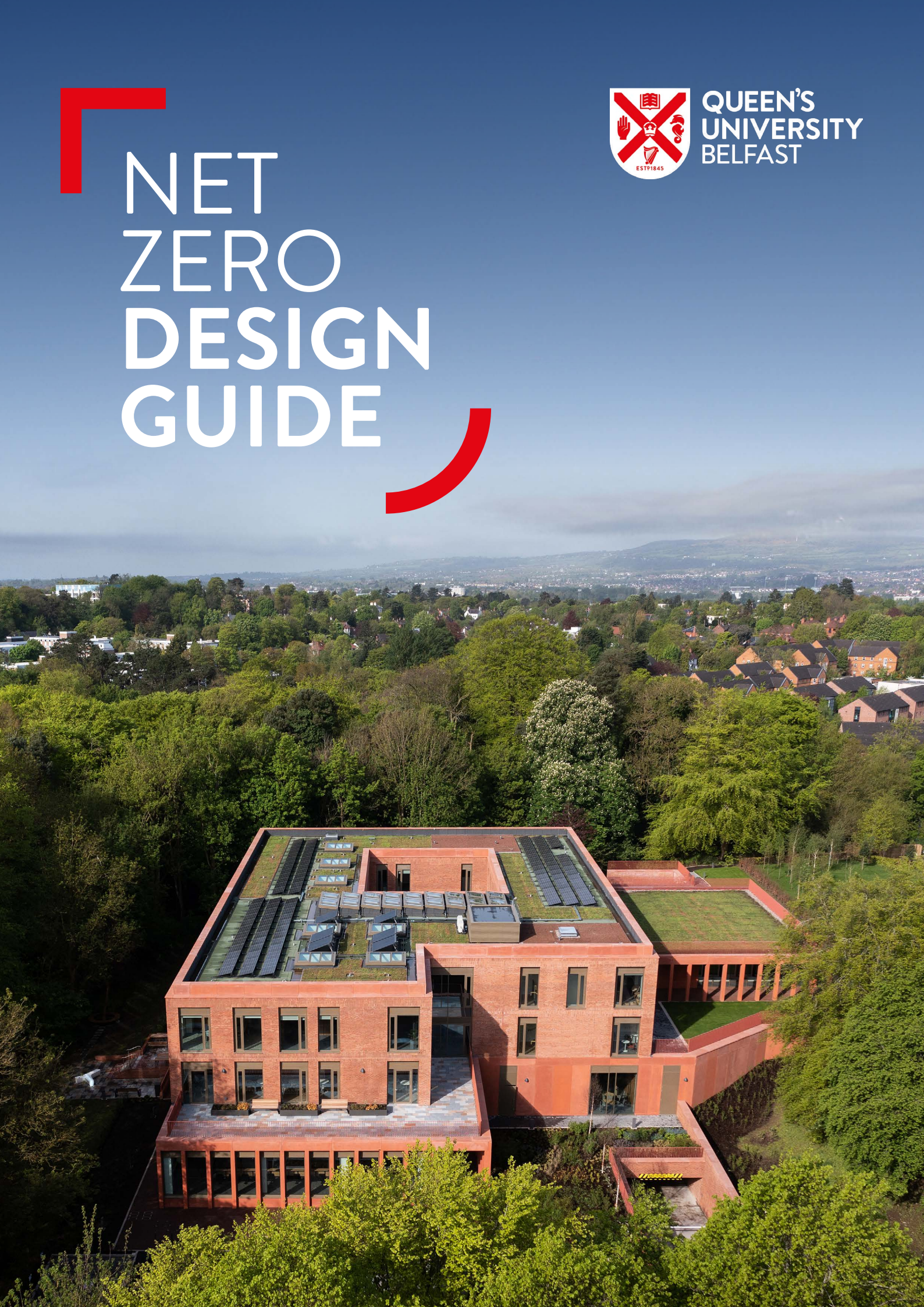
NET ZERO DESIGN GUIDE

QUEEN'S UNIVERSITY BELFAST



THE WORLD'S PEOPLE HAVE SPOKEN. THEIR MESSAGE IS CLEAR. TIME IS RUNNING OUT. THEY WANT YOU, THE DECISION-MAKERS, TO ACT NOW.

Sir David Attenborough

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Cover Image: New Student Hub at Queen's Business School (Riddel Hall)
Credit: Donal McCann

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INTRODUCTION

The Net Zero Design Guide is aimed at all stakeholders involved in the procurement of capital projects within the University. It seeks to provide a pragmatic approach to reaching net zero and is in alignment with science-based targets to deliver Net Zero emissions by 2050 and a 78% reduction by 2035 to limit global warming to 1.5 C. This design guide seeks to provide steps by which to transition from 'business as usual' towards a new 'Net Zero Approach' in accordance with the commitments of the University's Net Zero Plan launched in November 2023.

transition from 'business as usual' towards a new 'net zero approach'

The Net Zero Plan embeds the following key interventions:

1. Prioritising the re-use, retrofit and refurbishment of existing buildings over demolition and construction of new buildings.
2. Developing a sustainable design guide for construction projects focusing on design principles, targets, and sustainable and low carbon material sourcing and includes minimum requirements for all construction projects.
3. Setting design stage carbon reduction targets and enhanced sustainability criteria for each project, embedding Passivhaus, embodied carbon, and circular economy principles in specifications.
4. Developing a sustainable construction policy that requires capital works projects to undertake a Lifecycle Analysis (LCA) to achieve lower whole life carbon impact through setting embodied and operational carbon targets, with measures that will endure the value engineering process.
5. Reviewing net zero targets for capital works projects to ensure they have the correct level of ambition.
6. Continuing to review Scope 3 data and develop methodology to account for contractual measures that have been taken to reduce carbon in works contracts.
7. Collaborating with other Estates professionals, procurement consortia and contractors to stimulate action in supply chains to reduce carbon emissions. For example, via all contracts requiring carbon targets on products supplied and transport modes used and best practice sharing.
8. Investigating and investing in a transition to net zero supply chains wherever possible.

Extract from Queen's University Net Zero Plan (Queen's, 2023)

Design and construction teams play a vital role in the decarbonisation of the University Estate. Their approach to a project can make a difference of thousands of tonnes of CO2 over a building's lifetime. The University will endeavour to support and empower those involved in our capital works to make significant impact in the reduction of carbon emissions across the University.

The University will continue to use the BREEAM framework for all projects over £1M; however this will be supplemented with Passive House and EnerPHit standards on all future projects where a Whole Life Carbon (WLC) assessment and business case supports decision-making. To embed the new Net Zero Approach, the University will challenge the BREEAM framework to focus on University outcomes rather than compliance only. University capital works can be categorised into the following subsets:

1. **Major Projects** **> £250k capital value**
2. **Minor Works** **> £5k and < £250k**

This guide is structured to provide an overview of the key processes and will challenge stakeholders to ask 'plain language questions' (PLQs) of a project to ensure University outcomes are met. A greater emphasis will be given to monitoring net zero Key Performance Indicators (KPIs), recording performance and disseminating lessons learned more widely across the University.

The guide will remain as a 'live' document through periodic review and will evolve in response to industry developments and lessons learned. The guide should be read in conjunction with existing complimentary University specifications and contract information and does not detract from the obligations therein.

Where applicable the guide contains colour-coded text to highlight where PLQs are relevant to new or existing buildings.

KEY

ALL BUILDINGS
Applicable to all buildings.

NEW BUILDINGS
Applicable to new buildings only.

EXISTING BUILDINGS
Applicable to existing buildings & refurbishments only.

The University will target four key outcomes to progress our Net Zero commitments across the University Estate as shown in Figure 1 below.

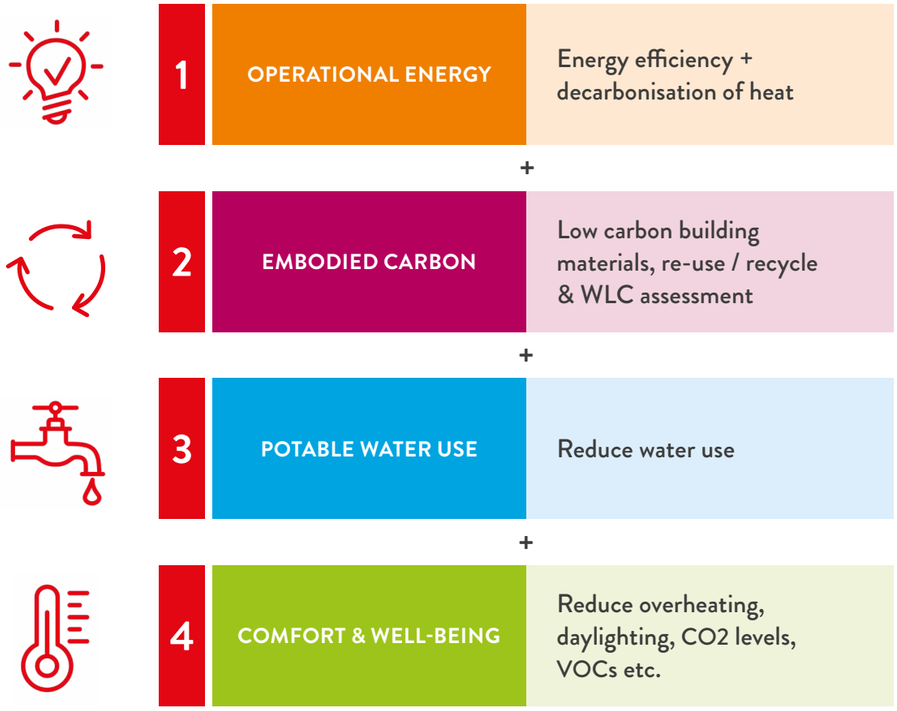

Figure 1: Queen's University Belfast, 2023.

From project initiation, all future projects should agree performance targets for each of the key outcomes above in accordance with best practice (see figure 2). These targets will be agreed and embedded within scope and budget prior to business case approval by Estates Planning. The Sustainability Team should be consulted where there are potential contradictions between the business case and the University's net zero commitments. All contract documents & KPI tracker should reflect these outcomes and be regularly reviewed and monitored by the Estate Manager responsible.

Best practice target metrics are shown in Figure 2 and will become increasingly more demanding as time progresses. The University has committed to the 2030 targets for operational energy, embodied carbon and health as highlighted (blue outline). Targets for potable water use will be considered on a project-by-project basis (yellow outline). In addition to these targets a range of wider sustainability measures will be implemented as detailed within the key themes of this document.

RIBA 2030 Climate Challenge target metrics for non-domestic buildings

QUEEN'S BASELINE

RIBA Sustainable Outcome Metrics	Current Benchmarks	2020 Targets	2025 Targets	2030 Targets	Notes
Operational Energy kWh/m²/y	225 kWh/m²/y DEC D rated (CIBSE TM46 benchmark)	<170 kWh/m²/y DEC C rating	<110 kWh/m²/y DEC B rating	<0 to 55 kWh/m²/y DEC A rating	UKGBC Net Zero Framework 1. Fabric First 2. Efficient services, and low-carbon heat 3. Maximise onsite renewables 4. Minimum offsetting using UK schemes (CCC)
Embodied Carbon $kgCO_2e/m^2$	1100 $kgCO_2e/m^2$ (M4i benchmark)	<800 $kgCO_2e/m^2$	<650 $kgCO_2e/m^2$	<500 $kgCO_2e/m^2$	RICS Whole Life Carbon (A-C) 1. Whole Life Carbon Analysis 2. Using circular economy Strategies 3. Minimum offsetting using UK schemes (CCC)
Potable Water Use Litres/person/day	>16 l/p/day (CIRA W11 benchmark)	<16 l/p/day	<13 l/p/day	<10 l/p/day	CIBSE Guide G

ASPIRATIONAL TARGET (TO BE REVIEWED)

RIBA 2030 Climate Challenge target metrics for all buildings

Best Practice Health Metrics		References
Overheating	25-28 °C maximum for 1% of occupied hours	CIBSE TM52, CIBSE TM59
Daylighting	> 2% av.daylight factor, 0.4 uniformity	CIBSE LG10
CO_2 levels	< 900ppm	CIBSE TM40
Total VOCs	< 0.3 mg/m^3	Approved Document F
Formaldehyde	< 0.1 mg/m^3	BREEAM

QUEEN'S BASELINE

Figure 2: (RIBA, 2019)

As per Figure 2, to achieve the 2030 targets the Estates Directorate will ensure all activities are embedded within the Outline Business Case (prior to approval) to avoid abortive work, additional time and cost to the project. To reach the University's Net Zero commitments by 2040, the new Net Zero Approach will include the following minimum actions:

ESTABLISH NET ZERO CARBON SCOPE

Net Zero Carbon – Construction

Net Zero Carbon – Operational Energy

REDUCE CONSTRUCTION IMPACTS

A whole life carbon assessment should be undertaken and disclosed for all construction projects to drive carbon reductions.

The embodied carbon impacts from the product and construction stages should be measured

REDUCE OPERATIONAL ENERGY USE

Reductions in energy demand and consumption should be prioritised over all other measures.

In-use energy consumption should be calculated

INCREASE RENEWABLE ENERGY SUPPLY

On-site renewable energy source should be prioritised

Off-site renewables should demonstrate additionality

OFFSET ANY REMAINING CARBON

Any remaining carbon should be offset using a recognised offsetting framework.

Extract from UKGBC: Net Zero Carbon Buildings, A Framework Definition

THE NET ZERO APPROACH

The Net Zero Approach will require a behavioural change to the procurement of our capital works across the University to achieve the target metrics highlighted in Section 1.0. This approach will require additional appointments and analysis as well as encouraging all project team members to collaborate and drive change. The Design Team will be required to use analysis to optimise low carbon design through an iterative design approach.

The key analysis required on all future capital projects over £1M include:

>£1M but <£5M
Passive House Planning Pack (PHPP) analysis
A WLC assessment (to BS EN 15978:2011 - RICS Whole Life Carbon Assessment 2nd Edition).

OR

>£5M
PHPP analysis and CIBSE TM54 for projects
A WLC assessment (to BS EN 15978:2011 - RICS Whole Life Carbon Assessment 2nd Edition).

The design team will be required to demonstrate how analysis has been used to inform design from project initiation through to in-use.

The following diagrams summarise the workflows that will be required at early design stages. The result of not applying these workflows to decision-making early in the project development stages will significantly impact a project's ability to meet the University's Net Zero commitments.

> **WE ARE AT A CROSSROADS. THE DECISIONS WE MAKE NOW CAN SECURE A LIVEABLE FUTURE**
>
> IPCC Chair Hoesung Lee

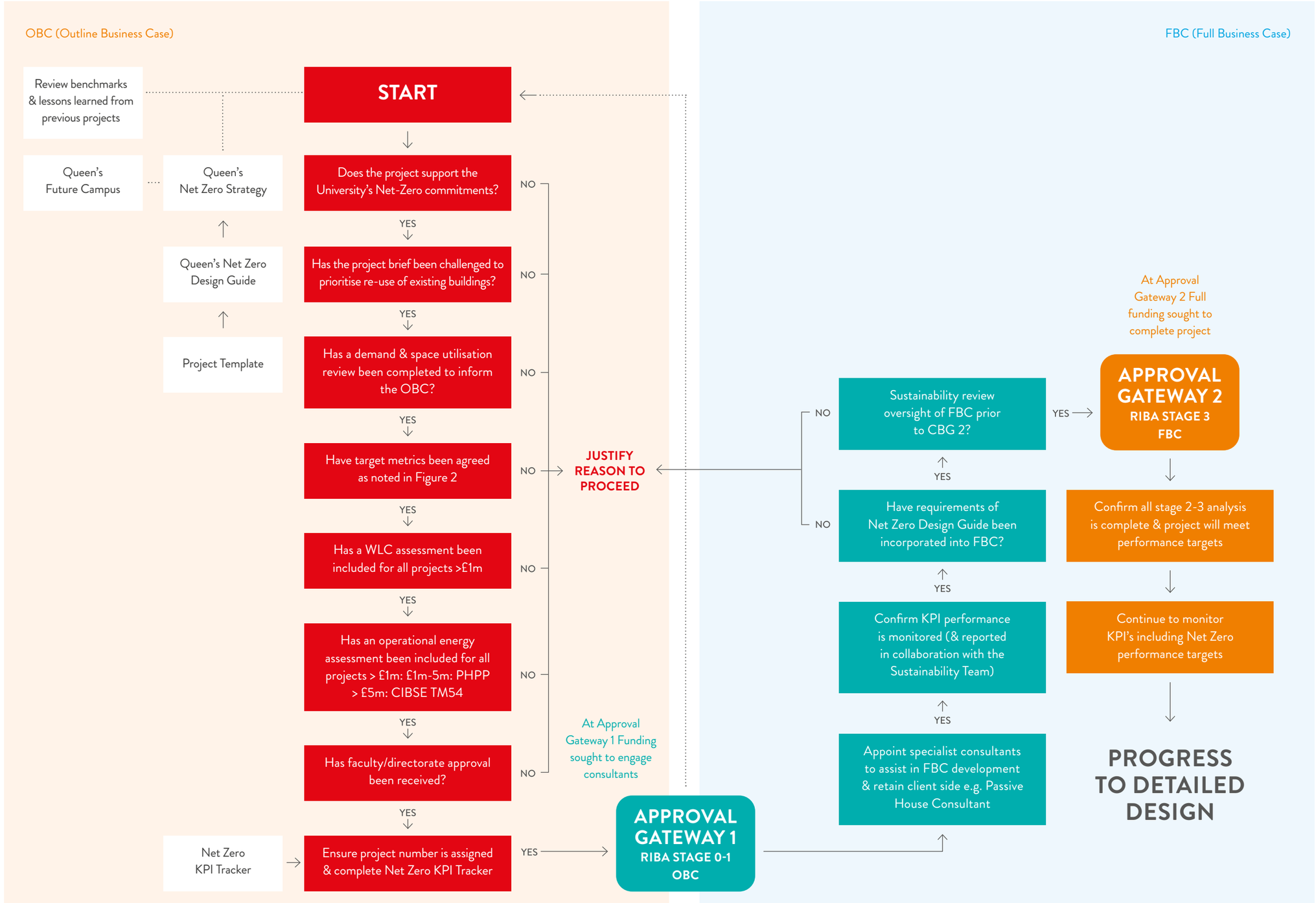

Figure 3:

PROJECT INITIATION WORKFLOW

Presents the process from project initiation through early approval gateways and key requirements that should be incorporated into all University projects prior to progression beyond RIBA Stage 3.

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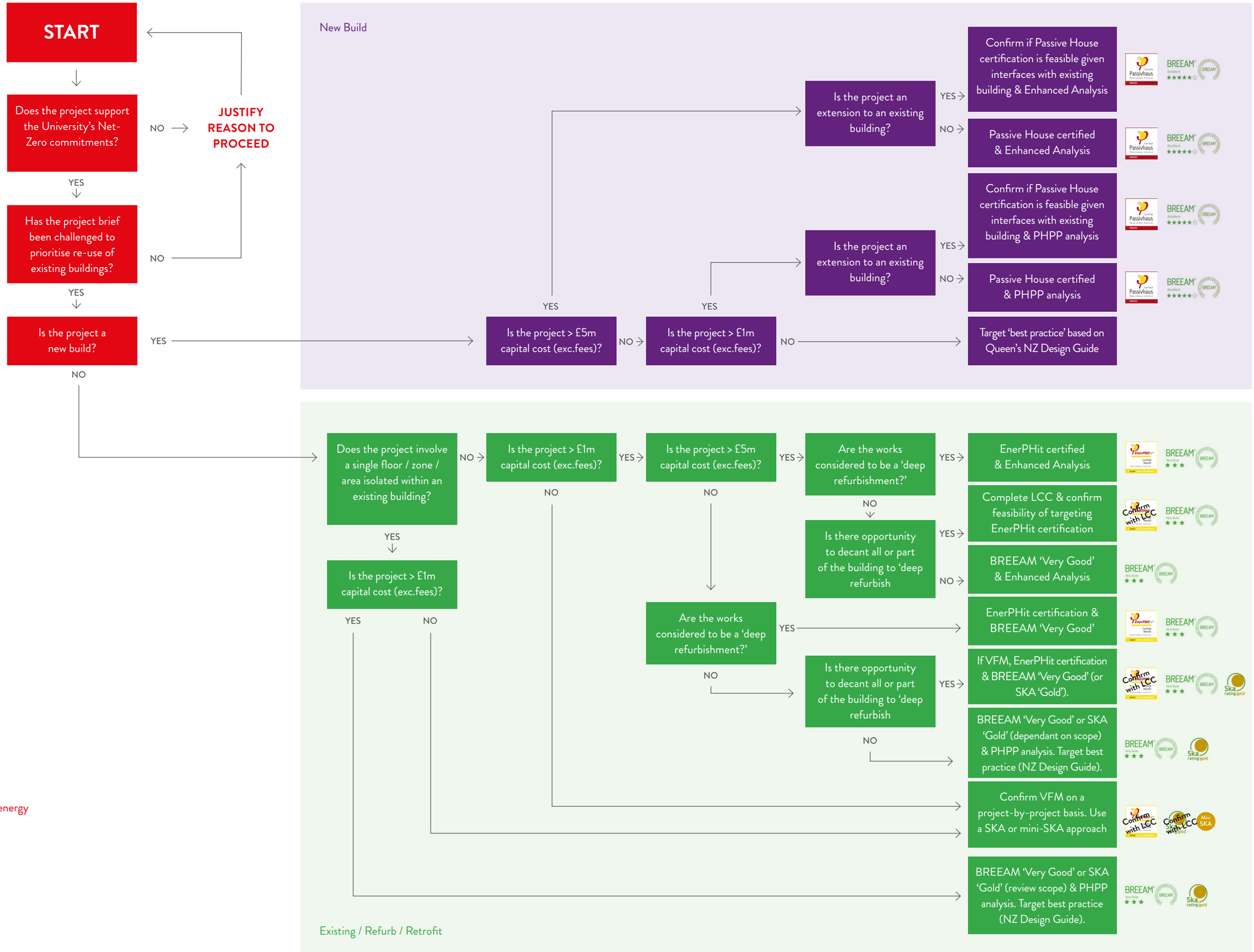
Terminology
OBC: Outline Business Case
FBC: Full Business Case
LCC: Lifecycle Cost
WLC: Whole Life Carbon Assessment
LCA: Lifecycle Assessment
EPD: Environmental Product Declaration
PHPP: Passive House Planning Package

Figure 4:

NET ZERO PROJECT CERTIFICATION & PERFORMANCE TARGETS SELECTION

Presents the pathway to choose the appropriate performance and sustainability standards and certifications for all University capital projects.



QUEEN'S UNIVERSITY BELFAST

Terminology
WLC: Whole Life Carbon Assessment
PHPP: Passive House Planning Package
LCC: Lifecycle Cost

DEFINITIONS OF ANALYSIS

Enhanced Analysis:
+ CIBSE TM54 Methodology: operational energy
+ WLC: Whole Life Carbon Assessment
+ Thermal Analysis
+ Visual Comfort Analysis

Simplified Analysis:
+ PHPP analysis: operational energy
+ WLC: Whole Life Carbon Assessment
+ Thermal Analysis
+ Visual Comfort Analysis

KEY THEMES

The key themes have been selected to provide insight into the outcomes required for all University capital projects. Plain Language Questions (PLQs) have been included to assist Estates Managers, Design and Contractor Teams to consider the critical issues across a project's lifecycle. The PLQs have been developed to supplement University requirements and should be read in conjunction with all appended specifications, contract and tender information and does not diminish responsibility of achieving the requirements within. Where applicable, document links have been included for further reading.

ACRONYMS

HEP:	Head of Estates Planning
EM:	Estates Manager
DT:	Design Team
C:	Contractor
PHC:	Passive House Consultant
BA:	BREEAM Assessor
SA:	SKA Assessor
SLC:	Soft Landings Champion (also referred to as owner's representative)

3.1 PROJECT ASSUMPTIONS

At project initiation, decision-making will set the future trajectory of our capital projects. This can be problematic if Lifecycle Cost (LCC) and Whole Life Carbon (WLC) analysis are not properly considered and incorporated into the business case and project brief. There is huge opportunity to influence carbon reduction at these earlier design stages.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Prioritise the retention, re-use and repurposing of existing buildings.**	Less embodied carbon associated with reuse of existing fabric.	• Review existing building stock as means to accommodating functional requirements	• Minutes & business case	HEP/EM
02	**Prior to project initiation, has the business case and project brief been adequately challenged?**	University business case should be challenged to build less, build lean and use share facilities to reduce embodied carbon.	• Review business case considering the principles of retention, re-use and repurposing	• Minutes & business case	HEP/EM
03	**Has a space / demand review been completed prior to project initiation?**	To avoid new build where existing accommodation can be re-used, significantly reducing embodied carbon.	• Consider use of existing building stock or shared facilities over new build	• Minutes & business case • Space/demand review on file	HEP/EM
04	**Does the project support the University's net-zero commitments?** See Queen's Net Zero Plan	All capital works must be considered against carbon impact to fulfil University's strategic goals.	• Justify rationale to proceed if it does not	• Notice of derogation with supporting LCC analysis on file signed by Director of Estates	HEP/EM
05	**Have precedent benchmarks been reviewed for building type and use?**	To confirm likely performance targets and strategy for achieving these.	• Confirm approach to meeting benchmarks for building type	• Minutes & business case	EM/DT
06	**Have performance targets been set for operational energy, embodied carbon, potable water use and comfort / well-being?**	To embed the level of quality & performance from project initiation to avoid additional cost & time.	• Justify rationale to proceed if performance targets are not aligned with best practice (i.e. p5 RIBA 2030 Climate Challenge)	• Notice of derogation with supporting LCC analysis on file signed by Director of Estates.	EM/DT
07	**Have lessons learned been reviewed?**	To avoid repeat of common issues.	Confirm approach to avoiding repeat of historic mistakes	Minutes Incorporated into Soft Landings kick-off	EM/DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
08	**Has a Sustainability Statement & the Net Zero KPI Tracker been completed with key performance requirements agreed?**	To provide clarity to design team on required Net Zero Carbon KPI's against which the project will be measured.	Prepare sustainability statement & Net Zero KPI Tracker to include: • Performance targets • Project opportunities (and constraints) • Certifications, standards and design guidance to be implemented • Deliverables to show evidence of compliance • Reporting requirements and pro-forma	• Include sustainability statement & KPI Tracker within project brief	EM/ PHC
09	**Do all procurement documents reflect the requirements of the Business Case and reflect the principle of the Net Zero Design Guide?**	To ensure project success and avoid additional cost and time.	Confirm adequate analysis is included: • Operational Energy • Embodied Carbon • Comfort and Well-being • Water Consumption	• Procurement documents	EM/ PHC
10	**Has a certified Passive House designer been appointed client side to assist in brief preparation.**	To ensure project success and avoid additional cost and time.	• Appoint Passive House consultant at Stage 0-1	• Appointment document • Scope of Services	EM/ PHC
11	**Has a Net Zero Carbon Champion been identified?**	To monitor and report throughout the project on Net Zero Carbon KPI's.	• Confirm Net Zero Carbon Champion and ensure they are aware of their duties	• Reporting of KPI compliance	EM
12	**Have the DT assigned responsibilities to achieve operational energy use?**	Determining responsibilities assures clarity surrounding risk management.	• Identify project team responsibilities to achieve operational energy use targets including the calculation of operational targets, documenting assumptions behind these, managing risks and validating in-use performance	• Scope and responsibility matrix	EM
13	**Has LCC and WLC been embedded into project scope and budget from project initiation?**	To ensure decision making is based on sound whole life cost and carbon analysis. Appropriate weighting must be given to both in any Value Engineering decision-making.	• Carry out LCC and WLC analysis on all capital projects	• Reports on file • Stage reports	HEP/ EM

3.2 CONCEPT DESIGN

The early design stages offer a critical opportunity to affect the fundamental characteristics of a project. Proper analysis of design options should be carefully considered and optimised through 'rules of thumb' and reference projects.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have the requirements of LETI suite of documents been fully considered and implemented where appropriate?**	To drive carbon reduction across University works.	• Review best practice industry guidance and confirm approach to attainment leti.uk/publications	• Minutes	EM
02	**Has the refurbishment / re-use of existing buildings been prioritised?**	To retain and re-use embodied carbon in existing buildings rather than create more.	• Carry out space / demand review of existing buildings • Challenge project brief and business case	• Outline Business Case • Minutes • Brief	HEP/EM
03	**Have performance targets been established prior to the commencement of RIBA Stage 2?**	To benchmark the project against industry taking account of typology, use, scale and complexity assisting in driving carbon reduction across the University.	• Establish performance targets prior to RIBA Stage 2		EM
04	**Has equal or greater weighting been assigned to operational energy performance than to aesthetics considerations in the overall context of design, pre-application and determination process?**	Aesthetics should not be given priority over operational energy performance.	• Carry out workshops and statutory engagement early in the design process • DT to agree design opportunities / decisions throughout with a view to carbon reduction	• Workshop minutes • Interim reporting	DT
05	**Has the site been optimised through good design e.g. orientation, overshadowing, outdoor spaces, minimising cut/fill etc.?**	To ensure project is not prejudiced for Passive House certification, optimisation of operational energy use, comfort and well-being or requires significant site works.	• Implement Passive Design principles such as optimum orientation (solar gain), shading and shelter from prevailing wind • Consider layout and grouping of spaces within building • Potential location of renewable technologies • Optimised cut and fill	• Site analysis • Initial PHPP analysis (excel) • Cut / fill analysis • LCA reports • End of stage WLC Assessment	DT PHC/DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	**Has the efficient use of materials been incorporated into the design?**	Overarching principles required in all projects to reduce embodied carbon.	• Carry out workshop at RIBA Stage 2,3 and 4 to review and monitor carbon impact of project using a Whole Life Carbon (WLC) Assessment • Use of carbon calculation software to inform design	• Strategy agreed with EM through carbon reduction software	DT
07	**Have structural options been reviewed to confirm embodied carbon impact?**	To reduce embodied carbon within design.	• Carry out optioneering studies utilising carbon calculation software to optimise design	• LCA reports • End of stage WLC Assessment	DT
08	**Has the structural grid been optimised?**	To reduce embodied carbon within repetitive elements.	• DT to provide structural optioneering set against LCA analysis with cost information	• LCA reports • Presentation	DT
09	**Has the use of raised access floors been avoided?**	To avoid reliance on a high embodied carbon system.	• Carry out design options to avoid use of raised access floor where practical	• Stage 2 Report • GA Sections	DT
10	**Have robust and natural materials been used?**	To reduce the need for repair, replacement, cleaning and maintenance.	• Consider material strategy in key project areas i.e. substructure, superstructure, façade, interiors, FF&E	• Minutes • Stage 2 report	DT
11	**Has the design approach considered the use of exposed structure and services?**	To reduce surplus finishes (embodied carbon).	• Justify rationale to proceed if it does not	• Rationale with supporting LCC & WLC reporting	DT
12	**Do basements form part of the design?**	Considerable embodied carbon associated with basement construction.	• No basements should be included within design, consider if plant or car-parking can be accommodated elsewhere	• Stage 2 report	DT
13	**Has glazing ratio, form factor and orientation been analysed to provide optimum design for space heating demand?**	To reduce space heating demand (carbon emissions).	• Design team to comply with Passive House performance targets	• PHPP reports, calculations and massing studies as part of Stage 2 report	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
14	**Maximise natural lighting.**	To reduce energy demand (carbon emissions).	Prepare sustainability statement to include: • Performance targets • Project opportunities (and constraints) • Certifications, standards and design guidance to be implemented • Deliverables to show evidence of compliance • Reporting requirements and pro-forma • Carry out daylighting analysis to optimise daylight in accordance with BS EN 17037:2018	• Include sustainability statement within project brief • daylighting analysis reports	EM
15	**Consider use of natural ventilation, optimisation of thermal mass where appropriate and as part of holistic design approach.**	To reduce energy demand (carbon emissions).	• Confirm adequate analysis is included for: • Operational Energy • Embodied Carbon • Comfort and Well-being	• Procurement documents	DT
16	**Has Design for Manufacture and Assembly (DFMA) been considered?**	To aid buildability and reduce wastage.	• Consider approach to construction	• Minutes	DT
17	**Does the design comply with the principles of 'Design for Disassembly'?**	For ease of disassembly, waste processing and disposal of any parts of product or building.	• Confirm approach to design for disassembly best on industry best practice • Design building systems & interfaces that are simple to understand. • Standardise elements, use repeating, regular patterns where possible. • Simplify and separate building systems, use a layered approach to keep elements of the building (with different anticipated liftspans) separate	• Minutes • Approach included in stage reports • Marked-up drawings	DT
18	**Reduce building size, material quantity and complexity.**	To reduce embodied carbon through efficient design.	• Confirm approach to design for disassembly best on industry best practice		DT

3.3 PASSIVE HOUSE

The University will target Passive House certification for all new and existing building projects above £1M. Feasibility using LCC analysis should be carried out on a case-by-case basis for all projects below this threshold to confirm whether Passive House provides value for money. Where certification is not targeted, a derogation should be sought from the Director of Estates with clear justification and impact based on WLC assessment and LCC decision-making evidenced. This should also be reviewed by the Estates Management Group (EMG) for comment.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has Passive House been targeted on new build projects over £1m? (Aspire to 'Plus' and 'Premium' where renewable technologies can be incorporated).**	To reduce operational energy use in new buildings.	• Target Passive House approach from project initiation and ensure business case supports additional appointments • Engage certified Passive House Designer at Stage 0-1 to inform the business case and project brief	• Appointment documents' • Clear requirement within brief	EM
02	**Has EnerPHit been targeted on all deep refurbishment projects over £1m? (Aspire to 'Plus' and 'Premium' where renewable technologies can be incorporated).**	To reduce operational energy use in existing buildings.	• Target Passive House approach from project initiation and ensure business case supports additional appointments • Engage certified Passive House Designer at Stage 0-1 to inform the business case and project brief	• Appointment documents • Clear requirement within brief	EM
03	**Has the DT considered the outcomes of the Queen's 'pathway projects' for lessons learned prior to appointment?**	To gain lessons learned and avoid pitfalls.	• Refer to 'pathway projects' for lessons learned and general awareness prior to project commencement	• Workshop minutes to confirm approach	DT
04	**Has the project adopted Passive House design approach from project initiation?**	To avoid additional cost.	• Embed Passive House approach and set performance targets from project initiation	• Business case	EM/DT
05	**Has the RIBA Plan of Work Passive House Overlay been consulted for stage-by-stage activities?**	To avoid additional cost and risk to project.	• Review and assign roles and responsibilities in accordance with RIBA Plan of Work Passive House Overlay	• Passive House Certification	DT
06	**Have the certification values for Passive House been communicated and approach determined for certification?**	Air-tightness target: ≤0.6m3/hr/m2 at 50 Pa. Wall U-value target: based on PHPP modelling. Floor U-value target: based on PHPP modelling. Roof U-value target: based on PHPP modelling.	• Confirm approach to achieving performance targets	• Workshop minutes • PHPP Reports	PHC/ DT/C
07	**Have the certification values for EnerPHit been communicated and approach determined for certification?**	Air-tightness target: ≤1.0m3/hr/m2 at 50 Pa; Wall U-value target: based on PHPP modelling; Floor U-value target: based on PHPP modelling; Roof U-value target: based on PHPP modelling.	Confirm approach to achieving performance targets	Workshop minutes PHPP Reports	PHC/ EM/DT
08	**Are the Project Team adequately trained and certified?**	Passive House design requires specialist training and experience.	Ensure all project team members are suitably trained.	Appointment documents	EM

3.4 PERFORMANCE TARGETS

Where Passive House certification is not achievable, a derogation should be sought from Director of Estates in writing and clear justification / impact based on WLC and LCC decision-making evidenced within.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have performance benchmarks been agreed were Passive House is not targeted?**	Where Passive House is not targeted a set of performance targets should be set from project initiation to avoid additional cost and time.	• A derogation should be sought in writing with clear justification / impact based on WLC and LCC decision-making evidenced	• Notice of derogation with supporting LCC analysis on file signed by Director of Estates	EM
02	**Has SKA HE Gold been targeted for the refurbishment / retrofit project? skarating.org**	To benchmark the University's refurbishment projects and drive carbon reduction.	• Confirm that project is eligible for accreditation • Confirm scheme type and scope of assessment (Cat A or B) • Embed SKA HE 'Gold' rating requirement within appointment documents, include scope of services for SKA Assessor	• Appoint SKA assessor at RIBA Stage 2. • Confirm SKA profile	EM
03	**Has a SKA assessor been appointed?**	Required for accreditation.	• Appoint SKA assessor	• Appointment documents • Ensure 'lines of communication' are agreed between SKA assessor and design team	EM
04	**Have best practice performance targets been agreed in accordance with RIBA 2030 Climate Challenge?**	To achieve the University's strategic goals.	• Confirm key performance targets at RIBA Stage 1 • Confirm air-tightness strategy and testing regime • Contractual requirement for attainment and testing • Confirm specification of air-tight products (lifespan etc)	• Targets clearly written into brief and sustainability statement • Air tightness line clearly shown on drawings • Strategy and update included with stage reports • PHPP reports included in stage reports • Testing should be completed in line with BS EN 13829 by operatives qualified to test to TS3. Average positive and negative pressure tests between 10 and 100 Pa should be taken • Confirm air-tightness risks in O&M manual to protect against future penetration • Photographic record of junction details during construction • Signed test certificates	EM/DT
05	**Where Passive House / EnerPHit certification is not feasible have the AECB Carbonlite (or similar) performance targets been integrated into scope & budget?**	To reduce energy use & improve comfort & well-being.	Target performance targets as follows: • Embodied carbon target: < 750kgCO_2e/m2 (new build office). Aspire for betterment • Operational energy target: < 0 to 55 kWh/m2/y and DEC A rating • Potable water use target: < 10 l/p/day The baseline performance targets are as follows: • New build air-tightness target: ≤1.5m3/hr/m2 as a minimum (AECB Carbonlite New Build) • Retrofit air-tightness target: ≤2m3/hr/m2 as a minimum Retrofit Step-by-step approach air-tightness target: ≤5m3/hr/m2 as a minimum (AECB Carbonlite Retrofit) • Wall, Floor and Roof U-value target: as determined by PHPP modelling to achieve baseline targets		DT

3.5 EXTERNAL ACCREDITATIONS

The University require project teams to challenge the 'historic' approach to external accreditation where it can become a 'tick box' exercise. The new net zero approach will require a step change to an outcome-based approach not compliance only. It is critical that where an external accreditation is used, analysis undertaken (resulting in cost to the project) is fed back into an iterative design process from concept design. Value for money and achieving University net zero outcomes should be a priority in all University projects moving forward.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has a WLC assessment been included with scope and budget for all projects > £1M,** in accordance with BS EN 15978, RICS PS 2 methodology.	This requirement is critical to benchmark and reduce carbon through iterative design based on analysis.	• Ensure analysis is included within scope and fee from project initiation • Carry out assessment to inform decision-making	• Analysis reporting and evidence of informed design approach based on results	EM
02	**Has the BREEAM profile been adequately challenged with a bias towards University outcomes rather than compliance?**	BREEAM may become a 'tick box' exercise if the BREEAM profile is not carefully tailored to optimise carbon savings.	Target performance targets as follows: • New Build: BREEAM 'Excellent' (projects > £1M) • Existing Buildings: BREEAM 'Very Good' (projects > £1M)	• BREEAM Tracker. • Minutes	BA
03	**Has BREEAM 'Excellent' been targeted for all new build projects > £1M?**	To benchmark the University's new build projects and drive carbon reduction.	• Set-up Tracker Plus and provide Queen's access • Carry out thermal analysis • Carry out daylighting analysis • Carry out LCC analysis • Carry out Operational Energy analysis (CIBSE TM54 2022)	• Gateway reports and accreditation • Analysis reporting • PHPP reporting (projects <£5m)	EM
04	**Has BREEAM 'Very Good' been targeted for all refurbishments over £1M with an aspiration to 'Excellent'?**	To benchmark the University's refurbishment projects and drive carbon reduction.	• Embed BREEAM requirement within tender documents, include scope of services • EM/DT should highlight any opportunities to improve University outcomes	• Achieve BREEAM Very Good	EM
05	**Has a BREEAM assessor been appointed?**	Responsible for BREEAM compliance.	• Appoint BREEAM assessor	• Appointment documents • Ensure 'lines of communication' are agreed between BREEAM assessor and design team	EM
06	**Has SKA HE 'Gold' been targeted for the refurbishment / retrofit project less than <£1M?**	To embed sustainability within the University's refurbishment projects, benchmark projects against best practice and drive carbon reduction.	• Confirm that project is eligible for accreditation • Confirm scheme type and scope of assessment (Cat A or B) • Embed SKA HE 'Gold' rating requirement within tender documents, include within scope	• Included in scope and budget • Appoint SKA HE assessor at Stage 2	EM
07	**Has a SKA assessor been appointed?**	Required for SKA accreditation.	• Appoint SKA assessor	• Appointment documents • Ensure 'lines of communication' are agreed between SKA assessor and design team	EM
08	**Has 'Tracker Plus' been set-up at RIBA Stage 2 and has access been provided to EM and Sustainability Team?**	To provide transparency / oversight of BREEAM.	• Set-up 'Tracker Plus' and provide invitation and training to appropriate Queen's Staff • Retain all non-targeted credits within overview	• Email invite notification to portal and confirm Queen's staff have access	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
09	**Have the following credits been targeted for all projects > £1M within scope and budget in addition to the minimum BREEAM credits:** • Hea 01 – Visual Comfort (Daylighting) • Hea 04 – Thermal Comfort Analysis • Ene 01 – Reduction of energy use and carbon emissions • Mat 01 – Lifecycle Impacts	To ensure appropriate analysis is completed to direct building design, and to ensure climate resilience is achieved.	• Ensure specific BREEAM credits are included within brief and scope of services from project initiation to avoid additional cost • Carry out thermal analysis • Carry out daylighting analysis • Carry out WLC assessment (RICS BS EN 15978 methodology) • Carry out LCC analysis • Carry out Operational Energy analysis (CIBSE TM54 2022)	• Gateway reports demonstrating iterative design approach and use of analysis to affect design outcomes • BREEAM accreditation • Analysis reporting • PHPP reporting (projects <£5m)	EM/DT
10	**For projects > £1m (or where deemed suitably complex), has an 'Operational Carbon Assessment' based on CIBSE TM54 (current addition) modelling process been included within scope and budget?**	For projects > £1m (or where deemed suitably complex), has an 'Operational Carbon Assessment' based on CIBSE TM54 (current addition) modelling process been included within scope and budget?	• Ensure analysis is included within scope and fee from project initiation • Carry out assessment to inform decision-making	• Ensure analysis is included within scope and budget from project initiation • Carry out assessment to inform decision-making	EM
11	**For projects > £1m < £5m, has PHPP modelling been included within scope and budget?**	To reduce operational carbon emissions through iterative design based on analysis.	• Ensure analysis is included within scope and fee from project initiation • Carry out assessment to inform decision-making	• Analysis reporting and evidence of informed design approach based on results.	EM

3.6 WHOLE LIFE CARBON ASSESSMENT

"The built environment industry has so far been addressing mainly operational emissions via reduction targets in building regulations (Part L), planning requirements by local authorities and sustainability assessment rating schemes (BREEAM, LEED, etc.) with the embodied aspect of carbon emissions not being fully addressed. To acquire an overall understanding of a built project's total carbon impact, it is necessary to assess both the anticipated operational and embodied emissions over the whole life of the asset." (RICS, 2018)

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has a WLC been included within scope and budget for all projects > £1m in accordance with BS EN 15978:2011 RICS Whole Life Carbon Assessment 2nd Edition?**	Analysis to assess the carbon impacts of a built asset over it's entire lifecycle.	• Include within Employer's Requirements • Agree WLC reporting intervals • Agree software (e.g. EC3, eTool, OneClickLCA,and Preoptima)	• WLC reporting	EM
02	**Has a suitably qualified WLC assessor been appointed?**	To ensure accuracy of WLC.	• Identify a WLC assessor as part of project team • Confirm WLC experience	• Included within Employer's Requirements	EM
03	**As part of Business Case development has a target been established in accordance with best practice for Embodied Carbon?**	Embodied carbon benchmark established to provide target for project.	• Confirm embodied carbon benchmark for building type and strategy for attainment • Confirm approach to optimising carbon reduction	• Minutes • WLC reporting to client	EM

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
04	**At Concept Design (RIBA Stage 2) have carbon 'hot-spots' / 'rules of thumb' been considered through optioneering using partial WLC and LCC analysis for building typology?**	It may be helpful to carry out partial WLCs focusing on options for one or more major elements, in order to consider the comparative carbon impacts before committing to a particular course of action, for example when deciding on structural elements. (RICS, 2023).	• Carry out partial WLCs / LCC assessments as necessary early in design process to confirm design approach (carbon / cost) • Agree design approach with Queen's	• WLC reporting • Presentation	DT
05	**Has a full project WLC been completed during early design phases?**	To determine further improvements at a strategic level. For buildings, the substructure and superstructure are usually a more significant proportion of embodied carbon than other elements, so comparative carbon studies during the early design phase can be hugely beneficial, optimising efficiency benefits before specifications are locked in.	• Carry out WLC review during RIBA Stage 2 and confirm strategic approach for optimising University outcomes i.e. capital cost, embodied carbon, operational energy efficiencies, durability, lower climate impact • Share and discuss findings with Queen's Estates to agree approach	• WLC Reporting • Presentation • Meeting minutes	DT
06	**Does the WLC cover 95%, including substructure, superstructure, finishes, fixed FF&E, building services and associated refrigerant leakage?**	Detailed analysis required to fully understand carbon associated with current project.	• Clearly written into Employer's Requirements • Include substructure, superstructure, finishes, fixed FF&E, building services and associated refrigerant leakage within WLC	• WLC reporting	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
07	**Does the WLC include for assessment at?:** • Concept design phase • Technical design phase • Construction phase • Post-completion phase **Additionally:** • Any significant decisions to be made • End of every design stage • End of the design process • End of construction.	To inform design and maximise carbon reduction.	• Clearly written into Employer's Requirements	• WLC reporting	EM
08	**Has the design been informed by the outcomes of WLC at each subsequent work stage?**	Analysis holds no value if it does not inform the design approach.	• Ensure workshops are programmed into design process • Use analysis to inform an iterative design process	• WLC reporting • Stage Reports • Carbon reduction presentation to Estates on WLC reduction at end of Stage 2, 3 and 4	DT/C
09	**Confirm WLC included post completion.**	To represent the 'as-built' carbon position.	• Carry out WLC post practical completion	• WLC reporting • Finalised dashboard report for records, benchmarking and lessons learned	EM/C

3.7 LIFECYCLE COSTS (LCC)

LCC is required to accurately assess the long-term impact of decision-making to the University. A reduction in capital cost can be attractive to a fledging project, however business cases and value engineering should be considered with a whole life perspective in mind regarding energy and maintenance implications.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has a Lifecycle Cost approach been taken to optioneering of items affecting operational energy use considering lifecycle cost rather than capital cost alone?**	To consider whole life cost rather than capital cost alone.	• Presentation of design options such as: HVAC servicing strategies, glazing types and extent, building fabric insulation levels	• DT presentation to Estates • Minutes	EM
02	**Has LCC been included within scope and budget for all projects > £1m?**	Detailed analysis required to fully understand cost impact of decision-making.	• Agree LCC methodology and reporting intervals • Communicate approach to Project Team • Include market tested specialist maintenance contracts within evaluation • Clearly written within brief	• Brief • LCC Reporting at key gateways and for significant design decisions • Minutes	EM
03	**Has an approach to VE been agreed?**	Lifecycle Cost versus Capital Cost must be considered through proper analysis.	• Identify any key decisions that require further LCC (i.e. Value Engineering)	• VE option reports with energy implications evaluated using BSi/BICS PD 15685-5:2008 lifecycle cost tool • Sample maintenance contracts	EM/DT
04	**Have non-moveable project requirements been confirmed at Stage 0-1?**	To align with net zero key performance indicators, KPIs.	• Confirm within project brief i.e. passive house certification, achieving RIBA Climate Challenge target • Complete Net Zero KPI tracker	• Brief • Outline / Full Business Case • Net Zero KPI tracker	HEP/EM

3.8 METERING AND ENERGY MONITORING

Benchmarking performance within the University's capital projects is the starting point in progressing the Net Zero Strategy. Collection of energy data through monitoring is a priority to efficiently manage the University estate. The new business-as-usual will require all new build capital projects to provide best practice metering. This will include a minimum breakdown of data as follows: heating and cooling, ventilation, domestic hot water, lighting, small power, servers, pumping, lifts and escalators, catering and special uses (e.g. servers rooms).

Data will be held centrally by Queen's Estates in a standard form for monitoring and benchmarking performance. Disclosure of data to a wider audience will be at the discretion of the University.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Where Passive House certification IS NOT targeted, have energy consumption targets been agreed from project initiation?**	Clear energy benchmarks required to determine building performance (energy consumption per m2).	• Set clear benchmarks written within brief • Audit through PHPP tool	• PHPP reports • Stage Reports	EM
02	**For Passive House projects has an 'Operational Energy Assessment' through PHPP been included within scope and budget?**	To comply with Passive House standard.	• Ensure analysis is included within scope and fee from project initiation • Carry out assessment to inform decision-making	• PHPP reports	EM
03	**For projects > £1m (or where deemed suitably complex), has an 'Operational Carbon Assessment' based on CIBSE TM54 (current addition) modelling process been included within scope and budget?**	To provide predicted energy consumption and basis for seasonal commissioning.	• Ensure analysis is included within scope and fee from project initiation • Carry out assessment to inform decision-making	• TM54 reports	EM

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
04	Has a metering and energy monitoring strategy been agreed in alignment with Queen's 'Brief for Consultant's Designing Mechanical and Electrical Services Installations' and TM39?	To avoid late changes in design.	• Agree metering and energy monitoring strategy prior to RIBA Stage 3 close in collaboration with Queen's • Dedicated metering workshop with Queen's Sustainability and MEP Team • Comply with Queen's 'Energy Monitoring Brief' (current issue)	• Minutes • Metering schematic (design and install) • Commissioning report from 'metre to desk' (point by point basis)	EM/DT
05	For refurbishment projects, have opportunities been identified for utility reporting and monitoring?	To improve data collection and monitoring with a view to reducing carbon emissions and improving comfort and well-being.	• Where practical, improvements should be made within scope of refurbishment projects	• Minutes	EM/DT
06	Have all meter locations been considered for access?	All meters should be accessible and readable without the need for access equipment or manual handling.	• Review proposed locations of all meters	• Marked-up drawing • Verification records of meter operation supplied pre-occupation	DT
07	Has construction stage site metering been considered?	To avoid complication, construction site metering should be separated.	• Prior to site set-up confirm: • Confirm basis of billing and settlement • Confirm meter location	• Provide site metering information to Energy Team pre-start • Minutes and marked-up drawing	EM/DT

3.9 FABRIC IMPROVEMENTS

A fabric first approach should be taken across the University Estate as assessed on a case-by-case basis with consideration to carbon and cost. Any upgrades to fabric (especially historic) should be holistically considered with the input of technical specialists as required.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	Have the recommendations of the Queen's Net Zero Plan been reviewed and embedded in the project?	Detailed analysis of existing buildings by category and intervention recommended.	• Embed requirements of Queen's Net Zero Plan	• Brief and Minutes	EM/ PHC
02	Are there any opportunities for improving building fabric within the project?	To improve energy efficiency.	• Carry out WLC assessment and LCC analysis on proposed measures to ensure payback	• Feasibility appraisal matrix • Independently reviewed U-value calculations • Key detail drawings • Construction photographs	EM/ PHC
03	Does the project allow for deep retrofit?	A deep retrofit is needed to achieve EnerPHit standard.	• Review utilisation and any 'sensitive' operations within space • Review decant possibilities • Review asbestos register for known presence of ACMs	• Marked-up drawings • Minutes	EM/DT
04	Has the existing building been surveyed prior to development of fabric enhancement options?	To confirm age, condition and appropriate intervention measures that will not adversely affect the building.	• Carry out appropriate surveys to confirm design approach. • Engage with specialist consultants to confirm approach	• Survey Report	EM
05	Has an appraisal matrix been developed with LCC information to confirm value for money?	To review options and likely payback.	• Develop options for inclusion with associated LCC information	• LCC reporting	EM/ PHC

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	Where EnerPHit certification IS NOT feasible, has AECB carbonlite standard been integrated into scope & budget?	To reduce energy use & improve comfort & well-being.	Baseline performance targets are as follows: • Retrofit air-tightness target: ≤2m3/hr/m2 as a minimum Retrofit Step-by-step approach air-tightness target: ≤5m3/hr/m2 as a minimum. AECB Carbonlite Retrofit • Wall, Floor and Roof U-value target: as determined by PHPP modelling to achieve baseline targets.	• Targets clearly written into brief and KPI Tracker • Air tightness line clearly shown on drawings • Strategy and update included with stage reports • PHPP reports included in stage reports • Testing should be completed in line with BS EN 13829 by operatives qualified to test to TS3. Average positive and negative pressure tests between 10 and 100 Pa should be taken • Confirm air-tightness risks in O&M manual to protect against future penetration • Photographic record of junction details during construction • Signed test certificates	EM/DT
07	Is the project a listed building or within a conservation area?	To determine the constraints of planning policy regarding fabric enhancements.	• Engage with Planning authority / HED early in the design process and agree approach	• PAD outcomes minuted	EM/DT
08	If internal fabric enhancements are proposed, is there adequate space for upgrades?	University space requirements and functionality should not be affected by refurbishment.	• Review space requirements	• GA drawings	DT
09	Has a decant strategy been agreed where the existing building is occupied?	To avoid disruption to staff and students.	• Confirm decant strategy where applicable	• Minutes	EM/DT
10	Have U-values been independently calculated and risk of interstitial condensation been reviewed?	To avoid creation of new problems within the building through ill-considered, piecemeal, or single measure retrofit.	• Confirm intervention is appropriate for building use and type • Carry out U-value calculations, independently verified	• Building survey • U-value calculations	DT/PHC

3.10 HEATING AND HOT WATER STRATEGY

A fabric first approach should be taken across the University Estate as assessed on a case-by-case basis with consideration to embodied carbon and cost. Any upgrades to fabric (especially historic) should be holistically considered with the input of technical specialist as required.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	Are there any opportunities for on-site renewable energy generation?	To reduce grid demand and carbon emissions.	• Review and confirm key opportunities for renewables and LCC	• Feasibility appraisal matrix with whole life costings	EM/DT
02	Has use of on-site renewables been maximised for the site?	To reduce grid demand and carbon emissions.	• DT to confirm optimum output for on-site renewable generation	• Feasibility appraisal matrix with whole life costings	EM/DT
03	Are there any opportunities for district heating i.e. dense heating load in the immediate vicinity?	To reduce carbon emissions.	• Review opportunities for improvements in heating and hot water delivery	• Feasibility appraisal matrix with whole life costings	EM/DT
04	Are there any site-specific opportunities for use of waste heat i.e. data halls, swimming pools, gymnasiums?	To reduce grid demand and carbon emissions.	• Review site specific opportunities for waste heat recovery • Liaise with Estates Energy Team and Estates Manager (M&E)	• Feasibility appraisal matrix with whole life costings	EM/DT
05	Are there opportunities for improvements to existing heating and hot water system including transitioning away from fossil fuel-based heating systems? (Refer to 3.13)	To carbon emissions.	• Review opportunities for improvements giving consideration to wider estates strategy	• Minutes	EM/DT

3.11 VENTILATION STRATEGY

Any changes to ventilation strategy (especially historic) should be carefully considered holistically. Where fabric upgrades are included for existing buildings, the condensation risk should be independently reviewed and verified.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	Has the condensation risk been considered where fabric enhancements are proposed?	To avoid condensation risk.	• Carry out thermal modelling to TM52/59	• Modelling reports to TM52/59	DT
02	Where a significant increase in occupancy density is proposed have ventilation requirements been considered?	To avoid overheating and ensure comfort and well-being.	• Carry out thermal modelling to TM52/59	• Modelling reports to TM52/59	DT
03	Does the design consider secondary glazing, air tightness and thermal bridge free design?	To improve operational energy demand.	• Consider interventions	• Modelling reports to TM52/59	DT

3.12 GLAZING AND GLARE

Overheating and glare can be a problem in buildings causing issues around inefficient cooling and productivity for occupants. It is key that glazing locations, orientation, and form are developed to optimise daylighting and views out whilst limiting the need for additional retrofit measures.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has glazing ratio and form been developed to provide views to external landscape?**	Consider views out for comfort and well-being.	• Review existing building stock and confirm where suitable • Review existing building stock for any enhancement opportunities	• Workshop minutes and business case • PHPP outputs	DT/PHC
02	**Has orientation been considered to avoid overheating without use of blinds?**	To reduce overheating / cooling load.	• Review orientation for optimum positioning • Limit use of 'bolt-on shading'	• Design development workshop minutes • Modelling reports to TM52/59	DT/PHC
03	**Have glare issues been designed out without use of blinds?**	Comfort and well-being.	• Carry out daylighting analysis to inform design • Design out glare as far as practical	• Daylighting analysis. • Marked-up drawings	DT
04	**Is the majority of the building natural lit?**	To avoid heavy use of artificial lighting which will affect energy demand.	• Carry out daylighting analysis in accordance with BS EN 17037:2018 • Target Hea 01	• Analysis reporting and evidence of informed design approach based on results	DT
05	**Confirm opportunities for improving daylighting, glare and overheating.**	To improve comfort and well-being metrics whilst reducing artificial lighting use.	• Carry out daylighting analysis on projects over £1M	• Analysis reporting and evidence of informed design approach based on results	DT

3.13 FOSSIL FUEL BASED HEATING SYSTEMS

The University are committed to achieving Net Zero by 2040. As such, the need to transition from Fossil Fuel based Heating Systems is a priority for all University works (new build, refurbishment, minor works including replacement / maintenance). Where lifecycle cost / carbon analysis provides rationale, progress should be made to transition from oil and gas boilers in preference for Air Source Heat Pump (ASHP) or Ground Source Heat Pump (GSHP). It is also the aspiration of the University to maximise use of on-site renewables.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have all practical measures been made to reduce energy consumption?**	To reduce carbon emissions and cost.	• Confirm appropriate measures in alignment with industry best practice	• DEC	DT
02	**Does the project propose use of low carbon heating technologies e.g. ASHP, GSHP, WSHP?**	No new fossil fuel-based heating systems are justifiable in new builds. Use of low carbon, renewable heating systems should be proposed to reduce carbon emissions.	• Identify opportunities f or transitioning to cleaner technologies • Review and provide recommendations on options	• Options appraisal report • Sample maintenance contracts • Brief and specifications • Commissioning certificates	DT
03	**Where refurbishment works are proposed, have opportunities been reviewed for transitioning away from fossil fuel-based heating systems?**	To identify opportunities for transitioning from fossil fuels and reduce carbon emissions.	• Feasibility of replacement of existing heat system where fossil fuels are used	• Brief • LCC and WLC reporting • MEP schematics (where there is approval to proceed)	DT
04	**Where transition from fossil fuel-based heating systems is considered, has a 'Whole Building Retrofit Plan' been developed?**	To avoid unnecessary / damaging interventions and agree a future plan of work.	• Develop a tailored 'Whole Building Retrofit Plan' prior to any intervention	• Whole Building Retrofit Plan	EM/DT
05	**In the case of an existing building or extension to a new building, are there opportunities for renewable retrofit as part of a 'Whole Building Retrofit Plan' or otherwise?**	To provide onsite renewable energy and reduce carbon emissions.	• Feasibility of key opportunities for renewable technologies	• Brief • MEP schematics (where there is approval to proceed)	EM/DT

3.14 WATER USE

Minimising water demand, optimising building systems, and harvesting rainwater as well as recycling and reusing water on-site

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has a potable water use target been set? Refer to best practice RIBA 2030 Climate Challenge?**	To reduce potable water / carbon emissions: use all projects should aspire to use 10litres / person / day for non-domestic buildings by 2030.	• Refer to best practice guidance RIBA 2030 Climate Challenge and set achievable target • Agree strategy • Specify low-flow appliances for all sanitary-ware and white goods	• Minutes • Specification	EM/DT
02	**Has water demand been reduced as far as is practical?**	To reduce potable water use and hence carbon emissions.	• Identify any opportunities for reduction • Use water efficient devices in agreement with Estates Services • Engage with Soft Landings champion & confirm in-use performance	• Minutes	DT
03	**Has a metering strategy been agreed for water consumption?**	To monitor water consumption and determine leakage.	• Confirm metering strategy in accordance with best practice	• Minutes	DT
04	**Has wastewater heat recovery been considered?**	To reduce operational energy demand.	• Consider where wastewater heat recovery can be implemented e.g. sanitary ware • Identify opportunities early	• Minutes • Stage 3/4 MEP drawings	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
05	**Does the project have any opportunity to introduce Sustainable Drainage Systems (SuDS) in accordance with regional planning policy and industry best practice?**	To reduce run-off from the development and to provide amenity and biodiversity benefits. Advantages include: • flood risk management • water quality management – reducing the impact of diffuse pollution • improving amenity and biodiversity – the integration of green infrastructure with SuDS solutions can help to create habitat, recreational and biodiversity areas • water resources • SuDS can help to recharge groundwater supplies and capture rainwater for re-use purposes • SuDS can help to free up capacity in already established drainage networks	• Confirm planning and environmental objectives that should influence the surface water management strategy • Confirm design criteria is in accordance with Belfast City Council (BCC) Sustainable Urban Drainage Systems Supplementary Planning Guide, The SuDS Manual (CIRIA 2015) and SuDS Design and Evaluation Guide (McCloy Consulting and Robert Bray Associates 2018) where applicable • Identify opportunities for SuDS within scheme • Identify opportunities for partnership with public stakeholders for wider benefits • Consider connection to street layouts, architectural and landscape proposals • Where identified, target Pol 03 criteria	• Minutes • Concept design drawings • Detailed design drawings • Design criteria agreed	EM/DT
06	**Has rainwater collection been considered for landscape watering (or otherwise) with interconnection with SuDS?**	To reduce water use and discharge to mains. NB Due to maintenance concerns within the University, rainwater harvesting is generally not implemented, however should further development's occur with successful precedence projects this could be considered in the future.	• Review opportunity for roof collection of rainwater with discharge to SuDS or landscape	• Marked-up drawings	EM/DT
07	**Have opportunities for greywater recycling been considered?**	To reduce water use and discharge to mains.	• Confirm if lessons learned negate opportunity	• Minutes	EM/DT

3.15 MATERIALS AND FINISHES

Due to the carbon impact of materials, the University require project teams to adhere to the principles of sustainable specification and sourcing on all capital projects.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Whether or not BREEAM is targeted have the principles of Mat01-02 been included?**	Queen's Net Zero requirements will go over and above these credits therefore as a by-product Mat01-02 should be achieved.	• Add to BREEAM tracker	• BREEAM tracker • Evidence of LCA • EPDs	DT/C
02	**Has the use of a carbon calculation tool been embedded within scope and budget and use of same been used to assess environmental impact of material spec?**	To reduce embodied carbon impact of material selection.	• Ensure use of carbon calculation tool is clearly written into brief and scope of services • Make specification choices based on review of Environmental Product Declarations (EPDs) • Provide training to DT and C where required	• Included in brief and scope • Evidence of a LCA review • Provide EPDs and material passports for the majority of products	EM/ DT/C
03	**Have use of Material Passports and 'cradle-to-cradle certified' products been included within the project?**	To promote 'design for disassembly'.	• Compare EPDs when specifying materials	• Minutes • EPD certificates	DT
04	**Have EPDs been received for the majority of building elements including: substructure, frame and upper floors?**	To provide evidence of reduction in carbon impact and ensure integrity of materials specified.	• Clearly state EPDs will be required for the majority of specified materials within scope of services and brief • Request EPDs for majority of building elements and store centrally within Queen's • Provide EPDs and LCA reporting for the majority of specified products	• Included in brief and scope • Evidence of comparison of material selection based on environmental metrics • EPD certificates • LCA Reports	EM/ DT/C
05	**Has the DT promoted the use of sustainably sourced, robust and natural materials?**	Less embodied carbon associated with sustainably sourced natural materials (and VOCs).	• Confirm material palette with Queen's and any cost implication at RIBA Stage 3	• Outline spec at RIBA Stage 3 • Included in specifications and drawings	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	**Does the design remove surplus finishes and materials (e.g. exposed structure)?**	Reduction in use of 'virgin materials' and hence less embodied carbon in construction.	• Confirm design approach with Queen's • Review precedence projects for lessons learned • Confirm specification for structure as finish (higher quality finish?)	• Included in specifications and drawings	DT
07	**Has a modular design been considered that enable partitions to be dismantled and relocated into different configurations, allowing space to be easily modified?**	To provide flexibility for future retrofits and reduce construction waste (hence embodied carbon).	• Confirm design approach with Queen's and end-users • Agree scope of likely future alterations if known	• Marked-up drawings • Future flexibility drawing showing key servicing elements and changes required	DT
08	**Is all timber sustainably sourced?**	To ensure sustainable practices are employed	• All timber must be from chain of custody certified sources (FSC, PEFC or GIB) or reclaimed	• Specifications. • Chain of custody notes for all timber used	DT/C
09	**Has the use of recycled and reclaimed materials been considered within the design approach?**	To reduce use of 'virgin materials'.	• Confirm approach to specifying recycled / reclaimed materials (with particular focus on internal finishes) • Agree and add key targets to SWMP	• Minutes • Tender return stating % of recycled content to be used on the project	DT/C
10	**Have self-finishing surfaces like timber been used?**	To promote circular economy, ease of repair and longevity.	• Compile outline specification at RIBA Stage 3	• Outline spec	DT

3.16 FURNITURE, FIXTURES AND EQUIPMENT (FF&E)

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Where demolition occurs, has the re-use of existing FF&E been considered?**	Prior to demolition, an audit of all FF&E should be completed to confirm which items are suitable for re-use.	• Carry out FF&E audit & identify opportunities within proposals for re-use & re-purposing	• Audit notes	DT
02	**Where refurbishment occurs, has the re-use of existing FF&E been prioritised?**	Prior to refurbishment, an audit of all FF&E should be completed to confirm what items are suitable for re-use. Items such as kitchen fittings (carcassing frame and door), sanitary-ware, furniture should all be considered.	• Carry out audit of existing FF&E and categorise for re-use, storage or disposal	• Audit notes • Minutes	DT
03	**Following audit on existing building has identification of suitable FF&E for (1) 'WARPIT' and (2) donation to key charities, such as Habitat for Humanity been completed?**	To prevent the disposal of good quality FF&E and promote circular economy.	• Promote all good quality FF&E via 'WARPIT' and to charities for reuse or elsewhere in the University Estate • Review audit to identify good quality items • Promote all good quality FF&E via 'WARPIT' for a minimum of two weeks. If not acquired, contact charities to determine if they are interested. Email sustainability@qub.ac.uk to find out key charities who accept donations	• Audit Notes • Evidence of promotion for reuse i.e. emails, notes	EM
04	**Have opportunities for re-use of existing FF&E been considered on the current project or elsewhere across the University?**	To reduce University expenditure and reduce the need to purchase new FF&E.	• Review any opportunities alongside likely cost of removal, repair and installation	• Minutes • Included in drawings and specs	EM/DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
05	**Has the use of reclaimed or refurbished FF&E been considered within the current project?**	To reduce cost and carbon associated with purchasing new FF&E.	• Review any opportunities alongside likely cost of installation	• Minutes • Included in drawings and specs	EM/DT
06	**Has the environmental performance of FF&E options been considered prior to specification?**	To select products based on embodied carbon, recycled content, harmful chemicals, presence of material passport etc.	• Carefully compare products based on EPD data, recycled material and also avoidance of harmful chemicals like formaldehydes and VOCs	• Evidence of comparison • EPDs	DT
07	**Does the FF&E specification prioritise 'ease of repair' rather than replacement?**	To reduce waste.	• DT to confirm approach to circular economy for all FF&E • Confirm longevity and maintenance of spec • Not reliance on adhesives for ease of replacement	• Minutes • Outline specs at Stage 3 • Drawings and specifications	DT
08	**Have products been specified that are easily recycled or broken down at end of life were repair is not viable?**	To reduce waste.	• DT to confirm approach to circular economy for all FF&E • Confirm presence of a material passport	• Minutes • Included in drawings and specs	DT
09	**Have all white goods and plug-in equipment been specified in accordance with Energy Saving Trust recommendations?**	To reduce operational energy demand.	• Liaise with Queen's to confirm approach to specification	• Minutes • Included in drawings and specs	DT
10	**Has the Sustainability Team been engaged where 'wet laboratories' are included in project scope to promote the 'LEAF' accreditation?**	To reduce operational energy demand.	• Liaise with Sustainability Team and include 'LEAF' accreditation in project scope where feasible	• Brief • LEAF Accreditation	EM/DT

3.17 COMFORT, HEALTH AND WELL-BEING

To enhance the health, well-being, satisfaction and productivity of students, asset users, maintenance operatives and other stakeholders.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have the principles of BREEAM 'Health and Well-being' been included in the design?**	To provide enhanced University outcomes relating to Comfort, Health and Well-being.			EM
02	**Have BREEAM credits Hea 01 and Hea 04 been targeted?**	To improve visual comfort and thermal comfort.	• Embed targets with scope and budget • Target credits Hea 01 and Hea 04 • Review project specific opportunities for betterment	• BREEAM accreditation	DT
03	**Have the principles of Biophilic design been considered and where feasible incorporated into the proposals?**	To improve user connection with nature and enhance well-being and comfort.	• At concept design review site analysis to confirm opportunities for incorporation	• Minutes • Marked-up drawing • Site analysis	DT
04	**Has thermal analysis been reviewed for the design?**	To confirm risk of overheating. Comfort and well-being will be adversely affected if regular overheating occurs.	• Embed a PHPP analysis in scope and budget for projects > £1m < 5m • Additionally, embed a CIBSE TM52 analysis included within scope and budget for projects > £5m	• PHPP comfort output reports • IES dynamic thermal model reports and TM52 analysis	DT
05	**Have the effects of thermal mass been considered for the proposed design (dense or lightweight)?**	To ensure building performance is as predicted.	• Holistically assess effects on in-use performance • Consider user behaviours and the impact on user experience and comfort	• Minutes • M&E Specification	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	Has current weather data been used for any thermal analysis?	To ensure accuracy of results.	• Current weather data to be used for analysis • Review effects of climate change on thermal analysis (resilience of design)	• Minutes • M&E Specification	DT
07	Have cooling set points been confirmed?	To strike a balance between energy use and occupant comfort.	• Confirm Queen's M&E specification is satisfied and notify of any specific project considerations • Queen's to confirm cooling set points in collaboration with DT based on occupancy, behaviour or system requirements etc	• Minutes • M&E Specification	DT
08	Are 'drinking water outlets' available throughout the building in accordance with 'WELL Standard' requirements W06 or as assessed on a case-by-case basis?	To ensure ease of access to drinking water for users and promote use of refillable containers.	• Assess provision and type on a case-by-case basis to ensure no over-provision based on 'WELL Standard W06' with consideration given to maintenance regime and lack of use (legionella) • Ensure all newly installed drinking water outlets are designed for water bottle and cup refilling • Confirm type (refrigeration and filtering, chilled mains or mains only) and funding for ongoing cleaning	• Outline spec agreed with Estates Services prior to ordering • Locations included on general arrangement drawings • Minutes (cleaning responsibility)	EM/DT
09	Has a POE been undertaken?	To confirm user satisfaction and performance in-use.	• Review Section 3.21 • Independent POE embedded into budget	• POE Report and presentation to Estates	EM

3.18 BIO-DIVERSITY

The University will enhance bio-diversity across the Estate using the following approaches:

1. Leave a site in better 'regenerative' ecological condition than before development.
2. Prioritise building and site re-use
3. Prioritise brownfield site selection
4. Carry out sustainable remediation of site pollution
5. Retain existing natural features
6. Create mixed use development with density appropriate to local context
7. Create green spaces (green roofs, vertical greening, pocket parks, green corridors)
8. Create habitats that enhance bio-diversity
9. Create 'productive' landscapes for urban food production
10. Zero local pollution from the development

(RIBA Sustainable Outcomes Guide, 2019)

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	Has the project brief been challenged to prioritise use of a brownfield site?	To avoid destruction of greenfield habitat.	• Confirm opportunities have been explored as part of scoping exercise prior to business case approval	• Minutes • Outline Business Case	EM
02	Has a registered ecologist been engaged at RIBA Stage 2?	To carry out field measurements of local ecology to ascertain health and diversity outcomes in use.	• Appoint a registered ecologist at Concept Design	• Scope of Services • Ecologist Report	EM
03	Do the proposals leave the site in a better 'regenerative' ecological condition than before development?	To enhance biodiversity and provide habitat for wildlife. To improve health and well-being of users.	• Confirm strategy to enhance the local flora and fauna post development • Confirm strategy to achieve urban greening factor (UGF)	• Minutes • Ecologist Report • Landscape Plan	DT
04	Have biodiversity opportunities been identified for the site?	To enhance biodiversity and provide habitat for wildlife. To improve health and well-being of users.	• Review site with Landscape Architect and Ecologist for site specific interventions	• Minutes • Marked-up drawings	DT
05	Does the project achieve a minimum UGF of 0.3 for commercial and 0.4 for residential developments (and, where appropriate, 0.5 for residential greenfield development) in accordance with 'Natural England – Green Infrastructure Planning and Design Guide'?	To enhance biodiversity and provide habitat for wildlife. To improve health and well-being of users.	• Develop Landscape Plan based on 'Natural England – Green Infrastructure Planning and Design Guide' with a targeted UGF requirement wherever feasible • Carry out UGF calculation	• Landscape Plan • UGF calculation	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	**Does the project achieve a Biodiversity Net Gain (BNG) of 10%?**	To enhance biodiversity and provide habitat for wildlife. To improve health and well-being of users.	• Programme site works to minimise disturbance to wildlife • Develop Landscape Plan based on 'Natural England – Green Infrastructure Planning and Design Guide' with a targeted BNG requirement wherever feasible • Develop a Biodiversity Management Plan	• Landscape Plan • BNG calculation • Biodiversity Management Plan	DT
07	**Has the use of native, wildlife hedgerows been included within the project?**	To enhance biodiversity and provide habitat for wildlife.	• Review and confirm University's maintenance regime and confirm whether formal or informal hedging is most appropriate • Select native trees and shrubs (at least 6nr.) for main hedge structure in accordance with RSPB guidance 'Plant a hedge for wildlife' • Confirm management regime for pollinators	• Minutes • Landscape Plan	DT
08	**Have areas been identified within the scheme where 'wilding' of grasses can be provided (over and above 'No-Mow May' areas)?**	To enhance biodiversity and provide habitat for invertebrates, solitary bees and insects etc.	• Identify areas for 'wilding', consider implications of maintenance regime and public access	• Marked-up drawings • Landscape Plan	DT
09	**Has the introduction of 'swift bricks' and 'swift calling system' been implemented where ecological report confirms recommendation?**	To enhance biodiversity and provide habitat for wildlife. (note, bird boxes on trees will not attract swifts).	• Introduce to site where recommended by ecologist • Confirm locations of proposed swift boxes on elevations based on ecologist recommendations, consider flight paths and height off ground, refer to RSPB guidance such as 'facts about swift bricks' and 'create a high home for swifts' • Consider proximity to 'busy' areas and maintenance regime	• Marked-up drawings • Elevations	DT
10	**Has the introduction of 'bat boxes / bricks' been implemented where ecological report confirms presence?**	To enhance biodiversity and provide habitat for wildlife.	• Introduce where recommended by ecologist • Consider proximity to 'busy' areas and maintenance regime	• Marked-up drawings • Elevations / Landscape Plan	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
11	**Have 'hedgehog highways' been introduced where fencing prohibits movement?**	To enhance biodiversity and provide protected corridors for wildlife.	• Introduce where recommended by ecologist • Confirm routes through site and ensure suitable clearance is provided under fencing • Confirm specification at Stage 3	• Outline spec. • Marked-up drawings • Landscape Plan	DT
12	**Where planters are proposed, does this include 75% of ornamental planting which are pollinator friendly (selected from the pollinator friendly planting code).** pollinators.ie	To provide food source for pollinators.	• Confirm outline specification at Stage 3	• Outline spec. • Landscape Plan	DT
13	**Has Sustainable Drainage Systems (SuDS) been considered? Use of permeable paving, grass-crete, rain-gardens etc.**	To reduce runoff and aid percolation of rainwater.	• Identify locations where SuDS can be incorporated at Concept Design	• Marked up drawings • Landscape Plan	DT
14	**Have areas of hardstanding been optimised and areas of greening been maximised.**	To aid percolation, reduce heat island effect and enhance biodiversity.	• Review and optimise areas of hardstanding. Where hardstanding is essential use permeable surfaces as standard	• Mat 01 LCA outputs • Site Plan / Landscape Plan	DT
15	**Has a green roof been considered? Where is it proposed has appropriate budget been safe guarded to avoid later VE.**	To act as attenuation, to reduce heat island effect, enhance biodiversity, improve health and well-being, air cleansing, improve lifespan of roof.	• Consider introducing green roofs at Concept Design • Build in budget to avoid VE of green roofs and engage green roof specialist early in design process • Confirm optimal building structure with WLC in mind i.e. enlarged structure to accommodate green roof • Confirm 150mm deep base minimum in specification • Confirm intensive or extensive green roof	• LCC calculation (detailing roof lifespan Vs capital cost of green roof etc) • Landscape Plan and specifications	DT
16	**Where sustainability measures have been implemented within scheme, has localised signage been included?**	To generate interest, provide engagement and 'living-lab' opportunities for staff, students and the public.	• Identify key locations for engagement, 'living-labs'	• Minutes • Site Plan / Landscape Plan • Schedule of signage	DT

3.19 TRANSPORT AND PARKING

A sustainable transport strategy is key to the University's net-zero journey. Where statutory policy or guidance does not prescribe a definitive metric for transport, parking, cycle parking, EV parking etc, consultation should be carried out with the sustainability team early in the design to determine a baseline requirement.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Does the project avoid large swathes of car parking and does it limit negative visual impact?**	To provide an effective car parking strategy whilst avoiding negative visual impact and promoting sustainable and active transport.	• Early engagement with statutory authorities, transport consultant and sustainability team	• Workshop minutes • Site Plan at Concept Design Stage	DT
02	**Does the project design comply with the principles of the University's latest Travel Plan?**	To ensure University outcomes are met.	• EM to circulate current Travel Plan to DT/C. • Requirements of Travel Plan to be taken forward in the project design (where applicable)	• Minutes. • Design drawings and specifications	DT
03	**Has cycle storage been provided at the ratio of one space per 10 occupants or in accordance with Tra 02?** **OR** **If Tra 02 is not targeted reference "Cycle Parking Quantities for New Developments" Table 8.1 in 'Standards for Public Cycle Parking, June 2021' – for educational institutions'. - Based on Travel Plan mode share targets for secure cycle parking, a minimum of 1 stand per 20 staff and 1 stand per 10 students.**	To provide ease of use for active travel / alternative means of transport.	• Include early in design layouts • Ensure CCTV for all secure cycle storage	• Minutes • Site plan and landscape plan • MEP schematics	DT
04	**Whether or not targeted, do all cycle storage spaces comply with the requirements of BREEAM Tra 03?**	To provide ease of use for active travel / alternative means of transport.	• Ensure all cycle storage spaces are compliant with requirements of BREEAM Tra 03 (even if not targeted) which include secure covered spaces, adequate lighting, prominent site location • Secured by Design level 2 if it has open public access. Secured by Design level 1 is acceptable for facilities already within a secured area, such as a building basement	• Outline spec at Stage 3	DT
05	**Whether or not targeted, do all changing facilities comply with the requirements of BREEAM Tra 03?**	To promote active / alternative means of travel.	• Include early in design • Comply with BREAAM Tra 3 - Compliant changing facilities • Provision of one shower for every 10 cycle storage spaces, subject to a minimum provision of one shower • Any building providing eight showers or more will comply regardless of the number of cycle storage spaces provided • Both male and female users must be catered for, i.e. either separate showers within shared gender-specific facilities (required provision split 50-50) or single shower cubicles and changing space for mixed use • Toilet or shower cubicles cannot be counted as changing facilities	• Outline spec at Stage 3 • GA drawings	DT
06	**Whether or not targeted, have the principles of BREEAM Tra 02 been complied with as good practice?**	To maximise the potential for local public, private and active transport.	• Comply with the principles of Tra 02	• Minutes	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
07	**Has a minimum of 6% of the total car parking provision been designated for disabled usage?**	Statutory requirement.	• Assign appropriate parking allowance and clearly mark on site plan	• Site plan and landscape plan	DT
08	**Has the project design allowed for calculation of priority spaces for car sharers in accordance with Tra 03a - KBCN0282?**	To promote alternative means of transport.	• Ensure at least 5% of total car parking capacity is provided for priority car sharer spaces, with a minimum of two spaces • (Note these spaces should account only for the car parking capacity that is dedicated to the staff working in the building, (excluding customers or visitors) • Car sharing spaces (Queen's Liftshare Scheme) should be clearly segregated from customer/visitor parking	• Site plan and landscape plan	DT
09	**Has cycle equipment been designed for a service life of 10 years?**	To ensure longevity of cycle fixtures.	• Ensure warranties are provided by suppliers to cover this period as per BICYCLE ASSOCIATION STANDARDS FOR PUBLIC CYCLE PARKING June 2021 – 2.10.1	• Warranty Documents	DT
10	**Has provision been made for non-standard cycle parking?**	To ensure 5% of spaces can accommodate a larger cycle (e.g. cargo bikes).	• Refer to "Wheels for Well-being – A Guide to Inclusive Cycling (4th Edition, 2020 and confirm approach • Ensure 5% of spaces will accommodate a larger / non-standard cycle (range from 2m to 3m in length to 1.5m width)	• Minutes • Outline spec at Stage 3 • Noted on site plan and landscape plan	DT
11	**Is the cycle storage connected to the wider cycle network via safe on-site cycle routes?**	To promote active travel and alternative means of transport.	• Early discussion with statutory authority and cycle networks organisations e.g. 'Sustrans' • Liaise with Sustainability Team for Staff / Students engagement material	• Minutes • Engagement literature shared with staff/students	EM/DT
12	**Has adequate drying space and lockers been included?**	To promote active travel.	• Include early in design • Comply with the requirements of Tra 3	• GA drawings	DT
13	**As a minimum, have 10% of total car parking spaces been provided with 3kW EV charging points and future ducting installed to expand?** **OR** **Where at least 5% of the car parking spaces provided for the building users include electrical charging points, with a minimum of two spaces being provided – BREAAM Table 35 Alternative Transport Measures – Reference D.**	To promote EV use.	• Agree optimal locations for EV and E-Bike charging points and agree with Queen's • Note on drawings, locations of charging points, extent of future ducting and confirm underground servicing for existing and new servicing is clash-free	• Site Plan and Landscape Plan • Drawings and specifications	DT
14	**As a minimum, have 2nr. E-Bike charging points been included into the project with future ducting installed to expand?**	To promote active travel.			
15	**Confirm all EV charging points are located a minimum of 10m clear of the building and boundaries of the site.**	As required for insurance purposes.	• Review site layout for clearances	• Site plan and landscape plan	DT

3.20 DATA DISCLOSURE

To benchmark performance across industry, promote collaboration across the University and to provide lessons learned.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have the data disclosure requirements been agreed for the project in accordance with relevant climate change initiatives such as RIBA 2030 Climate Challenge?**	If not targeted EM should justify rationale i.e. security risk.	• Confirm what data will be provided to academia in-house • Confirm what data will be provided to wider industry • Confirm data disclosure strategy including ongoing monitoring	• Minutes	EM/DT
02	**Has at least one 'living – laboratory' opportunity been identified for academic studies on the project?**	Confirm what data is required for future academic studies in-house to enable lessons learned, upskilling and alignment with SDGs.	• Agree any project specific opportunities and confirm key contacts in collaboration with Sustainability Team	• Minutes	EM
03	**Is DT aware of data collection requirements for the project & commitment?**	To enable specification metrics to be collated for the predicted and in-use building.	• EM to familiarise themselves with central repository for data collection	• Minutes • Embedded within ER and EIR	EM

3.21 SOFT LANDINGS

Soft Landings is used to refer to the smooth transition needed between the design and construction phases and the operation of a built asset. Combined with post-occupancy evaluation, the success of a soft landing is determined by comparing the required performance with actual outcomes. Soft Landings provides a framework for the University to focus on optimising performance and closing the performance gap in our capital works.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Have the BSRIA requirements of Soft Landings been implemented as follows:** • Full Soft Landings for all projects > £5m • Reduced scope for projects > £1m but < £5m • 'Basic success criteria' for projects < £1m but agreement of success criteria.	To create a collaborative and outcomes focused ethos and measure the 'success' of the project. Soft Landings is required when a project is suitably complex. A reduced Soft Landings scope is allowable where the framework is too onerous compared to the potential benefits.	• Soft Landings implemented in all projects > £1M • Include within scope and budget • Arrange training workshops as appropriate	• Project brief • Confirm schedule of Soft Landings workshops • Appoint Soft Landings Champion	EM
02	**For projects > £1m but < £5m has a reduced Soft Landings scope been confirmed with the project team?**	Reduced scope to ensure requirements are not overly onerous for less complex projects.	• Confirm reduced scope requirements	• Summary within Stage 2 Report • Minutes	EM
03	**For projects > £1m has success criteria been agreed at project initiation and has it been reviewed against performance throughout design & construction phases?**	To monitor outcomes against performance.	• Set success criteria • Monitor success criteria and revisit, amend as required to fulfil University outcomes	• Phase Checklists • KPI Tracker • Minutes	SLC/EM
04	**For projects < £1m, have basic success criteria been agreed?**	Although no formal Soft Landings is required, basic success criteria should be agreed to monitor outcomes against performance.	• Confirm basic success criteria	• Summary within Stage 2 Report • Minutes	EM

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
05	**Has a Soft Landings Champion been appointed early in the project?**	Also referred to as the owner's representative, this individual will coordinate and monitor all activities relating to Soft Landings. Consider whether a representative is needed from client & project team.	• Appoint a Soft Landings Champion	• Included in scope of services • Included within roles and responsibilities matrix	EM
06	**Have all 'Phase Checklists' been completed in accordance with BSRIA BG54 Soft Landings Framework (current edition)?**	To monitor and manage key Soft Landings activities throughout the project.	• Complete Phase Checklists	• Phase Checklist submitted to EM • Stage Reports	SLC
07	**Has the Soft Landings Champion confirmed roles and responsibility for coordinating 'transition-related activities'?**	To coordinate 'transition-related activities' for ease of handover.	• Provide roles and responsibilities ahead of handover	• Minutes	SLC
08	**Refer to Section 3.21 also. Has O&M information been digitally issued and securely stored within central repository?**	To provide a standardised approach to data collation to allow ease of management.	• Confirm Queen's standard O&M requirements • Confirm key dates for completion of O&M	• A BIM (RVT and IFC format) • AutoCAD as built files (DWG format) • Building manual (DOC and PDF format) • Digital O&M manual • Training sessions	SLC
09	**Has a user guide, O&M information and training for building users been provided?**	To ensure handover of key deliverables in good time and in advance of practical completion.	• Agree programme for delivery of O&M • Ensure BIM deliverables align with Soft Landings requirements		SLC
10	**Has a Post-Occupancy Evaluation (POE) been included within budget & scope for both 12 months & 36 months after handover and corrective actions taken where appropriate?**	To close the performance gap and ensure building operation is as designed.	• Agree programme for POE and suitable interval after practical completion for exercise • Collate and distribute lessons learned	• POE monitoring records and corrective actions. • POE Report. • Lessons Learned CPD presented and stored centrally for future reference	SLC

[1]The performance gap in buildings is described as the difference between the thermal performance predicted from building modelling and the actual measured energy in-use once the building is built and occupied. (Passivhaus Trust, 2017)

3.22 BUILDING INFORMATION MODELLING (BIM) AND AS-BUILT INFORMATION

The purpose of BIM is to drive coordinated design and data management through a project's whole lifecycle. The benefit of BIM regarding Net Zero is that the industry now has the tools to critically assess building design for operational and embodied carbon as a by-product. Additionally, all project data can be categorised and stored in a standard system, this is extraordinary useful for the University given the sheer volume of O&M information that exists requiring review and periodic updates.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Has BIM Level 2 been embedded into scope and fee for all projects?**	To ensure BIM requirements are established from project initiation.	• Embed within tender documentation	• EIR • Tender Documentation	EM
02	**Has the University issued the EIR to the DT/C?**	Required for all BIM Level 2 projects.	• Embed Net Zero deliverables within EIR • Confirm REVIT version • Confirm CDE / SharePoint storage for all data on project completion	• EIR	EM
03	**Has a BEP been issued by the DT/C and is this centrally accessible?**	BEP required as a tool to manage BIM requirements for the project.	• Create BEP to reflect University's requirements and deliverables	• BEP	DT/C
04	**Does the BEP include delivery of any project specific O&M information for building performance in-use?**	To support the optimisation of building performance in-use.	• Agree required O&M information • Liaise with Estates Services to confirm project specific requirements	• Minutes • BEP • BIM	DT/C
05	**Has a CDE been set-up with access available to project team?**	CDE required to allow DT/C to collaborate.	• Provide CDE and access	• CDE invitations • Confirm host of CDE during design, construction and on completion	EM/ DT/C

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	**Has the location of University's CDE been confirmed in advance of completion?**	The University will need to provide a storage location for O&M data on project completion.	• Confirm where a CDE will be hosted by the University on project completion	• Contained in EIR	EM
07	**Is the BIM suitably detailed and accurate to allow operational energy analysis throughout design and allow integration with PHPP?**	To optimise operational energy in design through analysis and inform design decisions throughout.	• DT to confirm suitability of BIM for analysis	• BEP to reflect requirements • Programme aligned with MIDP • BIM • Third party software reporting	DT/C
08	**Is the BIM suitably detailed and accurate to allow embodied carbon analysis throughout design?**	To optimise embodied carbon in design through analysis and inform design decisions throughout.	• DT to confirm suitability of BIM for analysis	• BEP to reflect requirements • Programme aligned with MIDP • BIM • Third party software reporting	DT/C
09	**Has a digital O&M manual and as-built model been provided for all projects > £1M?**	Ease of data management where digitally issued. As-built model required for ongoing facilities management.	• EM to ensure as-built information is collated in pre-agreed centrally stored location and accessible to all Estates sections	• BIM (RVT and IFC format) • AutoCAD as built files (DWG format) • Building manual (DOC and PDF format)	EM
10	**Has a 'Deconstruction Plan' been provided outlining general concepts for disassembly including load paths for the self-weight of structure and deconstruction?**	To enable safe disassembly at end of life. To allow the re-use of structural steel and other materials.	• Provide detailed plans where load paths are unconventional. All load transfer systems should be identified.	• Deconstruction Plan • Detailed drawings as required. DT/C	

3.23 WASTE

Waste disposal is a substantial cost to the University and one of significant impact to the environment. Construction projects provide an important opportunity to minimise waste, re-use and recycle through well considered waste management.

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
01	**Where appropriate, has a pre-demolition audit been carried out?**	To identify options for re-use and recycling of materials.	• Carry out a pre-demolition audit and provide options to Estates for the re-use and recycling of materials	• Pre-demolition survey • Minutes discussing opportunities	EM/DT
02	**Has zero waste to landfill been targeted?**	To reduce construction impact.	• Agree strategy	• SWMP	DT/C
03	**Where zero waste to landfill is not targeted, have exemplary targets been set in accordance with BREEAM Wst 01?**	To reduce construction waste by encouraging reuse, recovery, and best practice waste management practices to minimise waste going to landfill.	• Target exemplary level benchmarks (BREEAM™, Table 10.2, p271) • Include all key waste groups (BREEAM™ Table 10.3, p275) within SWMP	• SWMP issued to Queen's Estates for approval prior to construction commencement • Net Zero KPI Tracker	DT/C
04	**Has the use of a construction waste management tool been included within scope?**	To provide indicative cost savings and monitor construction waste.	• Contractor to confirm construction waste tool and schedule of reporting to Queen's • Contractor to record waste quantities by stream and tonnage	• Summary report • Waste transfer notes	C
05	**Have the principles of circular economy been considered within the design?**	To reduce waste and design for end of life.	• Provide design strategy for circular economy based on industry best practice	• Minutes and drawings • Design approach agreed at concept design where practical	DT

	PLAIN LANGUAGE QUESTIONS	RATIONALE	ACTION	EVIDENCE / DELIVERABLE	OWNER
06	**Has the DT developed the design based on efficient use of materials and reduction of waste?**	To optimise the use of materials and reduce waste.	• Design in accordance with industry best practice such as LETI Climate Emergency Design Guide, principles of DfMA etc • Engage with industry leaders e.g. BE-ST, LETI	• Design approach within stage reports	DT
07	**Has a SWMP been submitted to Queen's in advance of works commencement?**	To reduce construction impact.	• Identify methods for control of waste disposal within SWMP • Develop a SWMP	• SWMP	DT/C
08	**Does the SWMP ensure segregation of waste streams?**	To minimise waste to landfill and maximise recycling of waste.	• Review SWMP	• Waste transfer notes and summary report	DT
09	**Has a Waste Champion been nominated?**	Nominated individual to lead the implementation of the SWMP.	• Confirm individual with responsibility	• SWMP • Minutes	C
10	**Have appropriate recycling facilities for operation been agreed considering adequate storage space, fire protection and access for collection?**	To promote and provide waste recycling infrastructure/facility in accordance with Northern Ireland Waste Management Strategy requirements.	• Liaise with Estates (Environmental) to agree recycling strategy. Ensure no individual waste bins for offices are provided	• Provide site plan showing designated recycling area within development with access / collection routes • Minutes	DT
11	**Does the waste provision from the completed building adequately integrate with Queen's non-hazardous waste contract?**	To avoid costly waste management in-use.	• Liaise with Estates (Environmental)	• Minutes	EM/DT

4.0

ROLES & RESPONSIBILITIES

Head of Estates Planning	To champion the principles of the 'Net Zero Design Guide' through development of business cases and support implementation.
Estates Manager (Planning)	To champion the principles of the 'Net Zero Design Guide', monitor KPI's and ensure procurement of capital projects is in accordance with Net Zero targets from RIBA Stage 0-3
Estates Manager (Development)	To champion the principles of the 'Net Zero Design Guide', monitor KPI's and ensure procurement of capital projects is in accordance with Net Zero targets from RIBA Stage 4-7
Estates Manager (Minor Works)	To champion the principles of the 'Net Zero Design Guide' and ensure procurement of minor works projects is in accordance with Net Zero from RIBA Stage 0-7.
Estates Manager (Services)	To support the implementation of performance in-use of capital projects and support continuous improvement of the 'Net Zero Design Guide'. To procure any recurrent / maintenance related activities based on the principles of Whole Life Carbon and Lifecycle Cost analysis.
Head of Sustainability	To champion the 'Net Zero Design Guide' principles and periodically review KPI compliance at stage gateways.
Estates Manager (Sustainable Construction)	To support and facilitate implementation of the 'Net Zero Design Guide' and provide oversight of KPI's to confirm compliance.
Sustainability Team	To support implementation and development of the 'Net Zero Design Guide'.

5.0

REFERENCES

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Climate Emergency Design Guide, LETI (2020)
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Embodied and whole life carbon assessment for architects, RIBA (2018)
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Embodied Carbon Primer, LETI (2020)
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Five key Components of Net-Zero Carbon Buildings, LETI (2019)
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Net Zero Carbon Buildings: A Framework Definition, UKGBC (2019)
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Net Zero Plan, Queen's University Belfast (2022)
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Sustainable Outcomes Guide, RIBA 2019
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Whole Life Carbon Assessment for the Built Environment, 2nd edition, RICS (2023)
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GLOSSARY

ASHP	Air Source Heat Pump
BEP	BIM Execution Plan
BIM	Building Information Model
BNG	Biodiversity Net Gain
BREEAM	Building Research Establishment Environmental Assessment Method
CDE	Common Data Environment
CIBSE	Chartered Institute of Building Services Engineers
DEC	Display Energy Certificate
DfMA	Design for Manufacturer and Assembly
DOC	Native word document format (.doc)
DT	Design Team
C	Contractor
EIR	Employer's Information Requirements
EM	Estates Manager
EPD	Environmental Product Declaration
ER	Employer's Requirements
EV	Electric Vehicle
FF&E	Furniture, Fixtures and Equipment
GSHP	Ground Source Heat Pump
HEP	Head of Estates Planning
IES	Integrated Environmental Solutions
IFC	International Foundation Class (.ifc)
LCA	Lifecycle Assessment: A future projection of the carbon cost of anticipated day-to-day energy use, maintenance cycles, repair and replacement cycles and final demolition – is inherent in a WLCA and is usually presented as a graph showing annual carbon emissions over 60 years. The objective is to understand, at the design stages, the overall future carbon emissions performance of a building over its entire life, and therefore what can be done to decrease emissions. In addition to the mapping of anticipated future carbon emissions, it is possible to add a cashflow to the LCA to give a building owner a combined construction and 'In-use' cost, that is, a total cost of ownership. (RICS, 2022)
LCC	Lifecycle Cost
LETI	London Energy Transformative Initiative
MIDP	Master Information Delivery Plan
O&M	Operation and Maintenance (usually with reference to O&M Manual)
Performance Gap	The difference between the predicted performance and actual performance
PH	Passive House (or Passivhaus)
PHPP	Passive House Planning Package (Passive House calculation software)
RIBA	Royal Institute of British Architects
RICS	Royal Institute of Chartered Surveyors
RMP	Resource Management Plan
RVT	Native REVIT file format (.rvt)
SuDS	Sustainable Drainage Systems
TM54	Technical Memorandum 54
UGF	Urban Greening Factor
VE	Value Engineering
WLC	Whole Lifecycle Assessment: A whole life carbon assessment – an assessment of the sum total of all building-related emissions over a building's entire life – is the most comprehensive approach to achieving these reductions. WLC includes operational carbon emissions from day-to-day energy use and embodied carbon emissions, including material sourcing, fabrication of components, transport, construction, maintenance, repair and replacement, demolition, dismantling and disposal. The objective of a WLC assessment is to ensure the minimum overall lifetime carbon emissions and the maximum lifetime resource efficiency. (RICS, 2022)

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