Our Estate

Campus Scale & Buildings

- 300+ Individual Building
- 85% of core estate within a Conservation Area.
- 60 Hectares

Population

- Approximately 25,000 students and 5,000 Staff

Infrastructure & Space Usage

- 425,000m² Gross Building Area
- 1.09% GIA vacant space
- Sports Facilities
- Student Residential Space
- Research Intense
- Teaching Space
- Office Space
- Event Space

Top 10 Most Beautiful Historic Universities in the UK

(QS World University Rankings 2022)

QUEEN'S UNIVERSITY BELFAST







What are the Demands?

- World class teaching facilities
- World class research & innovation facilities
- Exceptional Student Experience & Quality Education
- Estate modernisation
- Space Optimisation
- Balancing Preservation & modernisation (Heritage & Adaptation)
- Financially challenging times

Alongside this, achieve NZ 2040 and Sustainability commitments

Our Sustainability Journey

BREEAM certification used at Queen's as standard for capital works since

2005

BREEAM®

2010

University launched a carbon reduction program.

Four combined heat & power projects completed.

2020

21% reduction achieved by 2020

Discussion around Passivhaus as a route to net-zero came to the fore.

Belfast City Deal Projects were funded to include BREEAM

2023

Net Zero Design Guide launched

Passivhaus embedded in capital works

Net Zero Plan launched Oct 2023

2025

First Passivhaus project commenced Summer 2024

Due for completion Summer 2026

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SHAPING A BETTER WORLD SINCE 1845
NET ZERO PLAN
June 2023
www.qub.ac.uk
https://www.qub.ac.uk/about/sustainability/net-zero/

Carbon Footprint

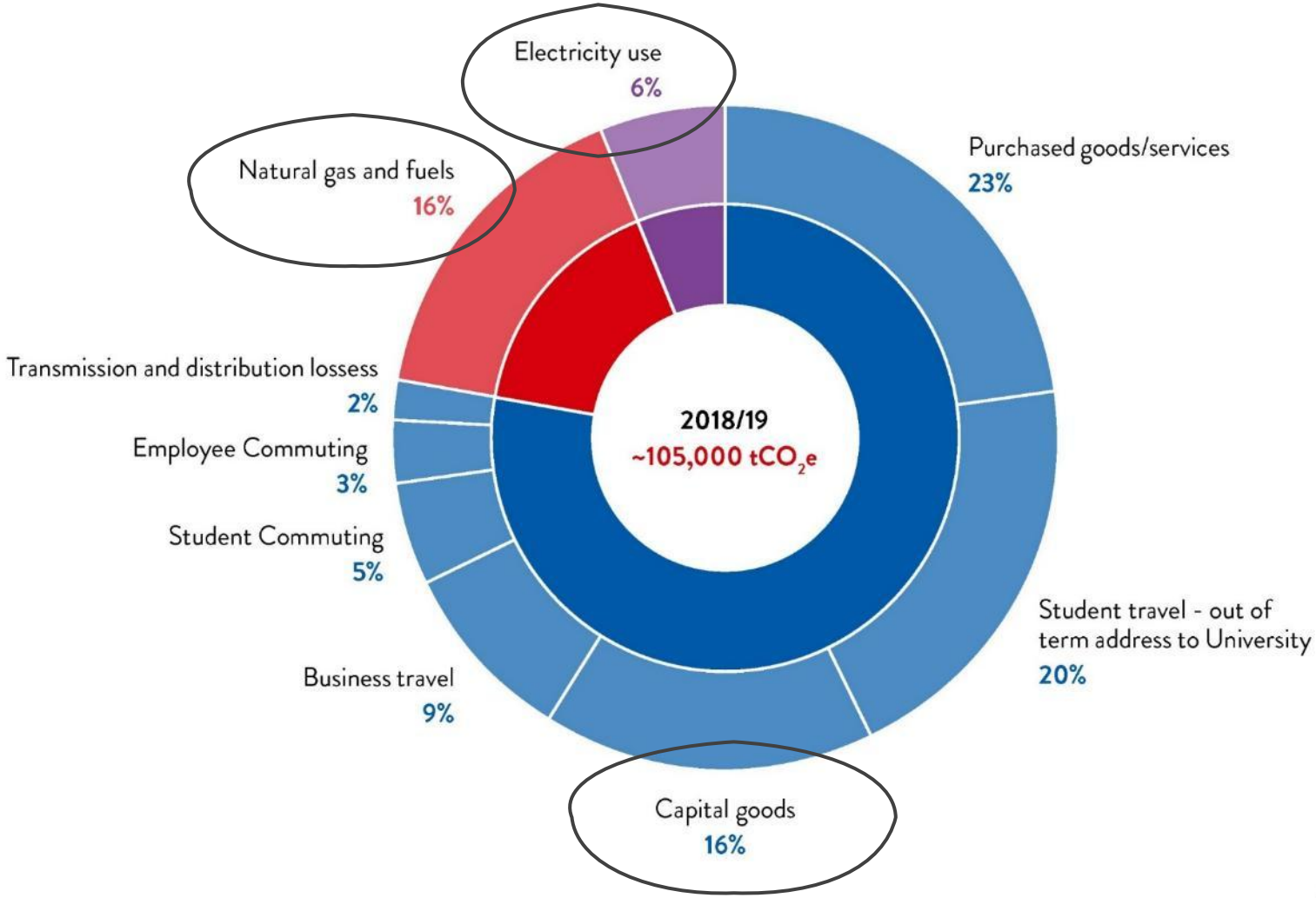

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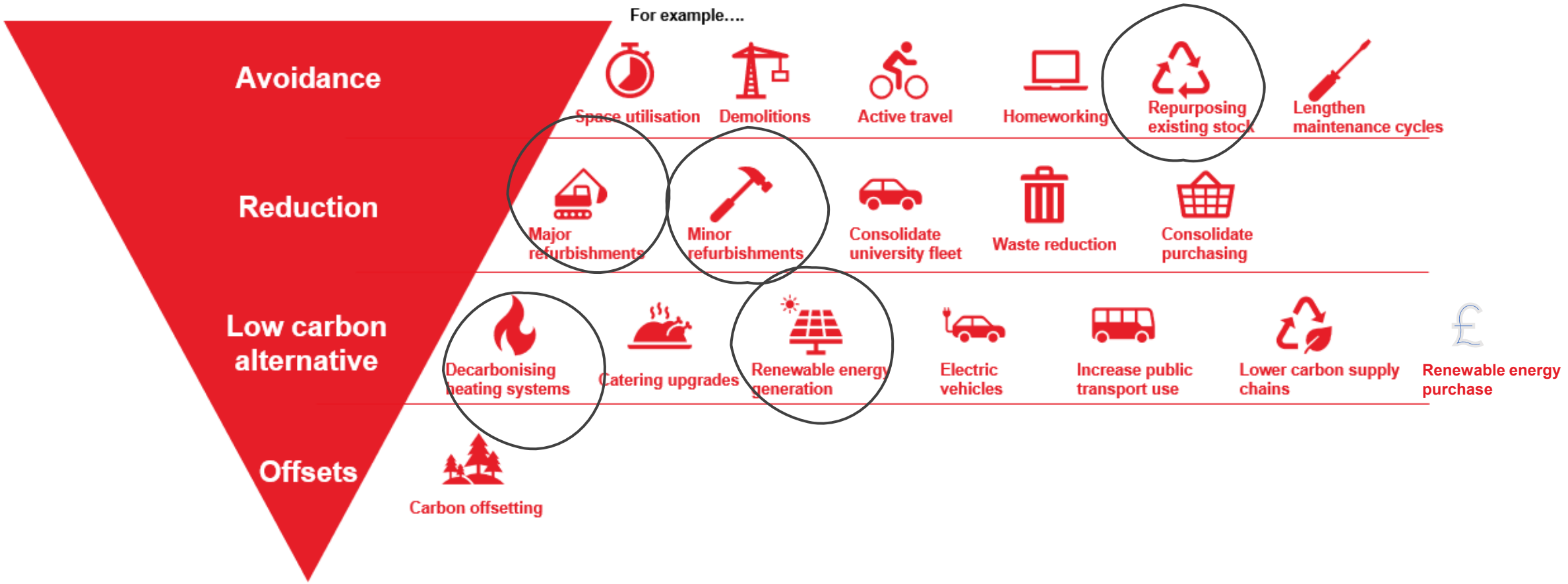
Figure 7: 2018-19 Carbon Footprint – used as our baseline

Approach To Net Zero



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Progress To Date

Net Zero by 2040

First Passivhaus building under construction

Geothermal energy generation

1 blue roof

5 green roofs

5 'No Mow' Areas within the Campus

Over £10 million invested in carbon reduction projects

On Campus Energy

21% reduction of carbon emissions

100% renewable electricity

>90% waste diverted from landfill

Over 20% increase in cycling parking provision

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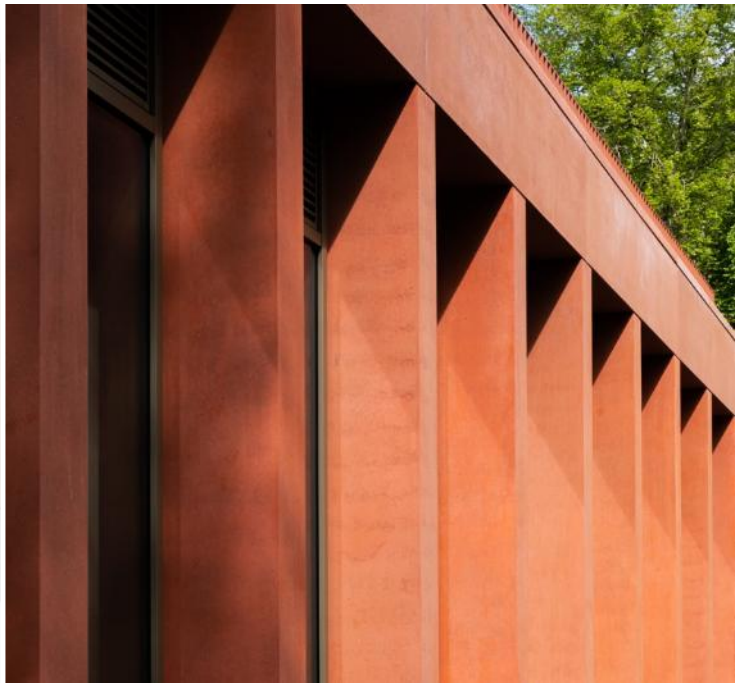
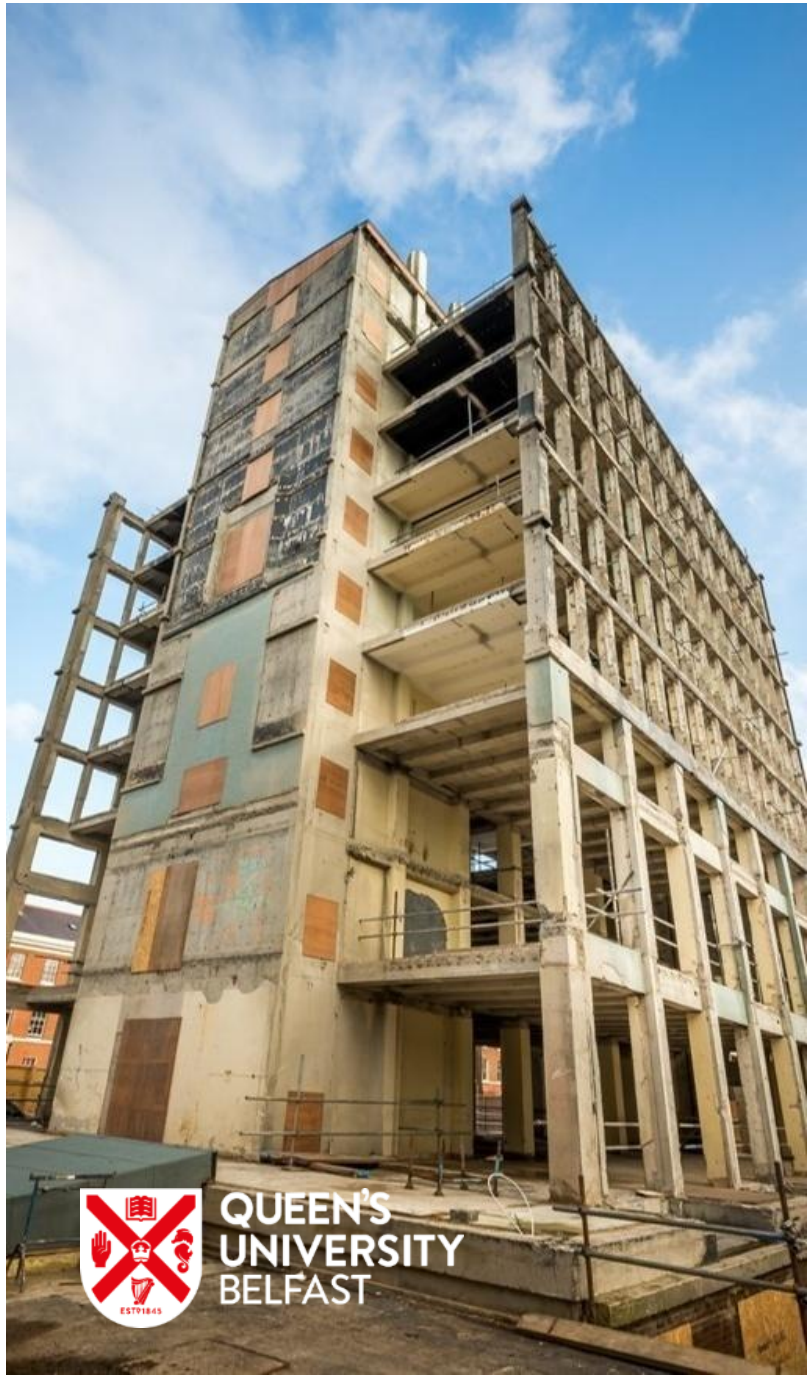
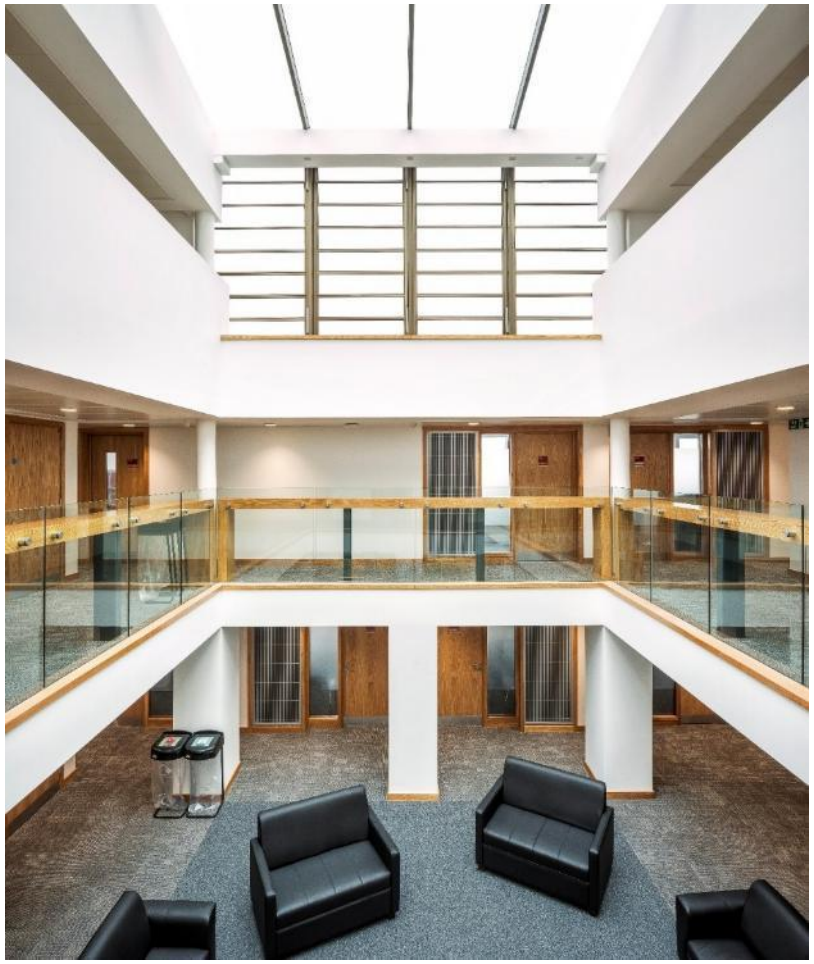
DESIGN QUALITY & ON-SITE RENEWABLE ENERGY (GEOTHERMAL)



PRIORITISING RE-USE & RETAINED EMBODIED CARBON





Decarbonising our Heat and Electricity

Integration of Biodiversity- Green and Blue Roofs


Sustainable Travel Infrastructure

Why Passivhaus?

PASSIVHAUS BUILDINGS

- ✓ Are optimised for net zero
- ✓ Consistently perform to design targets
- ✓ Are the best fit for a decarbonised grid
- ✓ Deliver health and wellbeing benefits
- ✓ Tackle fuel poverty

PASSIVHAUS BENEFITS

Our research identified almost fifty types of benefits relating to Passivhaus which have been categorised into six distinct areas. When taken together, they make a compelling case for the adoption of Passivhaus. Each of these six areas is backed by detailed research papers, available to download on the Passivhaus Trust website: http://bit.ly/PHTcostbenefit

BUILDING PERFORMANCE

- Low energy demand
- Reduces performance gap
- High levels of comfort
- Effective and healthy ventilation
- Higher performance building components
- Better site QA procedures resulting in better construction quality
- Lower risk of building fabric damage
- Resilient and future-proofed buildings

HEALTH & WELLBEING

- Eliminates cold homes & associated health impacts
- Guarantees good levels of ventilation
- Reduces internal pollutants such as VOCs
- Deals with internal humidity – eliminates condensation and mould
- Improves quality of life for people with chronic illness or disabilities
- Protects against external air pollutants
- Reduces risk of airborne infection
- Reduces the impact of external noise
- Reduces risk of buildings be
- Improves health of people i

JUSTIFY, WHY NOT?

CLIMATE EMERGENCY

- Lower carbon emissions
- Lowers peak demand
- Lowers the overall requirement for renewables
- More economical to save energy than to generate it
- best chance of achieving net zero in buildings
- rbonisation without increasing fuel bills
- face of short-term extremes and longer-term
- ges
- Ability to support demand response
- Lower cooling requirement in a future warmer climate

PEOPLE PERFORMANCE

- Reduced absenteeism
- Improved productivity
- Improved learning outcomes
- Attract and retain staff

FINANCIAL

- Lower energy bills
- Rental - fewer and shorter void periods
- Reduces the extent and depth of fuel poverty
- Higher capital value 5-7%
- Lower maintenance & management costs
- Ability to access cheaper time of day tariffs
- Lower whole life costs
- Lower borrowing costs / Green mortgages
- Ability to access cheaper green finance
- Holds value in the event of future carbon or efficiency legislation
- Lower risk of defects litigation
- Lower risk of repetitiononal damage due to quality issues

SOCIAL

- Improved health& wellbeing of communities
- Reduced demand on health and social services
- Improved learning outcomes for children
- Economic stimulus of construction
- Upskilling of the construction workforce
- Clear statement of intent for transition to a net zero economy
- Demonstrates compliance with social value policies & targets
- Aligns with several UN Sustainable Development Goals

http://bit.ly/PHTcostbenefit

QUEEN'S UNIVERSITY BELFAST

Weavers' Hall

Purpose-Built Managed Student Accommodation

Passivhaus Classic

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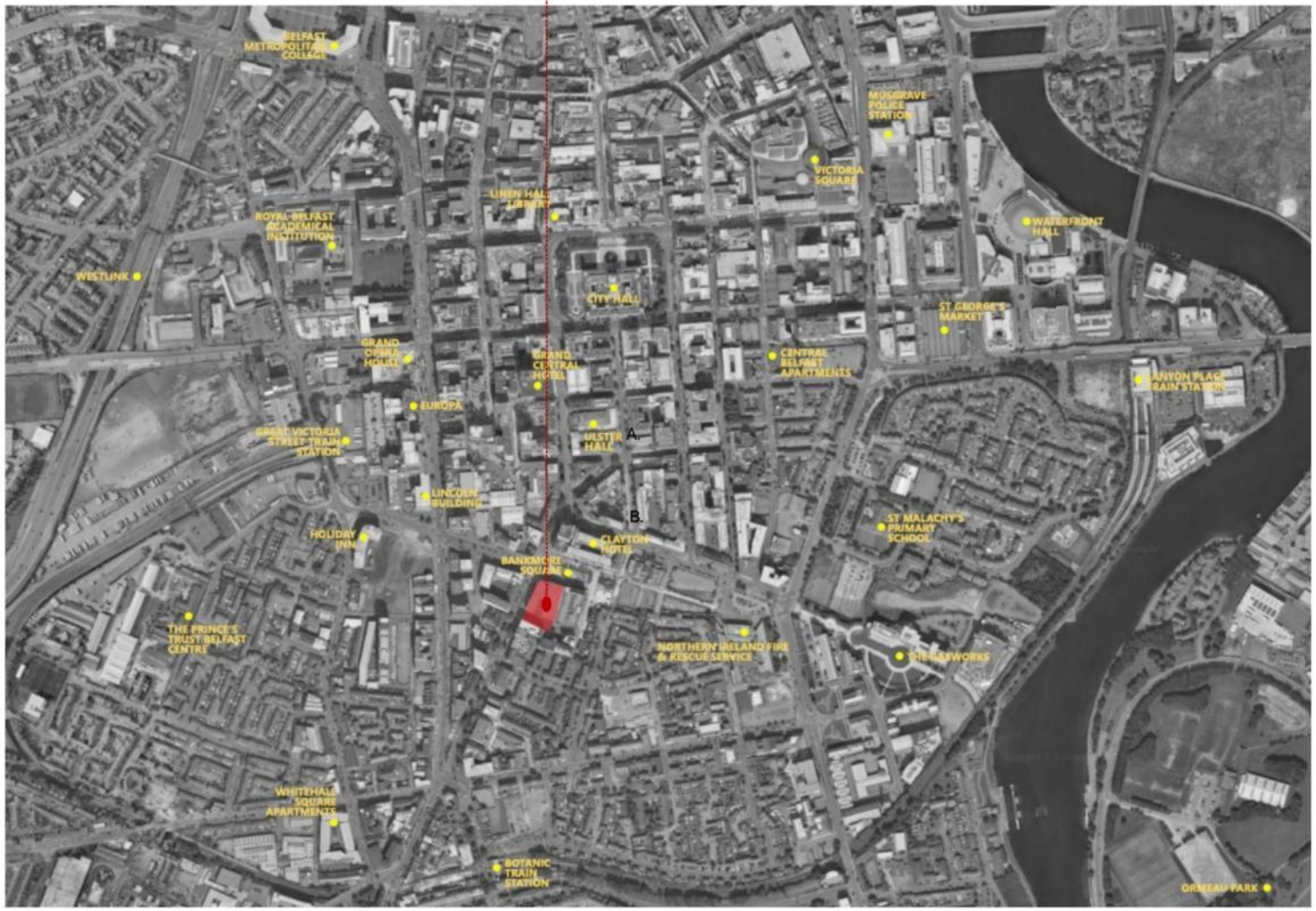
Weavers’ Hall

PURPOSE-BUILT MANAGED STUDENT ACCOMMODATION (PBMSA)



GRAHAM

ETIVE RPP ARCHITECTS

Bennett | Freehill

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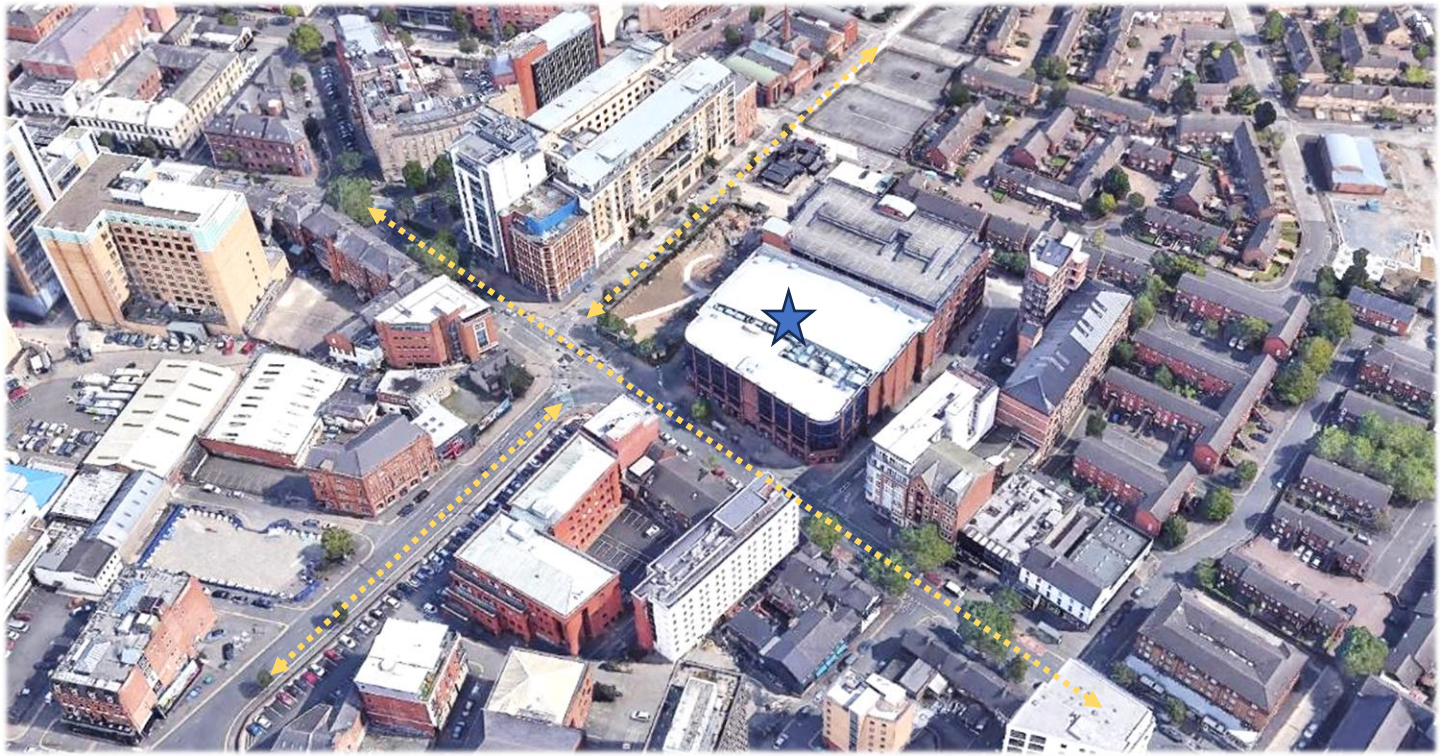
Weavers’ Hall



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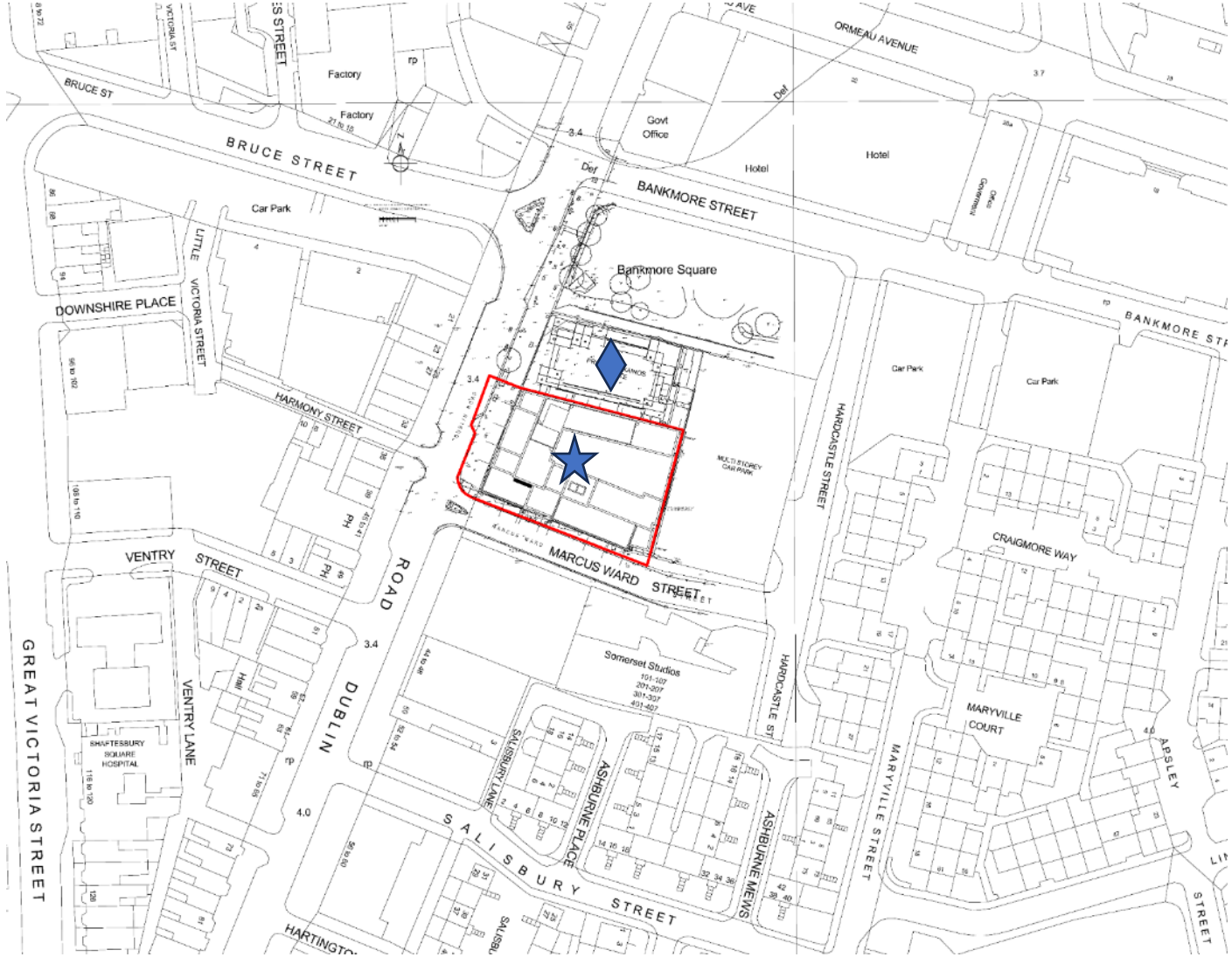
Weavers' Hall



Weavers’ Hall

DUBLIN ROAD & MARCUS WARD VUCITY SITE LOCATION & CONTEXT

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Weavers' Hall

- Feasibility of roof mounted PVs was carried out, very limited suitable space due to overshadowing, roof mounted plant etc.

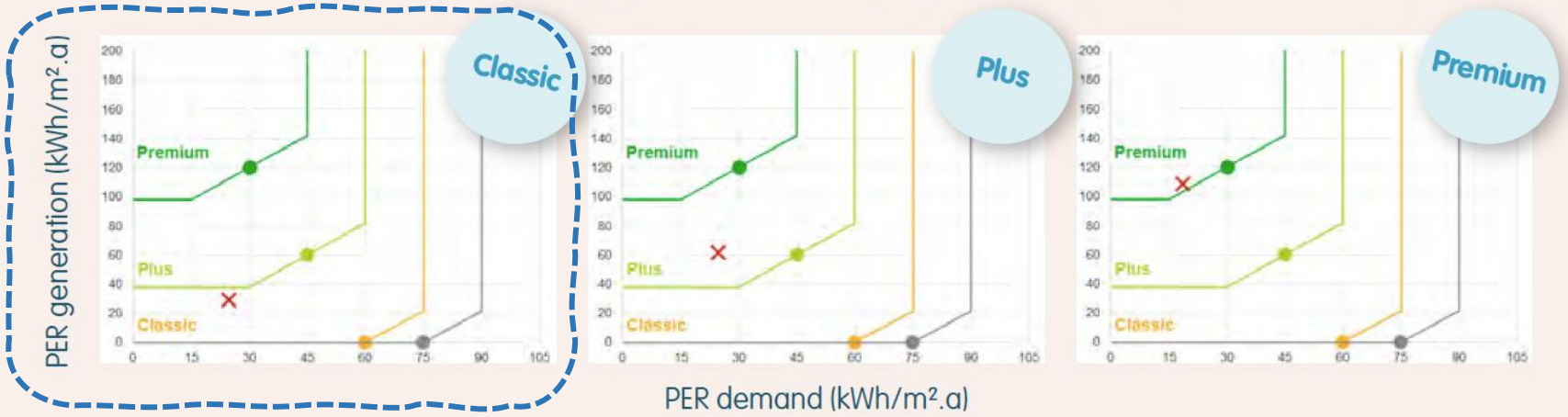

AERIAL VIEW FROM SOUTH WEST


AERIAL VIEW FROM SOUTH


AERIAL VIEW FROM S. SOUTH EAST

CLASS AMBITIONS

Get the basics right, and upgrading your Passivhaus Classic to Plus or Premium could be as easy as adding solar power and improving your appliances. The graphs below show the energy demand of a 2-storey detached dwelling (the red x) against the Classic, Plus and Premium criteria. To meet Passivhaus Classic, the house is already optimised for building performance and is heated with an efficient heat pump. Simply filling the south roof with PV upgrades the house to Passivhaus Plus, and a hypothetical step up to Passivhaus Premium would need only the addition of more PV on the north roof, best efficiency appliances and shower water heat recovery. This is one example - there are many ways to meet the higher classess.



Weavers' Hall
Mechanical Strategy

QUB – PBMSA - BLOCK PLAN LAYOUT

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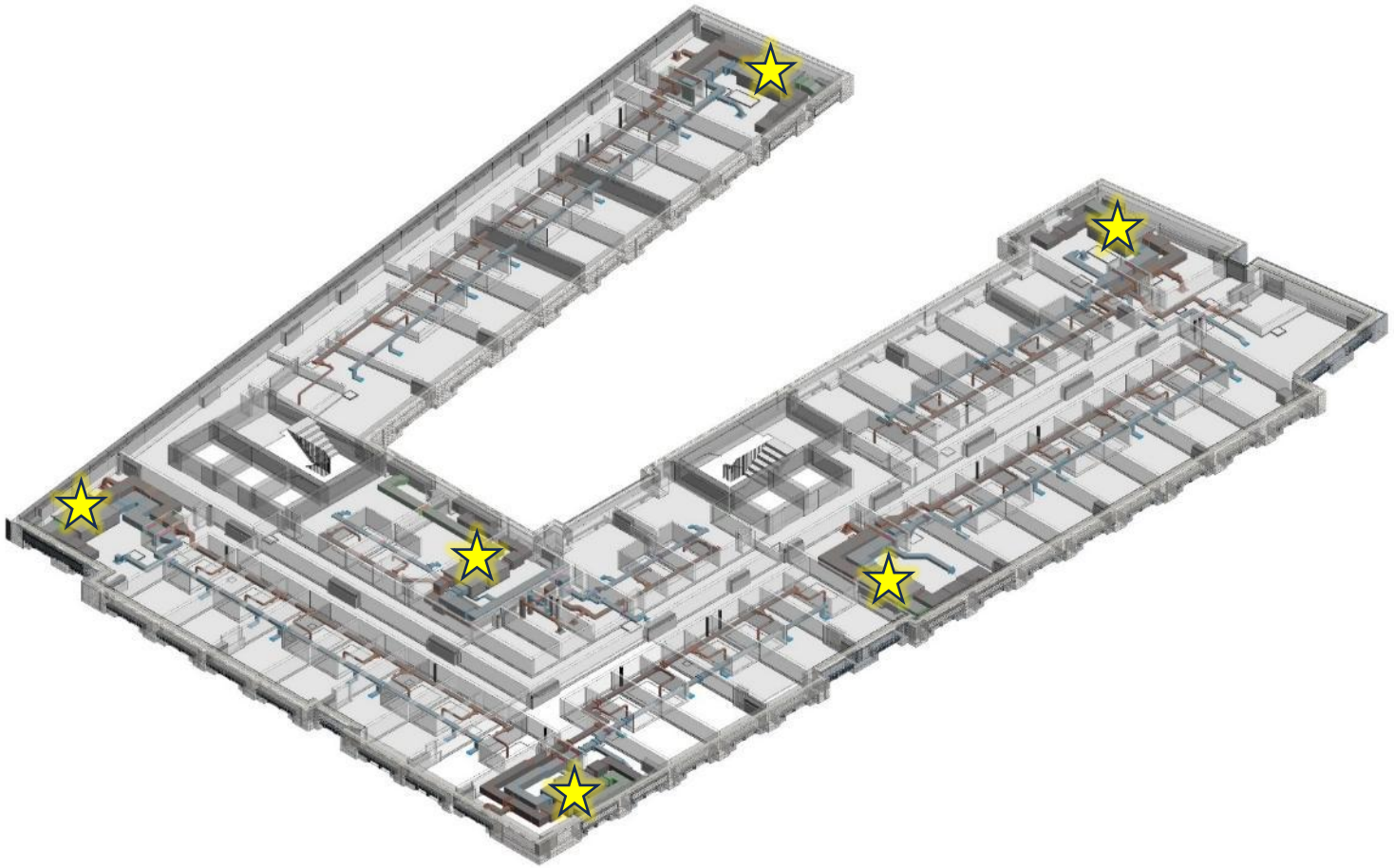
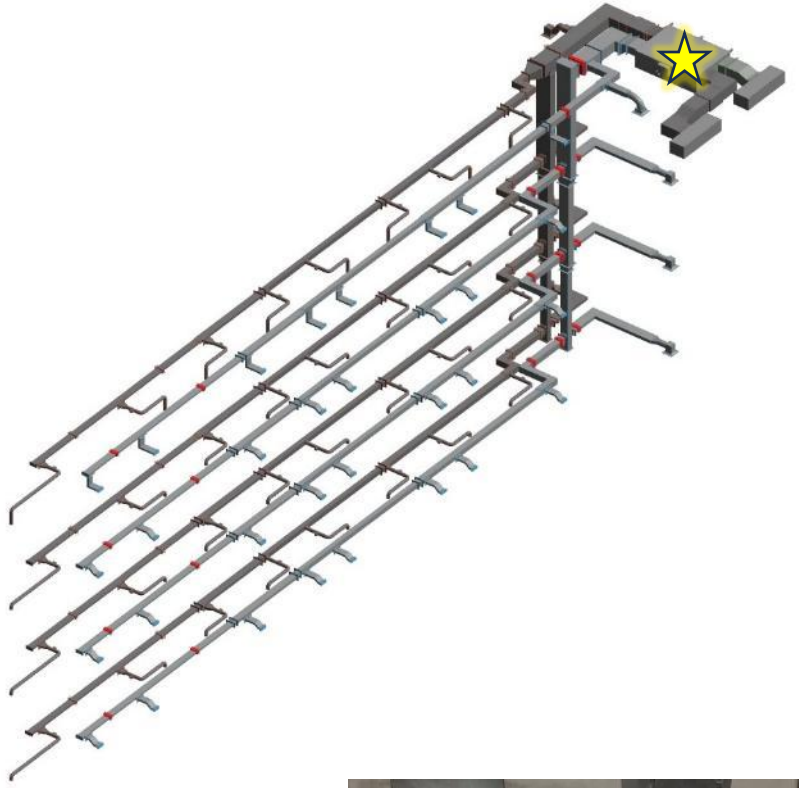
Weavers' Hall

Mechanical Strategy





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Weavers' Hall

Overview

TYPICAL STUDIO CONCEPT

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Weavers’ Hall
Overview

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Weavers' Hall
Overview

- Budget: £46.2M
- GIA: 16,700sqm
- Work Stage: RIBA Stage 5 (on-site)
- Passivhaus 'Classic' targeted
- 459 high-quality student bedrooms
- BREEAM 'Excellent'
- RC frame, SFS infill
- All electric heating
- Attenuation at roof level (blue roof)

Challenges / Opportunities

- Tight programme
- Large form/factor ratio

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GRAHAM
ETIVE
RPP ARCHITECTS
Bennett | Freehill

Performance

U-values		
Roof: 0.18W/m^{2}K	**Wall: 0.19W/m^{2}K**	**Floor: 0.12W/m^{2}K**

Designed energy performance	
Airtightness n_{50} (≤ 0.6ACH @ 50 Pa)	0.6 @ 50 Pa
Space Heating Demand (≤ 15 kWh/m².a)	6.18 kWh/m².a
Heating Load (≤ 10 W/m²)	9.34 W/m²
Primary Energy Demand (≤ 120 kWh/m².a)	76 kWh/m².a
Primary Energy Renewable (PER) Demand (≤ 60 kWh/m².a*)	58.69 kWh/m².a

Weavers' Hall

Progress to Date

Weavers' Hall

Passivhaus Trust

The UK Passive House Organisation

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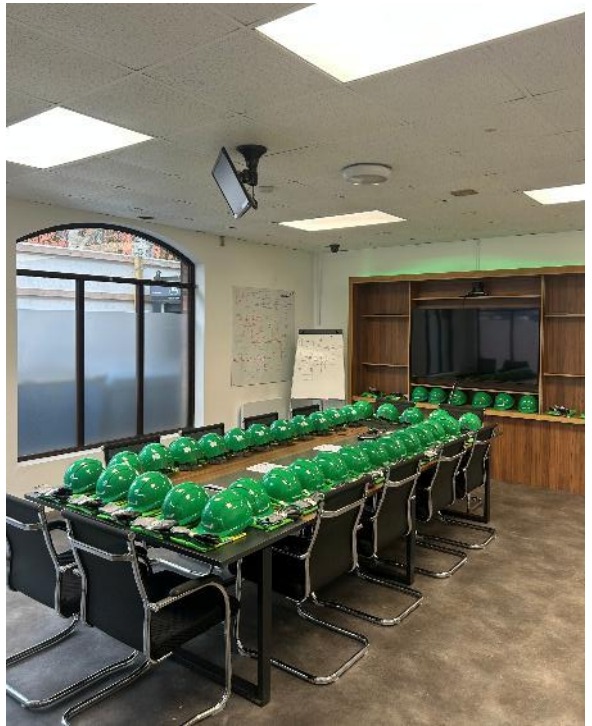
iPHA Affiliate

Weaving into Belfast's skyline: a landmark for student living

Belfast's skyline is about to get smarter. Weavers' Hall, Queen's University Belfast's first Passivhaus-certified student living tower, is setting the bar high for low-carbon student-wellbeing-centred design.

With 459 bedrooms across a 16-storey landmark, excellent air quality and the highest level of energy performance, it's more than accommodation - it's a statement of what student housing should be. Join us on 7th October as this landmark project becomes the centrepiece of our upcoming Passivhaus Masterclass, unpacking every detail from design through delivery.



Why Weavers' Hall?

- Typology was well understood – energy demand, usage etc.
- Significant amount of repeatability
- Scale of building – Appointment of a Tier 1 Contractor
- Running costs built into rental costs
- Any savings factored into lifecycle cost

OTHER CONSIDERATIONS

- 12-15% capex uplift assumed at Outline Business Case
- Other building typologies may be more challenging
- If not now, then when?
- It's the right thing to do..

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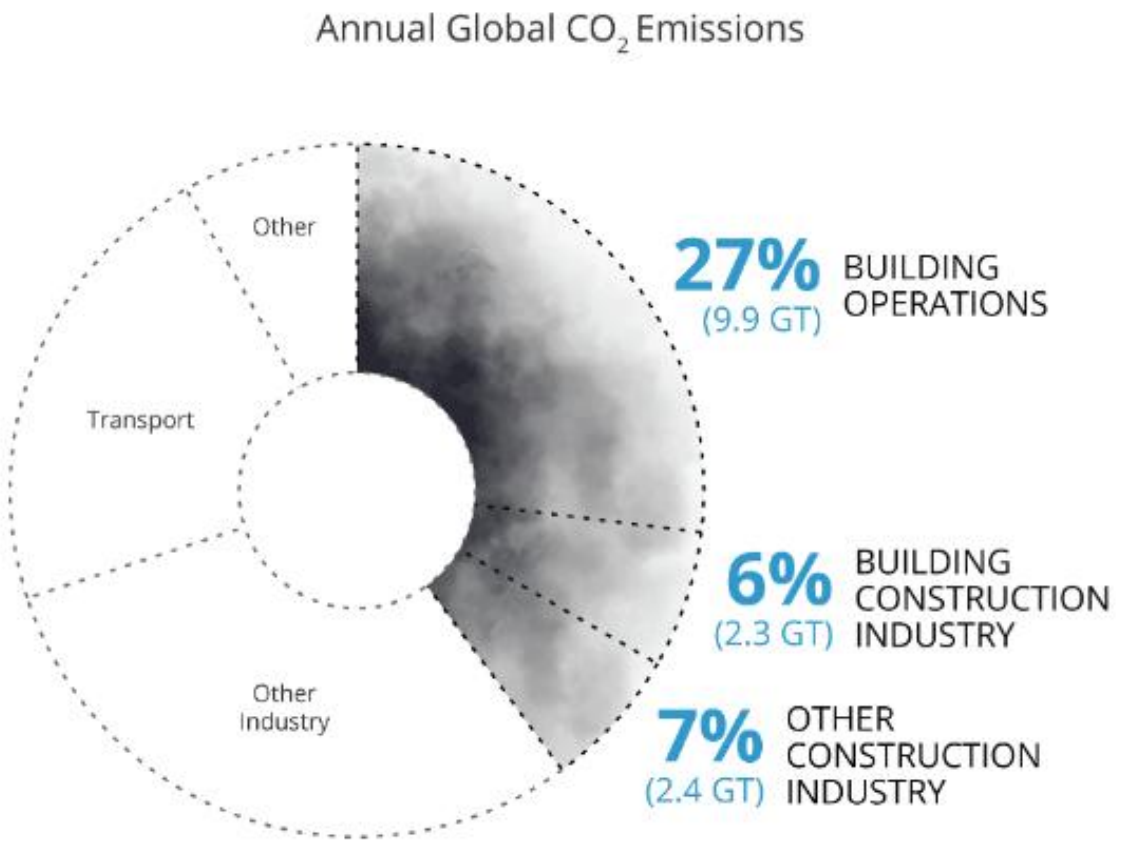
How does Passivhaus support the University's Net Zero Strategy?

Whole Life Carbon



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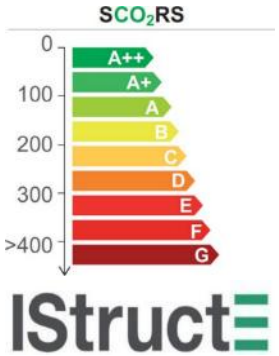
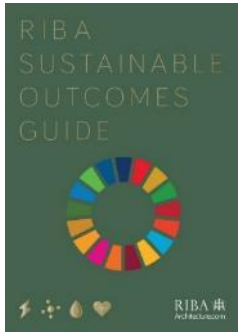
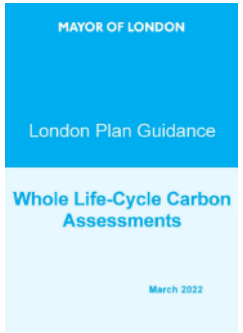
Whole Life Carbon

Whole Life Carbon = Operational Carbon + Embodied Carbon

Part L







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Climate Adaptation

Teaching	Indoor	Heatwave causes overheating of classrooms and/or workshops.	Locations on campus become too hot for staff and students to use, potential risk to safety. Reductions in productivity, comfort, and wellbeing of staff/students due to building overheating. Building closure Increased illness of students and staff.	People & Culture / Safety Services / Estates Services / Academic Staff	3	2	6	Utilisation of areas with existing air-conditioning, remote working practices where required. Monitoring of predicted extreme heat events. Ensure ventilation and cooling strategies accompany fabric improvements. Use of passive cooling / night time cooling, atrium cooling in extreme weather. Remote working. Continued mandate of Passivhaus/EnerPHit/ AECB certification.	3	1	3	Increased summer temperatures and more frequent heatwaves raise the likelihood of instances overheating.	4	1	4	Identify locations on campus least affected by overheating and prioritise use of these areas during summer months. Comms to issue an updated dress code for extreme weather. Targeted Air Con provided to key shared working areas 'climate resilient spaces' Increase shading provision indoors/outdoors through introduction of trees/biodiverse spaces.	Make physical alterations to buildings on campus to provide enhanced cooling/shading etc. Further upgrades to MEP to facilitate comfort where required. Identify research labs which may need reviewed in future for further cooling and ventilation due to specialist nature.
	Outdoor	Heatwave makes work outside unsafe	Disruption to maintenance / outdoor teaching	Academic Staff / People & Culture / Safety Services / Estates Services	2	2	4	Provision of appropriate PPE (suncream, sun protective clothing), postponement of outdoor works	2	1	2	Increased summer temperatures and more frequent heatwaves raise the likelihood of instances overheating.	3	1	3	No actions identified.	Alter teaching timetables to minimise outdoor work during peak of summer.
		Storms/flooding make work outside unsafe	Disruption to maintenance / outdoor teaching	Academic Staff / People & Culture / Safety Services / Estates Services	2	2	4	Provision of appropriate PPE (waterproofs and warm clothing etc), postponement of outdoor works	2	1	2	More frequent storm and flood events increase the likelihood of disruption.	3	1	3	No actions identified.	Develop plan to provide alternative teaching venue indoors at short notice.
		Warmer conditions increase risk of pests and disease to staff and students.	E.g. increasing risk of tick bites and infectious diseases. Increased presence of rats, hornets, wasps nest etc.	Academic Staff / People & Culture / Safety Services / Estates Services	1	1	1	Raising awareness of pests, providing repellants and encouraging inspections	1	1	1	Increasing prevalence of pests and disease increase the risks to staff and student's health.	2	1	2	Monitoring of new and developing threats and diseases. Ensure students and staff are aware and take precautions.	Deliver specific training to students and staff, plus additional protections.
	Business Travel	Heatwave causes road disruption and rail cancellations.	Staff and students are delayed or prevented from travelling.	Academic Staff / People & Culture / Estates Directorate / Contracted Travel Provider (CTM)	2	2	4	Use of Sustainable Business Travel Policy. Remote working practices until conditions improve.	2	2	4	Higher summer temperatures and more frequent heatwaves increase the likelihood of disruption.	2	2	4	No actions identified.	Arrange events to minimise travel during peak of summer.
		Flooding blocks rail and road links	Staff and students are delayed or prevented from travelling.	Academic Staff / People & Culture / Estates Directorate / Contracted Travel Provider (CTM)	2	2	4	Use of Sustainable Business Travel Policy. Remote working practices until conditions improve.	2	2	4	Increased rainfall and more frequent flooding raising the risk of disruption.	2	2	4	No actions identified.	No actions identified.
		Storms disrupt travel	Staff and students are delayed or prevented from travelling.	Academic Staff / People & Culture / Estates Directorate / Contracted Travel Provider (CTM)	2	2	4	Use of Sustainable Business Travel Policy. Remote working practices until conditions improve.	2	2	4	More frequent storm events and stronger winds increase the likelihood of disruption.	2	2	4	No actions identified.	No actions identified.

Teaching	**Indoor**	Heatwave causes overheating of classrooms and/or workshops.	Locations on campus become too hot for staff and students to use, potential risk to safety. Reductions in productivity, comfort, and wellbeing of staff/students due to building overheating. Building closure Increased illness of students and staff.	People & Culture / Safety Services / Estates Services / Academic Staff	3	2	6	Utilisation of areas with existing air-conditioning, remote working practices where required. Monitoring of predicted extreme heat events. Ensure ventilation and cooling strategies accompany fabric improvements. Use of passive cooling / night time cooling, atrium cooling in extreme weather. Remote working. Continued mandate of Passivhaus/EnerPHit/ AECB certification.

How does Passivhaus support the University's Net Zero Strategy?

- Passivhaus is **optimised for net zero; reduces demand, improves efficiency**
- It **consistently performs** to design targets
- It is the best fit for a **decarbonised grid; electrification and renewables integration**
- Reduces heating and cooling demand
- It delivers **health and wellbeing benefits**
- We can demonstrate **value for money**
- Weavers' Hall is a **'Pathway Project',** leading the way for wider rollout
- It provides teaching and research (living-lab) opportunities
- It can reduce Climate Change risk e.g. overheating

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Lessons learned?

- Set the ambition from the beginning: embed within outline business case
- Demonstrate value for money
- Early contractor involvement
- Build Passivhaus into standard documentation
- Upskilling
- Regular iterative design reviews
- Collaborate
- Consider handover: Post Occupancy Evaluation (POE).

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An Agreed Set of Principles

Net Zero Design Guide

- Refurbishment & Retrofit should be prioritised
- Passive House or EnerPHit target for all projects > £1M
- SKA Higher Education ‘Gold’ rating target for all fit-out projects < £1M
- A Whole Life Carbon (WLC) assessment for all projects > £1M
- Life Cycle Costing (LCC) – consider whole life cost rather than capital cost alone
- Additional ask for Biodiversity
- Additional ask for Soft Landings on all projects over £5M, with a reduced scope for those projects between £1 – 5M

Passivhaus aligns with our net zero commitments alongside the various strands of sustainability..

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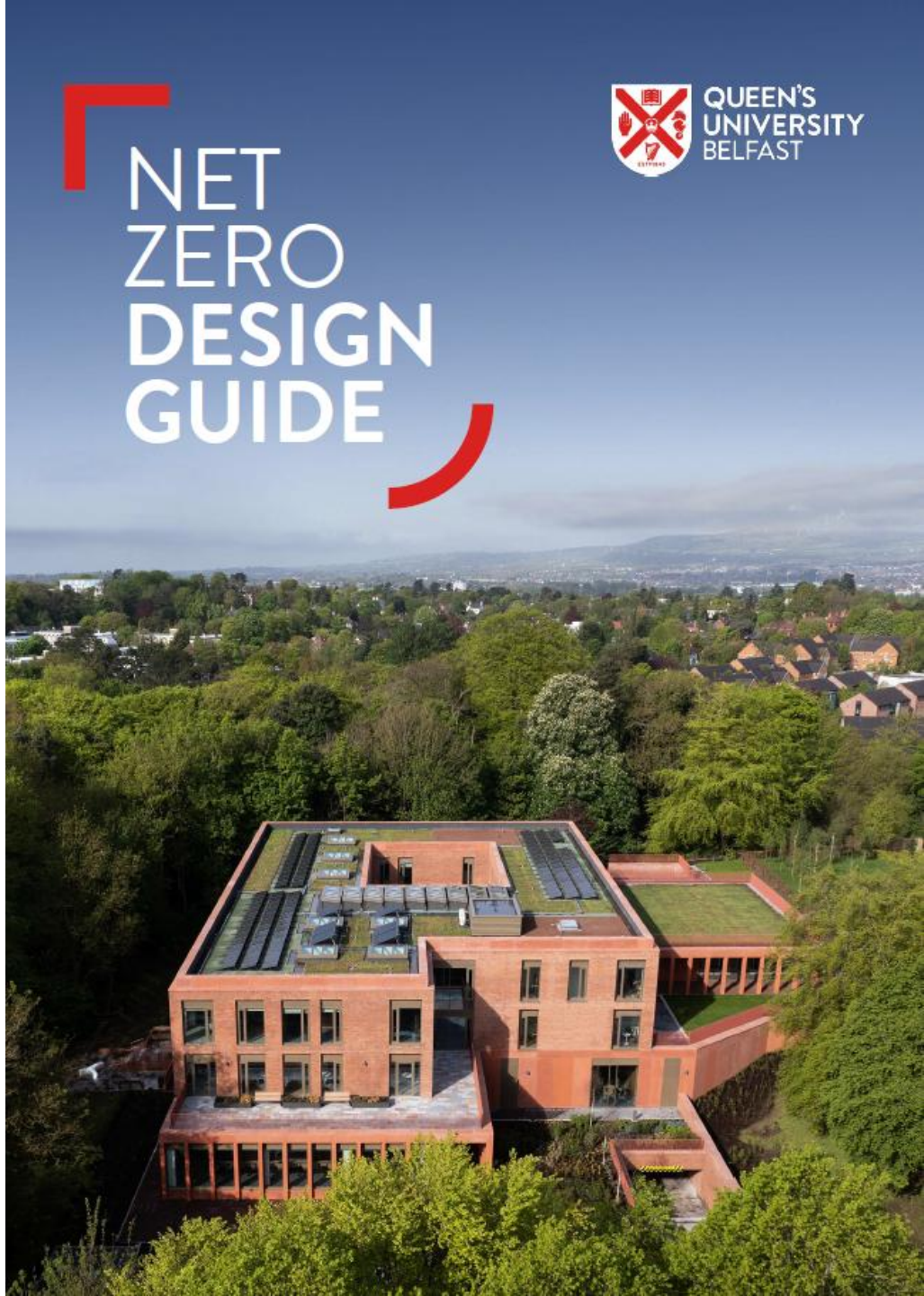

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You are warmly invited to Queen's University's annual

SUSTAINABLE CONSTRUCTION CONFERENCE

MATERIALS MATTER:
A DEEP DIVE INTO MATERIAL INNOVATION, CIRCULARITY, AND LOW IMPACT DESIGN.

TUES 24TH FEBRUARY 2026
8.45 AM – 1.20 PM
MANDELA HALL

REGISTER HERE

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EST 1845

Thank You