating layer
- Liquid screed
- Sheet flooring suitable for kitchen use

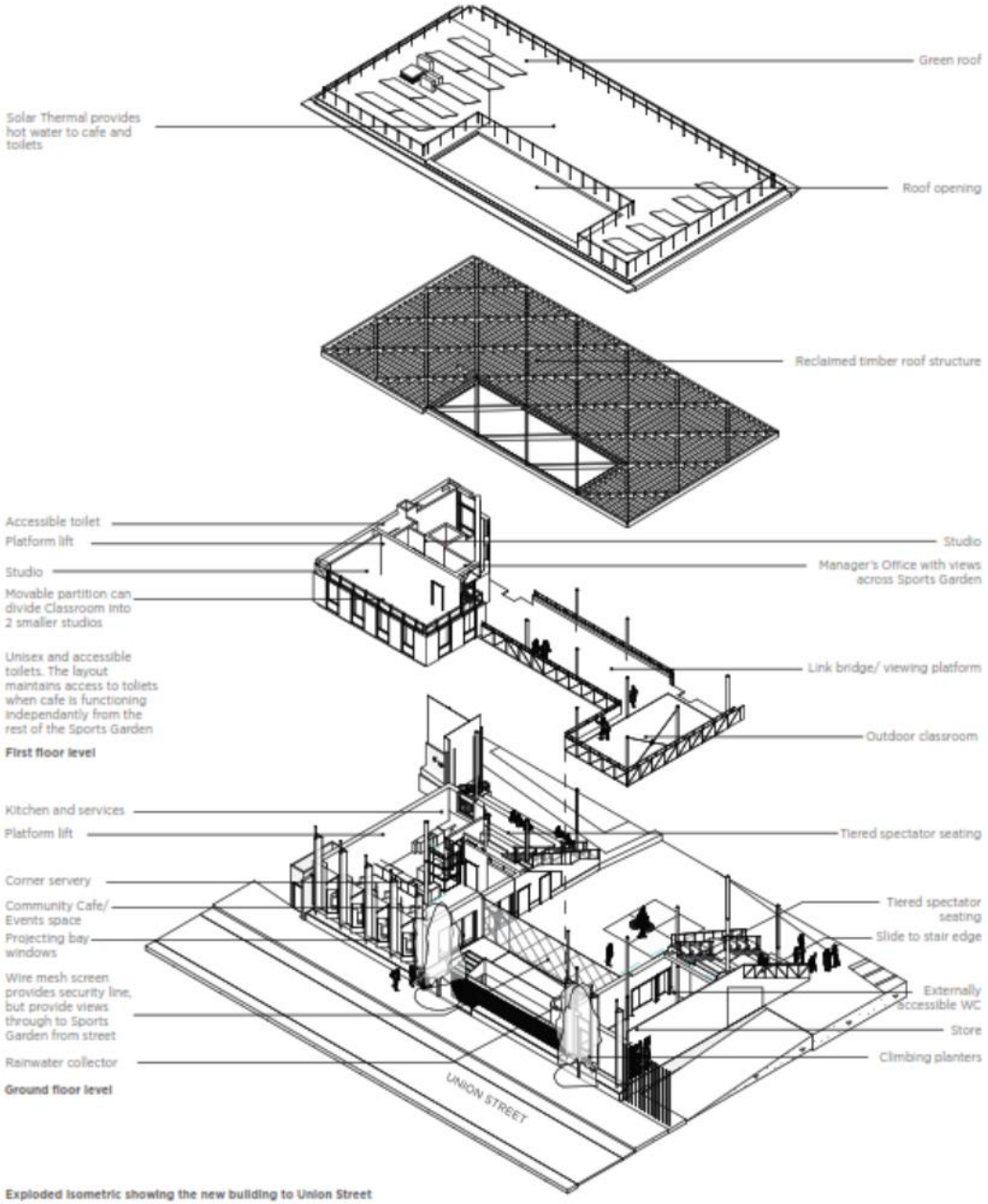
Studio spaces to Union Street side (First floor)
- Plasterboard ceiling (to provide fire protection to joists)
- Posi-joists (as Structural Engineer design) – with insulation in between as required for UFH system (UFH as M&E Engineer's design)
- Timber deck (plywood or OSB)
- Timber sprung floor system with underfloor heating system (heating pipework within insulation boards between battens)

Office, studio to garden side and corridor (First floor)
- Plasterboard ceiling (to provide fire protection to joists)
- Posi-joists (as Structural Engineer design)
- Timber deck (plywood or OSB)
- Timber battens to raise FFL up to Sprung floor level
- Timber deck (plywood or OSB)
- Rubber sheet flooring

- Aim for ZAP
- BREEAM – highlighted action is to use returnable packaging
- Aim to set one target for overall reuse; recycling and diversion of waste from landfill; note 95% is required for GLA CE Statements
- Aim for materials passport and an end of life plan which can be as part of the O&M (not just on plastics)
- consider reused and recycled content for key products


The worst food for children is almost always wrapped in plastic
Alpen Gold
Mamba
LINDOR
STORCK
Vanilla
Париж

Plan to reduce operational plastic waste



Exploded isometric showing the new building to Union Street

Plan kitchens to allow for healthy, fresh food prep and reusable dishes

Plan for installation of water bottle re-fill stations

Plan space for recycling bins indoors and outdoors