# Canada Water Zone F Sustainable Design & Construction

20/04/22





Key

Town Centre Type

Landmark Building

Tall Buildings

Printworks

Parkside Type

Neighbourhood Type

Superstore Block

## **Brief**

#### **KEY FACTS**

#### OFFICE

- ~401K SQFT\* OF ADAPTABLE, GENEROUS WORKSPACE
- 582 CYCLE SPACES
- LOW CARBON USAGE IN CONSTRUCTION
- LOW CARBON USAGE IN OPERATION
- DESIGNED FOR DIASSESMBLY, RE-USE AND ADAPTABILITY

#### RESIDENTIAL

- 410 HIGH QUALITY HOMES,
   10% FULLY WHEELCHAIR ACCESSIBLE,
   60% FAMILY SIZED UNITS
- 10SQM EXTERNAL AMENITY PER HOME
- DUAL ASPECT FOR ALL RESIDENTS
- NATURAL VENTILATION + COOLING

#### **RETAIL**

- ~20K SQFT\* OF FLEXIBLE AND GENEROUS RETAIL FLOOR SPACE
- ACTIVE GROUND PLAN WITH ALL CORNERS PROVIDING RETAIL FRONTAGE

# 01 PLACEMAKING + ACTIVE GROUND FLOOR



- diverse ground floor uses
- maximise active frontages
- inviting, engaging, and biodiverse public realm

# 02 RESPOND TO CANADA WATER + DOCKS



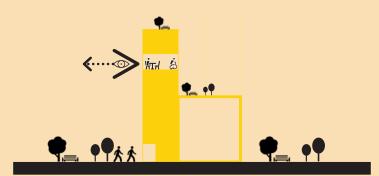
- relate to the historic docklands and industrial past
- feel like a true piece of Canada Water
- respond to future development

# 03 CHARACTERFUL BUILDINGS



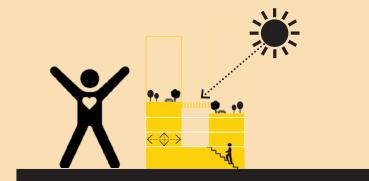
- use self finished materials
- relate to industrial heritage
- façades that respond to function

## 04 GENEROUS, HIGH-QUALITY LIVING



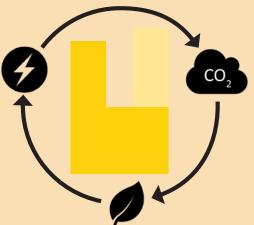
- private external amenity space to all units
- generous communal amenity space
- prominent, safe and welcoming entrances

# 05 FLEXIBLE, INSPIRING WORKSPACE

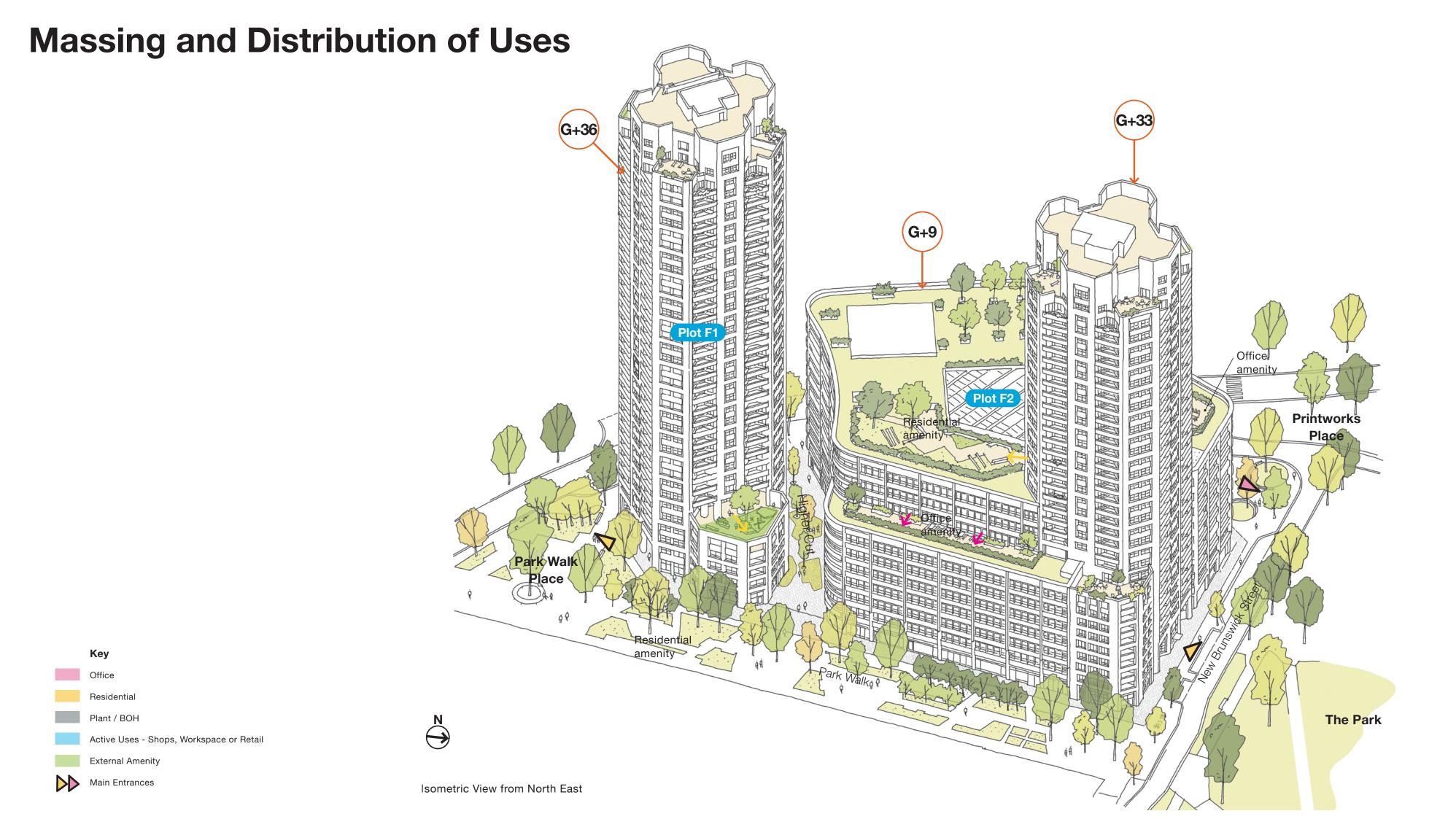


- characterful floorplates
- focus on occupant well being
- accessible outdoor amenity
- daylight and views
- diverse, generous, adaptable, flexible spaces

# 06 INTEGRATED APPROACH TO



- Passive design strategy
- Low embodied and operational carbon
- BREEAM Outstanding
- End of Life Strategies and Modern Methods of Construction



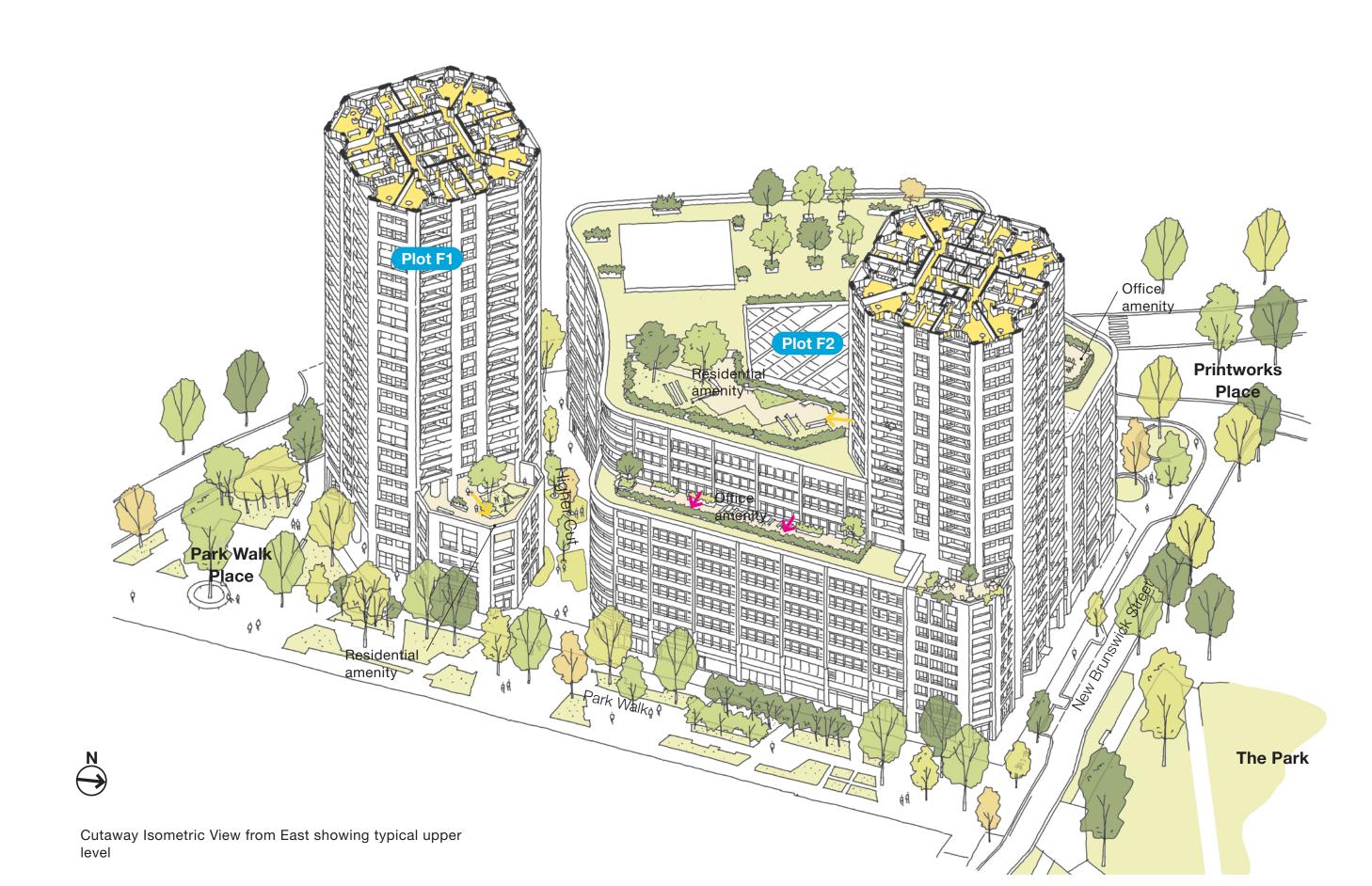
# **Typical Upper Floor Arrangement**

Key

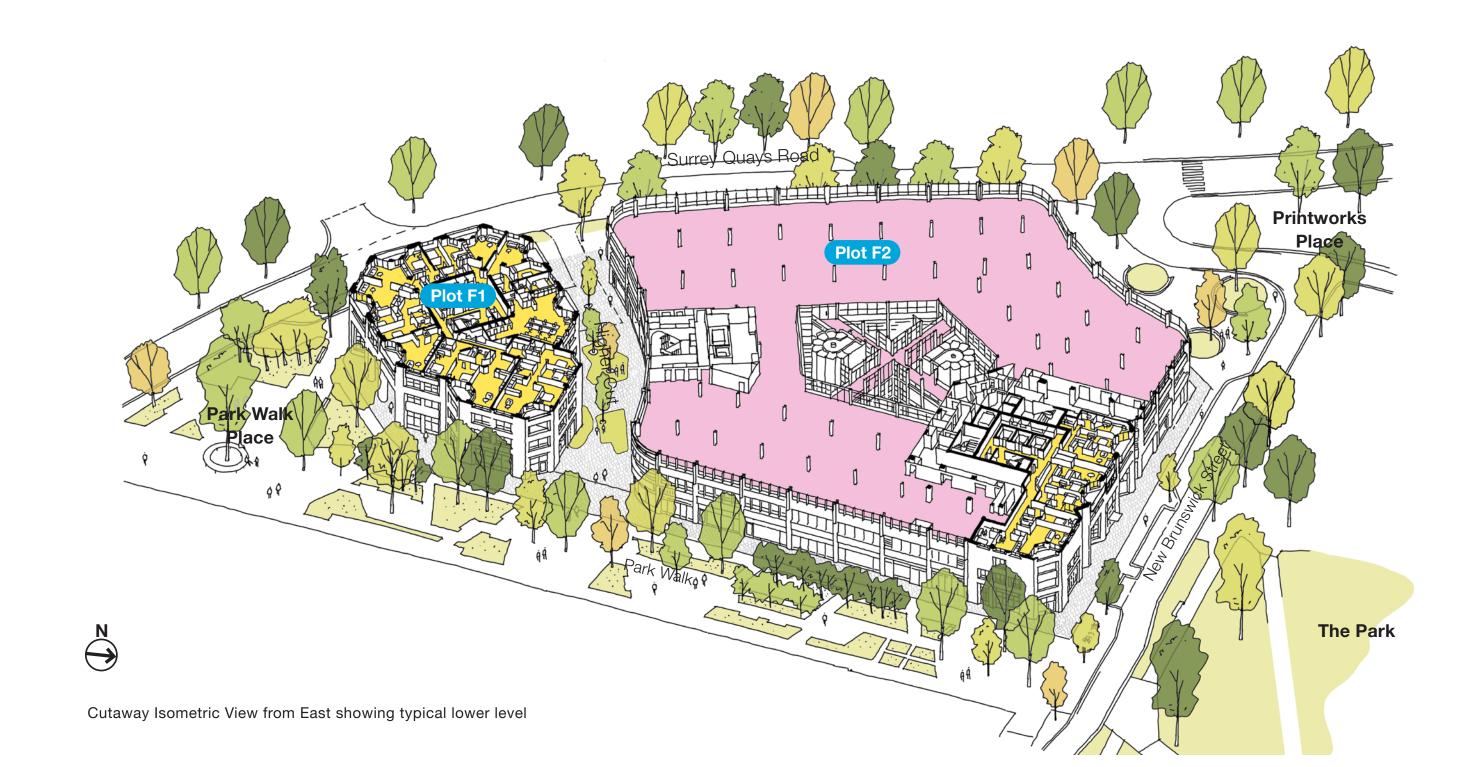
External Amenity

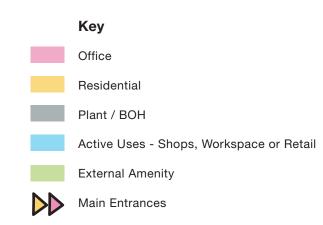
Main Entrances

Active Uses - Shops, Workspace or Retail



# **Typical Lower Floor Arrangement**





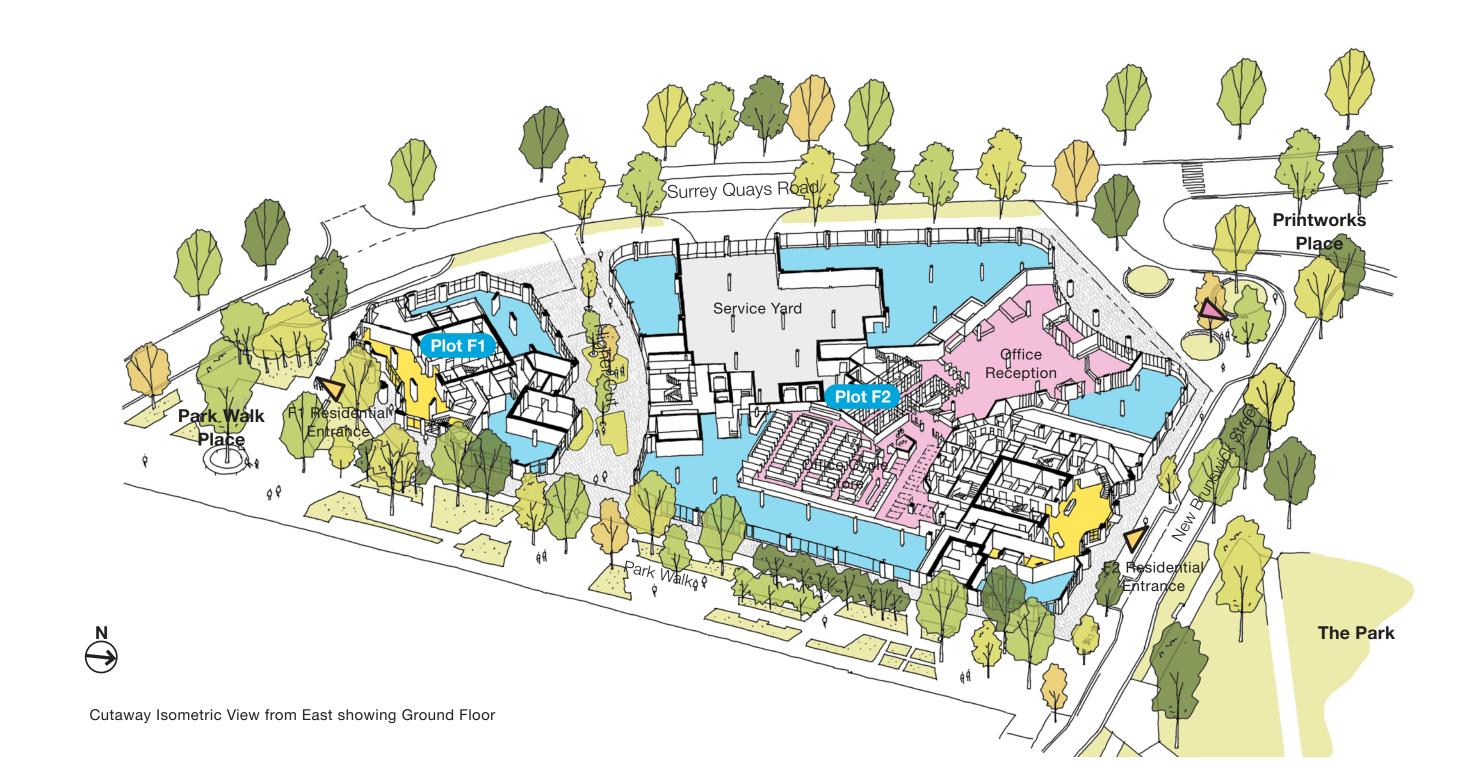
# **Ground Floor Arrangement**

Key

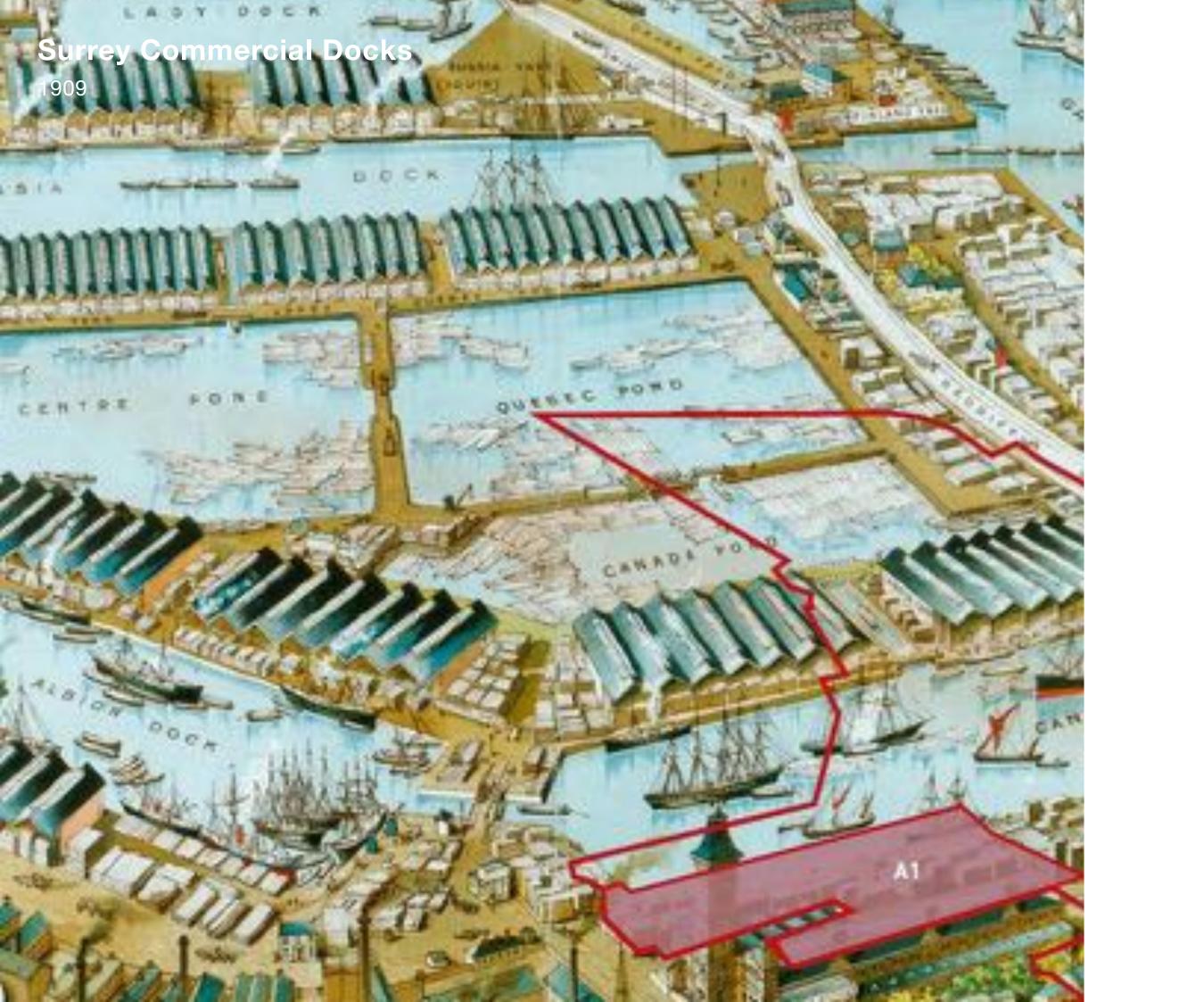
**External Amenity** 

Main Entrances

Active Uses - Shops, Workspace or Retail



# **Architectural Design**







# Ford Factory

Detroit, Albert Kahn 1910

Flexible sheds Long life, loose fit







## **View of Printworks Place**









#### **Climate Emergency**

# Climate change: Five things we've learned from the IPCC report



@ 1 March | # Comments



COP26



A new report released this week by the UN's Intergovernmental Panel on Climate Change (IPCC) looks at the causes, impacts and solutions to climate change.

The report gives the clearest indication to date of how a warmer world is affecting all living things on Earth.

Here are five things we learnt from it.

# 1- Things are way worse than we thought

From the melting of the Greenland ice sheet to the destruction of coral reefs, climate related impacts are hitting the world at the high end of what modellers once expected. And much more quickly than previously assessed by the IPCC.

#### Heatwaves at both of Earth's poles alarm climate scientists

Antarctic areas reach 40C above normal at same time as north pole regions hit 30C above usual levels



A drop of water falls off an iceberg melting in the Nuup Kangerlua Fjord in south-west Greenland. Earth's poles are undergoing simultaneous extreme heat. Photograph: David Goldman/AP

Startling heatwaves at both of Earth's poles are causing alarm among climate scientists, who have warned the "unprecedented" events could signal faster and abrupt climate breakdown.

Temperatures in Antarctica reached record levels at the weekend, an astonishing 40C above normal in places.

At the same time, weather stations near the north pole also showed signs of melting, with some temperatures 30C above normal, hitting levels normally attained far later in the year.

At this time of year, the Antarctic should be rapidly cooling after its summer, and the Arctic only slowly emerging from its winter, as days lengthen. For both poles to show such heating at once is unprecedented.

# Non-Domestic – Offices Target

RIBA Sustainable Outcome Metrics	Business as Usual	2025 Targets	2030 Targets
Operational Energy kWh/m²/y	130 kWh/m <sup>2</sup> /y DEC D (90)	< 75 kWh/m <sup>2</sup> /y DEC B (50) and/or NABERS Base build 5	< 55 kWh/m <sup>2</sup> /y DEC B (40) and/or NABERS Base build 6
Embodied Carbon kgCO2e/m <sup>2</sup>	1400 kgCO <sub>2</sub> e/m <sup>2</sup>	< 970 kgCO <sub>2</sub> e/m <sup>2</sup>	< 750 kgCO <sub>2</sub> e/m <sup>2</sup>
Potable Water Use Litres/person/day	16 l/p/day (CIRA W11 benchmark)	< 13 l/p/day	< 10 l/p/day

-58% reduction (over half)

-46% reduction (nearly half)

-38% reduction (over third)



#### **Knowledge Transfer Partnership**





ALLFORD HALL MONAGHAN MORRIS

Canada Water Zone F is the key case study for the KTP





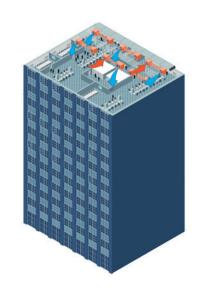


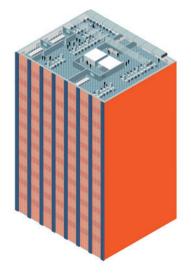


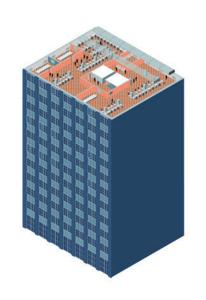


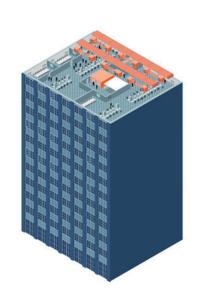
sweco 🕇

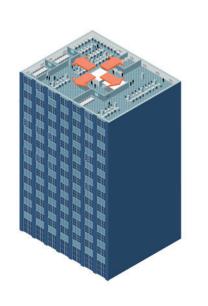
The purpose of the KTP is to develop a model for the delivery of net-zero carbon designs for high-density, mixed-use developments and a corresponding Net-Zero Carbon Decision Support Tool.



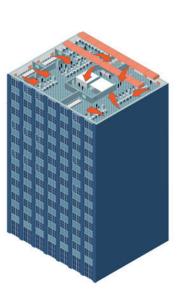


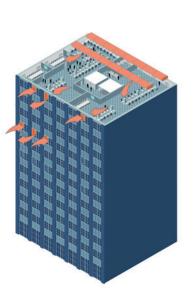


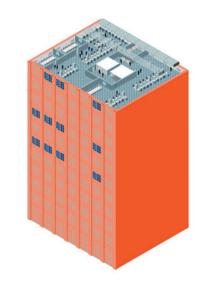










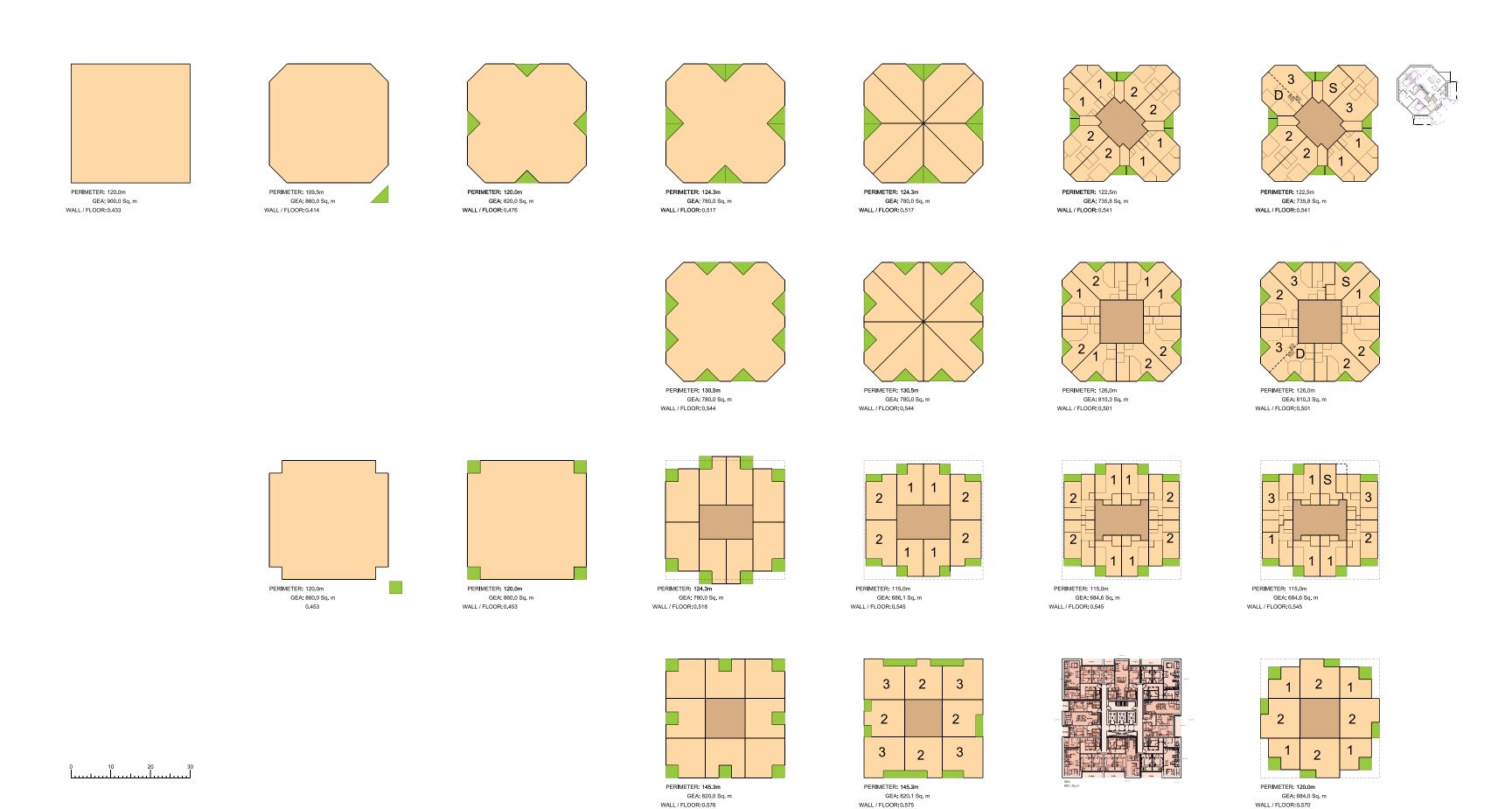


8 things we've learned....



## **Residential Uses**

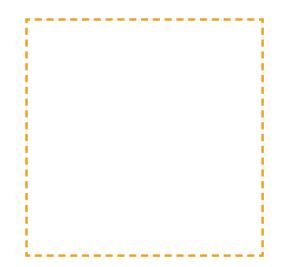
# Typology Studies



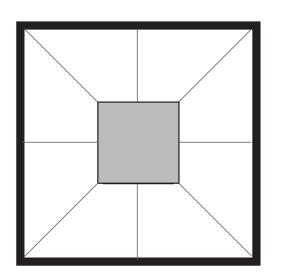
WALL / FLOOR: 0.575

#### **Residential Uses**

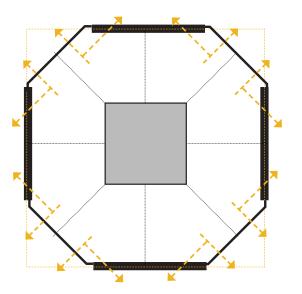
# Typology Studies



1. Approved Parameters

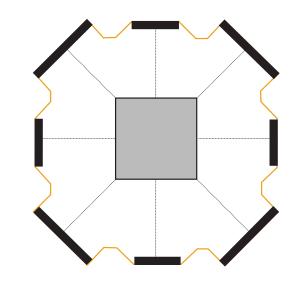


2. Centrally Cored Square Tower



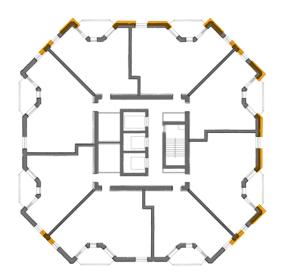
3. Chamfer for dual aspect

Chamfered corners have been introduced to allow dual aspect to every unit while further improving range and quality of aspect

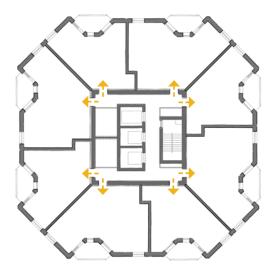


#### 4. Balcony cuts

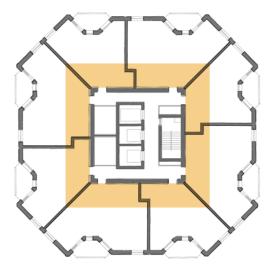
Balconies are accommodated in large cuts to provide privacy and protection at all levels.



**5. Solid walls + Deep Reveals**Solid walls will reduce overheating within the homes.

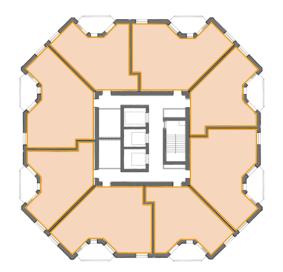


**6. Core and Front Door** Access to homes directly off core.



7. Service and Utility Zone
Service and utility zone to be located adjacent to core for efficiency and

stacking.



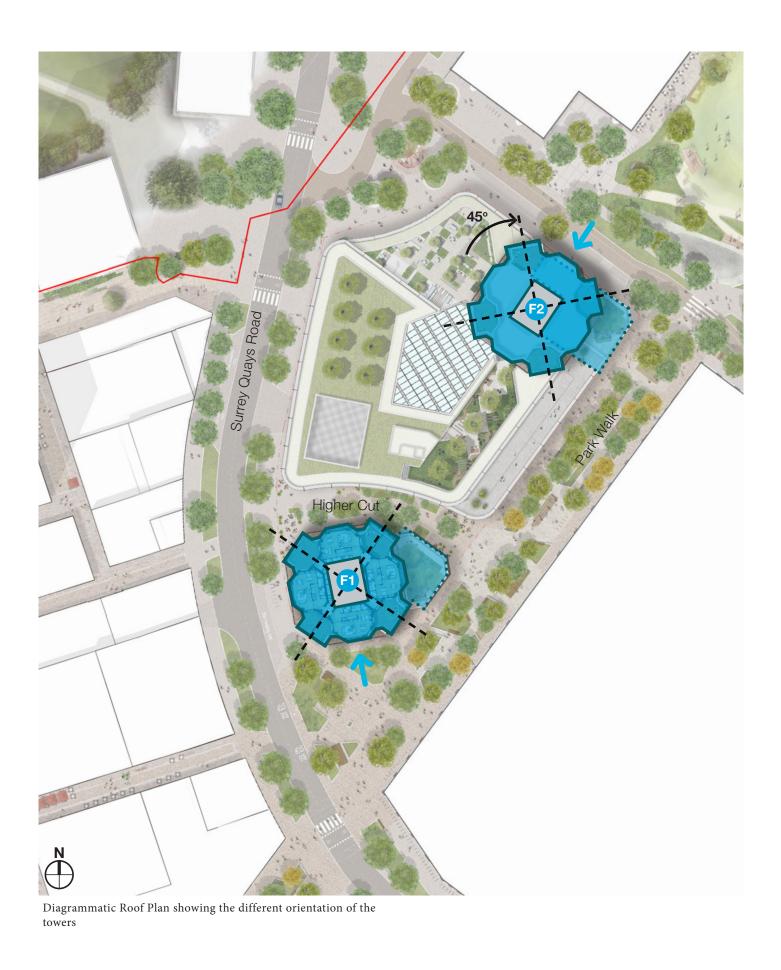
8.8 x homes per floor

8x homes per floor including, studios, one bedroom, two bedroom and three bedroom homes.

## Residential

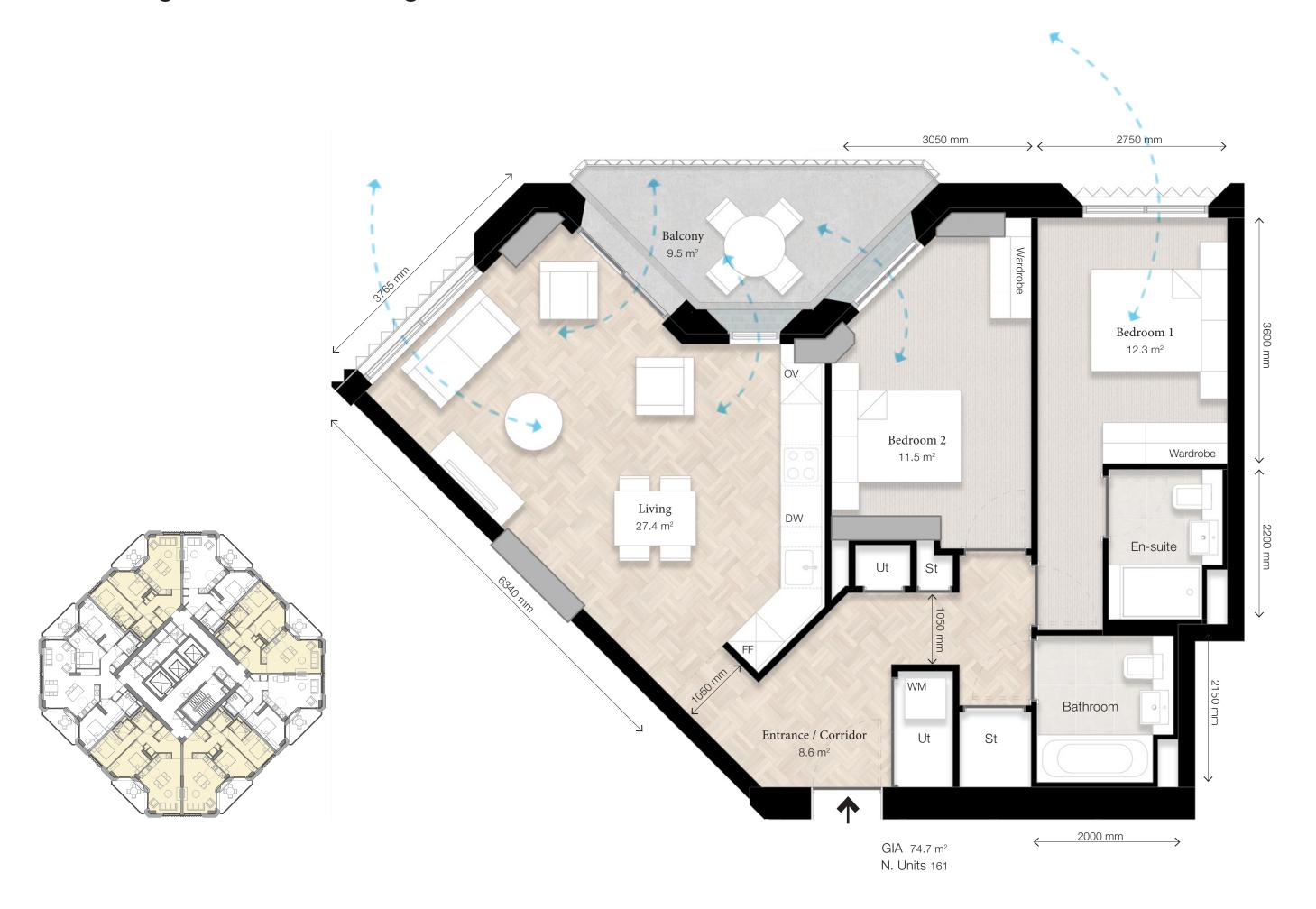
# Stacking quadrants, flexible mix

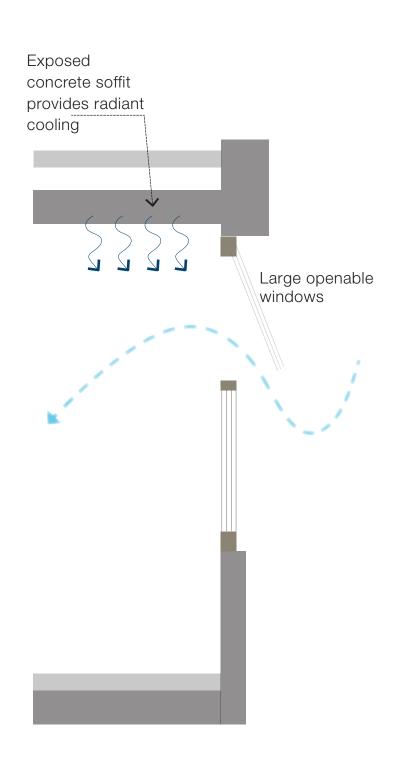




## **Residential Layouts**

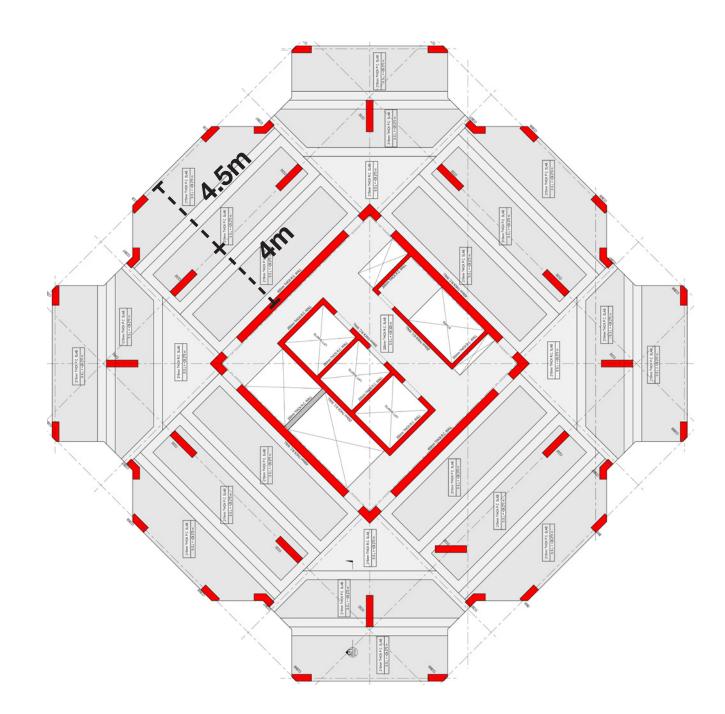
Overheating and Passive Design

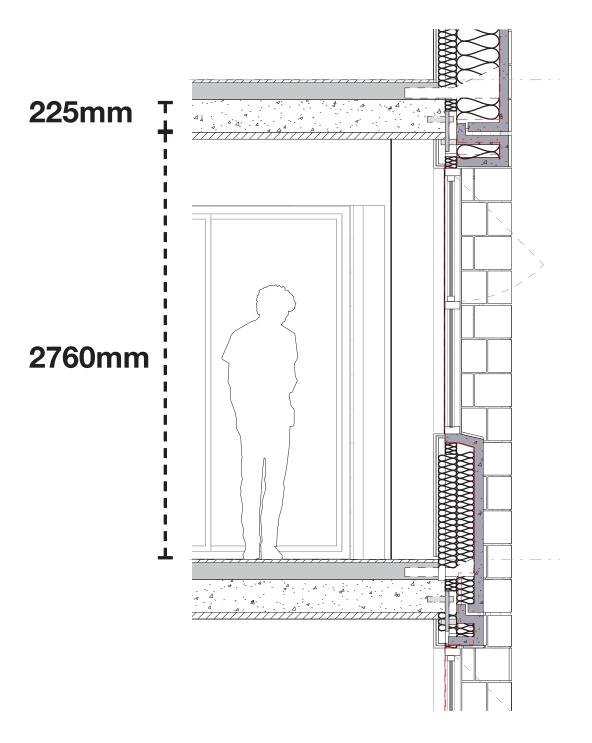




## **Residential Structure**

Square core, tight grid, lean structure

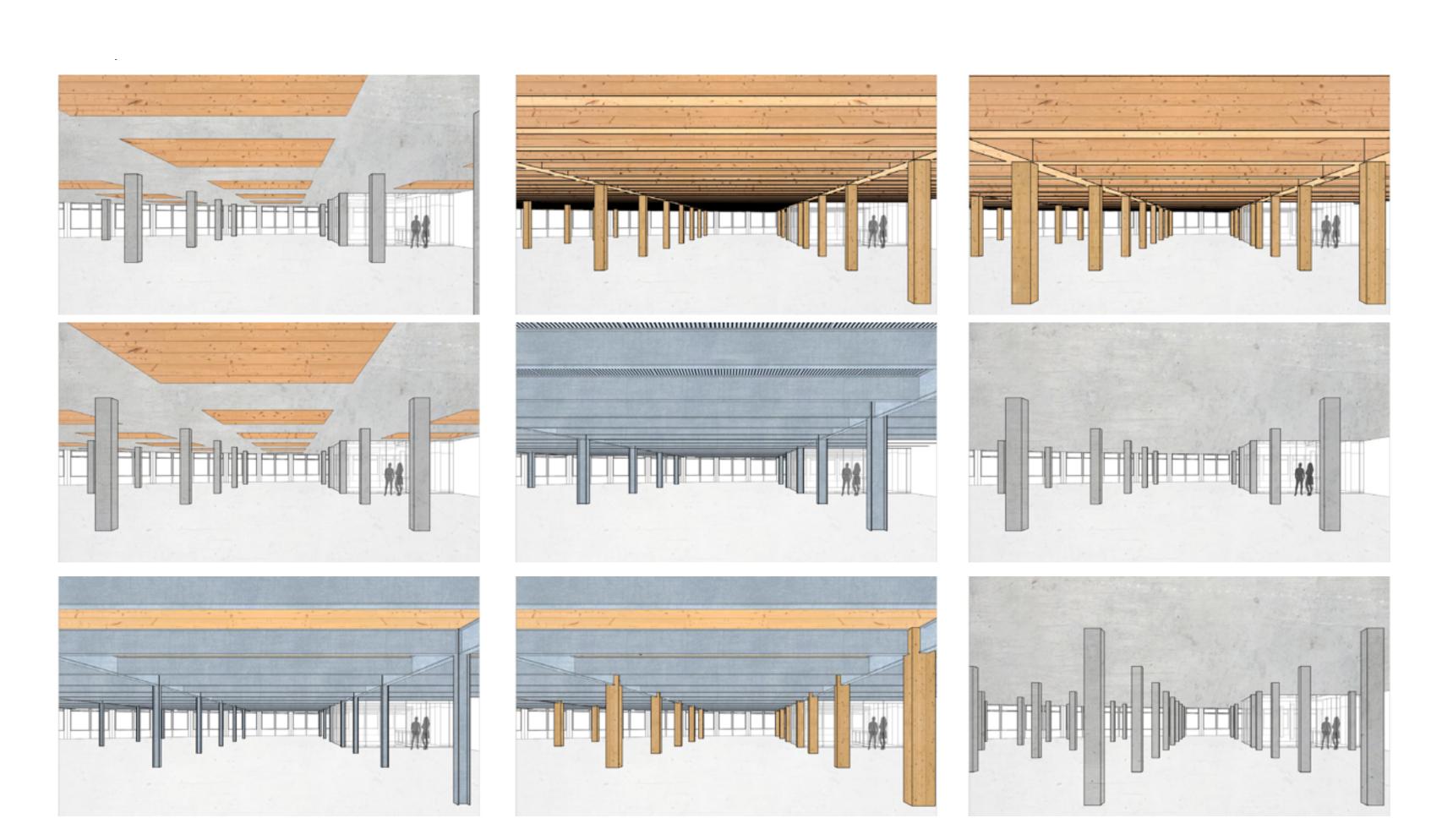




25mm of concrete slab reduction = c100 tonnes of carbon across both towers

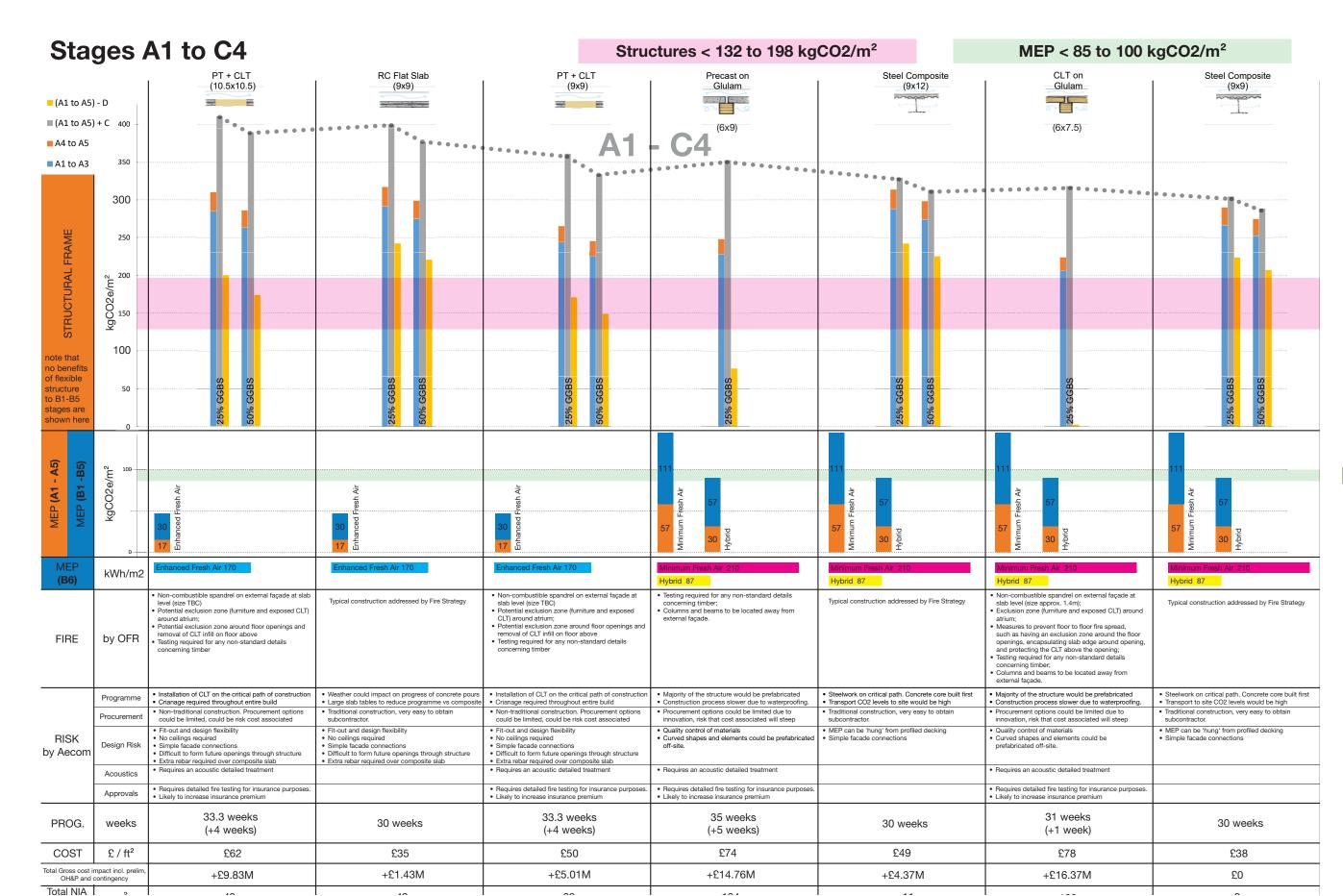


## Structural Grid



#### Structural Grid - Stage 2 Design Iteration



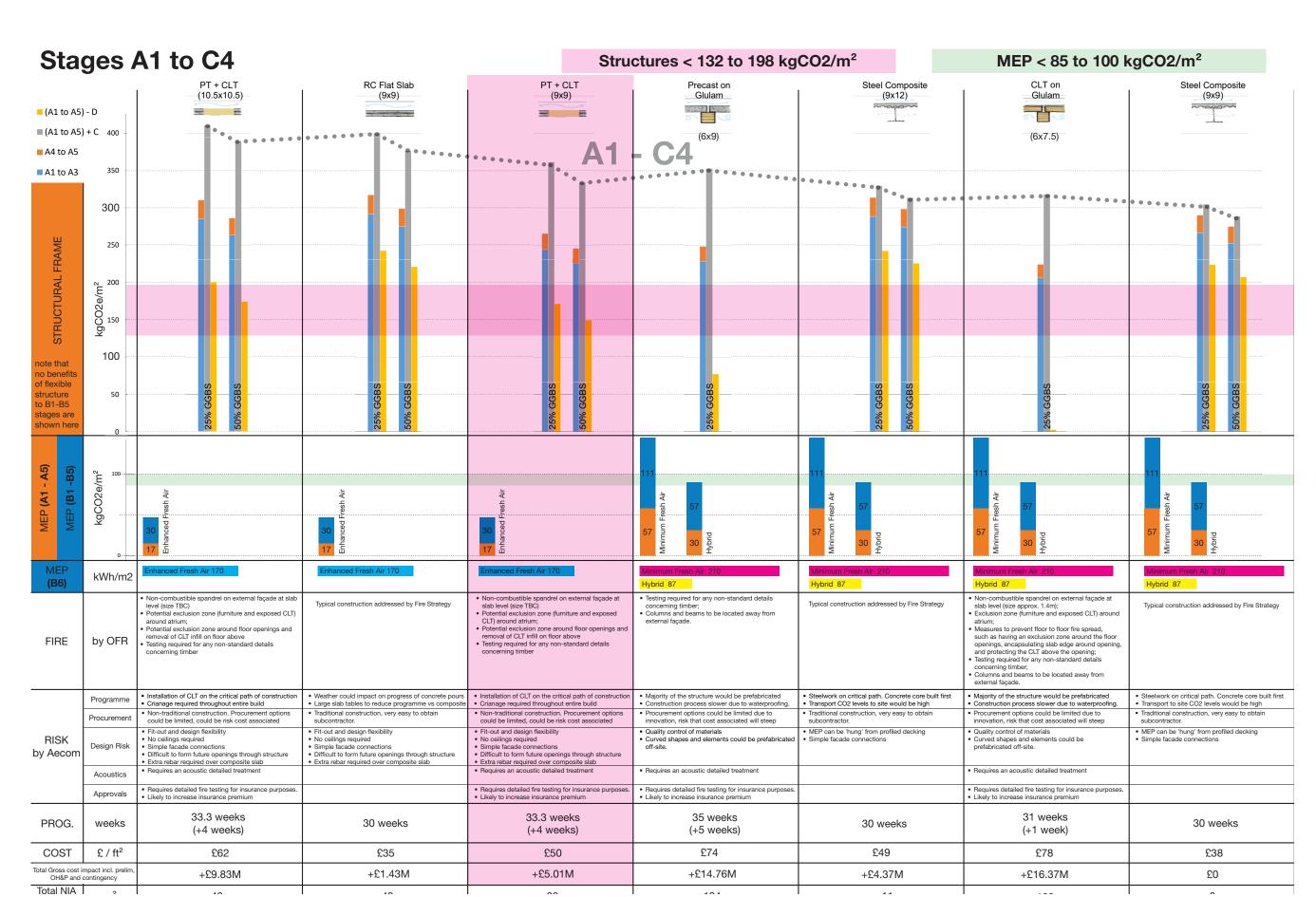


# **BUDGET RANGE**

**BUDGET RANGE** 

### Structural Grid - Stage 2 Design Iteration





# **BUDGET RANGE**

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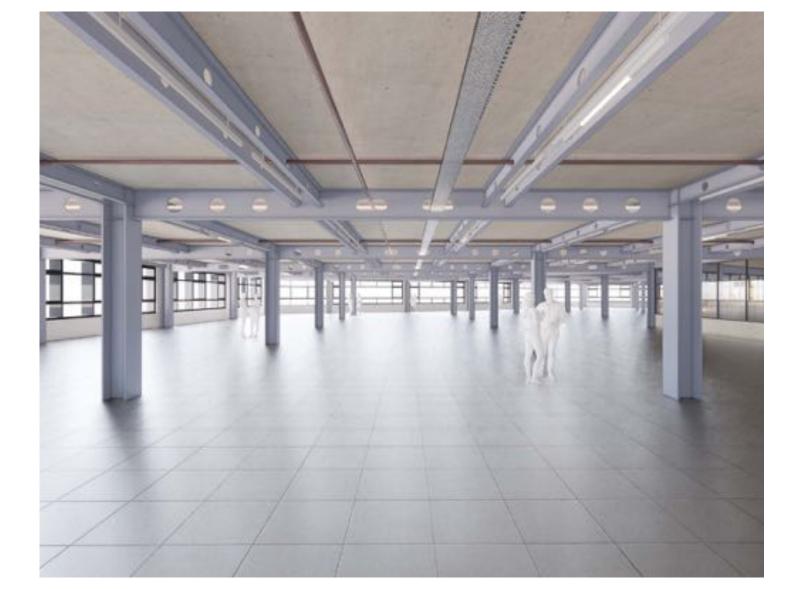
Structural Grid - Stage 3 Contractor Engagement





#### 245mm PT In-situ concrete with CLT Infill

- 64.7 kg/C02/m2 (typical bay)
- Assumes timber sequestration
- Insurance risk

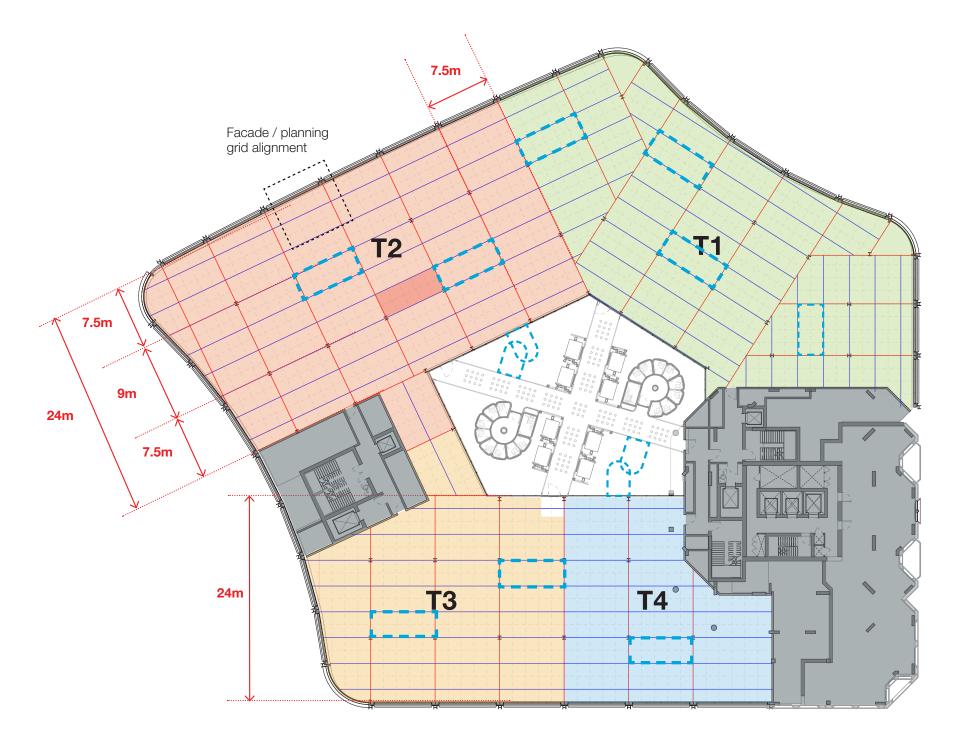


#### **140mm Low Carbon Concrete Cassettes**

- 63.6 kg/C02/m2 (typical bay)
- 100% Cement Free
- Hi-Star Steel
- Re-usable cassette system

VS

# Structural Grid - Stage 3 Contractor Engagement



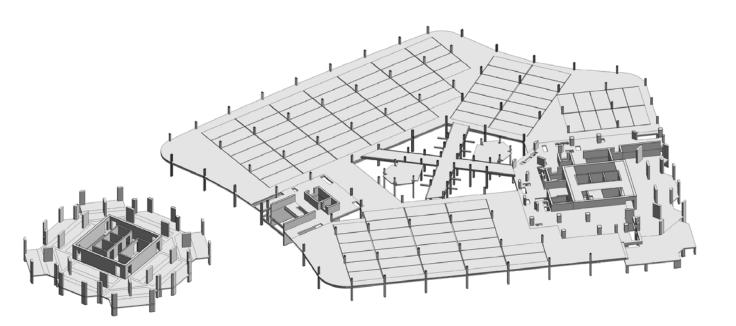


Figure 8.4 Office floor in the Plot F development



Figure 8.3 Single Cassette module



Figure 8.5 Supporting steelwork

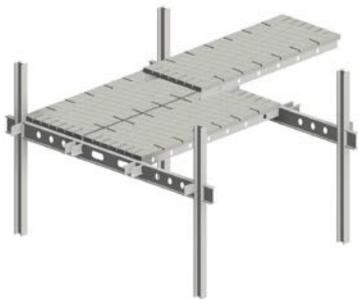
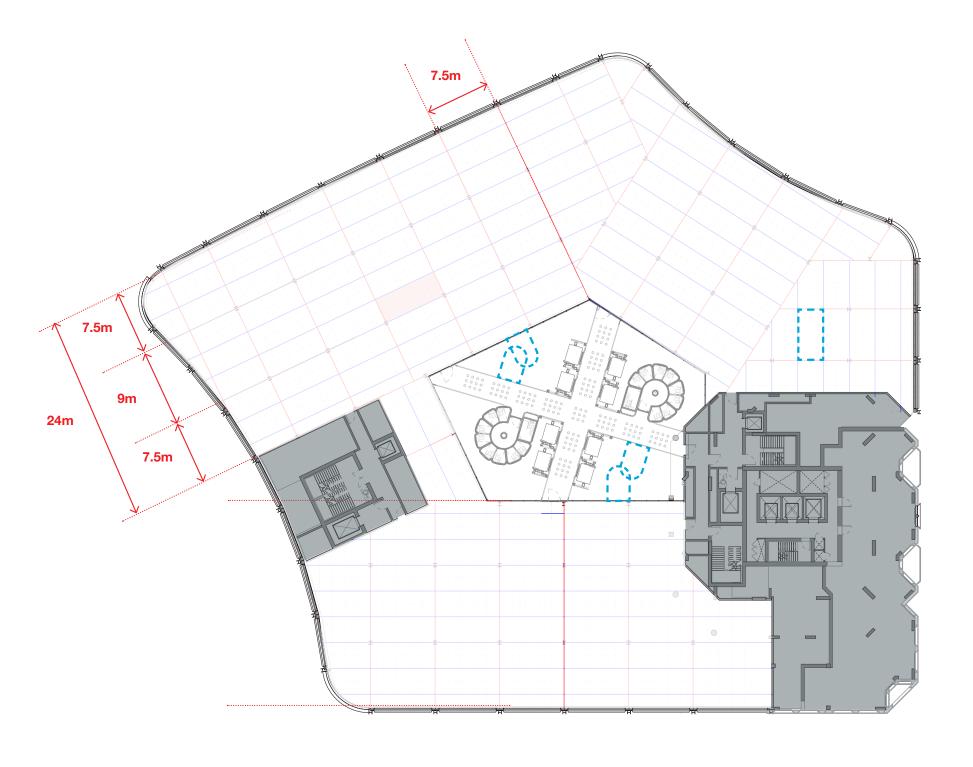


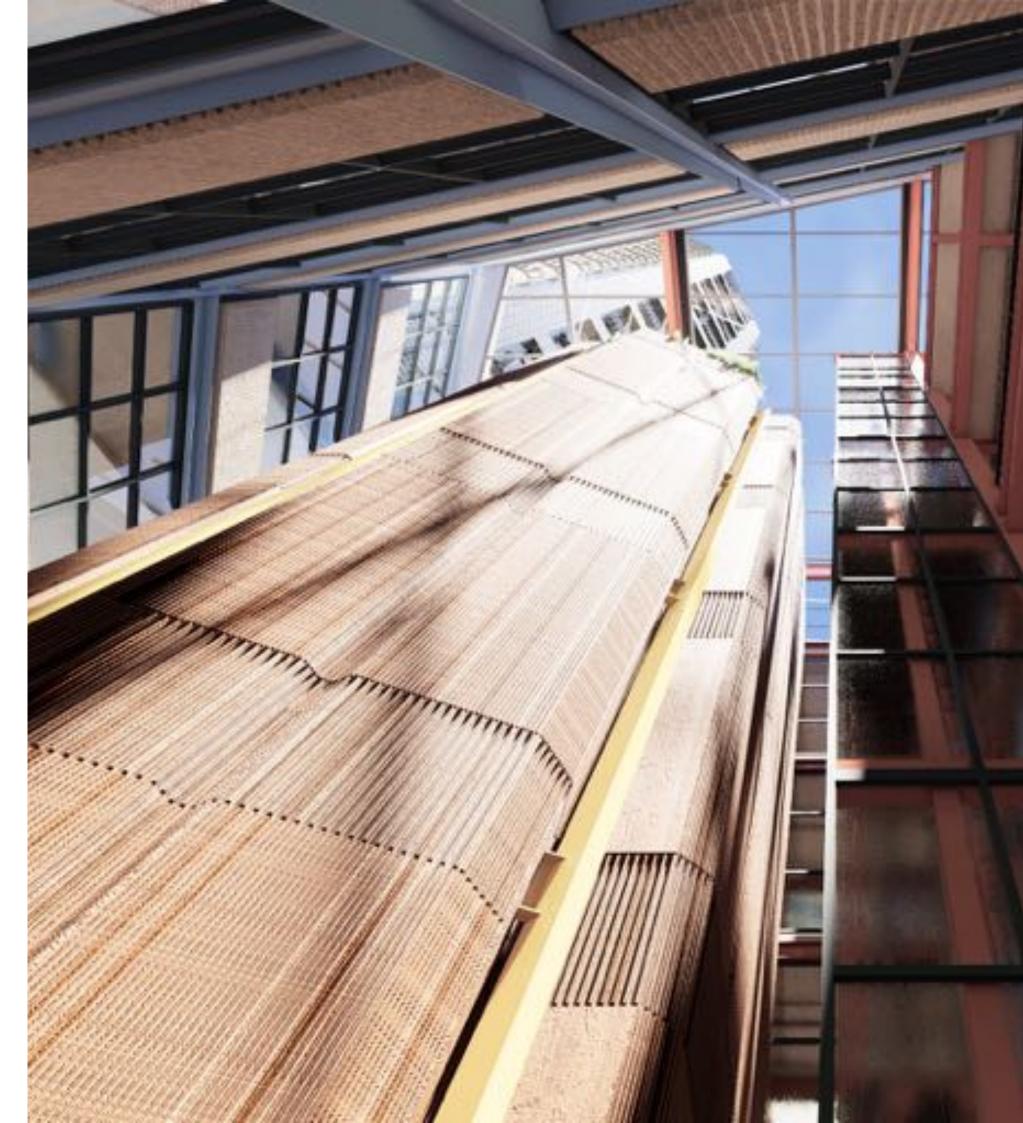
Figure 8.6 Assembly



**Figure 8.7** LCC & frame prototype by MACE & development partners

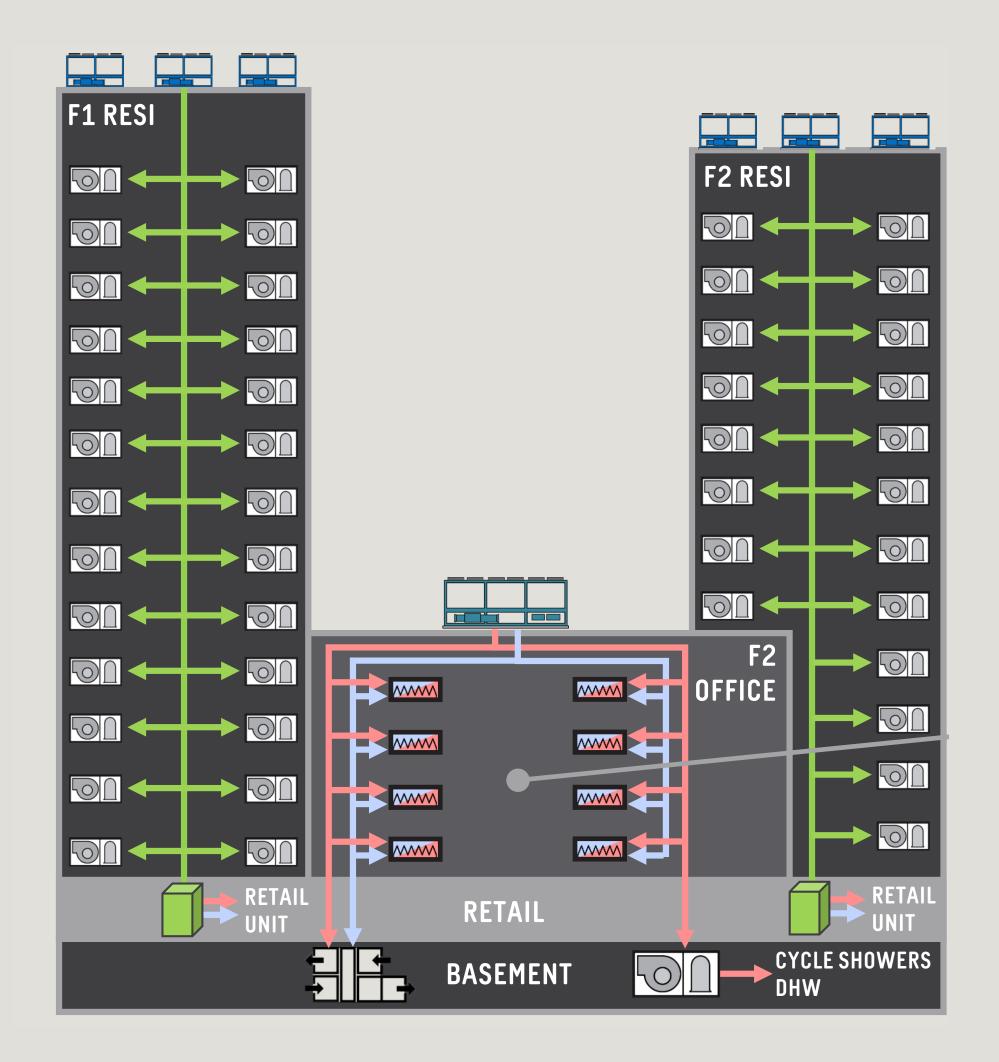
Occupied Courtyard Adaptable Core





# **Operational Energy Budget**





#### **Residential Energy Strategy**

2030 Roadmap

Canada Water Zone F Residential 2030 Roadmap Building Façade (Performance) Fan & Pump Efficiencies Services Fabric Energy Efficiency Considered Fan Selections With Low SFPs Strategy + Overheating TM59 Compliance System Pressures Optimised **Energy Savings** Explored Air Source Heat Pump + Water Source **Internal Gains** Throughout Combined Efficiencies of Air & Water Based Lighting Efficacies Targets RIBA Stage 3 System Enhancing Energy Usage A-Rated White Goods **ALL Electric + Temperature Distribution Modular Plant / Demand Control** Heating + Cooling Delivered Via All Electric Tech Optimised Demand Control Via Modular Low Ambient Temperatures Optimising Energy Equipment Sizing & Thermal Storage **Further Studies Energy Sharing Heat Recovery** Stage 4 Residential Ambient Loop Linked To Retail MMR In Apartments Integral Heat Recovery Vertical Heat Rejection Delivering 'Free Heat' To Loop Transportation 2030 Target 35 kWh/m<sup>2</sup>/y

2021-09-21

#### **Commercial Energy Strategy**

2030 Roadmap

Canada Water Zone F Se Commercial 2030 Roadmap Façade (Performance) Peak Solar Gains < BCO Guidelines Thermal Performance > Part-L Challenge BCO Small Power + Lighting Cooling Provisions ALL Electric + Temp Air Source & Water Source Heat Pumps Combining To Increase Efficiencies **Integrated ASHPs** Reducing Pipe Runs + Rapid Local Control To Air Handling Units **Heat Recovery** Aligning Air Volumes Supply & Extract To

Increase Heat Recovery Potential



#### **Distributed AHUs**

On-Floor Air Handling Units Per Tenancy To Offer Close Control & Efficiencies



#### **Pump Optimisation**

Pipework Pressures Interrogated + Reduced Pipework Distribution = Pump Efficiencies



#### **Energy Sharing**

Cooling Heat Rejection Re-Distributed Into Heating Network Offering Energy Savings



#### **Demand Control**

Equipment Locations / Part-Load Assessments & Linking To Mixed-Mode Operation Shut-Offs



#### **Free Cooling**

Distributed Chilled Water & Air Temperatures Specified To Enable 'Free Cooling' Benefits



Building Services Strategy +

**Energy Savings** 

Explored

Throughout RIBA Stage 3

**Further Studies** Stage 4

Vertical Transportation

Parasitic Power

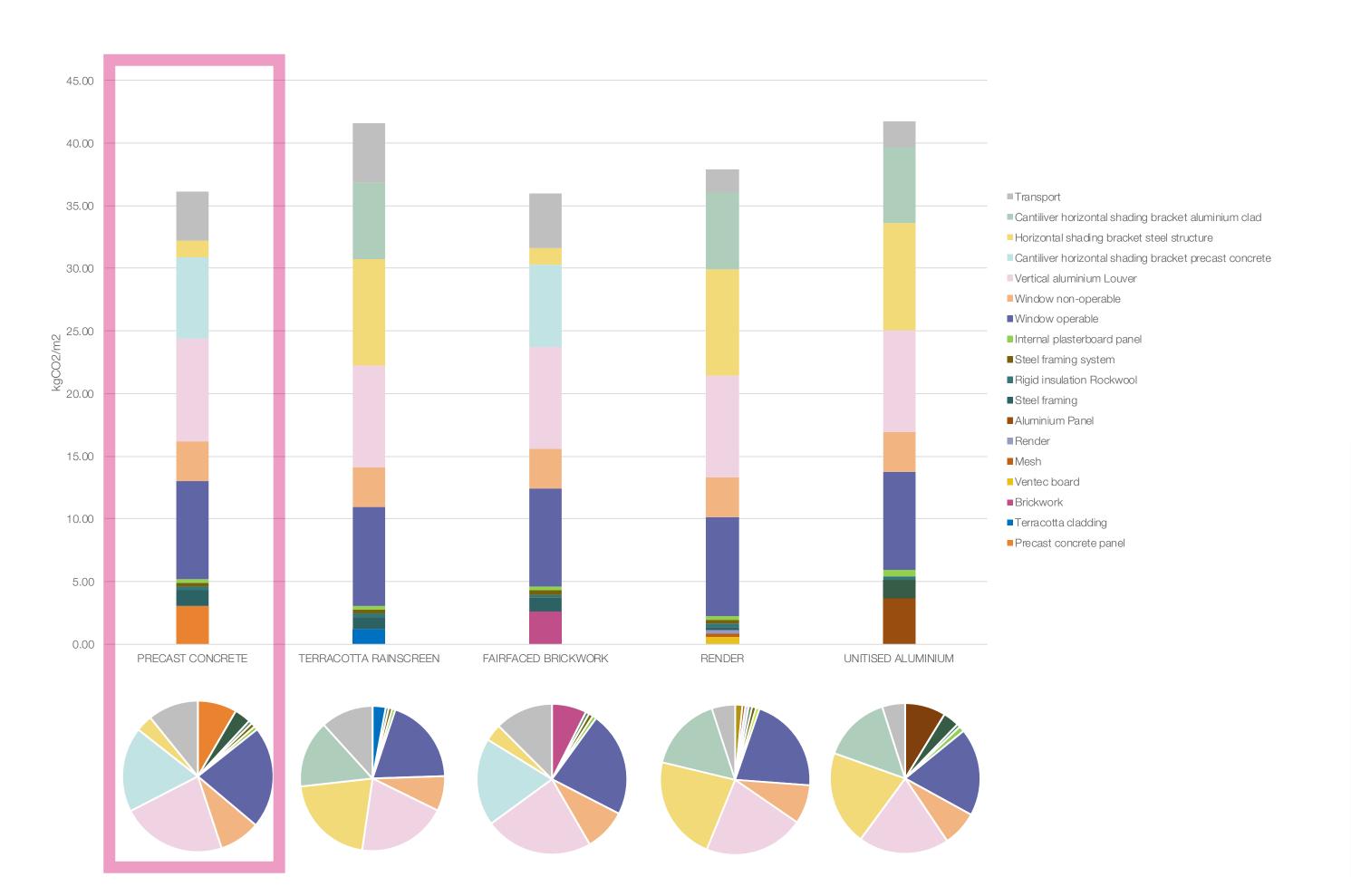
2030 Target 90 kWh/m²/y

2021-09-21



### **Residential Envelope**

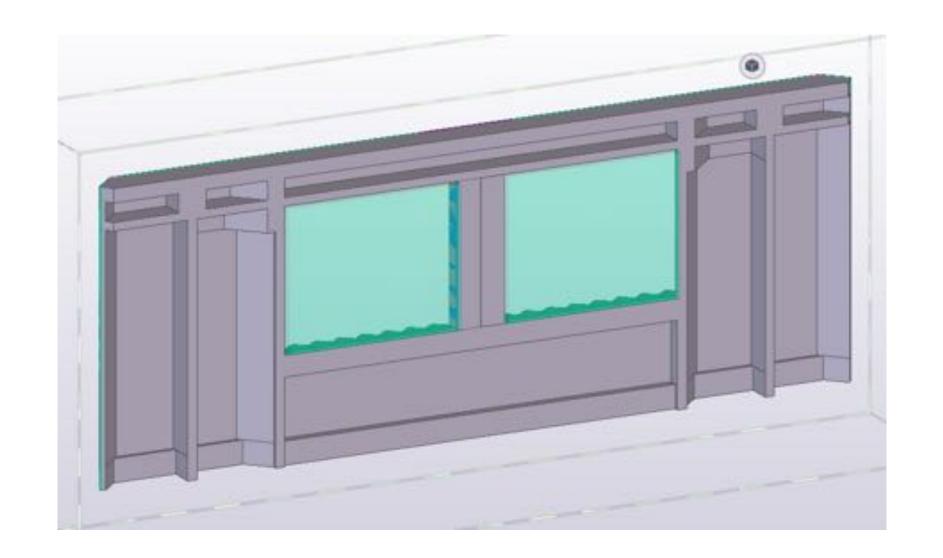
### Facade System Analysis

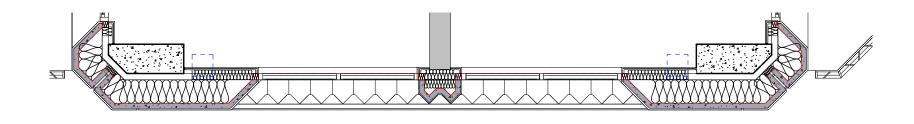


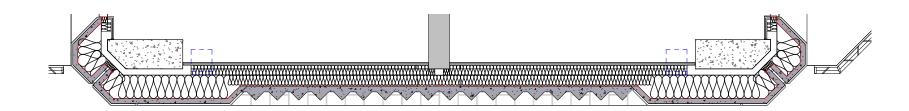


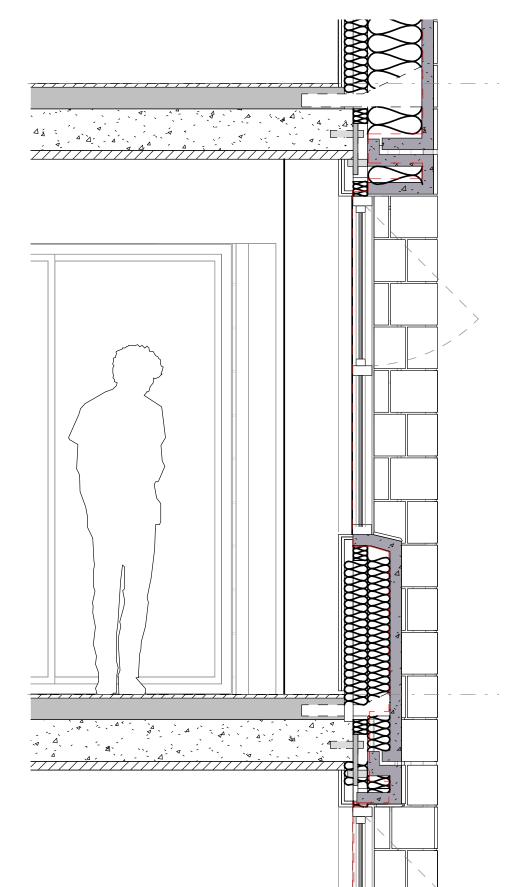
### **Residential Envelope**

Robust Ultra High Performance Concrete Shell (UHPC)









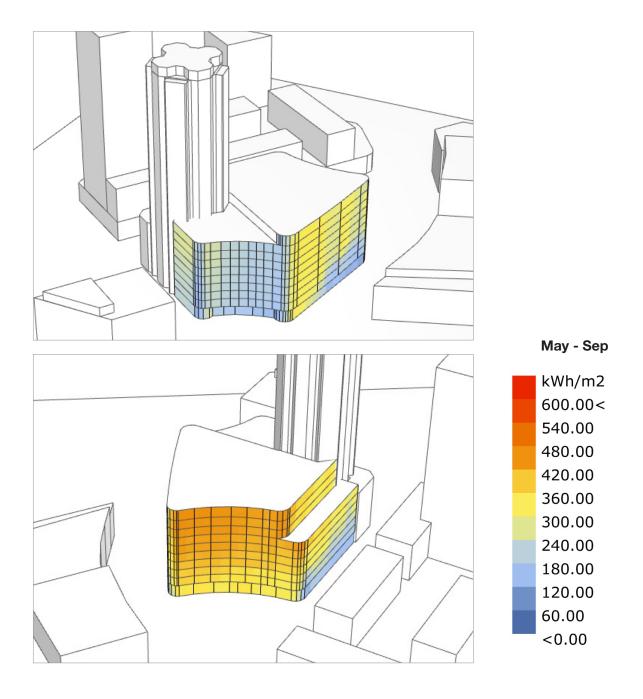




Solar Load

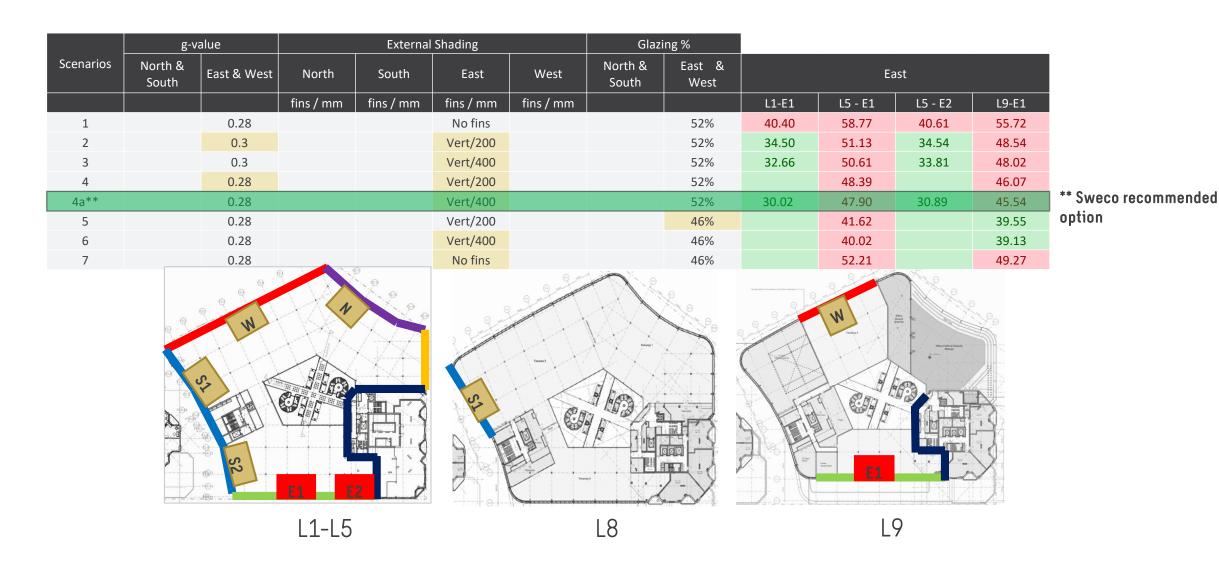
BCO Guidance = 50-65 W/m2 = c200kWh/m2/annum

British Land Target = 40W/m2 = c90kWh/m2/annum

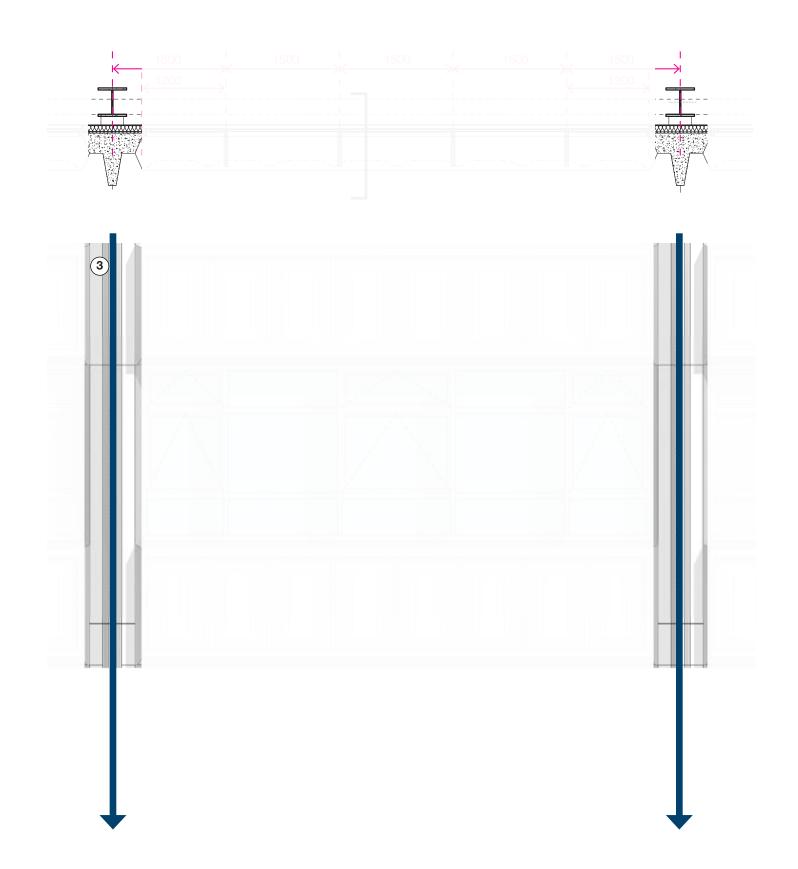


# Façade Analysis - East



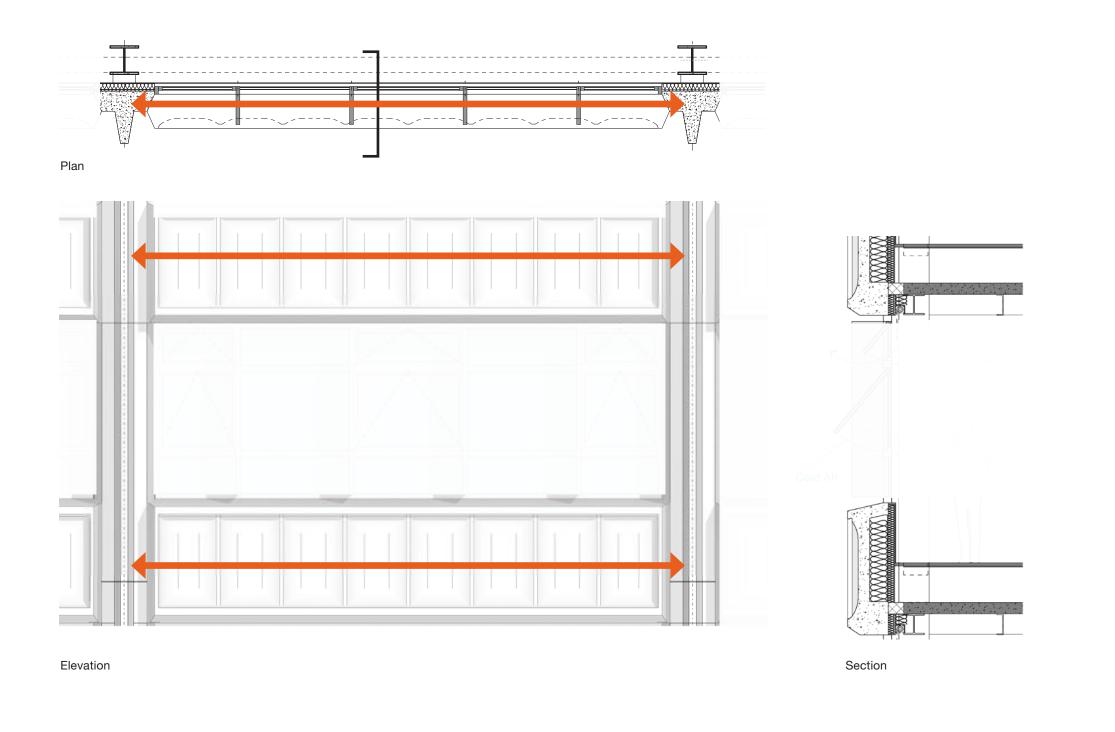


Modular System - Expressed Frame



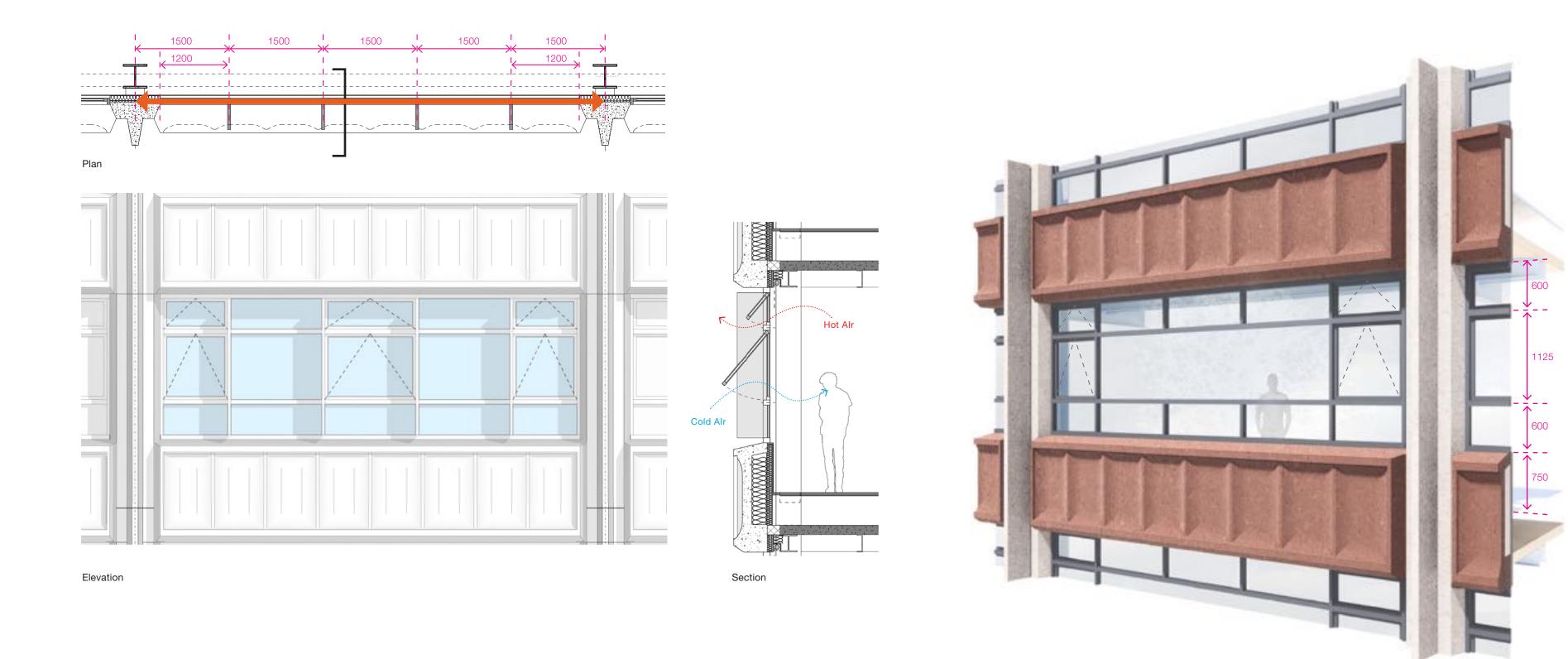


## Modular System - Spandrel Beams





### Modular System - Independant Window System





Material Specification - Recyled Aluminium





#### YOUR EXTRUSION CARBON FOOTPRINT

(GWP > Global Warming Potential)



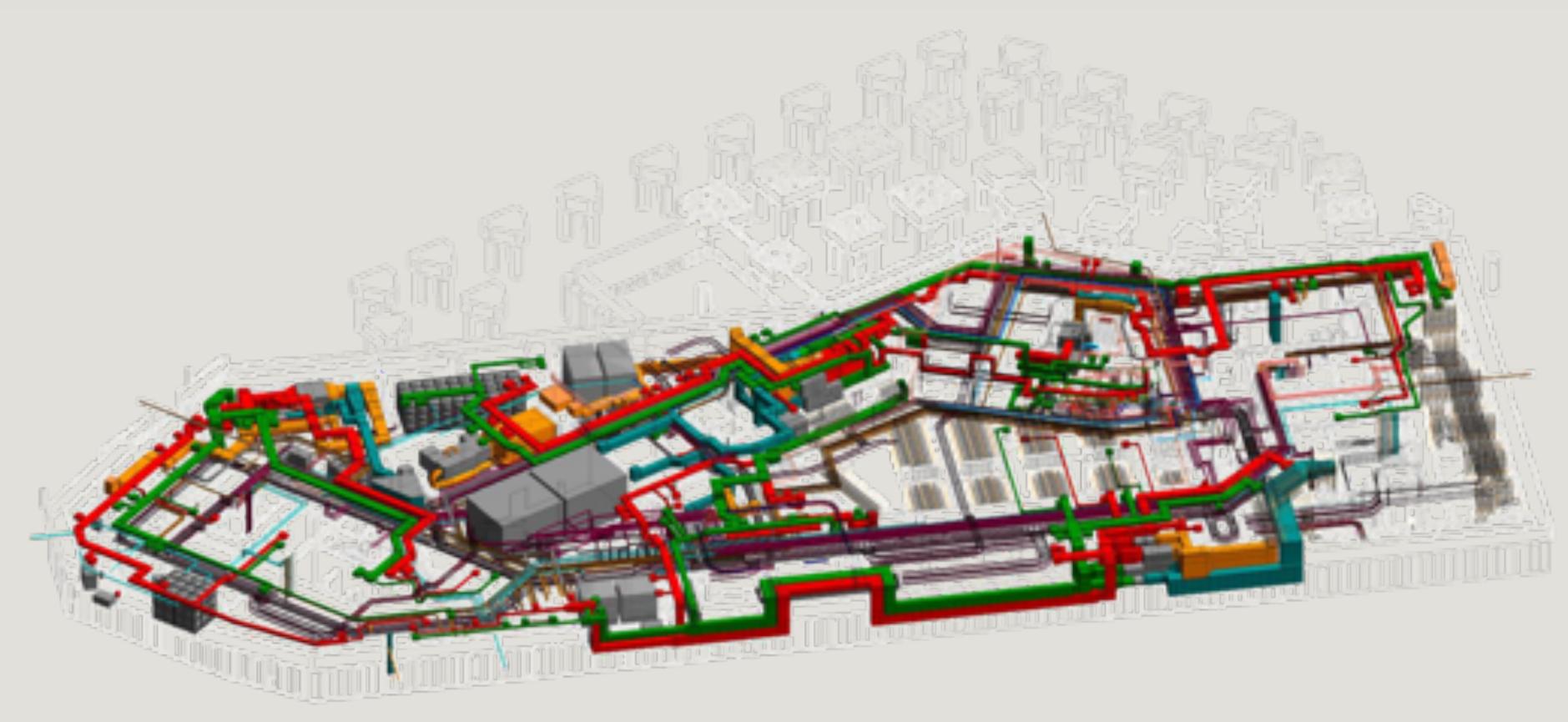
YOUR EXTRUSION
If you had use primary Aluminium from:

Europe 919,125 kg CO2

1,784,812 kg CO2

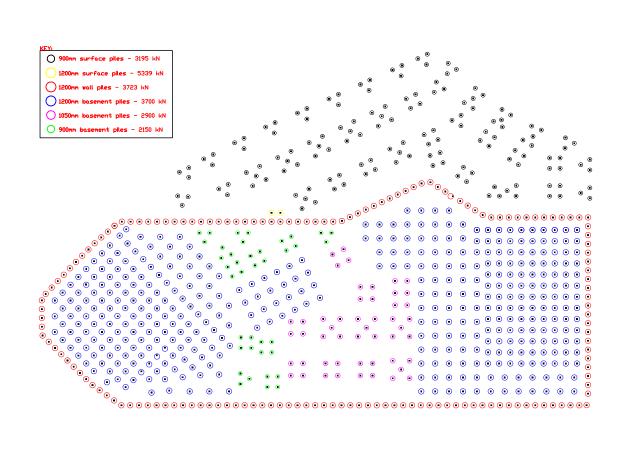
Worldwide\*\*

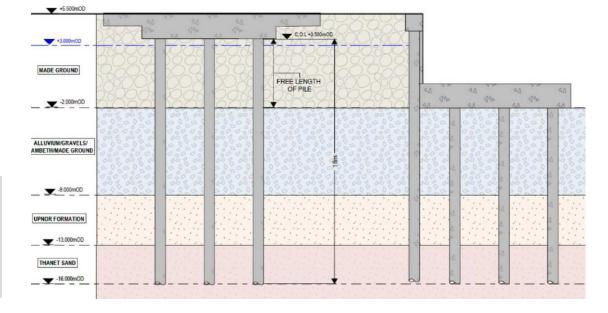
# On floor plant and minimal basement

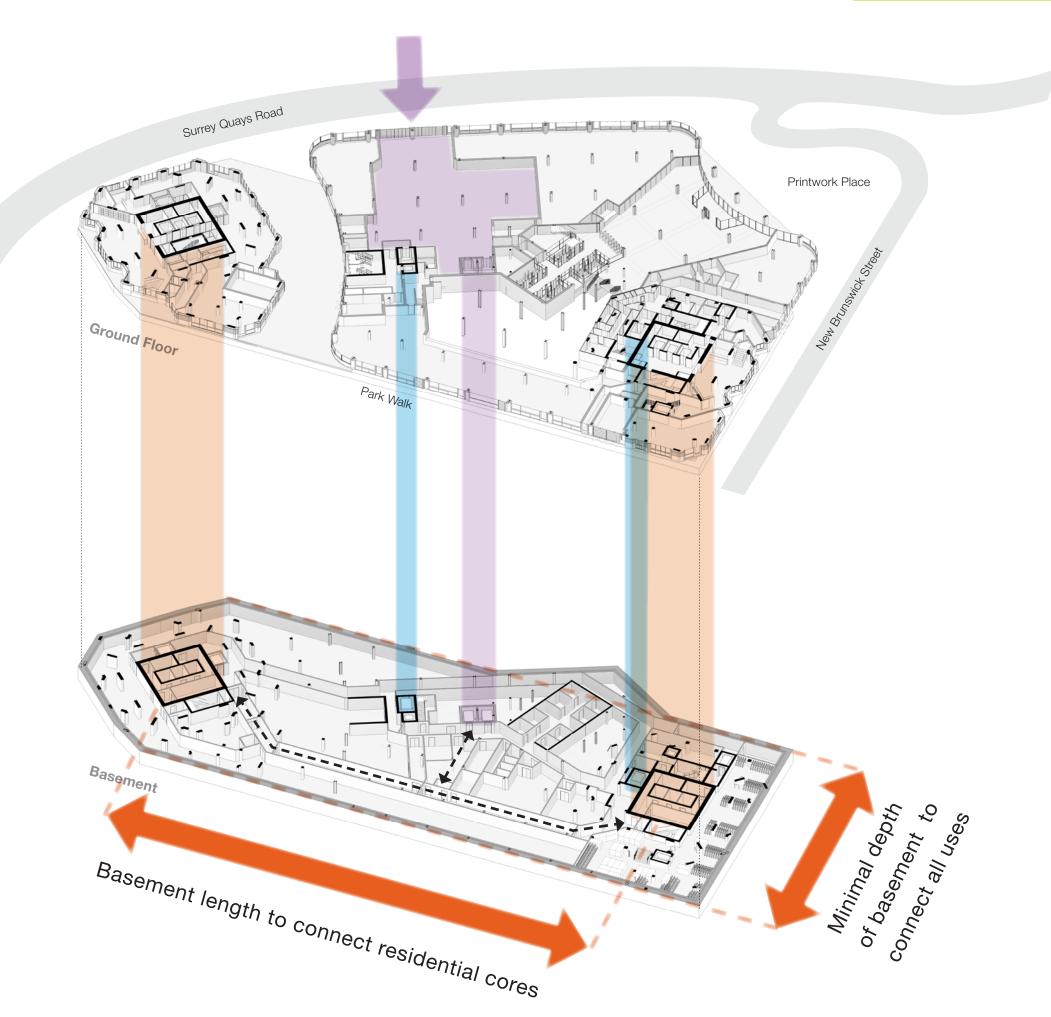


### Reduce

### Minimised Basement





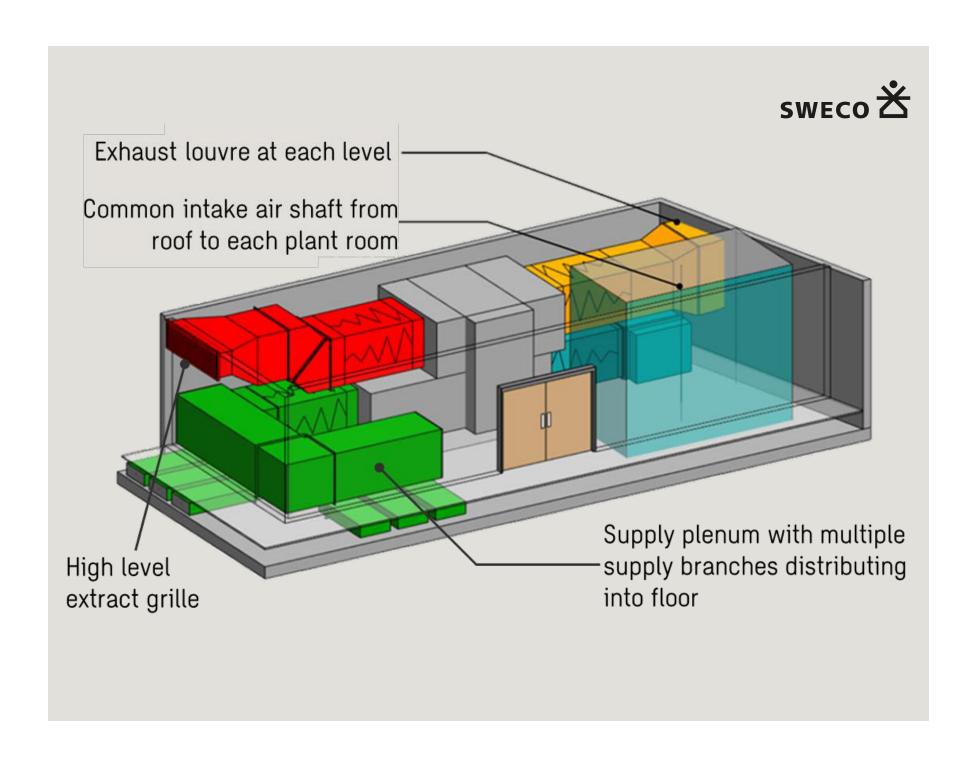




### **Commercial Energy Strategy**

On floor plant





Modern Methods of Construction in Residential Design

### **Modern Methods of Construction**

Residential High Rise System

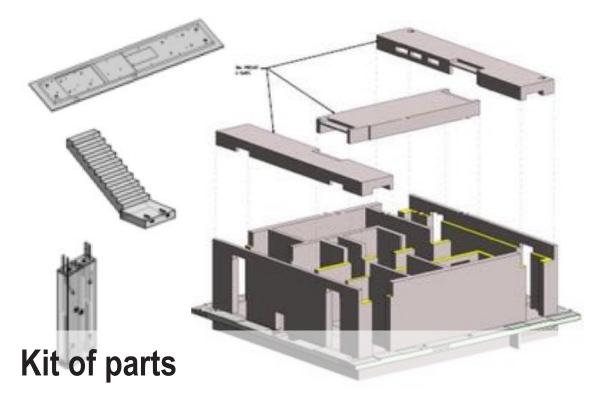
50% Recycled Content of Concrete (GGBS)

90% less waste than in-situ

99% waste diverted from landfill

60% reduction in site water use

40% reduction in CO2 Emissions due to transport

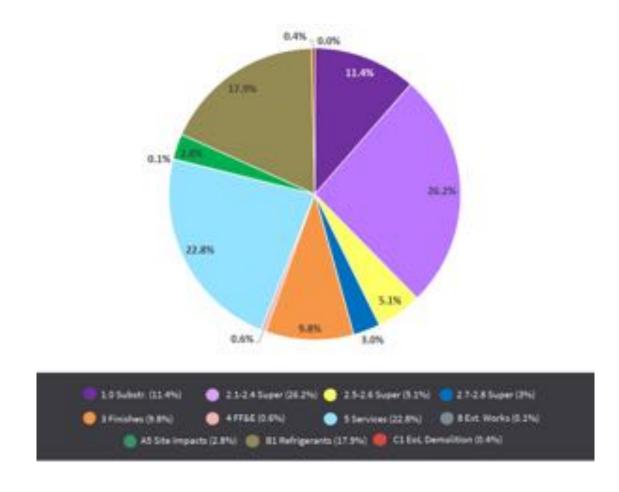




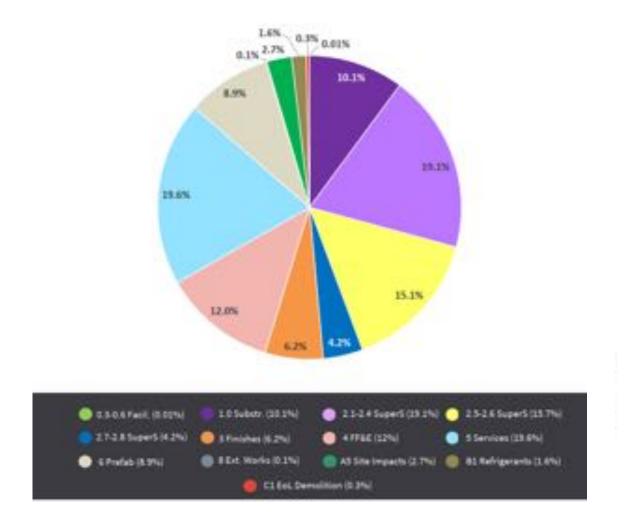




# **Embodied Carbon - Methodology & Budget**



**Commercial Uses** 



Residential Uses

### **Carbon Budgeting**

### Design Responsibility

RICS professional statement



RICS professional standards and guidance, UK

Whole life carbon assessment for the built environment

1st edition, November, 2017



rics.org/guidance

Whole life carbon assessment for the built environment

	Building part/Element group	Building element
	Demolition	0.1 Toxic/Hazardous/Contaminated Material treatment
		0.2 Major Demolition Works
0	Facilitating works	0.3 & 0.5 Temporary/Enabling Works
		0.4 Specialist groundworks
1	Substructure	1.1 Substructure
2	Superstructure	2.1 Frame 2.2 Upper floors incl. balconies 2.3 Roof 2.4 Stairs and ramps
2	Superstructure	2.5 External Walls 2.6 Windows and External Doors
2	Superstructure	2.7 Internal Walls and Partitions 2.8 Internal Doors
3	Finishes	3.1 Wall finishes 3.2 Floor finishes 3.3 Ceiling finishes
4	Fittings, furnishings and equipment (FF&E)	4.1 Fittings, Furnishings & Equipment incl. Building-related* and Non-building-related**
5	Building services/MEP	5.1-5.14 Services incl. Building-related*
6	Prefabricated Buildings and Building Units	6.1 Prefabricated Buildings and Building Units
7	Work to Existing Building	7.1 Minor Demolition and Alteration Works
8	External works	8.1 Site preparation works 8.2 Roads, Paths, Pavings and Surfacings 8.3 Soft landscaping, Planting and Irrigation Systems 8.4 Fencing, Railings and Walls 8.5 External fixtures 8.6 External drainage 8.7 External Services 8.8 Minor Building Works and Ancillary Buildings

#### Table 3: Building element groups to be considered (based on the BCIS SFCA)

**10** RICS professional statement

Effective from 1 May 2018

<sup>\*</sup> Building-related items: Building-integrated technical systems and furniture, fittings and fixtures built into the fabric. Building-related MEP and FF&E typically include the items classified under Shell and core and Category A fit-out.

<sup>\*\*</sup> Non-building-related items: Loose furniture, fittings and other technical equipment like desks, chairs, computers, refrigerators, etc. Such items are usually part of Category B fit-out.

### **Carbon Budgeting**

### Value Square

