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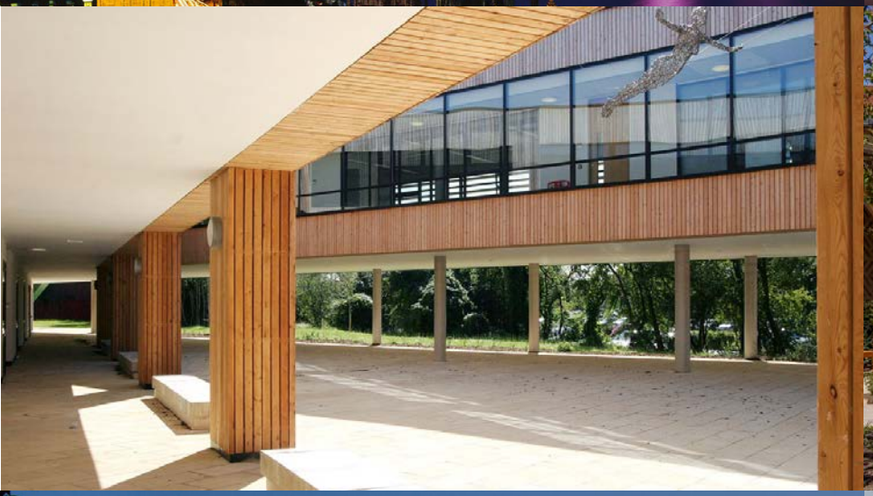
Towards a Circular, Regenerative Future

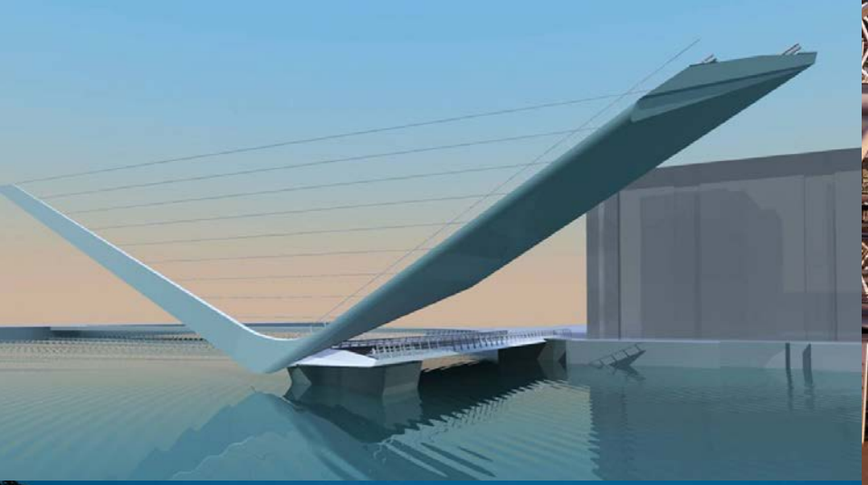
IABSE 21st September 2023

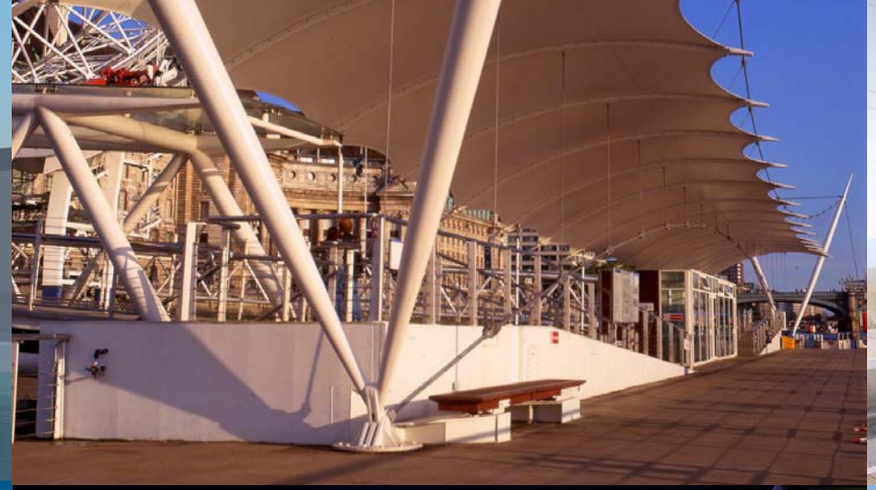
Julia Barfield

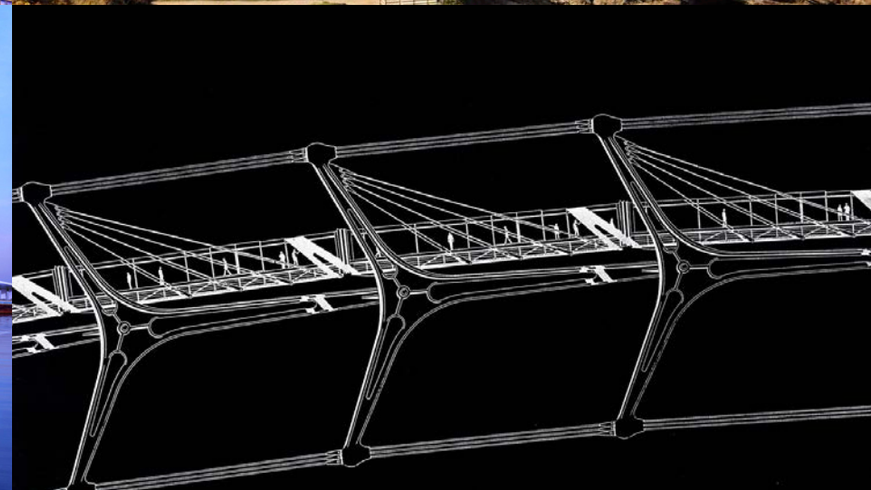








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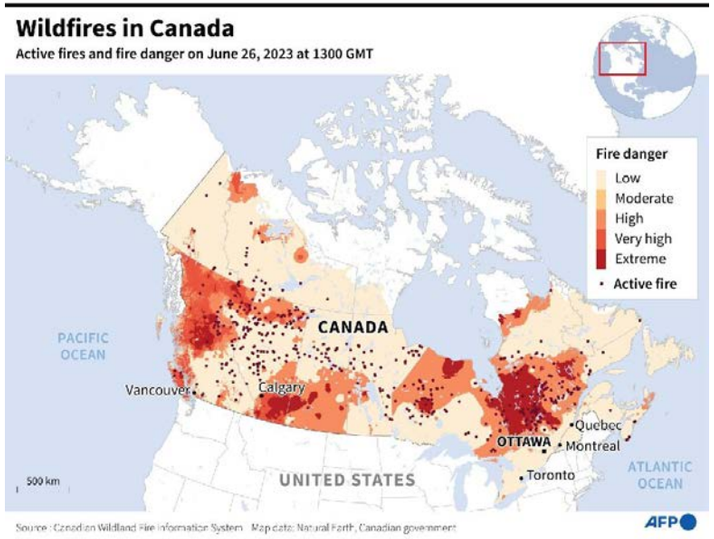
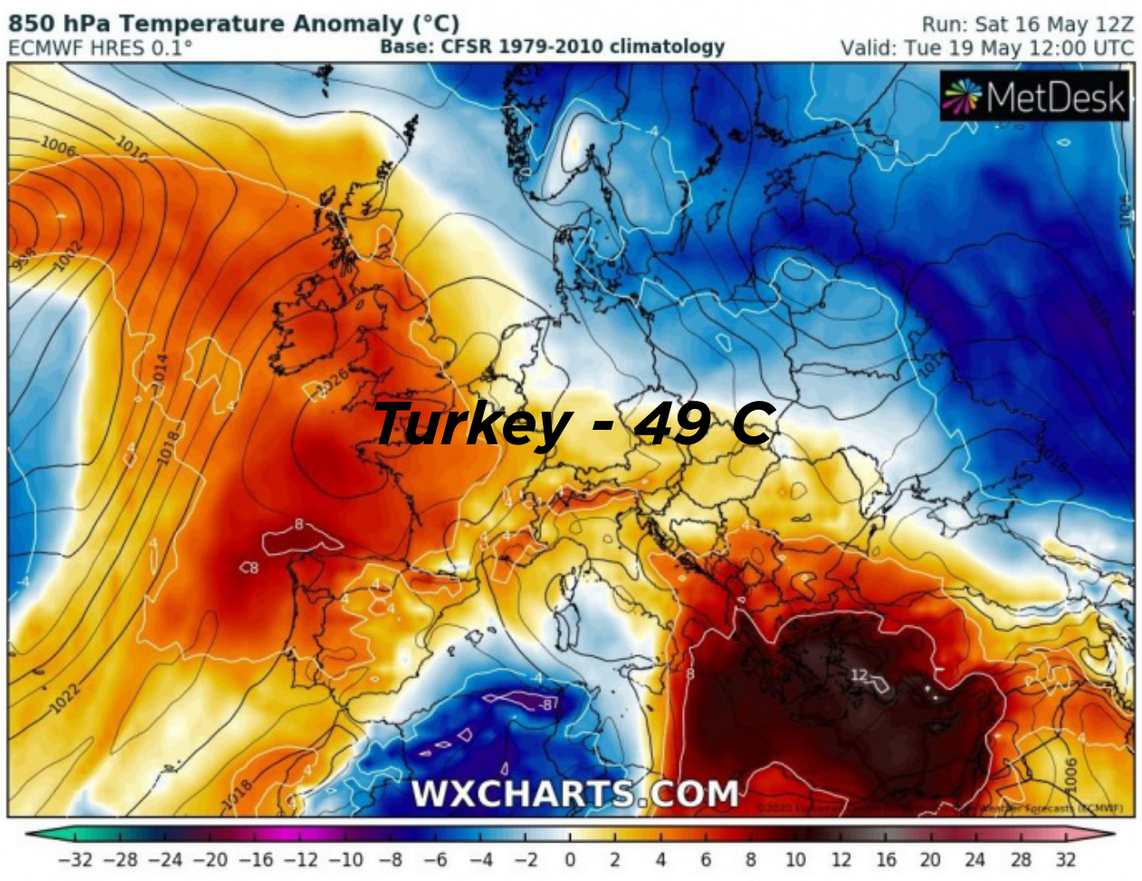
Climate Context

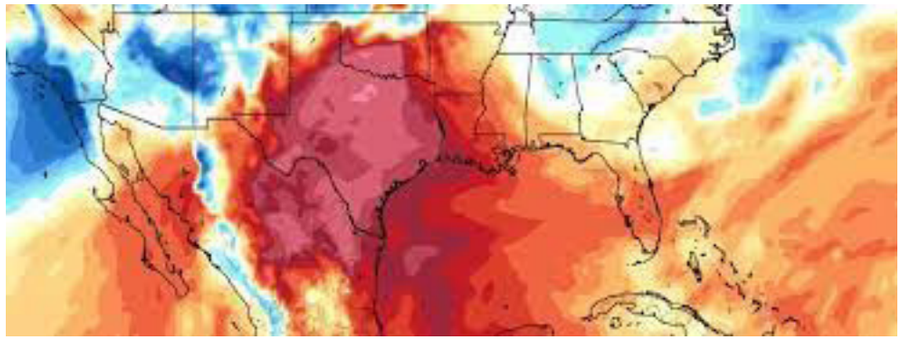
Extreme Weather Events 2023 - Fires



Extreme Weather Events 2023 - Floods

Extreme Weather Events 2023 - Heat waves





U.N. Secretary - General Antonio Guterres

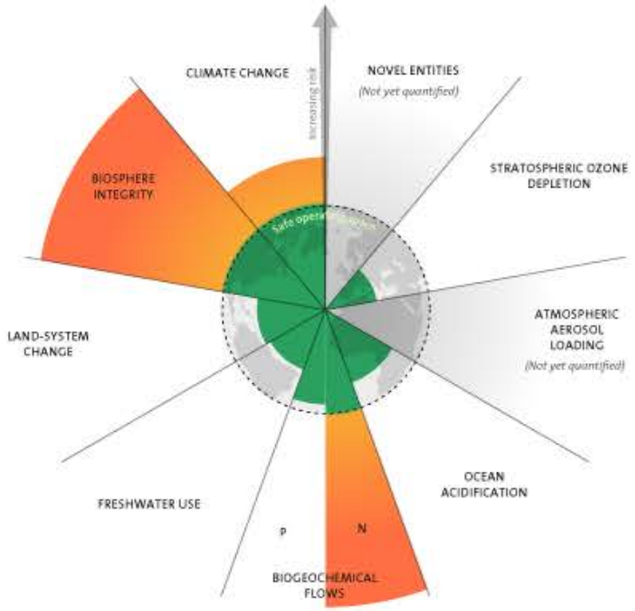
“We are on a highway to climate hell with our foot still on the accelerator”

“Greenhouse gas emissions keep growing, global temperatures keep rising, and our planet is fast approaching tipping points that will make climate chaos irreversible”

COP27

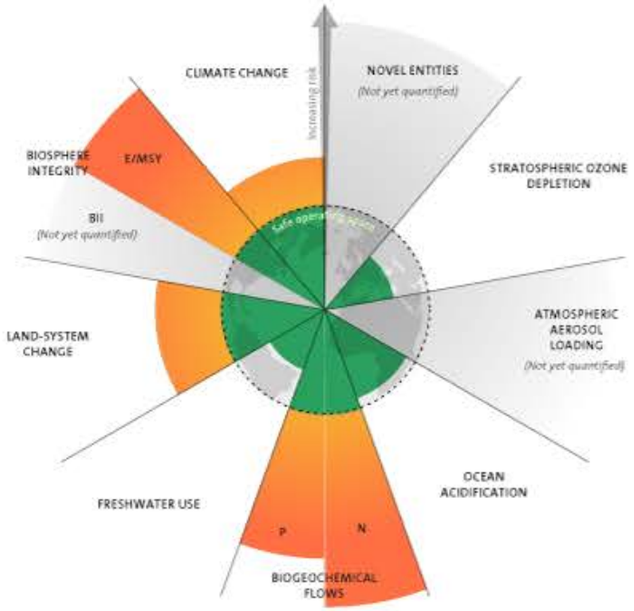
Exceeding Planetary Boundaries

2009



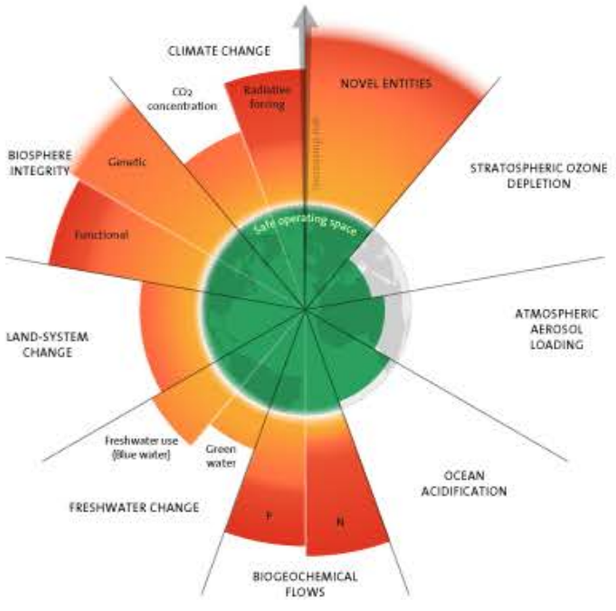
3 boundaries crossed

2015



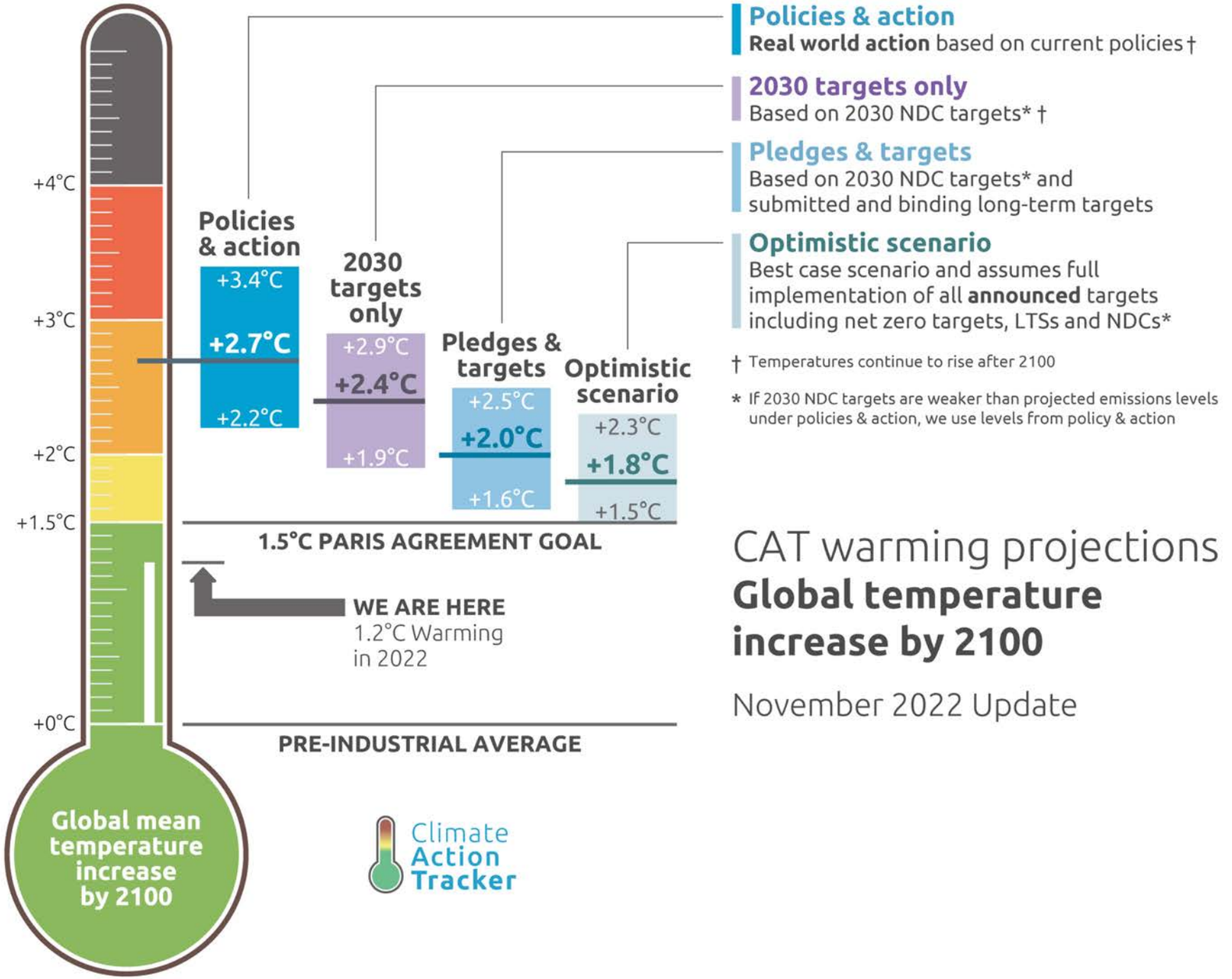
4 boundaries crossed

2023



6 boundaries crossed

Climate Action Tracker



CAT warming projections

Global temperature increase by 2100

November 2022 Update

Percentage of species at risk of extinction by 2100

Vertebrates

4%

8%

26%

Plants

8%

16%

44%

Insects

6%

18%

49%

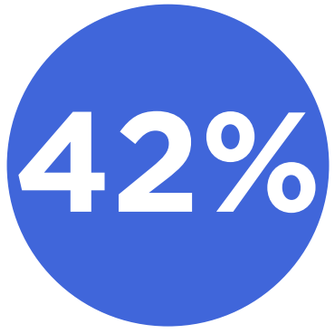
1.5°C

2°C

3.2°C

Warren et al, 2018, Science

Construction Industry Impacts



Of UK total Carbon Emissions are attributed to built environment (according to the UK Green Building Council)

Of UK waste is generated by the Construction Industry - a massive 120 million tonnes

Of all raw materials mined and harvested annually are consumed by the construction sector

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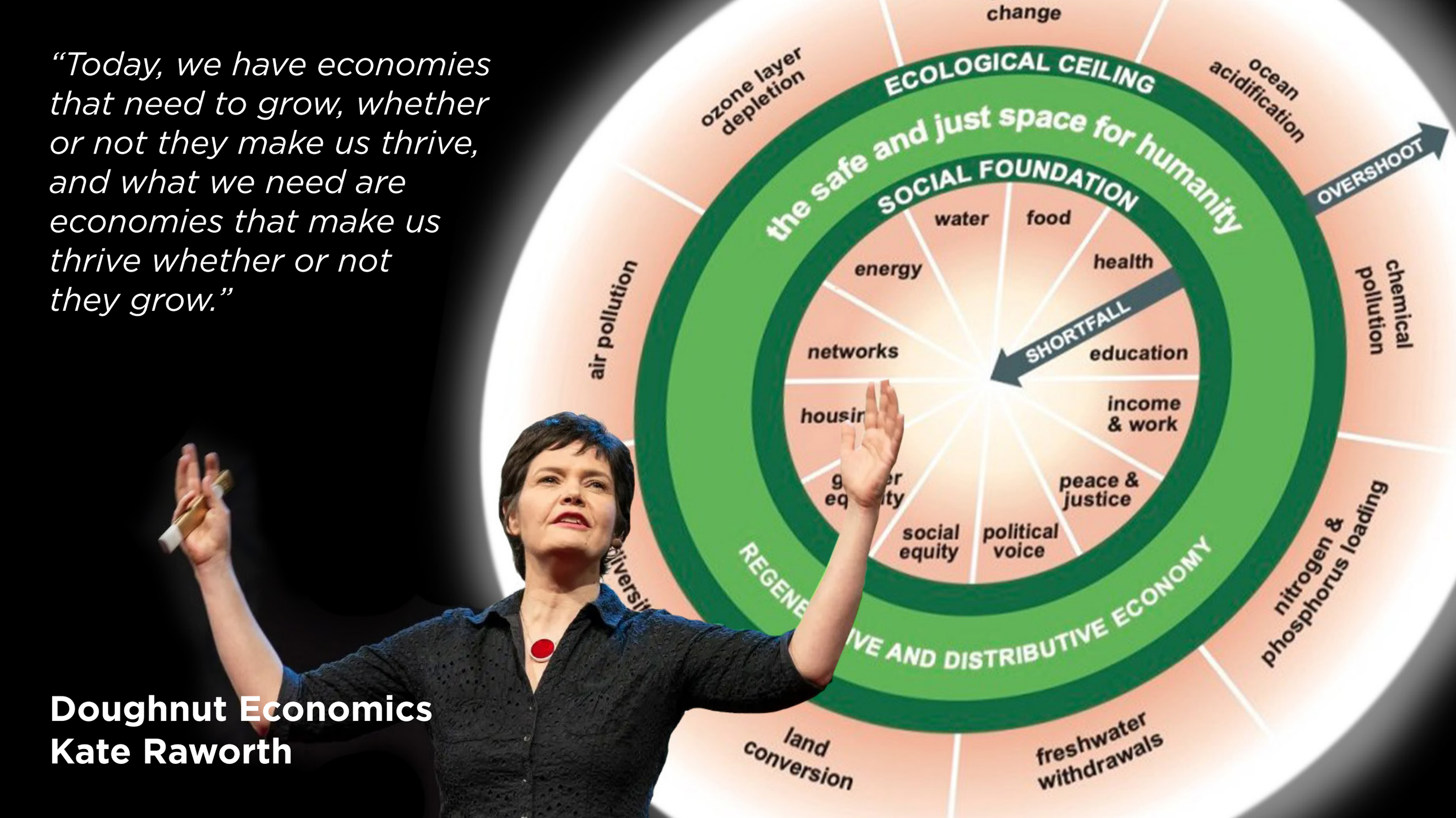
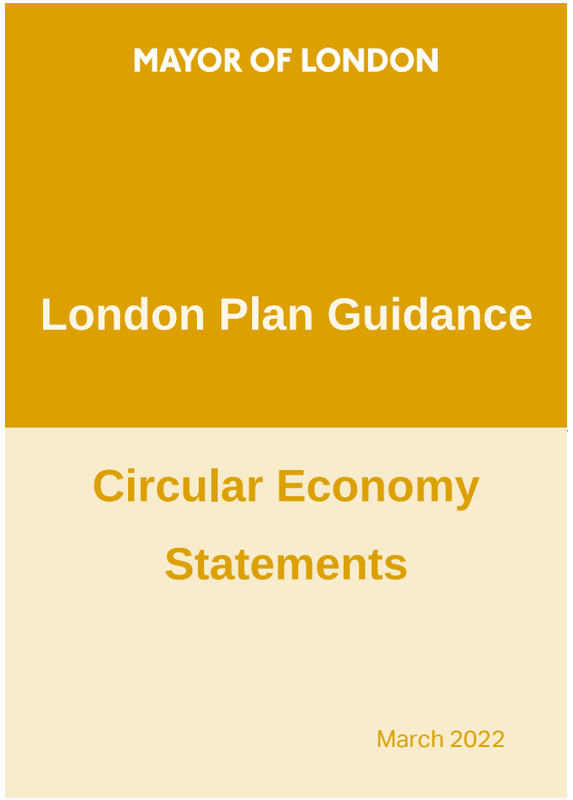
Moving towards Circularity...

“Today, we have economies that need to grow, whether or not they make us thrive, and what we need are economies that make us thrive whether or not they grow.”



Doughnut Economics
Kate Raworth

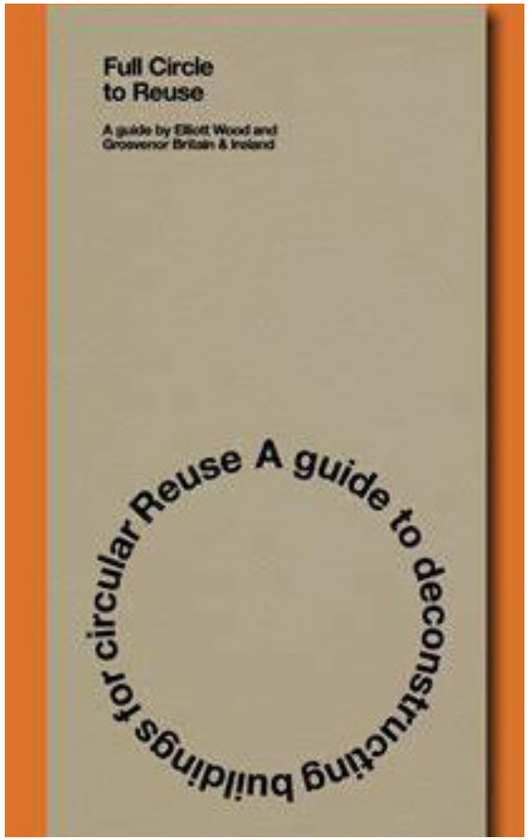
Planning Context

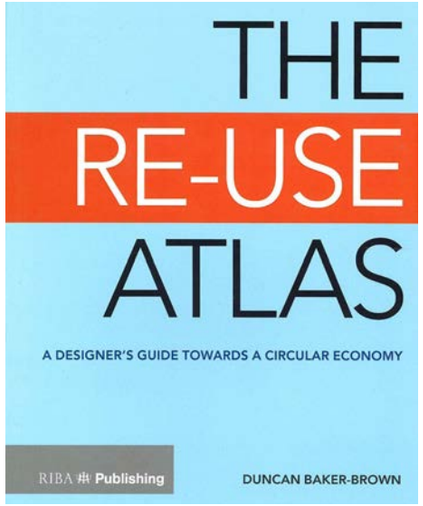


March 2023

"A Circular Economy is defined in draft London Plan Policy SI7 'Reducing waste and supporting the Circular Economy' as one where materials are retained in use at their highest value for as long as possible and are then reused or recycled, leaving a minimum of residual waste."

Wider Context





01

The Lendager Group

Milan Chair Pavilion

Resource Rows, Copenhagen

Saving as much as 29% CO2 by upcycling only 10% of all building materials.

Upcycle Studios, Copenhagen

How 3,000 m2 row houses can save 45% CO2 and turn 1,000 tonnes of waste into building materials.

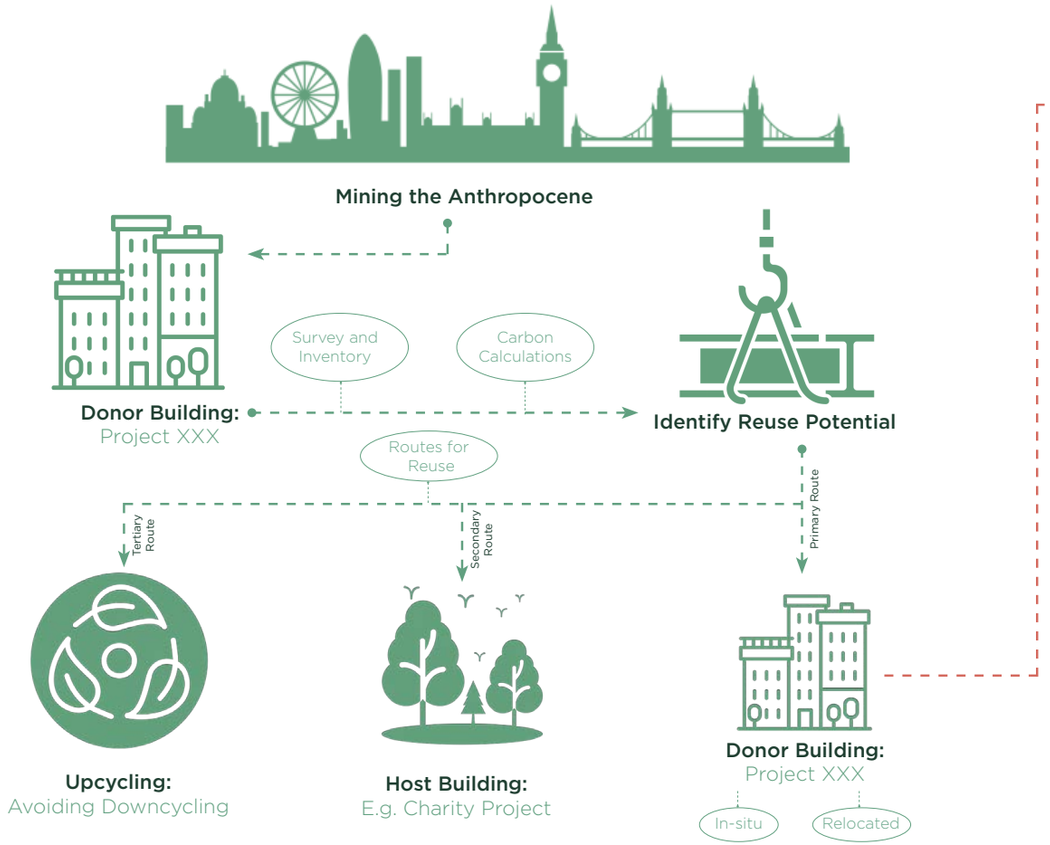
02

22 Baker Street

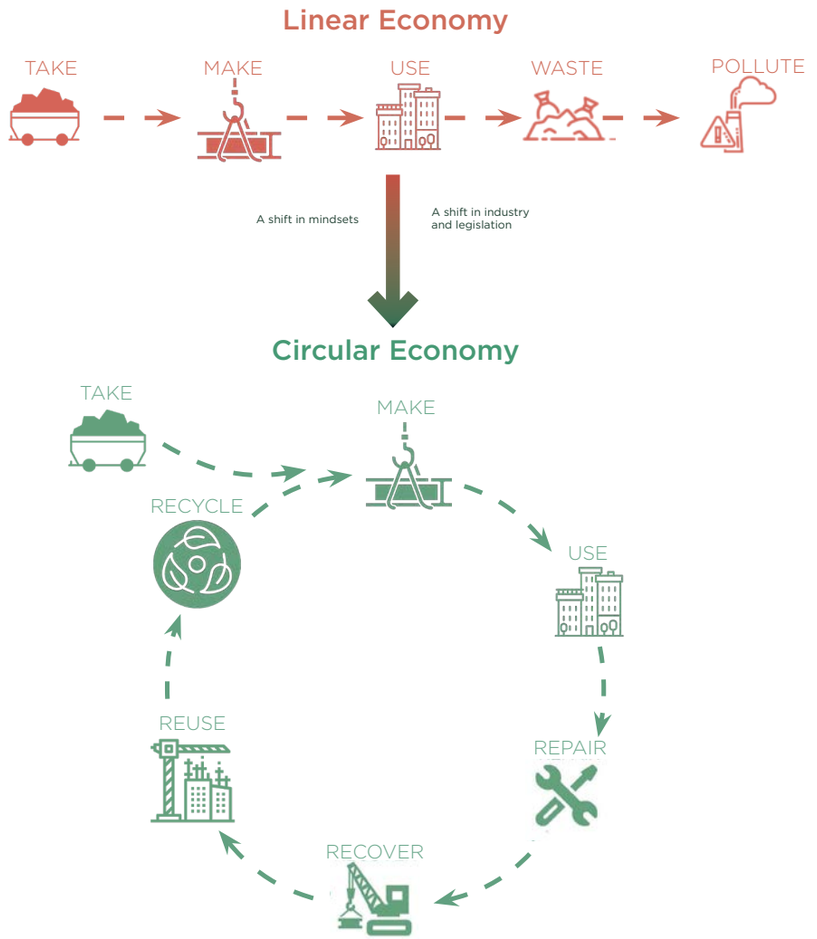
The Circular Economy and Urban Mining

The strategy for retrofit and reuse

The Circular Economy within MBA



Moving from a Linear to a Circular Economy



RETROFIT

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Circularity

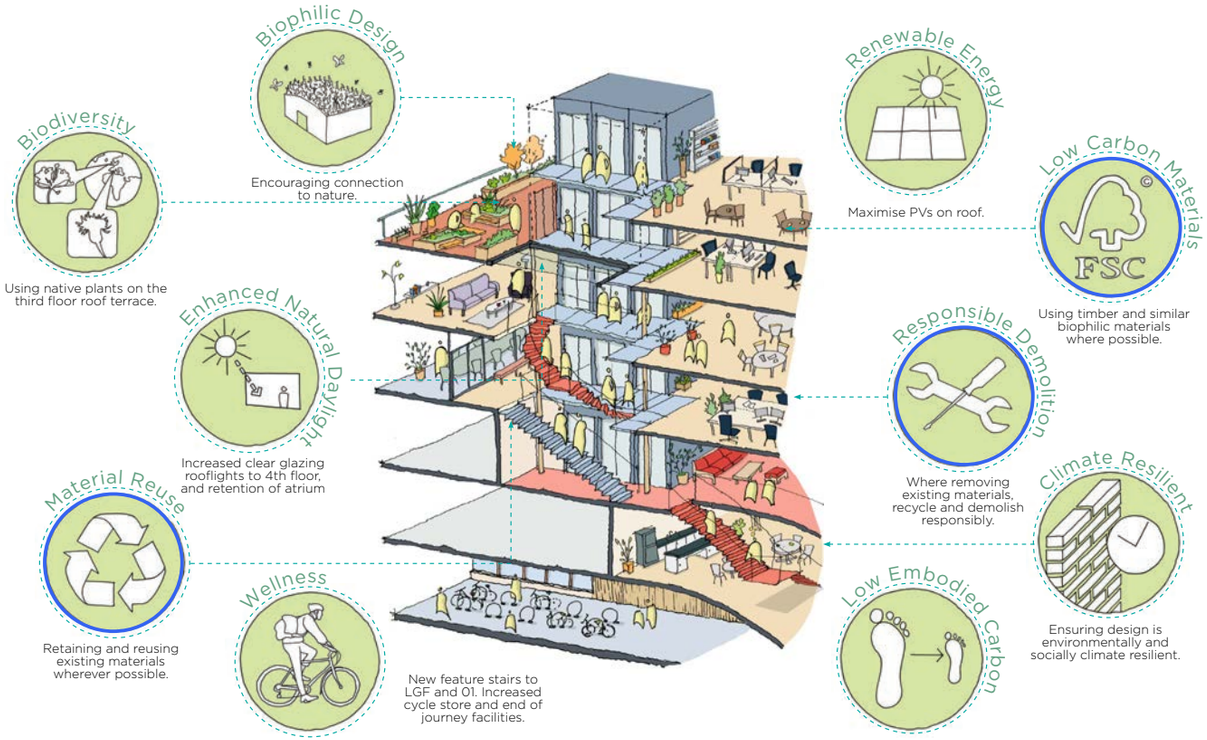
DECONSTRUCT don't demolish

22 Baker Street

Existing External View of Office Building

Existing Internal View of Upper Floor
Office Space

Existing Internal View of Atrium



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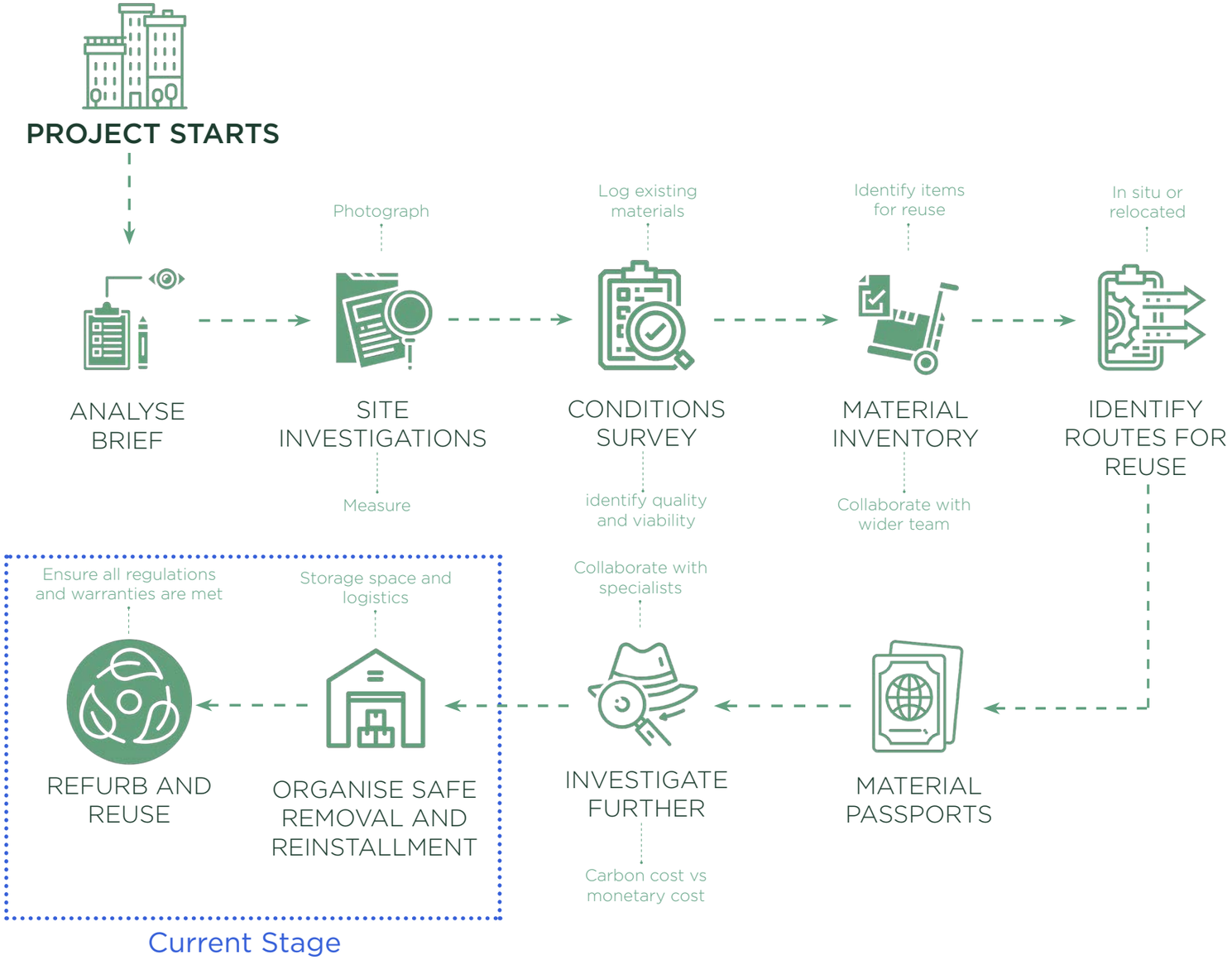
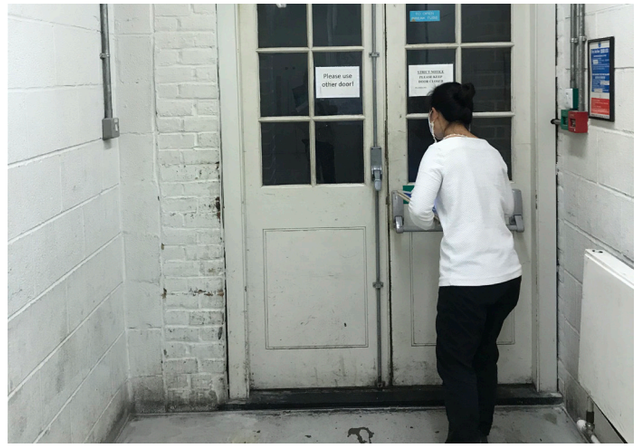
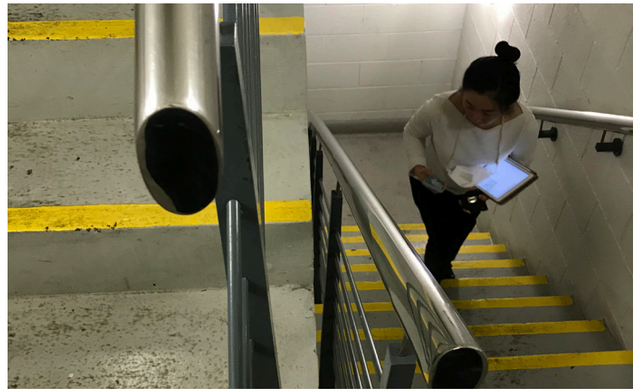
Reuse Methodology







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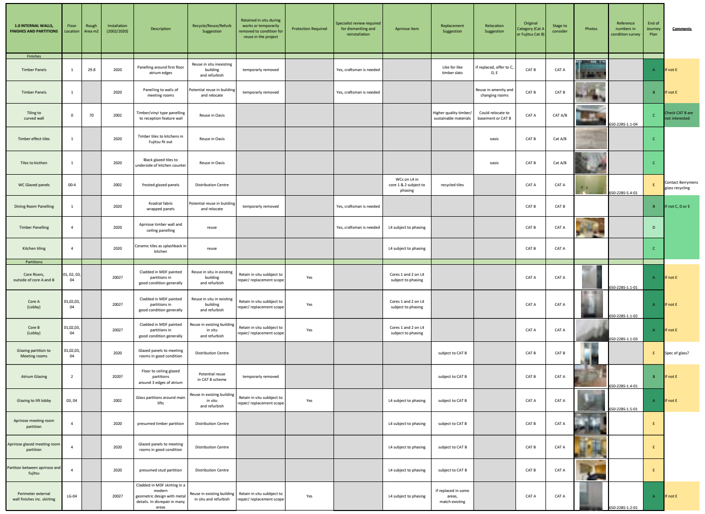
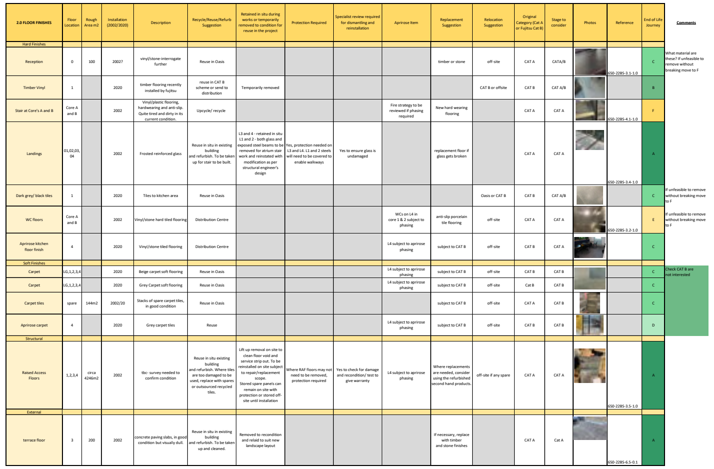
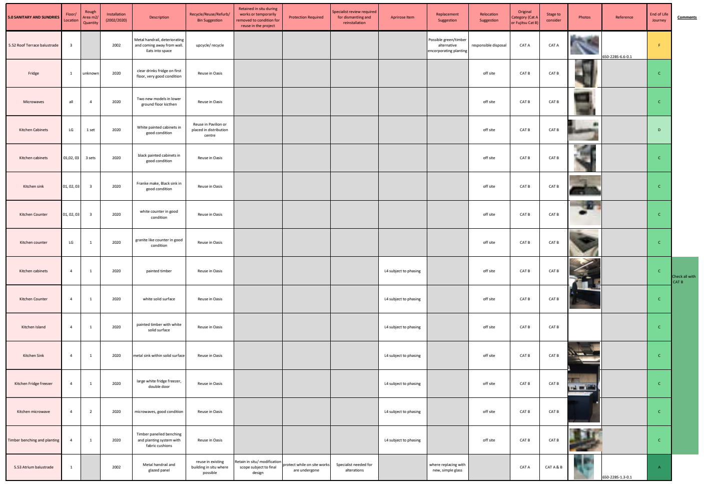
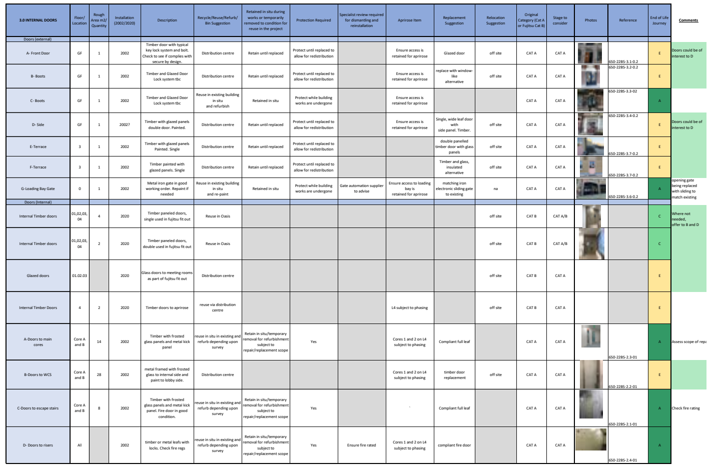
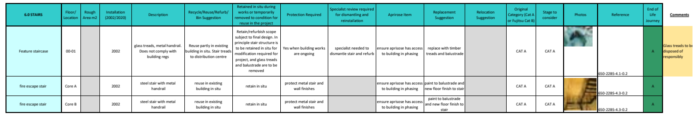
Existing Material Inventory

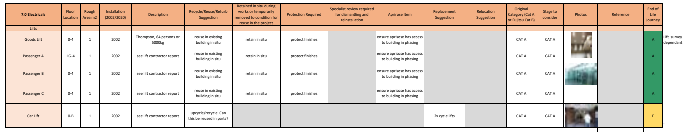


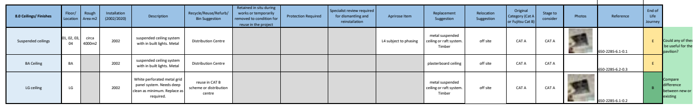


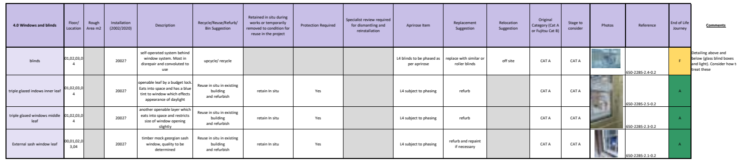










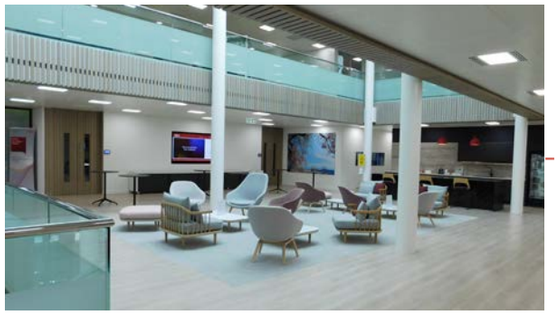


Key:

- (A) 22 BS - Cat A
- (B) 22 BS - CAT B Potential
- (C) Oasis Play
- (D) Other reuse opportunity
- (E) Upcycle
- (F) Recycle

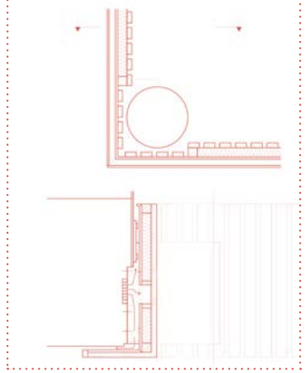
As issued to the Contractor Faithdean at RIBA Stage 3/4

Material Passport development



Existing Material Passport 01

Material:	Timber Veneer
Location:	First Floor around Atrium
Dimensions:	26mm x 830mm x 60mm
Area:	29.8m²
Installation Date:	2020
Method of Installation:	Screwed to split batten system
Supplier:	Profile Interiors
Maintenance History:	Unknown
Performance Grade:	Unknown
Aesthetic Grade:	Grade A
Reuse/Recycle/Refurbish:	Refurbish
Stage to Consider:	Shell and Core



Description:
Pre veneered oak MDF - laquered/stained with MDF back board - white semi matt

Potential Areas for Reuse:
Reuse in Basement amenity space

Monetary Cost to Replace:
£1,898.96

Carbon Cost to Replace:
98 kg/CO_2 (estimate)

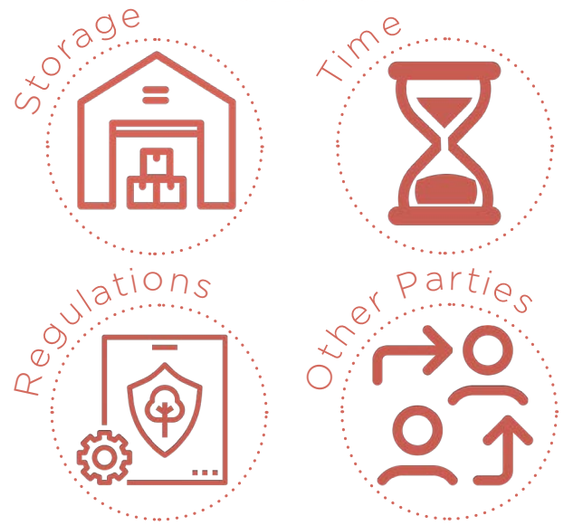
Material Name: **Timber Fascia Panelling**
Material Code: **650-T01**

EXAMPLE RETROFIT OFFICE BUILDING TARGET

A+ <345Kg
(A <530Kg)
CO_2 per m²

Example Overall GEA= circa 10,400 sqm
Overall Carbon Target= 8,320,000 kgCO_2

Immediate Barriers to Reuse:



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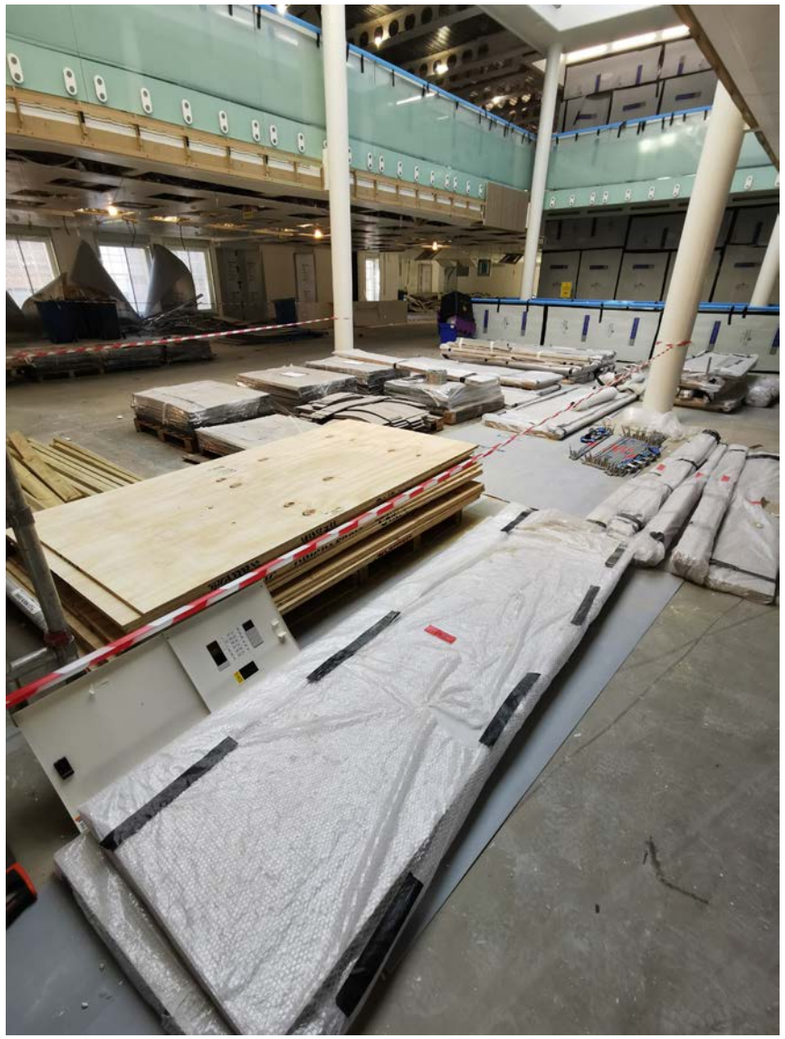
From desk to site

In collaboration with Lazari, Lawmens and Faithdean



Reuse in situ material collected, sorted, protected and referenced for reconditioning and reinstallation.

Ceiling Tiles

Raised access floor tiles deconstructed and grouped to be sent for reconditioning before being reinstalled in office building.

Soft strip out of ceilings

Removal of reuse material via electric vans

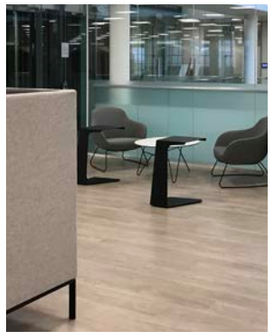
Removal of reuse material to be sorted

Circularity - Success Stories

Raised Access Floors

Existing Material Passport 01

Floor Location:	01,02,03,04
Area (Estimate):	4,245.5m²
Installment:	2002
Recycle/Reuse/Refurb:	Keep and refurb
Replacement:	NA
Stage to Consider:	CAT A
Monetary Saving:	£146,160
Carbon Saving:	121,633.6 kg CO2e



Description:
Metal raised access floor plates and pedestals across office floorplates. Refurb and reuse as much as possible, replacing with upcycled tiles where need.

Potential Areas for Reuse:
In-situ

Material Name: **Raised Access Floors**

Internal Fire Doors

Existing Material Passport 05

Floor Location:	All
Area/Quantity (Estimate):	75 doors (mostly fire)
Installment:	2002-2020
Recycle/Reuse/Refurb:	Keep and refurb
Replacement:	Sustainable alternative
Stage to Consider:	CAT A
Monetary Cost to replace:	circa £199,500
Carbon Cost to replace:	29.6kg/unit =3900 $kgCO_2$

Description:
Timber MDF doors with paint finish. Some with glass vision panels. Range of handles and kickplates. Mostly Stainless steel.

Potential Areas for Reuse:
In-situ or in Basement.

Material Name: **Internal Core Doors**

Total Savings:

Raised Access Floors

Area = 4,872 m2

Cost saving = **£146,160**

Carbon saving = **121,634 kg CO2e**

Internal Fire Doors

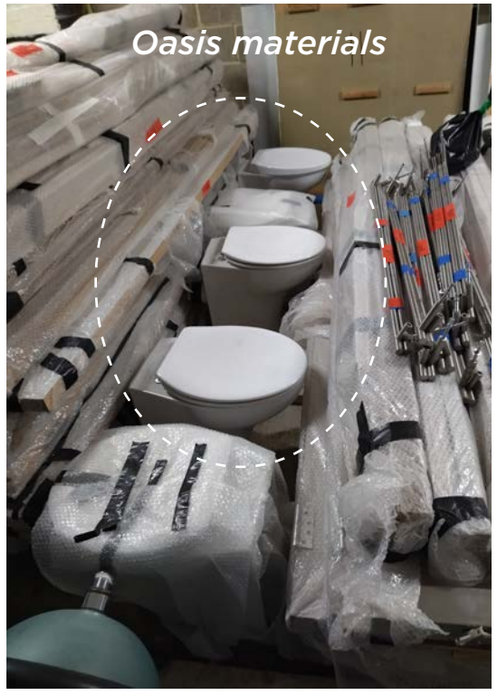
Number = 133 units

Cost saving = **£199,500**

Carbon saving = **3900 kg CO2e**

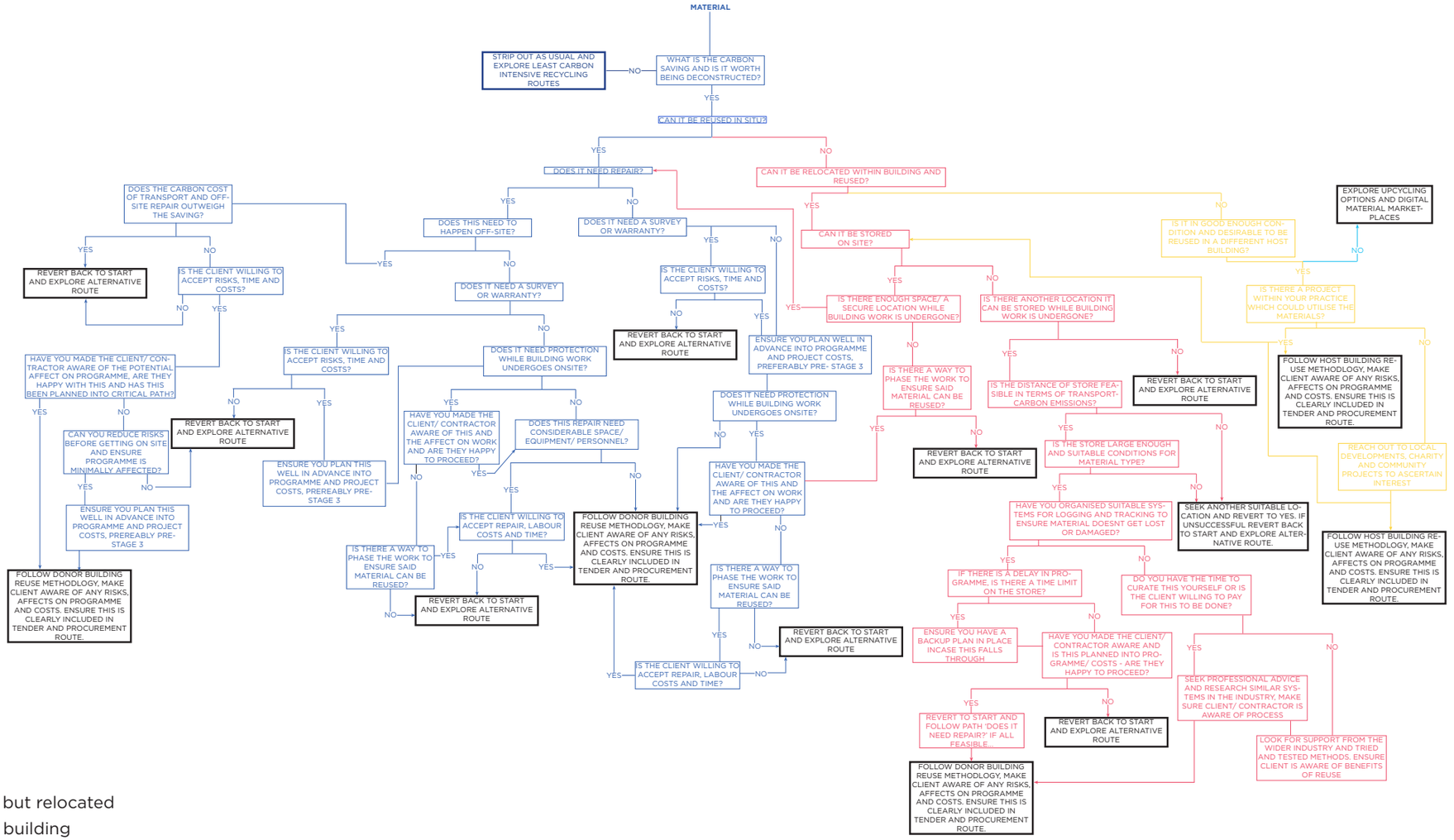
(Costs include:
- *Auditing/ design process fees*
- *Specialist fire consultant survey and fees*
- *Repair and ironmongery replacement fees*
- *Fire consultant verification for re-use)*

Storage and Coordination



Circularity

Material Reuse Pathway



= Reuse in-situ

= Reuse on site but relocated

= Reuse in host building

= Upcycled or reformed

= Recycled

:ated

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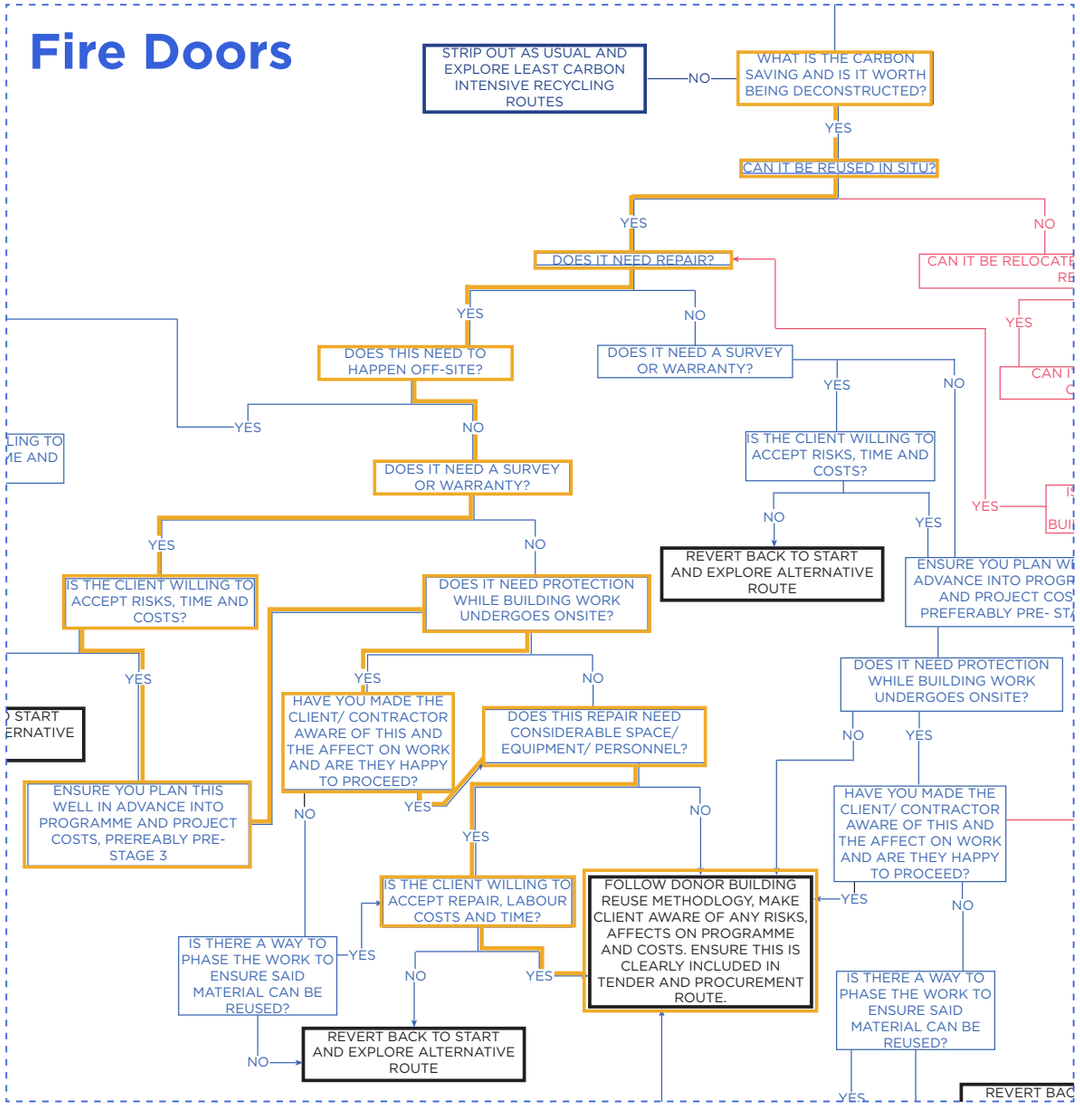
Circularity

Material Reuse Pathway



03

Oasis Nature Garden

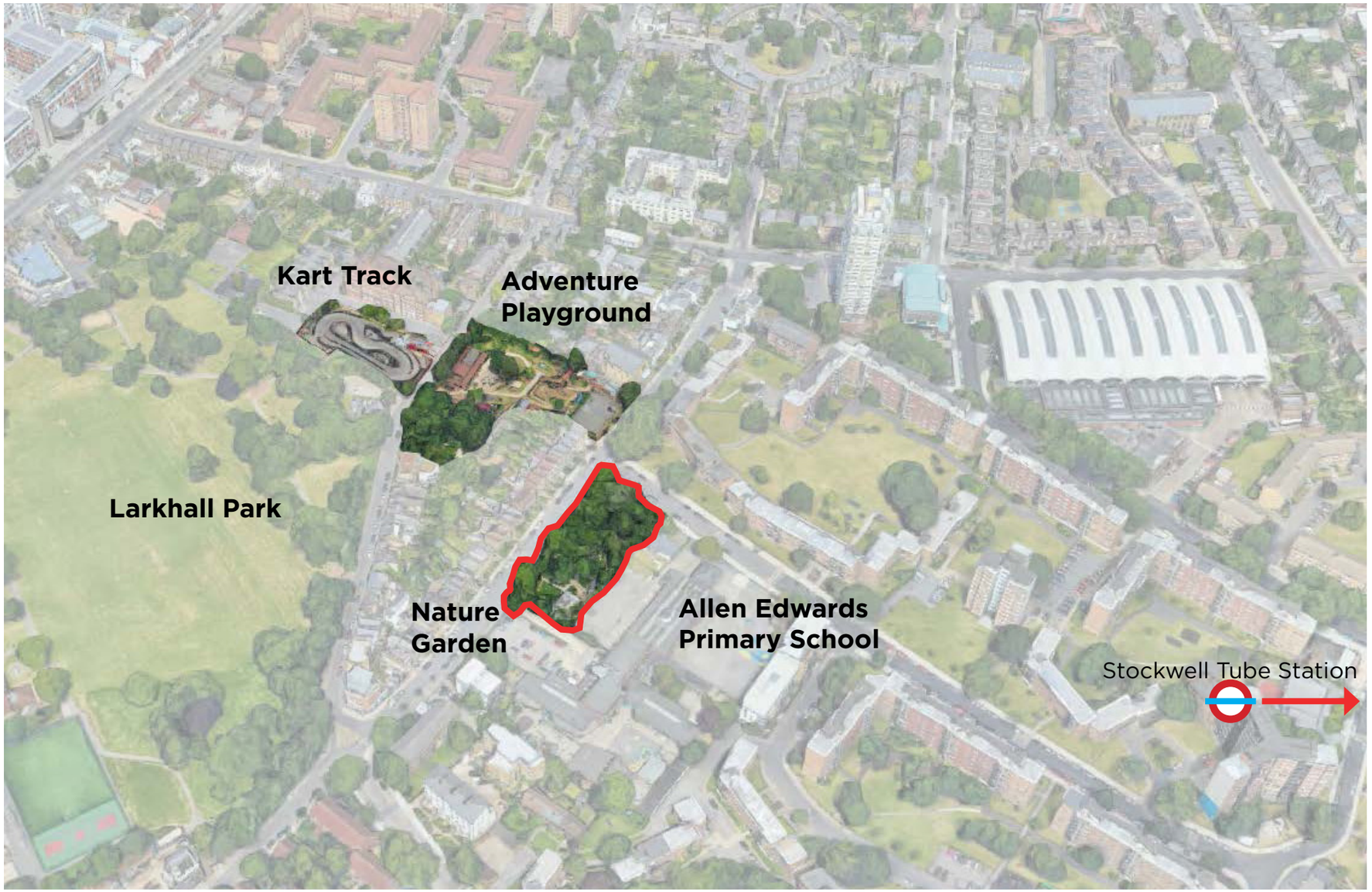
Host and Donor Building Relationship

Site Location

Adventure Playground

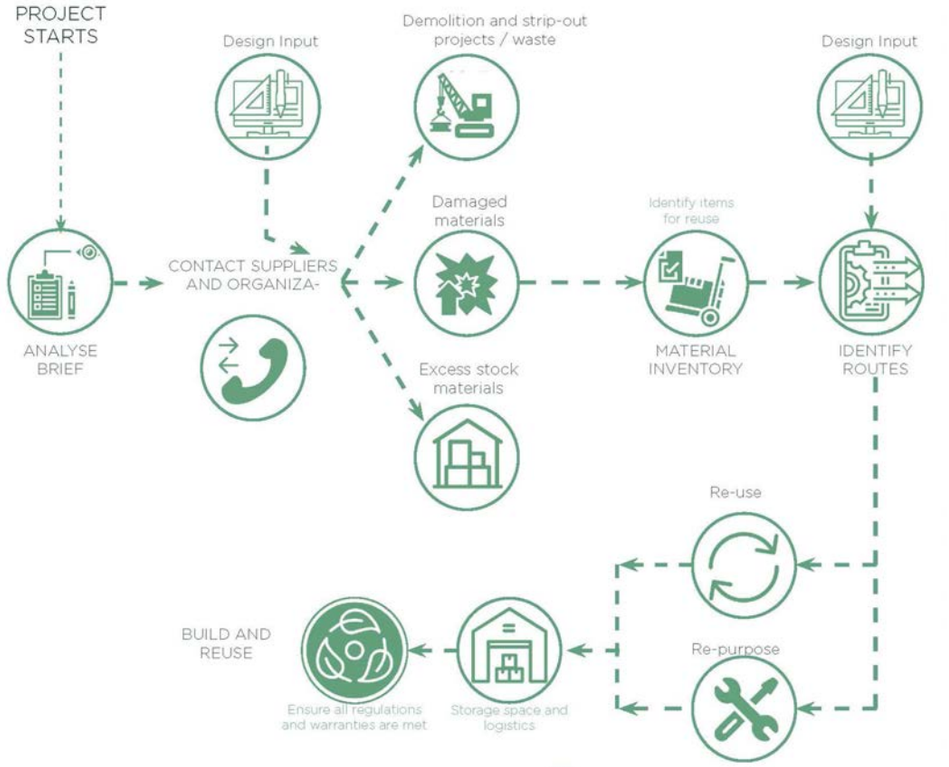
Kart Track

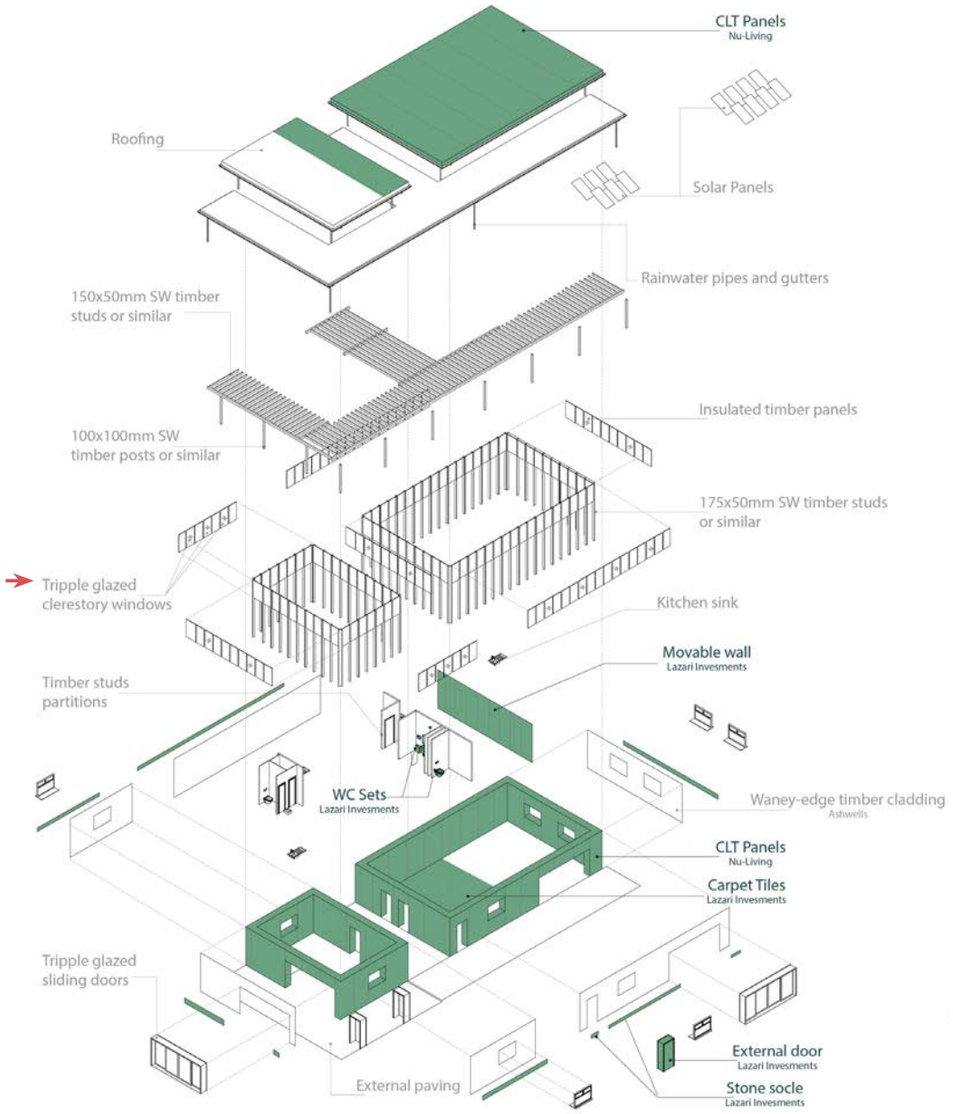
Nature Garden



Circularity

Built with all REUSED materials





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Circularity

Nu-Living CLT Panels

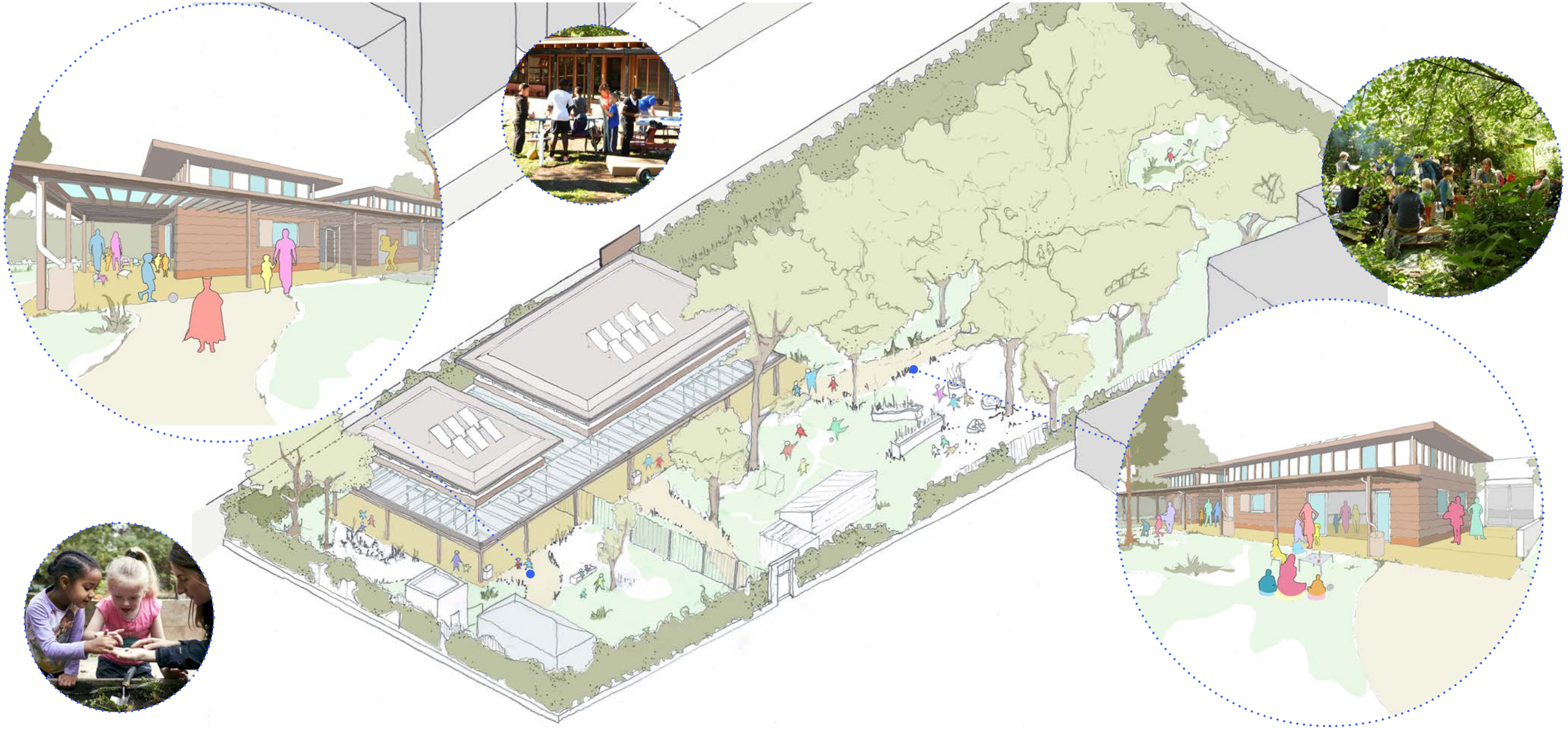
Ashwells Timber Yard

One Exchange Square

22 Baker Street

Circularity

WLCA: 331 kgCO2e/m2



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04

Urban Mining

A Fresh Approach

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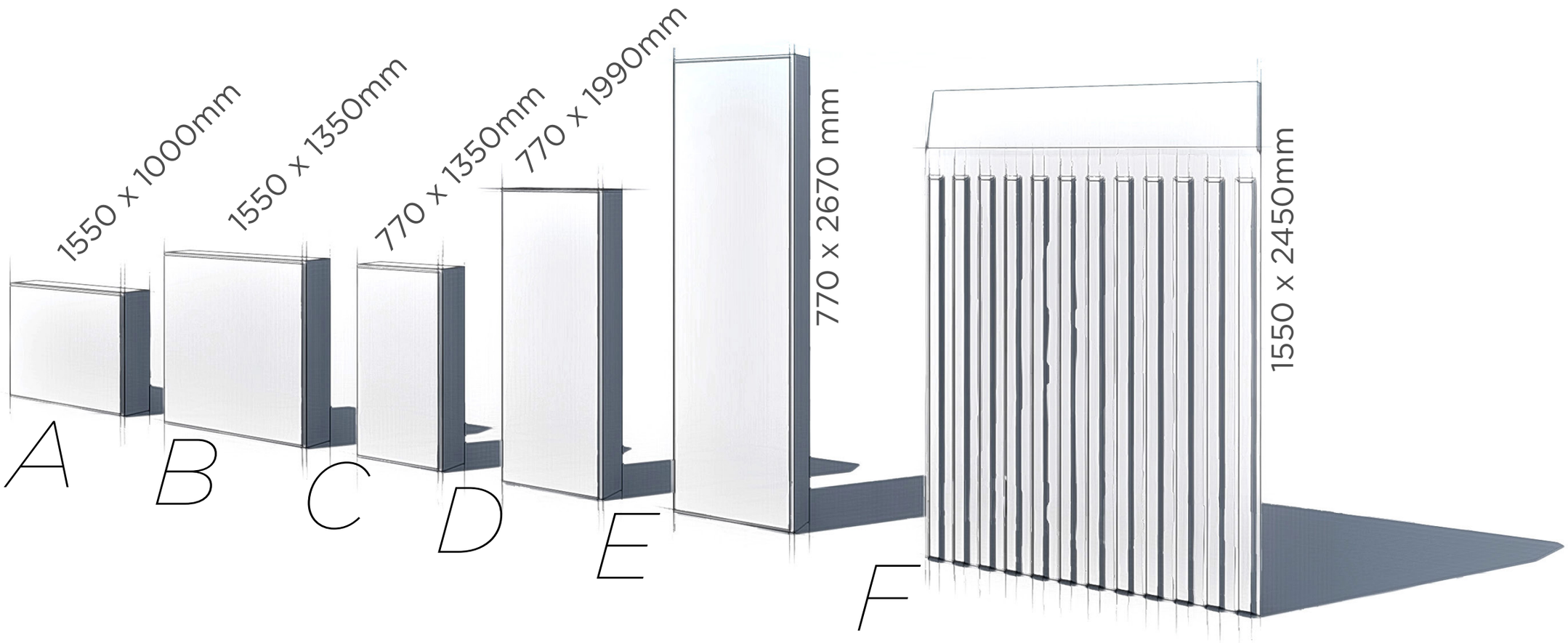
Existing Building

A Kit of Parts

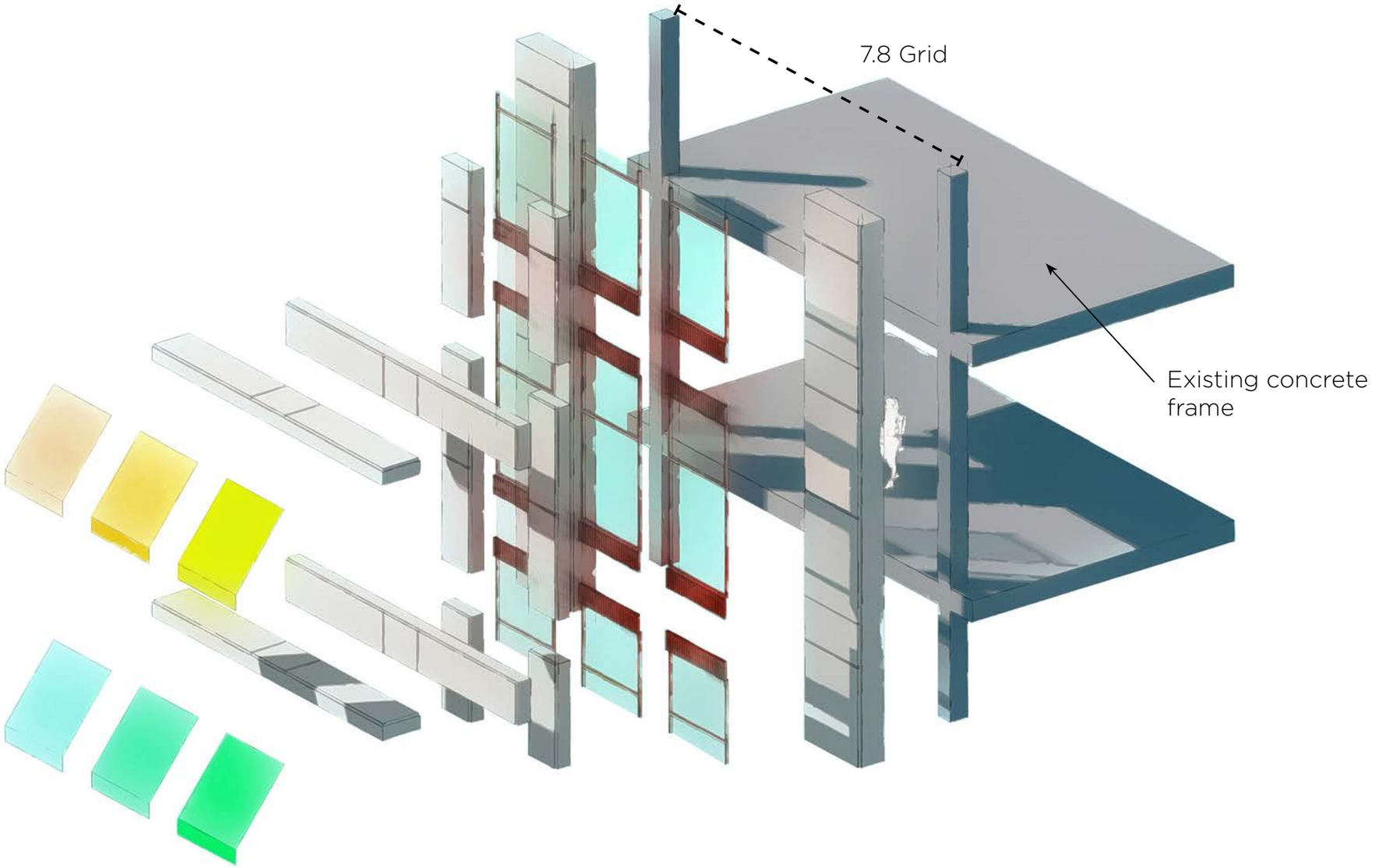


Approx 1000sqm of panels available per floor

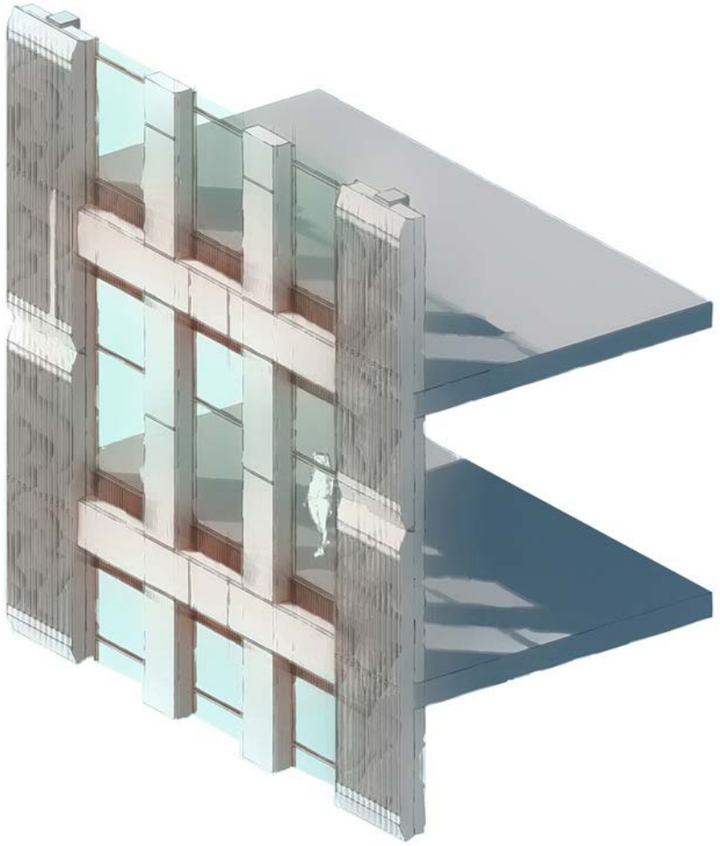
A Kit of Parts

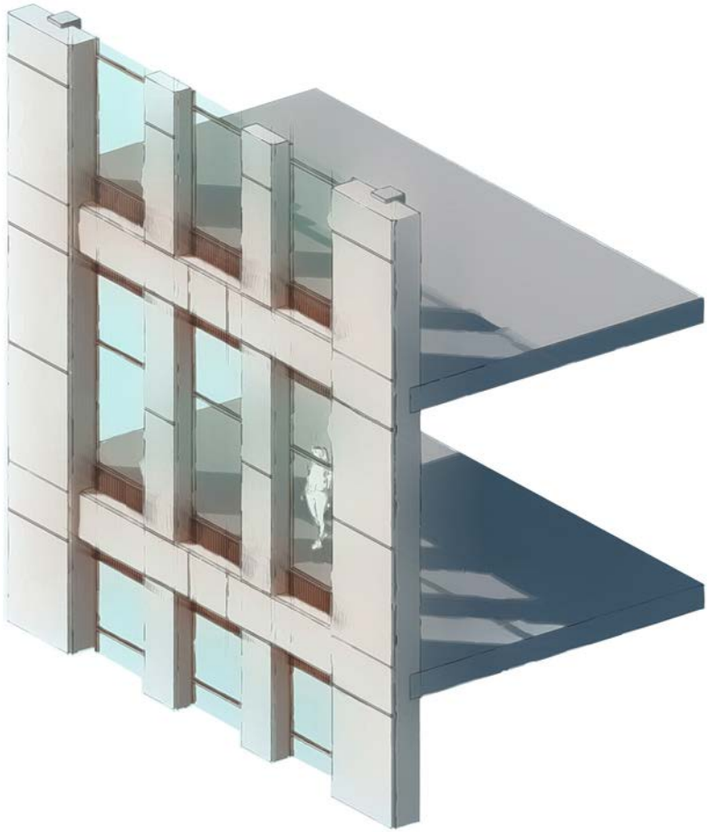
Recondition, visually improve, reconfigure, reuse

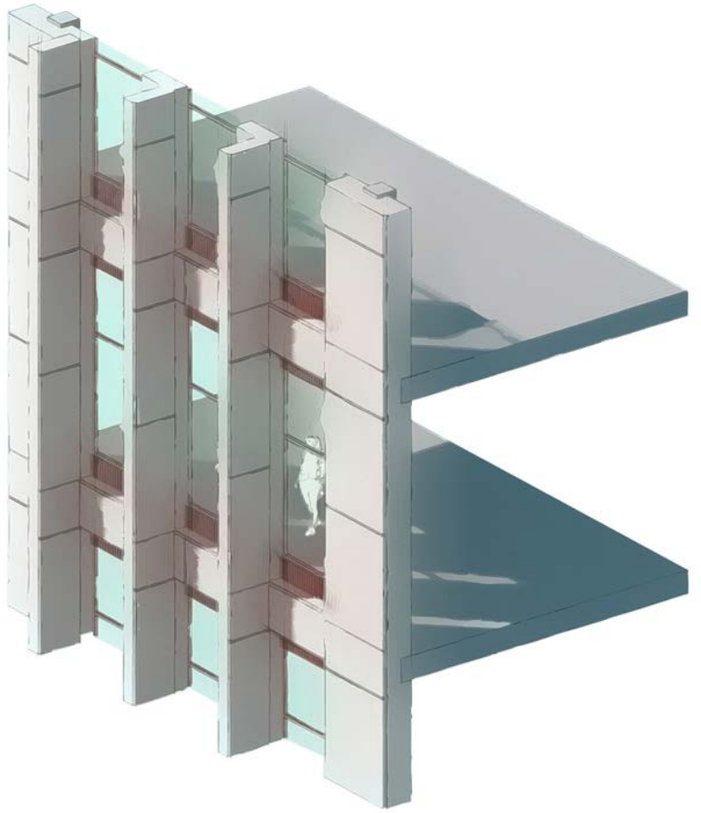
Kit of parts can be reused anywhere within building or on a donor site..avoiding downcycling!



Facade Options Using Existing Panels

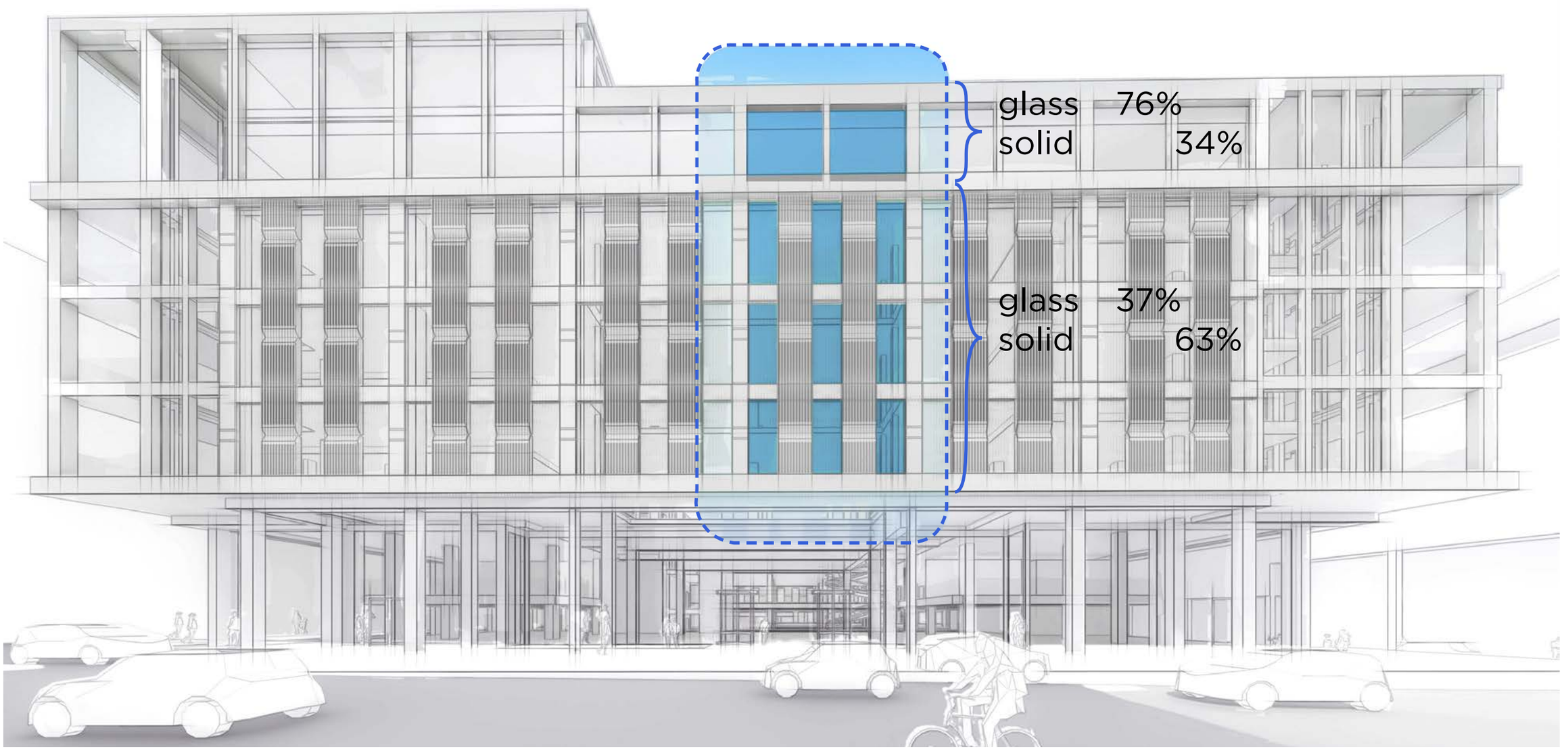






Facade Options Using Existing Panels

Following LETI guidance...



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05

Bio-materials and Synthetic Biology?

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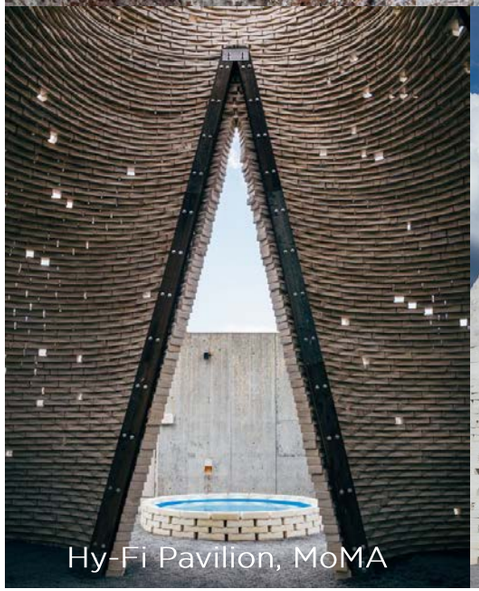
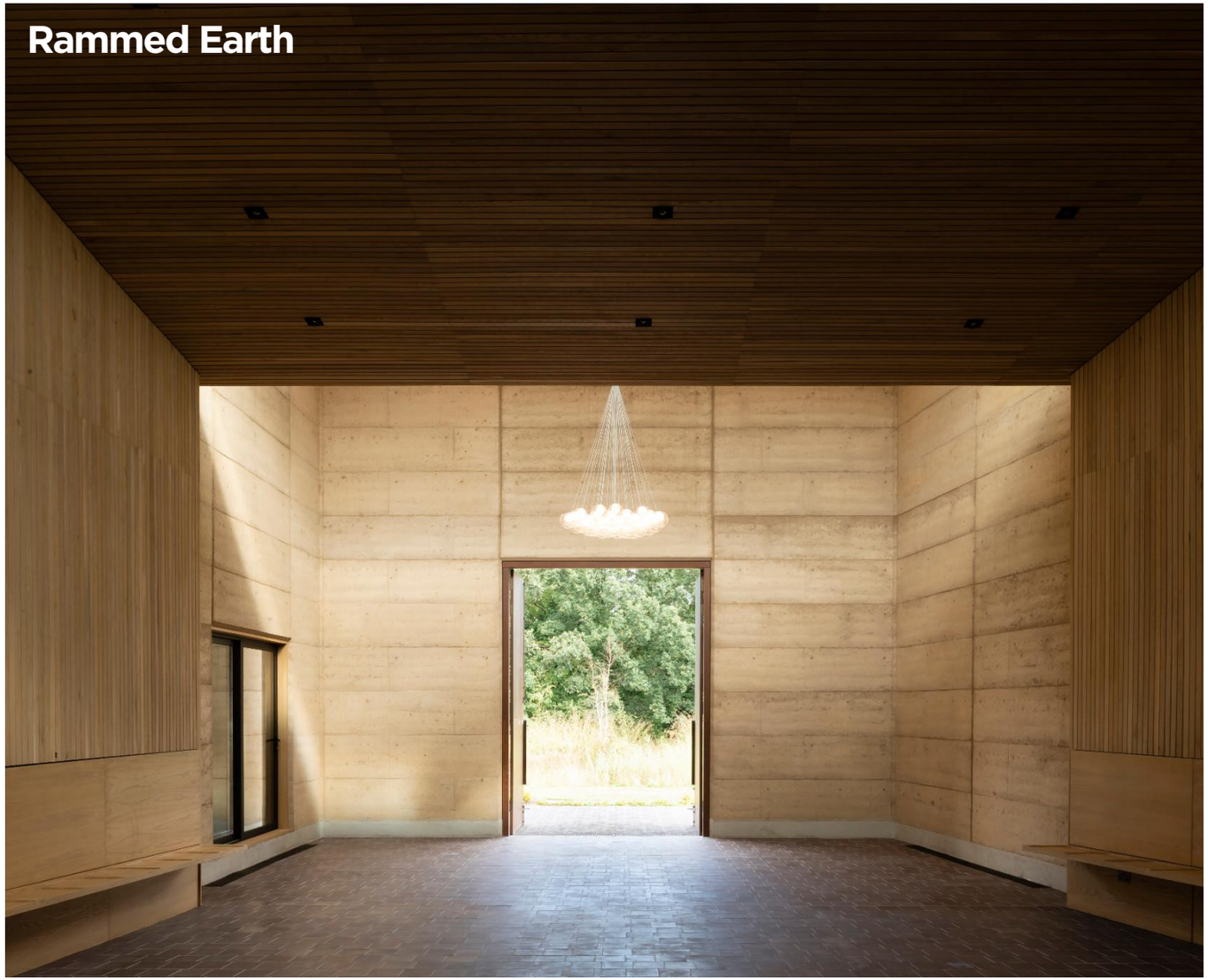
Bio materials

Bio materials - straw

Bio materials





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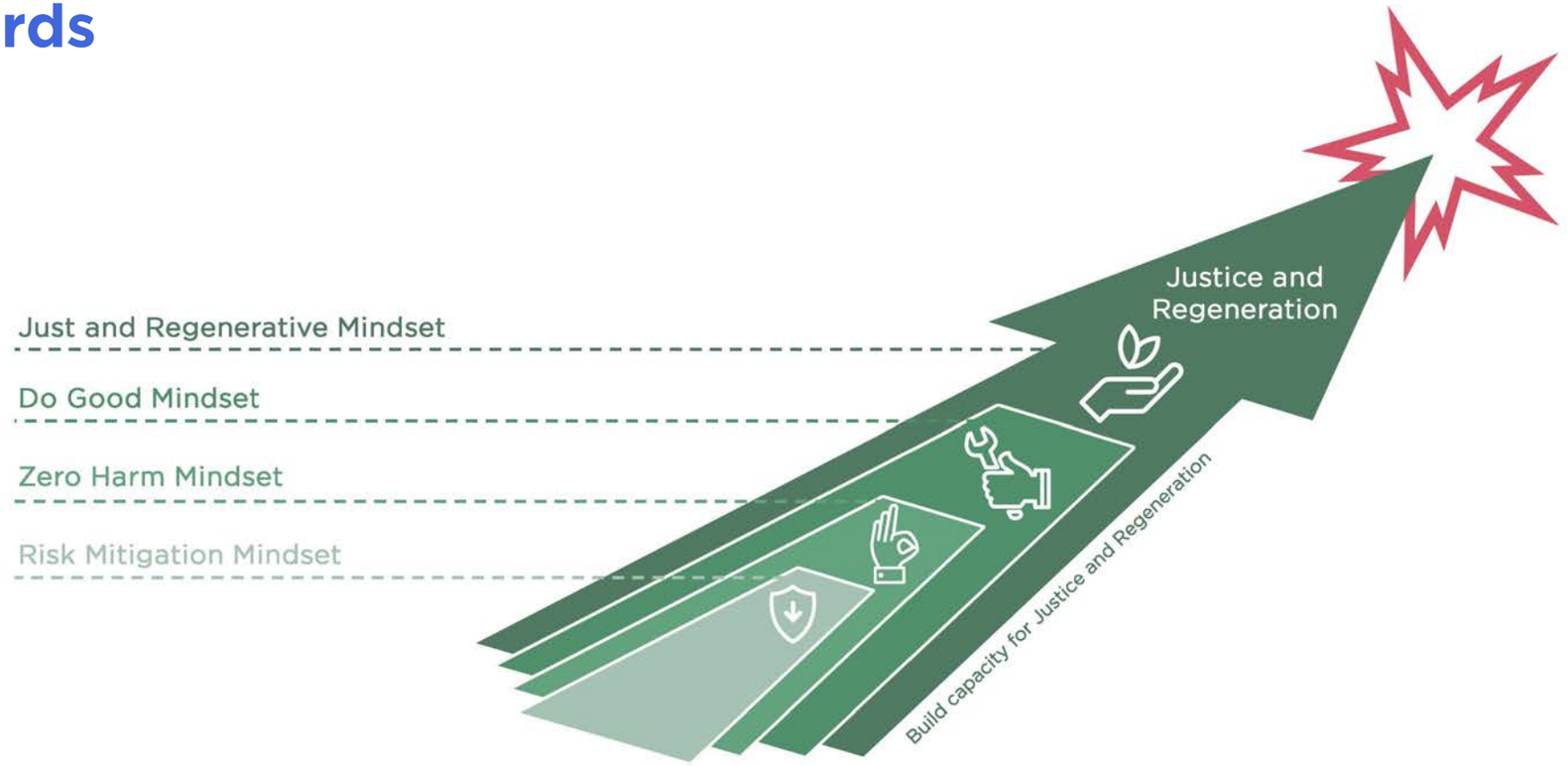
Practice:
Moving towards regenerative practice

Moving Forwards



Forum for the Future: Just and Regenerative diagram

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The Practice - Climate Action

Feeding back to the wider team:

Marks Barfield
Climate Action
Core Team

Our Carbon Emissions

Staff Personal

2.0%

128 tonnes CO_2e

Practice

0.4%

26 tonnes CO_2e

Projects

97.6%

6,188 tonnes CO_2e

TOTAL= 6,342 tonnes CO_2e

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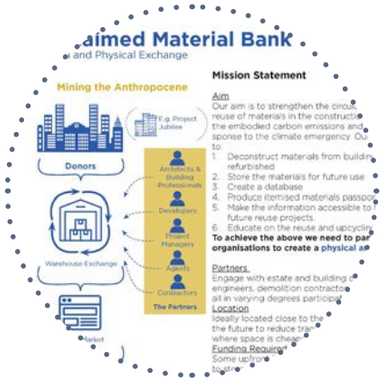
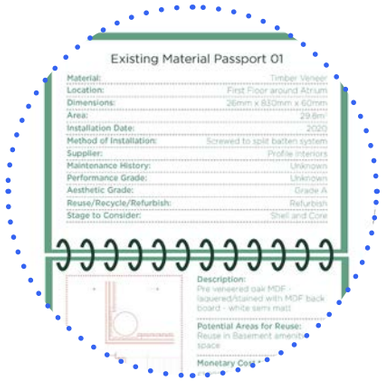
What are we doing at a practice level?



Reclaimed Material Bank
Physical and Digital Store

Reuse in Reality
Pocketbook

Sustainable Materials
Library



Existing Material
Passports

Campaigning for Change and
Collaborating

Passivhaus
Certification

Workshops with Specifiers
NBS

Wren
The Wren Insurance
Association Limited

Workshops with
Insurers

Committed to...

RIBA 2030 CLIMATE CHALLENGE

RACE TO ZERO

Architects Declare Climate and Biodiversity Emergency

ARCHITECTS CLIMATE ACTION NETWORK

Reclaimed Material Bank

The Partners

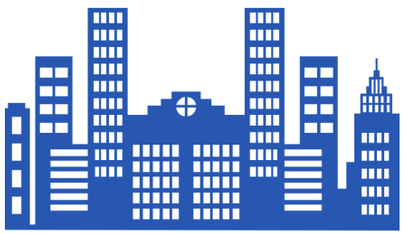
Architects & Building Professionals

Developers

Project Managers

Agents

Contractors



Donors

E.g. Project Jubilee

Warehouse Exchange

Digital Market

Hosts

E.g. Oasis Nature Garden

Moving towards mainstream reuse

Specialist Consultants

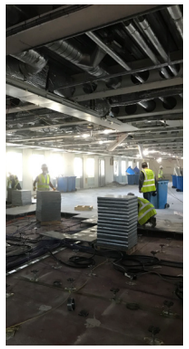
Architects & Specifiers

Developers

Involved Parties

Reuse in Reality Pocketbook

In collaboration with Lawmens



Raised Access Floors
Category: **Floors**

1. Pedestals sheer number means time taken is too long for reward. They are covered in glue and would need carefully cleaning one by one.
2. Mechanically fixed pedestals are much better where possible.
3. Tiles easy to reuse and clean, even with glue.
4. Unable to reuse those with screed on top.

1. Reuse in Reality

The nuts and bolts of deconstruction

Suspended Ceilings
Category: **Ceilings**

1. Standard and simple metal ceilings easily removed for reuse
2. Soft ceiling tiles easy to damage at edges but could be upcycled in other ways
3. Ceiling frames take time and money to take apart but can be fully upcycled in parts
4. Bespoke designs, hidden fixings, complex interconnecting nut and bolt construction difficult for reuse.

2. Reuse in Reality

The nuts and bolts of deconstruction

Partitions
Category: **Internal Walls**

1. Timber studs are generally better for reuse and upcycling than metal.
2. Metal is hard to reuse in form as they tend to warp and bend over life and when deconstructed.
3. Metal studs are ordinarily melted down and recycled which results in more carbon production.

3. Reuse in Reality

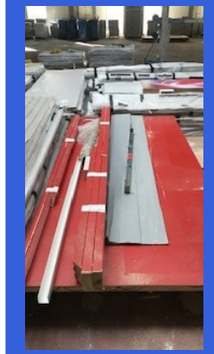
The nuts and bolts of deconstruction

General Finishes
Category: **Finishes**

1. Floor finishes like vinyl/ carpet are better in tile form rather than sheet. Sheet is much harder to take up neatly if glued etc.
2. Carpet tiles can be reused if glued properly, letting the glue set for 15mins. If placed down wet with too much glue, they are difficult to remove carefully.
3. Stainless steel is hard to reuse as it is a precious metal and difficult to cut.

8. Reuse in Reality

The nuts and bolts of deconstruction



Doors
Category: **XXX**

1. Generally successful for reuse as they could be demounted, protected, and stacked for later use
2. Exposed rather than hidden fixings are better where possible - means a change in aesthetic
3. Sizes of doors effect reuse - Large , heavy doors are a risk to health and safety if have to manually remove.
4. Note door reuse has complications with fire and accessibility regs.

4. Reuse in Reality

The nuts and bolts of deconstruction

Glass
Category: **Finishes**

1. Tricky to manually remove due to risk of breakage and compromises health and safety of staff
2. Easier to reuse in smaller modules. Difficult to get out of building due to size. **Depends on the building itself and how things may be removed.**
3. Ordinarily likely to be crushed down and recycled
4. Engage tenant team earlier to reuse glazed partitions in situ.

5. Reuse in Reality

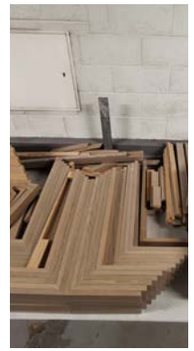
The nuts and bolts of deconstruction

Coatings
Category: **Finishes**

1. Painted metal not an issue for recycling as melted and paint separates. However, it is better to reuse steel in form.
2. Intumescently coated steel would have to be burned off; taking steels from site, de-coating and returning them to site.
3. Ensure good records are kept of FR paint used and certification.
4. Mastic is very difficult to remove – don't use unless necessary.

6. Reuse in Reality

The nuts and bolts of deconstruction



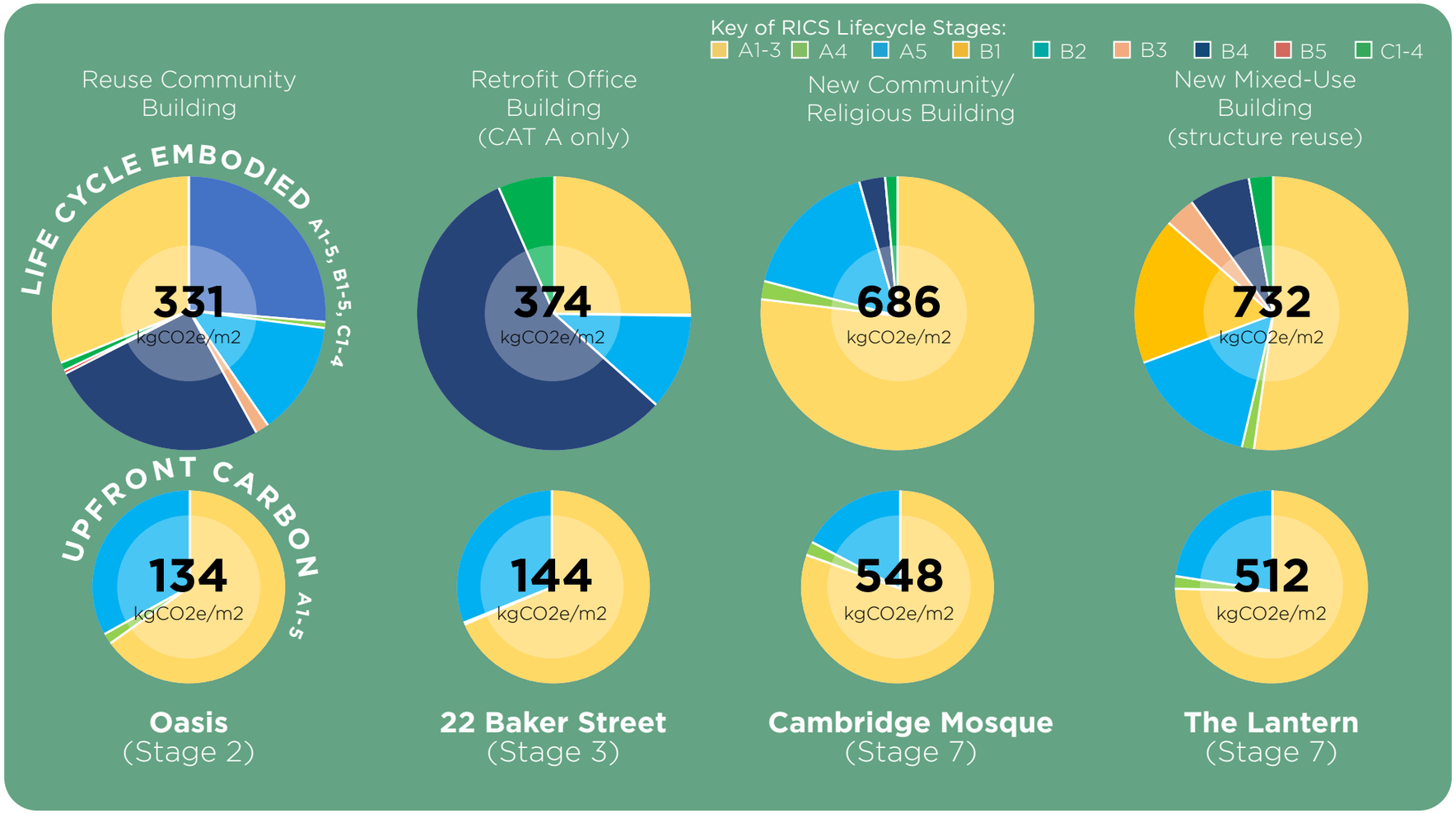
Joinery & Furniture
Category: **Finishes**

1. Timber panels easier to remove with glue than screw - dependant on amount of glue used.
2. Corian desk – likely built on site due to size. Too large and heavy to be removed as is so plan is to neatly slice down the middle into two parts and the joint could be an architectural feature.

7. Reuse in Reality

The nuts and bolts of deconstruction

Whole Life Carbon Assessments



Points of note:
1) Upfront carbon proportions generally arent that dissimilar
2) The impact of lifecycle stages changes dramatically depending on the nature of building work - reuse material, retrofit or new
3) Reusing in situ is considerably better!

Campaigning for Change - Architects Declare

Executive Summary for Policy Makers

We are stuck in a period of inaction on the climate and ecological crises. Since the formation of Architects Declare in 2019, the construction industry has offered many practical solutions to solve these crises and create a regenerative and just built environment – but these have not been incorporated into national policy. We now require a Government that embraces far-reaching system changes and implements them at a national scale.

The Architects Declare five point plan, underpinned by a foundation of systemic change, offers a practical, impactful and implementable set of policies to support an economic transition that benefits public health and addresses climate targets. Implementation offers new jobs, reduced pollution, restoration of nature, and economic boosts across all the UK's regions.

Overview of the five points:

1 Resource efficiency
42% of the UK's emissions[3] are controlled or influenced by the built environment, these must be radically reduced to align with our Net Zero laws.

2 Circular Economy
The construction industry generates 62% of UK waste[4] and 50% of material use: we must rapidly transition to a fully circular economy through targeted regulation and policy interventions.

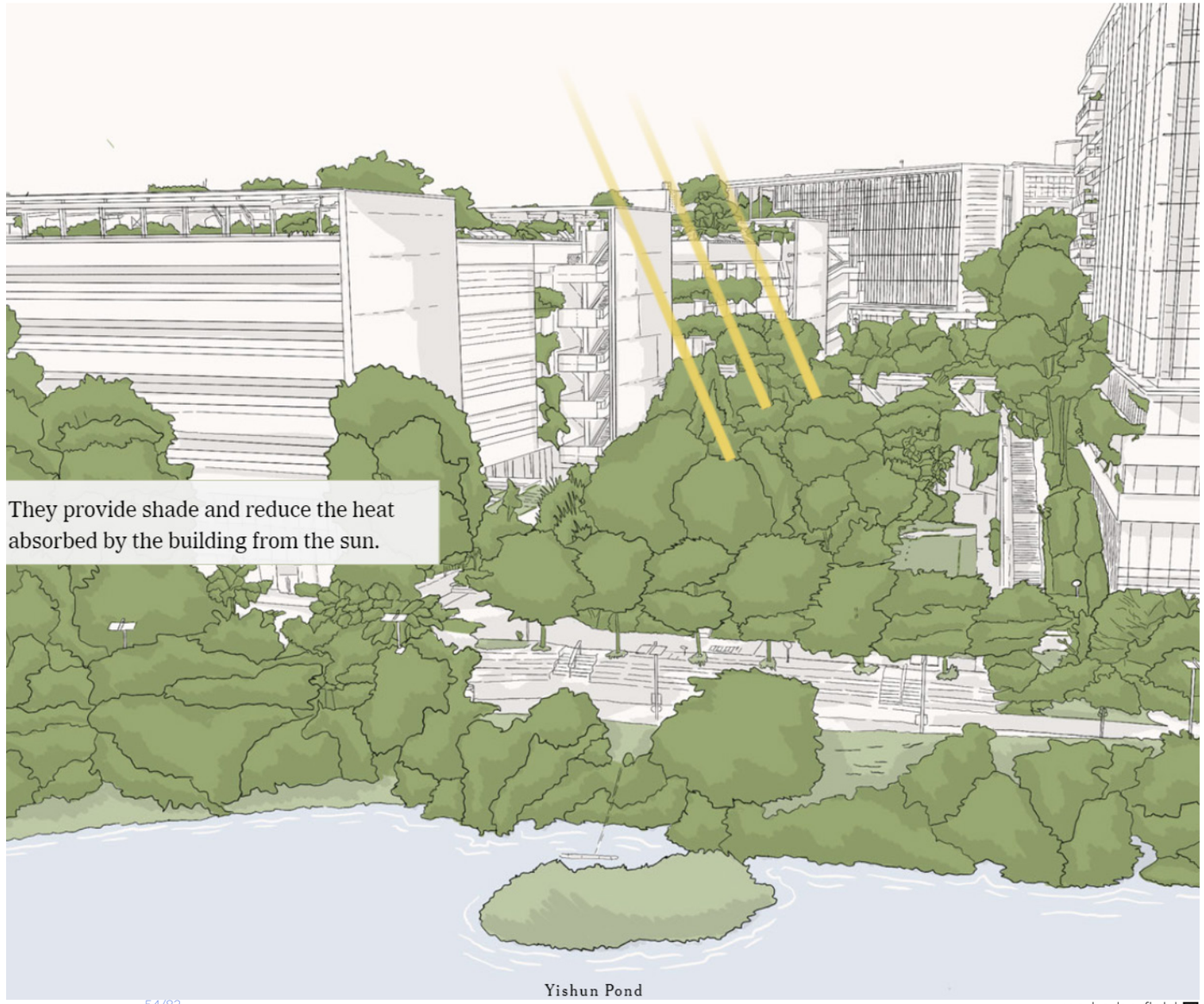
3 Natural systems
The UK has lost over 50% of its biodiversity in the last 50 years[5]. Nature's importance must be elevated within our planning system, to mitigate further destruction.

4 Design for Health and Wellbeing
Transport, infrastructure and buildings are interlinked – urban planning plays a crucial role in solving our public health crises whilst enabling sustainable lifestyles.

5 Social Justice
We currently have no standardised way of measuring the social impact of government spending. We need development that is people-centred and protects the planet.

The Foundations
Our five points must sit upon a foundation that can support them, through systemic economic and political change. Our economy needs re-aligning with wellbeing and planetary limits, our laws must safeguard future generations, we must embed climate literacy at all levels of society and we must rebuild trust in our political system.

Regenerative City Cooling



The power of trees

Reducing toxic air quality

Encouraging biodiversity

Adding Oxygen

Storing and soaking up carbon

Improving health and wellbeing

Lower urban temperatures

Protecting us from flooding

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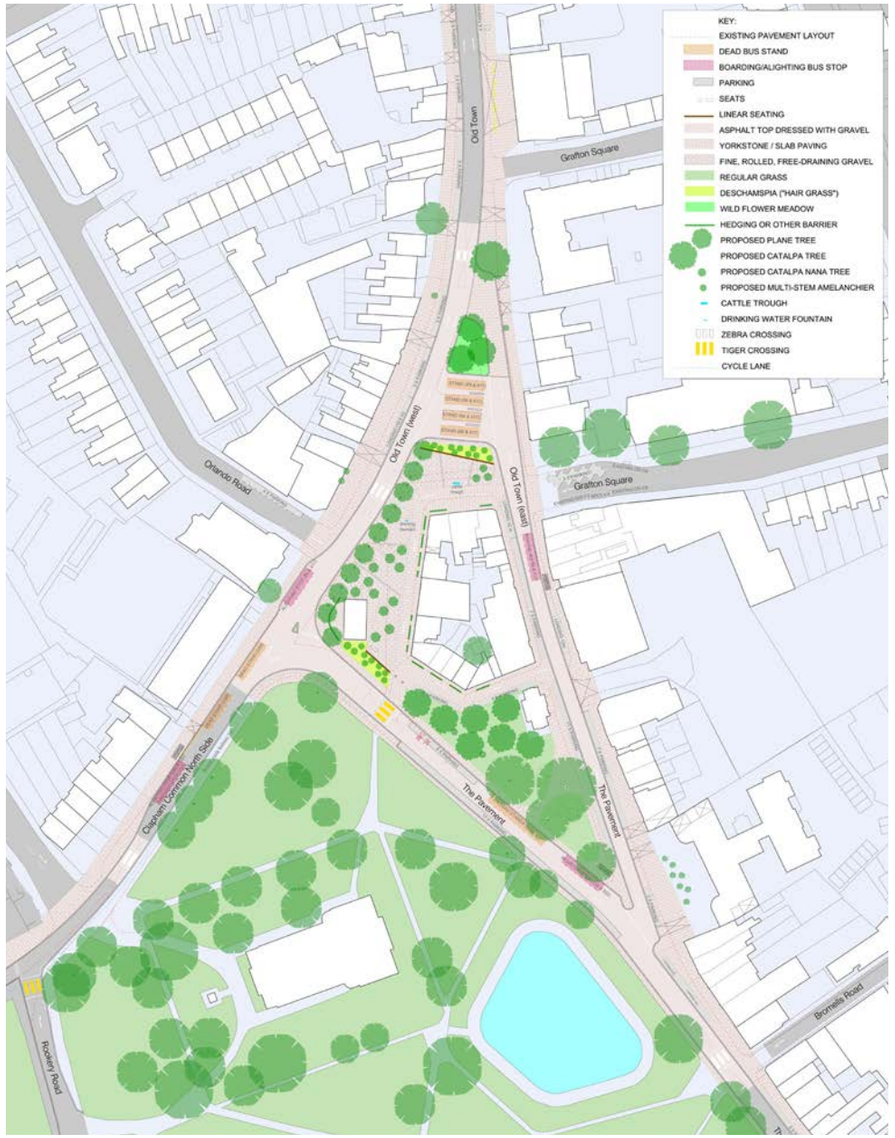
Clapham - Urban Greening

Creating a new high quality, urban piazza in South London

- Reducing the dominance of traffic
- Redesigning the bus stop and stand layout
- Reversing the percentage of road to pavement area from 65/35% to 35/65%
- Giving the area back to the pedestrian
- 80 new trees planted



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Clapham - Urban Greening

Reducing urban temperatures

EXISTING GRASSED AREA

EXISTING TREE

PROPOSED TREE
SUBJECT TO TRIAL HOLE INVESTIGATION

PROPOSED TREE IN PLANTER
UNDERGROUND UTILITIES HIGHLY LIKELY

TREE LOCATION CONFIRMED BY TRIAL HOLES COMPLETED IN 2014

GREEN WALL

CLAPHAM HIGH STREET GREENING MASTERPLAN
DRAFT 29/09/16

A site visit was undertaken to ascertain potential locations for additional trees. At first sight, there are entire sections heavy with utility covers where trees in planters could be the viable solution and sections where street furniture such as cycle parking, A boards, bins and sign posts is prevalent. A decluttering study and rationalisation of the furniture could result in more space for trees.

A few gaps have been identified where trees could be planted, however this needs to be confirmed by further underground investigations. The high street narrows considerably towards Clapham Common where it also becomes busier with retail and there are fewer opportunities for greening.

We have also included the findings of a TfL study completed in 2014 where out of 11 trial holes only two have shown conflicts. Some trees appear to have been planted since then and we have included five other locations which haven't.

Other opportunities for planting will need to be looked at, for example installation of green walls on inactive frontages.

POTENTIAL FOR
46 NEW PLANTED TREES (SUBJECT TO FURTHER INVESTIGATION)
25 NEW TREES IN PLANTERS
3 NEW GREEN WALLS (SUBJECT TO STAKEHOLDER AGREEMENT)

Campaigning for Change - West Somerset Lagoon

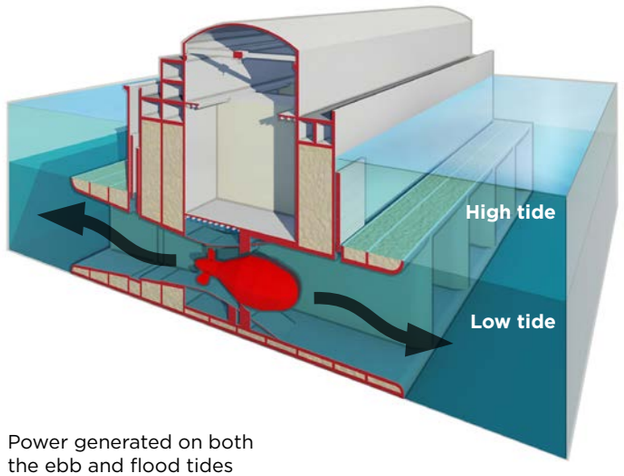
TEES
Tidal Engineering and Environmental Services

Capturing one of the UK's main natural energy sources

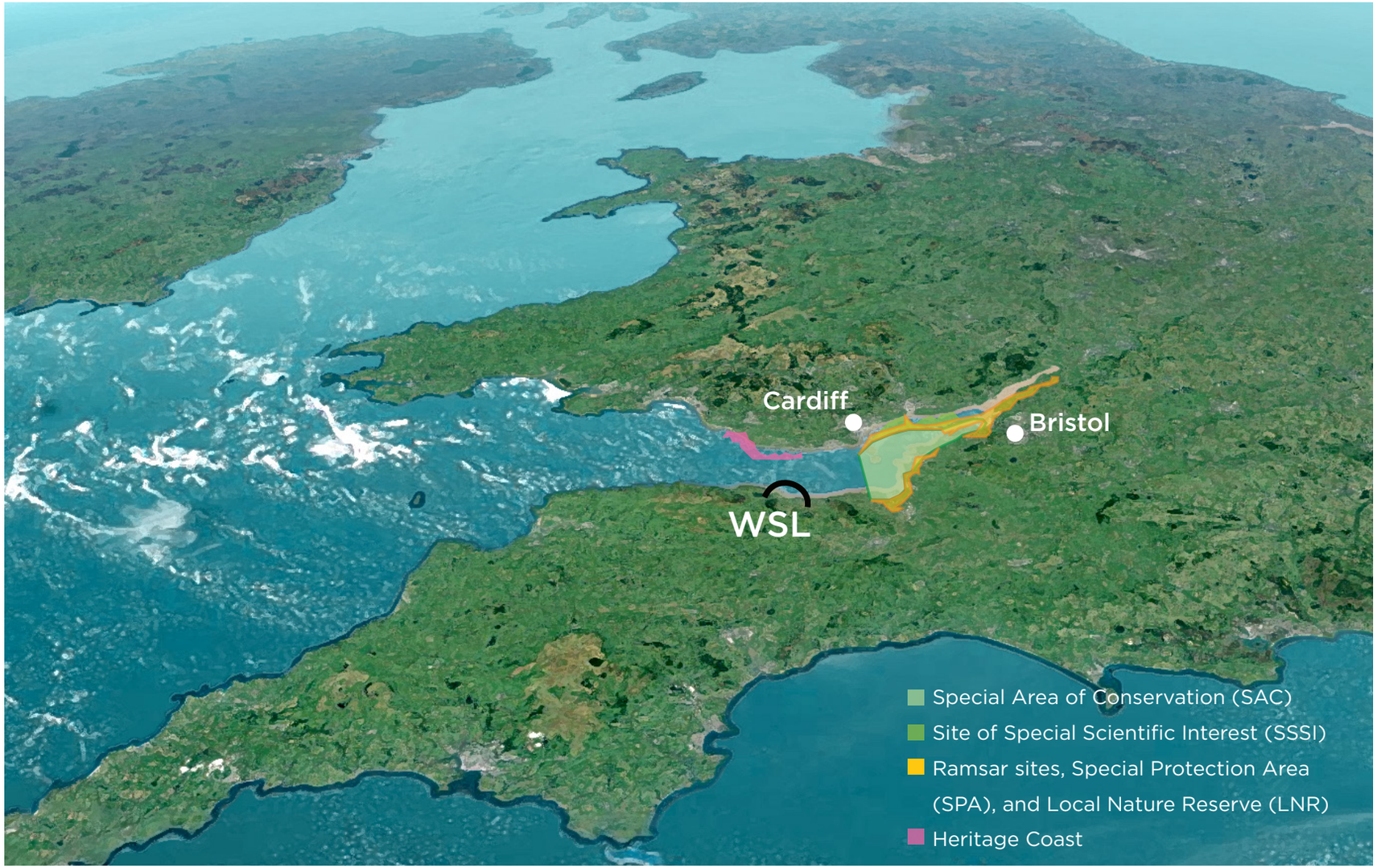
The West Somerset Lagoon has been strategically located on the southern coast of the Bristol Channel Basin between Minehead and Watchet to take advantage of the **world's second highest tidal range**. At Minehead the tidal range will be up to **10.9m**, generating the maximum energy possible whilst minimising environmental, economic and visual disturbance.

The proposed lagoon will be located:

- outside of navigation channel to Bristol and Cardiff Ports
- outside of Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Local Nature Reserves (LNR).
- where no major rivers are enclosed
- where it provides coastal protection against storms and sea level rise



Power generated on both the ebb and flood tides



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Campaigning for Change - West Somerset Lagoon

TEES
Tidal Engineering and Environmental Services

UK energy security
The lagoon will deliver renewable energy for **2m UK 'median usage' homes** (Ofgem)

Untapped energy source
The Bristol Channel Basin has the **2nd highest tidal range in the world**

Affordable
Cost per MWh with Regulated Asset Base funding is similar or cheaper than nuclear.

Cost
£8.5bn (Estimated at 2020 prices)

Long life
120+ year life span

Reliable energy
Generates energy on **both ebb and flood tides**. Could provide continuous energy with short term storage

Predictable energy
Unlike the sun and wind, the tides are reliable and predictable well into the future

Delivery
5 yrs to start of generation. Simple repeatable construction method.

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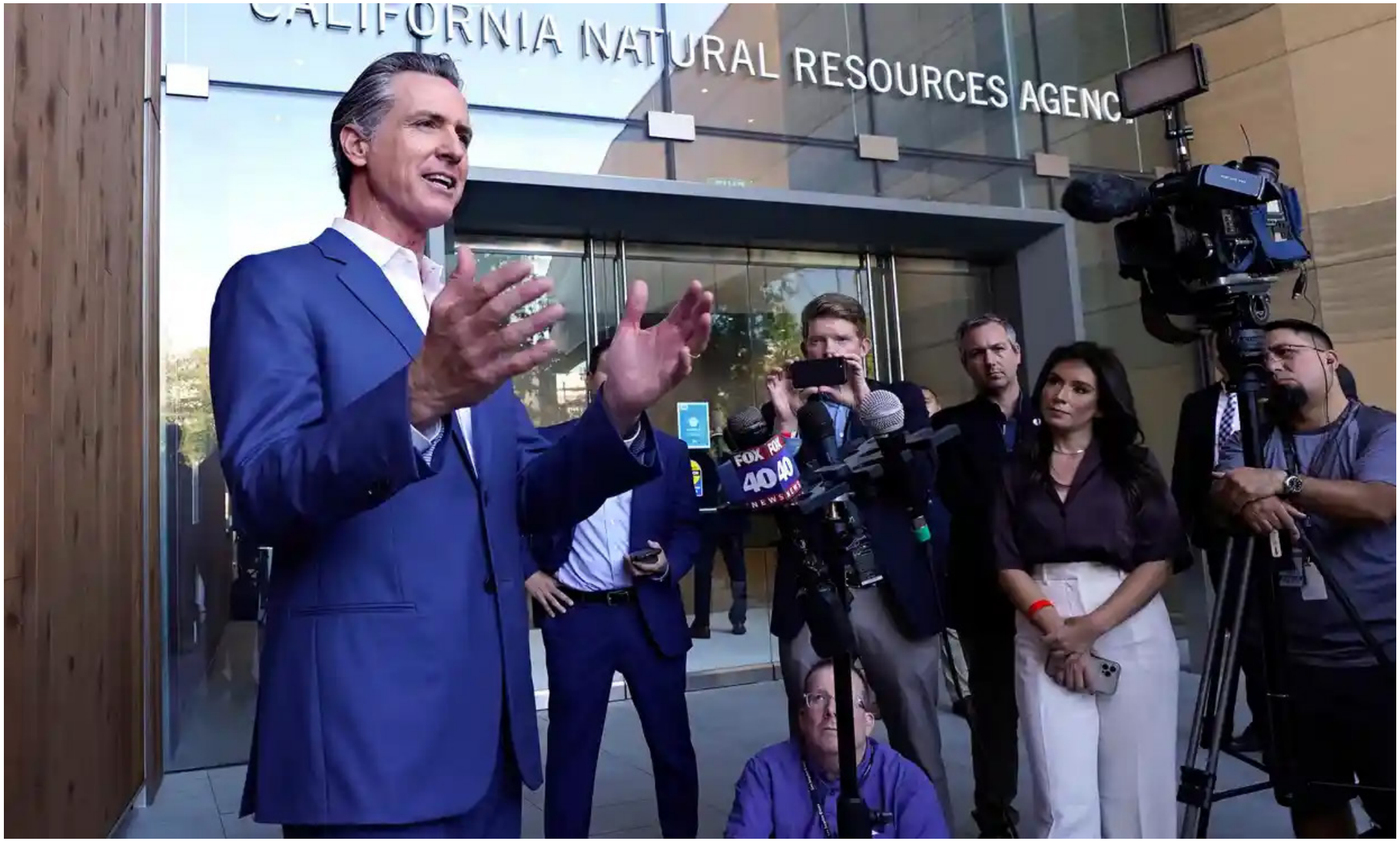
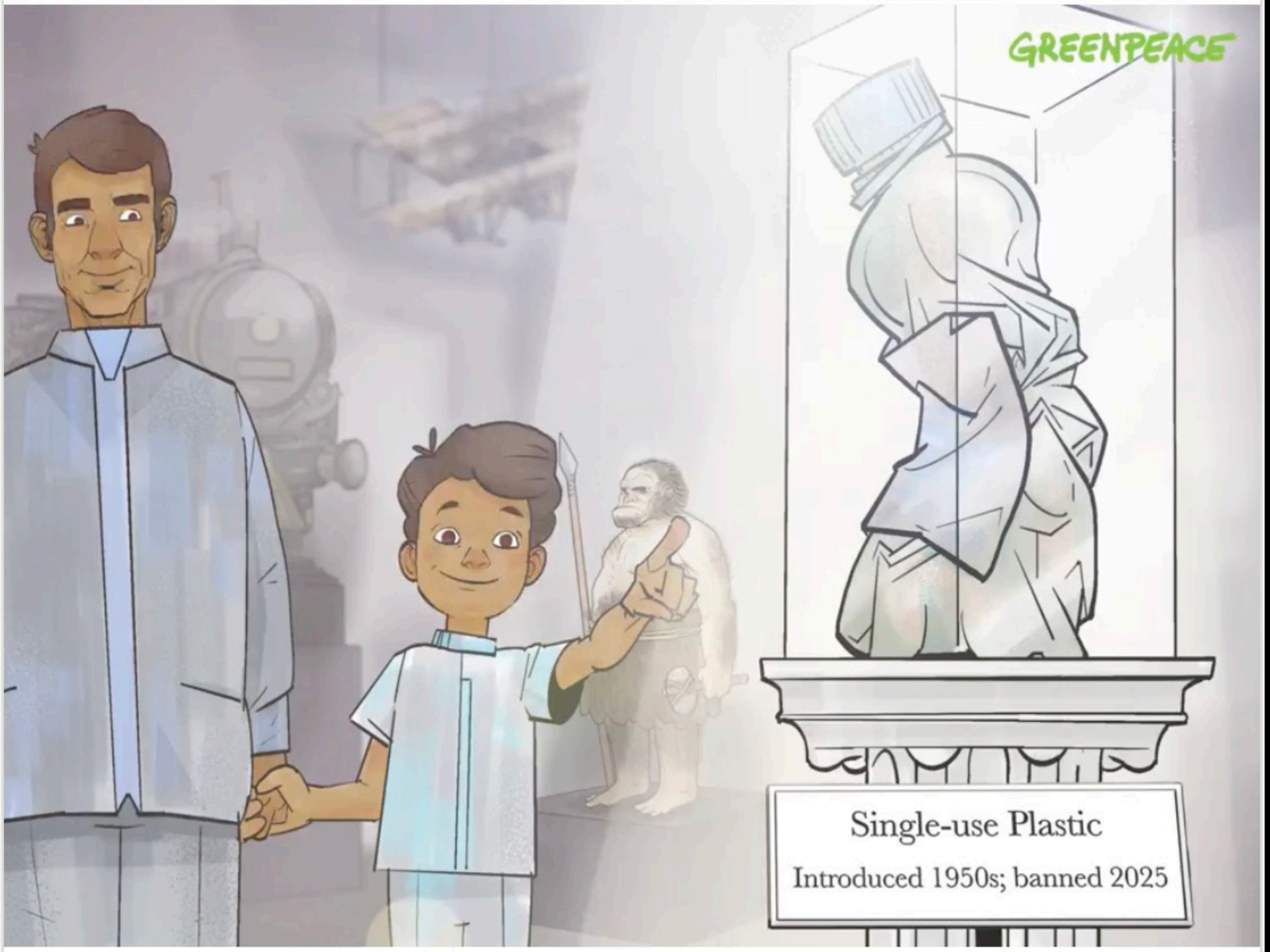
California sues oil companies!

Civil lawsuit filed by the state targets Exxon Mobil, Shell, Chevron, ConocoPhillips and BP, claiming they deceived the public and down-played the risks posed by fossil fuels.




GREENPEACE
Single-use Plastic
Introduced 1950s; banned 2025