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WHOLE LIFE CARBON ASSESSMENT COMPARATIVE STUDY

71 AVENUE ROAD, CAMDEN

29/06/2023 *by RM, reviewed by AJ*

EXECUTIVE SUMMARY

A Whole lifecycle carbon assessment has been undertaken for two potential development options at 71 Avenue Road in the London Borough of Camden. The scheme options include a new build proposal and a refurbishment proposal.

The Whole lifecycle carbon assessment has been aligned with the latest published *London Plan Guidance: Whole Life-Cycle Carbon Assessments (March 2022).* All lifecycle stages are presented in Figure 1, however as highlighted, a Whole lifecycle carbon assessment considers lifecycle stages A1 to B5 and C1 to C4 as well as modules B6 - operational energy & B7 – operational water.

Table 1 shows the results for the Whole lifecycle carbon emissions for *Assessment 1 – New Build Scheme* and for *Assessment 2 – Refurbished Scheme.* The results show that modules A1-A5 Product and Construction Process stages have the largest impact on the total embodied carbon emissions in both assessments. The second largest source of emissions is derived from the End-of-Life stage C1-C4 modules. Of both the assessments, the New Build Scheme has the higher total embodied and operational carbon emissions.

Table 1: Estimated Embodied and Operational Carbon Emissions

	Sequestered Carbon	Module A1 – A5	Module B1 – B5	Module B6 – B7	Module C1 – C4	Module D	TOTAL*
Assessment 1 – New Build Scheme (including module B6)							
TOTAL kg CO_2e	-105,741	1,514,584	95,385	114,479	367,452	-23,897	1,871,680
TOTAL kg CO_2e GIA	-88	1,263	80	95	306	-20	1,561
Assessment 2 – Refurbished Scheme (including module B6)							
TOTAL kg CO_2e	-88,791	396,652	28,566	72,301	131,697	5,675	468,123
TOTAL kg CO_2e GIA	-224	999	72	182	332	14	1,179

**Total excluding module D*

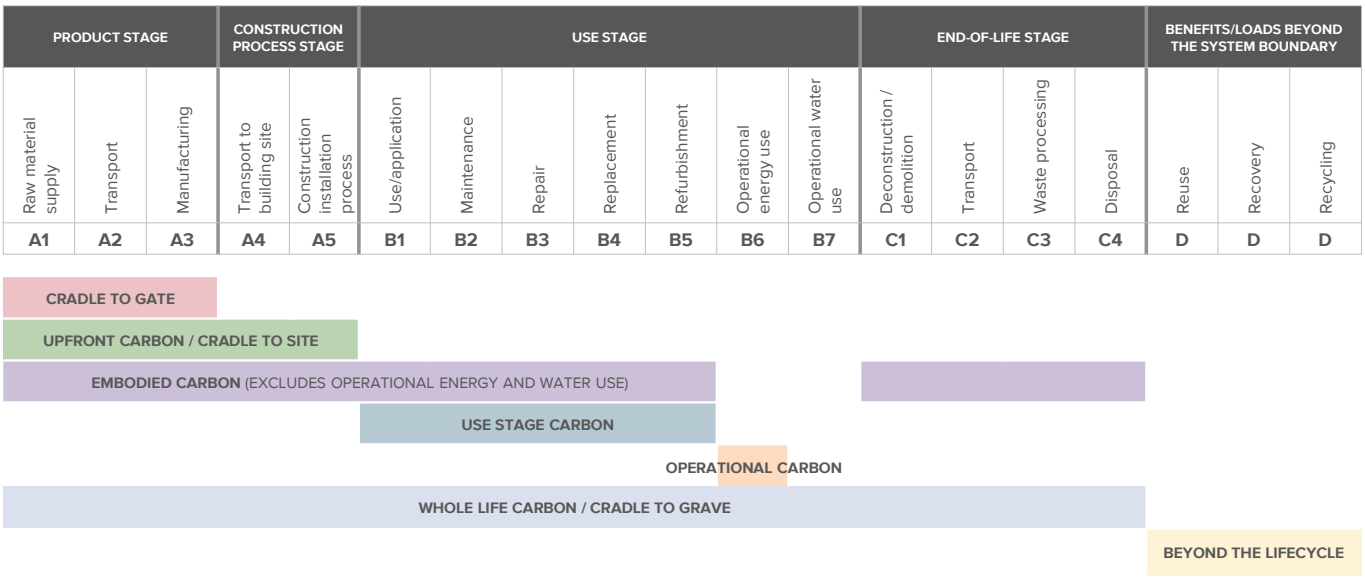

Figure 1: Lifecycle stages (modules) according to EN 15978 and terminology of carbon emissions scopes.

INTRODUCTION

As buildings become more energy efficient, operational carbon emissions will make up a smaller proportion of a development's whole life-cycle carbon emissions. It is therefore becoming increasingly important to calculate and reduce carbon emissions associated with other aspects of a development's life cycle; namely, embodied carbon emissions.

SITE DESCRIPTION

The proposed development is located within a residential area of the London Borough of Camden and currently comprises a 2-storey residential building. There are two proposed options for the development at 71 Avenue Road. The first includes the retention and refurbishment of the existing building, the second proposal includes demolishing the existing and constructing a new building.

POLICY FRAMEWORK

The London Plan 2021 has included under Policy SI2 Minimising greenhouse gas emissions, a requirement for a Whole Life-cycle Carbon Assessment for all referable development proposals.

> *F. Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.*

The GLA has also published a Whole Life-cycle Carbon Assessments Guidance (March 2022) which explains how to prepare a WLC assessment for planning applications. As outlined in the guidance, applicants are required to take action at the following stages:

- Pre-application
- Stage 1 submission (i.e. RIBA Stage 2/3)
- Post-construction (i.e. upon commencement of RIBA Stage 6 and prior to the building being handed over, if applicable. Generally, it is be expected that the assessment would be received three months post-construction)

METHODOLOGY

The methodology followed in calculating the embodied carbon emissions is aligned with the GLA Life-Cycle Carbon Assessments Guidance and the RICS professional statement (PS) for undertaking detailed carbon assessments. The RICS Whole life carbon assessment for the built environment (2017), follows the European standard EN 15978. For operational carbon emissions estimates for the two development options, the GLA's methodology for energy assessments has been followed. Please refer to Appendix B for more details.

LIFE CYCLE STAGES

The life cycle stages covered by the RICS methodology refer to EN 15978, which includes a modular approach to a built asset's life cycle, breaking it down into different stages. The four main modules are Product stage [A1 – A3], Construction Process stage [A4 – A5], Use stage [B1 – B7] and End of Life stage [C1 – C4]. Module D consists of the potential environmental benefits or burdens of materials beyond the life of the project, this is usually reported separately to the cradle to grave modules [A – C].

Table 2 shows the life-cycle stages that were considered for the assessment and the assumptions made for some stages due to limitations of the software used.

Table 2: Life cycle stages.

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage				Benefits and loads beyond the system boundary		
Raw material supply	Transport	Manufacturing	Transport to building site	Installation into building	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
A1	A2	A3	A4	A5	B1	B2*	B3‡	B4	B5†	B6	B7	C1	C2	C3	C4	D	D	D
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓

* B2 has been estimated by extrapolating the results of B3 assuming these correspond to 25% of B2 emissions (RICS PS).
‡ B3: a repair/year% has been added for some building components as indicated in the RICS PS (2.3 Roofs, 2.5 External walls, windows, 2.6 Windows, 3 Finishes and 5 Services).
† B5: B4 figure includes B5 emissions in the GLA WLC template.

BUILDING ELEMENTS

The Whole lifecycle carbon assessment covers all building elements listed in Tables 3 & 4 (where applicable to the Proposed Development). Material quantities have been provided for both the new build and refurbishment scheme options, and are reported in the bill of quantities included in Appendix A. A minimum of at least 95% of the cost allocated to each building element category has been accounted for, where information has been given, in line with GLA policy.

Table 3: Building elements as per RICS NRM. (New build scheme)

Group	Building Element	Applicable	Included
0. Demolition & facilitating works	0.1. Toxic / hazardous / contaminated material treatment	N	N
	0.2. Major demolition works	Y	Y
	0.3. & 0.5. Temporary / enabling works	N	N
	0.4. Specialist groundworks	N	N
1. Substructure	1.1. Substructure	Y	Y
2. Superstructure	2.1. Frame	Y	Y
	2.2. Upper floors incl. balconies	Y	Y
	2.3. Roof	Y	Y
	2.4. Stairs & ramps	Y	Y
	2.5. External walls	Y	Y
	2.6. Windows & external doors	Y	Y
	2.7. Internal walls & partitions	Y	Y
	2.8 Internal doors	Y	Y
3 Finishes	3.1 Wall finishes	Y	Y
	3.2 Floor finishes	Y	Y
	3.3 Ceiling finishes	Y	Y

Group	Building Element	Applicable	Included
4 FFE	4.1 Fittings, furnishings & equipment	Y	Y
5 Building services / MEP	5.1–5.14 Services	Y	Y
6 Prefabricated Buildings and Building Units	6.1 Prefabricated buildings and building unit	N	N
7 Work to existing building	7.1 Minor demolition and alteration works	N	N
8 External works	8.1 Site preparation works	Y	Y
	8.2 Roads, paths, paving's and surfacing's	Y	Y
	8.3 Soft landscaping, planting and irrigation systems	N	N
	8.4 Fencing, railings and walls	Y	Y
	8.5 External fixtures	N	N
	8.6 External drainage	N	N
	8.7 External services	Y	Y
	8.8 Minor building works and ancillary buildings	N	N

Table 4: Building elements as per RICS NRM. (Refurbished scheme)

Group	Building Element	Applicable	Included
0. Demolition & facilitating works	0.1. Toxic / hazardous / contaminated material treatment	N	N
	0.2. Major demolition works	N	N
	0.3. & 0.5. Temporary / enabling works	N	N
	0.4. Specialist groundworks	N	N
1. Substructure	1.1. Substructure	Y	Y
2. Superstructure	2.1. Frame	Y	Y
	2.2. Upper floors incl. balconies	Y	Y
	2.3. Roof	Y	Y
	2.4. Stairs & ramps	Y	Y
	2.5. External walls	Y	Y
	2.6. Windows & external doors	Y	Y
	2.7. Internal walls & partitions	Y	Y
	2.8 Internal doors	Y	Y
3 Finishes	3.1 Wall finishes	Y	Y
	3.2 Floor finishes	Y	Y
	3.3 Ceiling finishes	Y	Y
4 FFE	4.1 Fittings, furnishings & equipment	Y	Y
5 Building services / MEP	5.1–5.14 Services	Y	Y
6 Prefabricated Buildings and Building Units	6.1 Prefabricated buildings and building unit	N	N
7 Work to existing building	7.1 Minor demolition and alteration works	Y	Y
8 External works	8.1 Site preparation works	Y	Y
	8.2 Roads, paths, paving's and surfacing	Y	Y
	8.3 Soft landscaping, planting and irrigation systems	N	N
	8.4 Fencing, railings and walls	Y	Y
	8.5 External fixtures	N	N

Group	Building Element	Applicable	Included
	8.6 External drainage	N	N
	8.7 External services	Y	Y
	8.8 Minor building works and ancillary buildings	N	N

SOFTWARE TOOLS

The tool used for the embodied carbon assessment is the eToolLCA, which follows BS EN 15978, is IMPACT-compliant and BRE certified and listed in the GLA Life-Cycle Carbon Assessments Guidance, Appendix 1 as an acceptable tool.

MATERIALS & PRODUCTS

Embodied carbon calculations have been carried out using:

- Type III environmental declarations (Environmental Product Declarations[1] and equivalent) and datasets in accordance with BS EN 15804; and,
- EPDs and datasets in accordance with ISO 14025 and ISO 14040/44.

Sequestered (biogenic) carbon, in particular from the use of timber products, biogenic carbon is typically reported separately from the GWP emissions.

Embodied carbon is difficult to calculate for many MEP systems due to a lack of available data. Where manufacturer specific data is not available figures for embodied carbon have been taken from the closest matching system within the eToolLCA database. In cases where there are no comparable systems embodied carbon has been calculated based on the key materials used to manufacture the equipment, by weight.

[1] An Environmental Product Declaration EPD is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products in a credible way (Environdec)

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EMBODIED CARBON RESULTS

ASSESSMENT 1 – NEW BUILD SCHEME

Figure 2 shows the results of Assessment 1, which is the New Build Scheme. The results show that as expected, the highest contribution to the Whole life carbon of the project is the *A1-A3 Product stage* which accounts for approximately 780 tCO_2e (39.9%). These emissions are derived from the use of concrete and reinforced steel within the building substructure as well as floors within the superstructure.

The second largest contributor is A4 – Transport of Equipment and Materials, which accounts for 572 tCO_2e (29.3%) of the total carbon emissions of the building during its lifetime. These emissions can be attributed to the transport of both equipment and materials from factory to site.

And the third largest contributor is *C4 – Disposal* with 241 tCO_2e (12.3%).

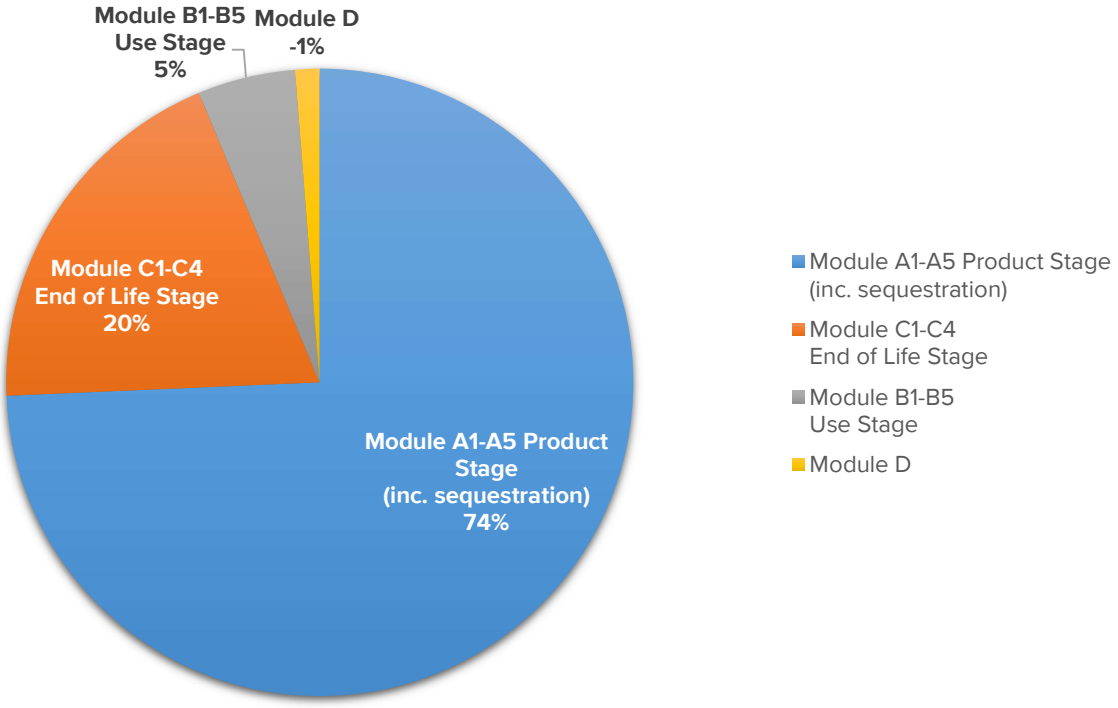

Figure 2: WLC results for Assessment 1 by LCA stage

ASSESSMENT 2 – REFURBISHED SCHEME

Figure 3 shows the results of Assessment 2, which is the Refurbished scheme. The results show that the highest contribution to the whole life carbon of the project is the *A4 Transport of Equipment and Materials stage* which accounts for approximately 209 tCO_2e (37.1%).

The second largest contributor is the *A1-A3 Product stage*, which accounts for about 153 tCO_2e (27.2%) of the total carbon emissions of the building during its lifetime. These emissions are largely derived from the use of concrete within the building substructure, and the replacement of the deteriorated floors and bricks within the superstructure

And the third largest contributor is the *C4 Disposal stage* with 85 tCO_2e (15.1%).

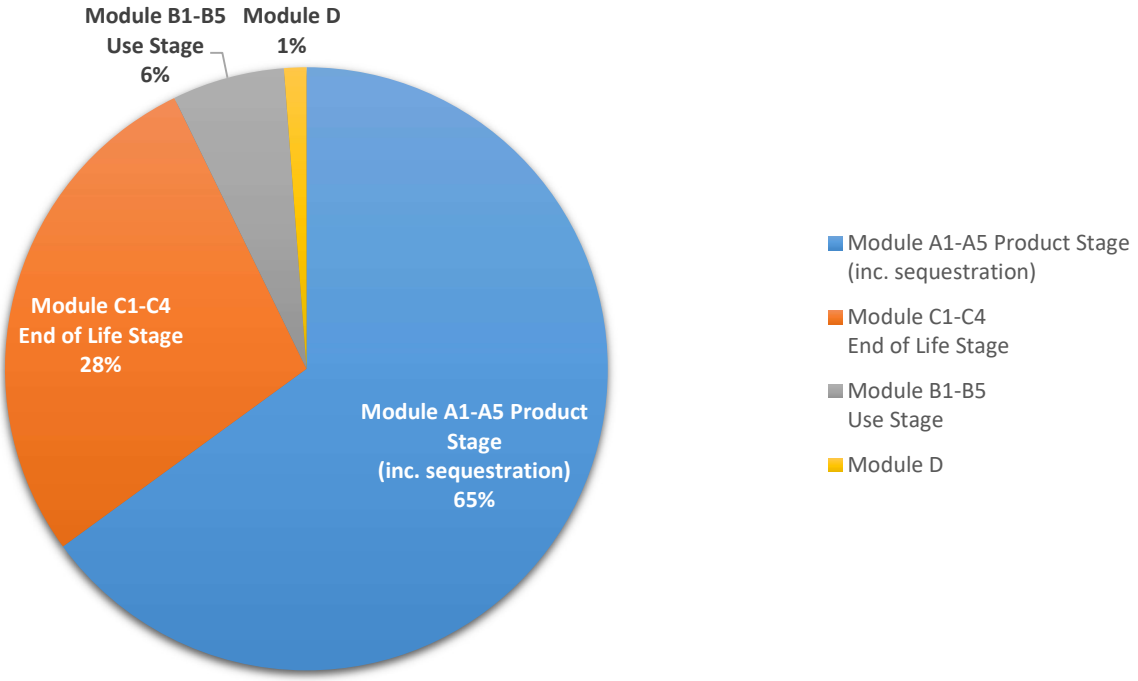

Figure 3: WLC results for Assessment 2. by LCA stage

NEW BUILD SCHEME V REFURBISHED SCHEME

The embodied carbon emissions of the proposed development are shown in Figure 4, for both *Assessment 1 – New Build Scheme* and *Assessment 2 – Refurbished Scheme.* The results show that overall, the new build scheme has a higher total embodied carbon potential than the refurbishment scheme. The difference in total emissions between the new build and refurbishment schemes can mainly be attributed to the increased use of materials and equipment associated with the construction of the new build option. This can be seen in the increased emissions of modules A1-A3 Products stage, A4 Transport of equipment and materials, B4 Replacement, and C2 Transport of waste offsite.

If the two proposals are compared on a floor area basis, as shown in Table 5 the new build scheme still has an overall kg CO2e/m^2 GIA higher than that of the refurbished scheme. With an overall difference in intensity of 382 kg CO2e/m^2 GIA

However, for modules C1-C4 the new build scheme's embodied carbon is 306 kg CO2e/m^2, compared to 332 kg CO2e/m^2 GIA for the refurbished scheme, as such the refurbished scheme has a higher kg CO2e intensity per m^2 than that of the new build. This can be most likely attributed to the overall higher GIA (1,199 GIA) of the new build compared to the refurbishment (397 GIA).

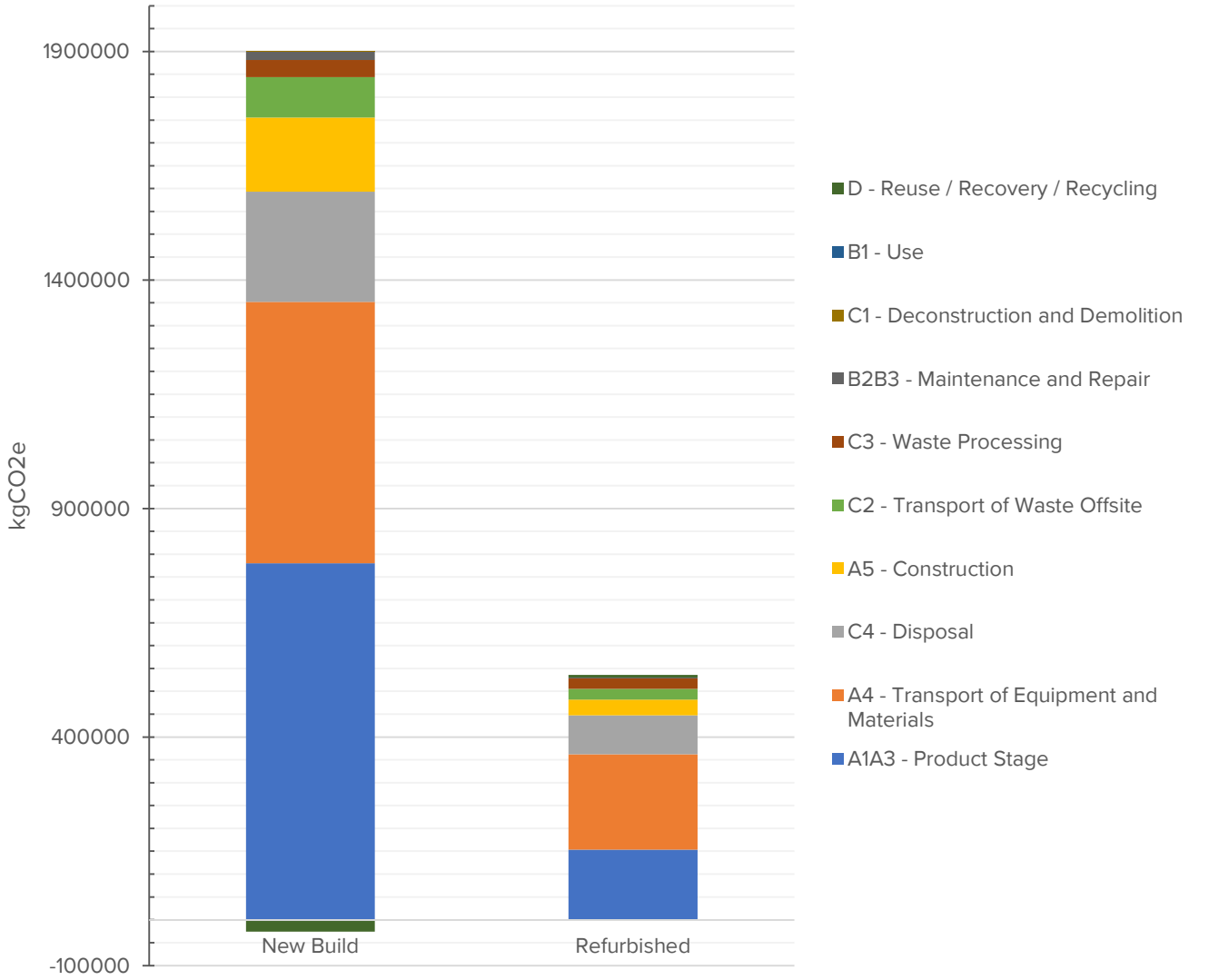

Figure 4: Sum of Global Warming Potential (kgCO2e), Function by Life Cycle Module

Table 5: Embodied carbon emissions by module (kg CO_2e/m^2 GIA)

	New Build Scheme	Refurbished Scheme
Modules A1-A5 (inc. sequestration)	1,175 kg CO_2e/m^2 GIA	775 kg CO_2e/m^2 GIA
Modules B-C (excluding B6 & B7)	386 kg CO_2e/m^2 GIA	404 kg CO_2e/m^2 GIA
Total of Modules A1-A5 B-C	1,561 kg CO2e/m^2 GIA	1,179 kg CO2e/m^2 GIA

WHOLE LIFE CARBON RESULTS

B6 - OPERATIONAL ENERGY

Module B6 – Operational energy covers carbon emissions arising from the energy use of the buildings integrated energy systems, projected throughout the lifecycle of the project (in our case 60 years is standard). It on average forms around a 1/3 of all carbon emissions of a built asset over its lifetime, as such it is important to assess its contribution to the overall building performance in addition to just embodied carbon emissions when comparing the new build and refurbished scheme options.

Using the energy data set provided by the calculations XCO2 have carried out for this development (detailed further in the accompanying Energy and Sustainability Statement), operational energy has been modelled for both the new build and refurbished scheme options to assess the impact on total carbon emissions for both. The analysis has followed GLA's guidance for energy assessments. The operational water use has been derived from the CIBSE 'Rules of Thumb Guidelines for Building Services (5th edition 2011)'.

ASSESSMENT 1 – NEW BUILD SCHEME (INCLUDING B6)

Figure 6 below shows the results of Assessment 1 but this time including the operational energy figures. The results show that module *B6 Operational Energy* accounts for a relatively small proportion of emissions at 6% of the total or 114 tCO2e. *A1-A3 Product stage* still accounts for the largest proportion of emissions.

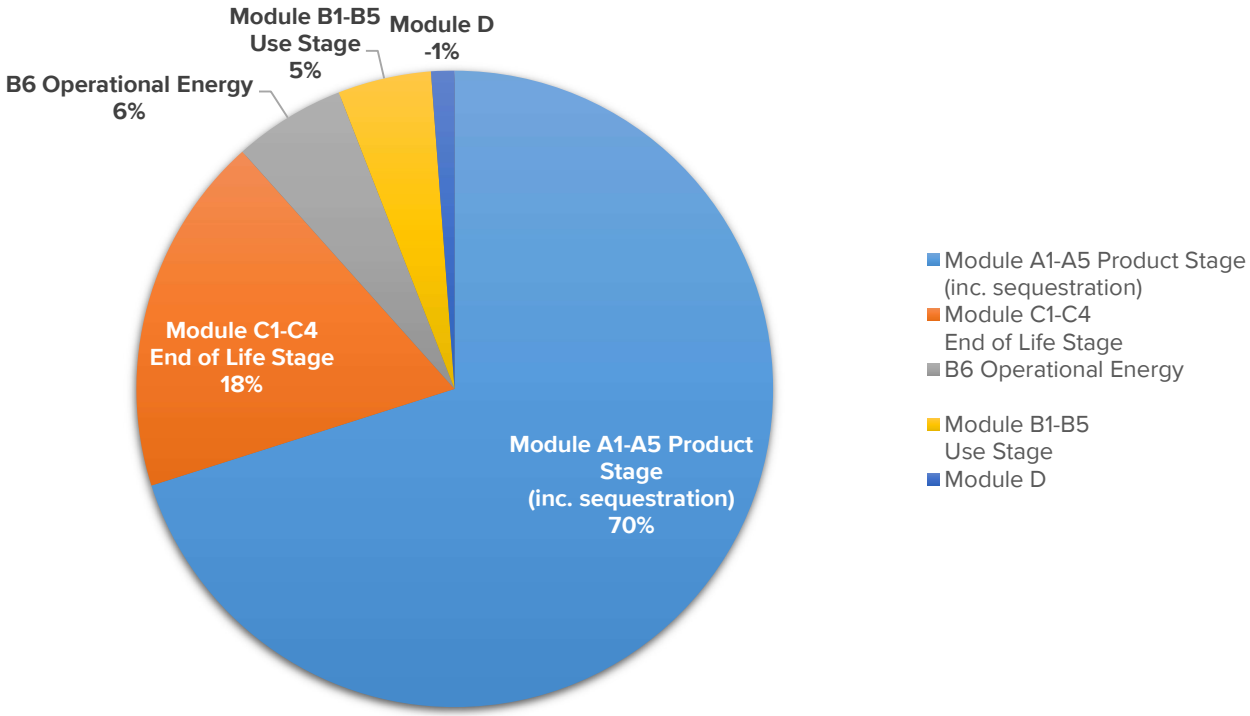

Figure 5: WLC results for Assessment 1. by LCA stage (including B6 – Operational Energy)

ASSESSMENT 2 – REFURBISHED SCHEME (INCLUDING B6)

Figure 7 shows the results of Assessment 2, the results indicate that module *B6 – Operational Energy* accounts for 13% of the total or 72 tCO2e. This demonstrates that the refurbished scheme has a significantly higher proportion of emissions attributed to operational energy, than the new build scheme. When comparing the schemes by floor area, the refurbished scheme produces 86.6 $kgCO_2/m^2$ more than the new build through operational energy.

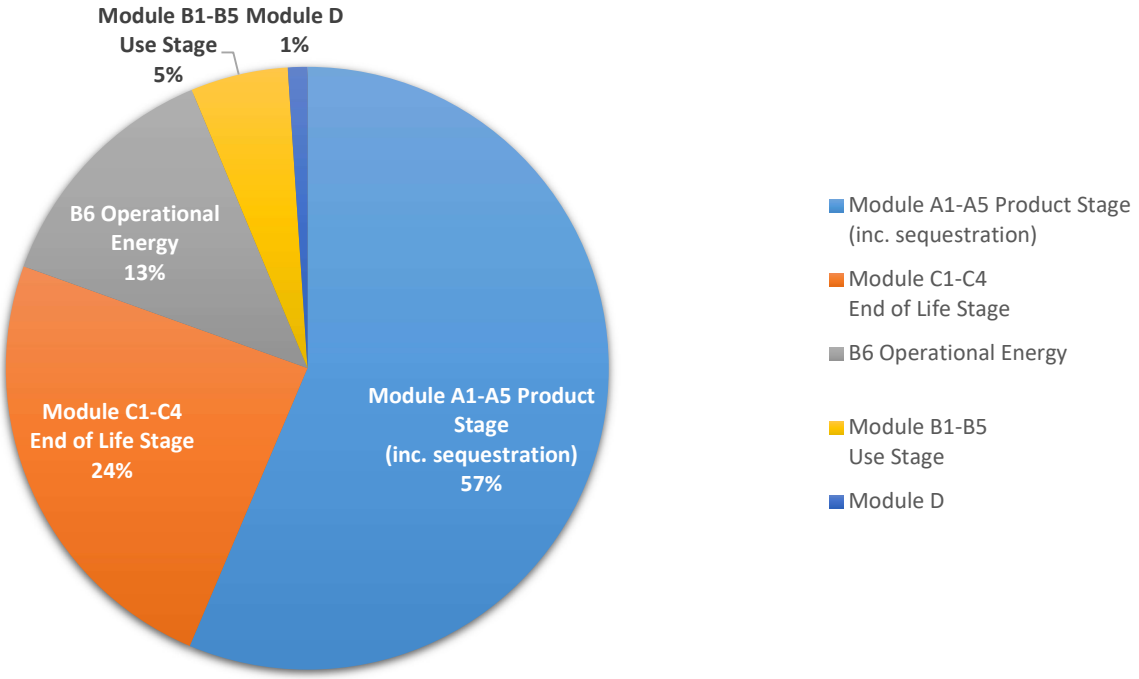

Figure 6: WLC results for Assessment 2. by LCA stage (including B6 – Operational Energy)

NEW BUILD SCHEME V REFURBISHED SCHEME (INCLUDING B6)

The embodied carbon emissions of the proposed development, covering modules A1-A5 Product stage, B1-B5 Use stage, C1-C4 End of life stage and Module D with the addition of B6 Operational energy emissions, is shown in Figure 7, for both *Assessment 1 – New Build Scheme* and *Assessment 2 – Refurbished Scheme.*

The results show that overall, the new build scheme has a higher total whole life carbon potential than the refurbished scheme. The difference in total emissions between the new build and refurbishment schemes can mainly be attributed to the increased proportion of emissions from the product stage of the new build option.

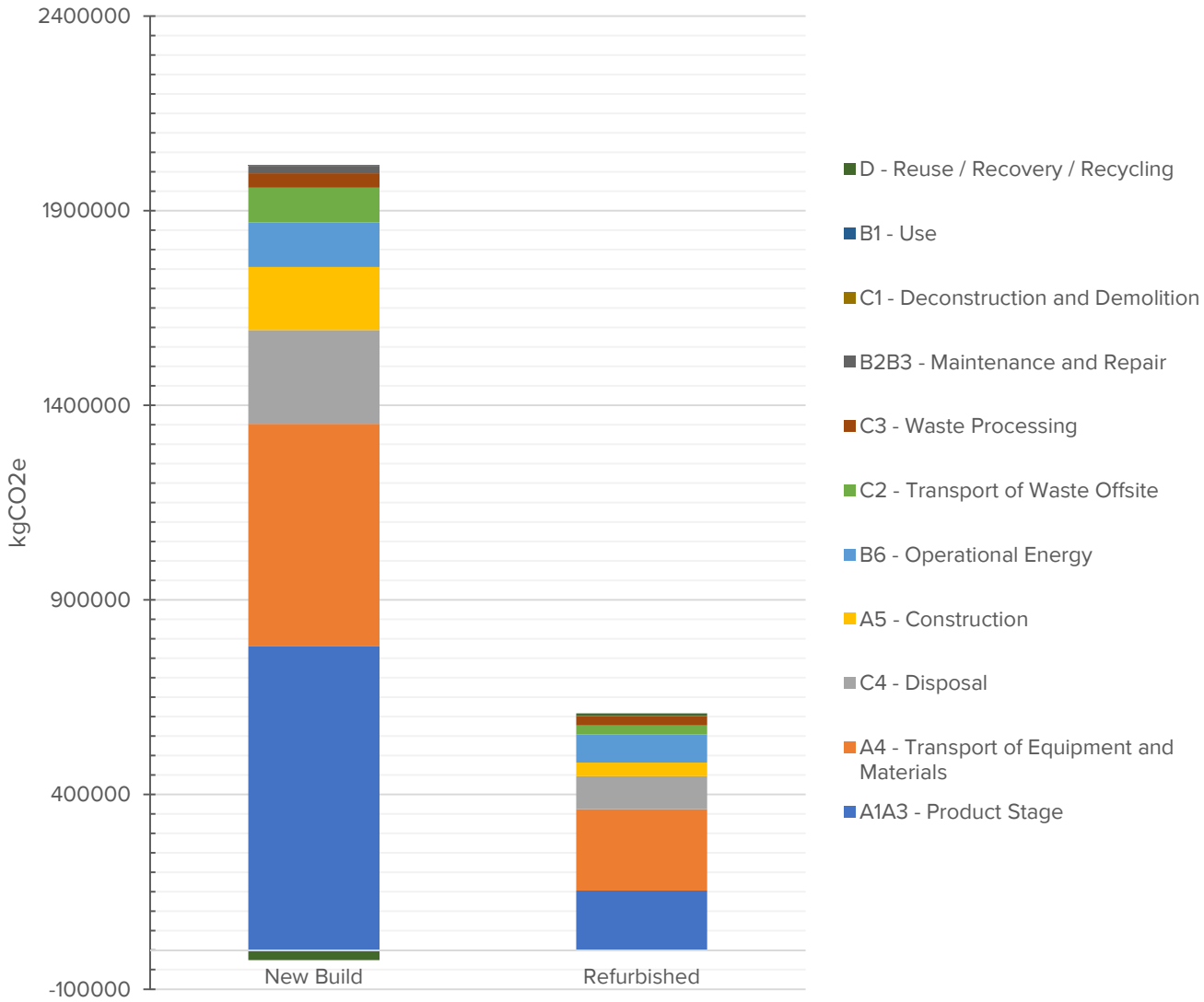

Figure 7: Sum of Global Warming Potential (kgCO2e), Function by Life Cycle Module (including B6 – Operational Energy)

CONCLUSION

In conclusion, the proposed new build scheme has higher overall associated embodied carbon emissions than the refurbished scheme, which is attributed to the complete demolition and reconstruction of the existing building, along with associated emissions from transport of materials and equipment used during construction of the new building.

Additionally, when operational energy emissions are included within the modelling, it is demonstrated that the new build scheme has total carbon emissions higher than that of the refurbished option over a predicted 60-year lifespan. This is likely due to the increase in floor area of the new building compared to the existing, resulting in a higher space heating demand. However, if the operational energy emissions are compared on a floor area basis, the new build out-performs the existing with almost 50% less $kgCO_2/m^2$ production. This can be attributed to the lower performance of the building fabric and internal conditions from the refurbished option, compared to that possible from the demolition and erection of a new build.

Therefore, when considering both options the new build should be considered the more carbon intensive option.

APPENDIX A – NEW BUILD AND REFURBISHMENT RFI

New Build - Materials RFI

CLASS	IFCMATERIAL	QUANTITY	UNIT	THICKNESS_MM	Product specification / assumptions
1. FOUNDATIONS AND SUBSTRUCTURE:					
Foundation, sub-surface, basement and retaining walls					
FOUNDATION	350mm DIA. Concrete Piles @500c/c	175	UNIT		Concrete Piles RC 11M DEEP (including details of strength class and cement content) Concrete grade C32/40 Concrete volume 185M3
FOUNDATION	300mm RC 30/37 Uniform Rafat with extra bars at edges	136	M3	300	300mm RC 30/37 Uniform Rafat with extra bars at edges Concrete grade C32/40
FOUNDATION	200mm RC Colums foundation	3	M3	200	200mm RC Colums foundation with extra bars Concrete grade C32/40
FOUNDATION	200mm RC 30/37 edges foundation to Uniform Raft	7	M3	200	200mm RC edges foundation to Uniform Raft with extra bars Concrete grade C32/40
FOUNDATION	250mm RC 30/37 Basement wall	100	M3	250	250mm RC 30/37 Basement wall around perimeter, swimming pool pits and lift pit Concrete grade C32/40
FOUNDATION	500 mm Deep and 800mm wide RC 30/37 Foundation Pile Cap	38	M3	500	500 mm Deep and 800mm wide RC 30/37 Foundation Pile Cap Concrete grade C32/40
FOUNDATION	600x250 mm RC 30/37 Foundation Colums	5	M3		600x250 mm RC 30/37 Foundation Colums at Basement Level Concrete grade C32/40
FOUNDATION	Rebar grade B500B				Rebars to all RC construction elements at basement and ground floor slab level
2. VERTICAL STRUCTURE AND FAÇADE					
External walls and facade					
EXTERNAL WALL	102.5 mm solid brick outer leaf	55.00	M3	102.5	Solid red brick including: joining mortar and clay bricks
EXTERNAL WALL	75mm residual cavity			75	
EXTERNAL WALL	75mm Kingspan Kooltherme K108 Cavity Board	41.00	M3	75	
EXTERNAL WALL	190mm wide 7.3N Dense Block	105.00	M3	190	Precast concrete blocks, 440 x 190 x 215 mm, Enviroblock Dense 7,3N (Aggregate Industries)
EXTERNAL WALL	18mm sand, cement and lime internal render	12.00	M3	18	
EXTERNAL WALL					
Internal walls and non-bearing structures					
INTERNAL WALL	190mm wide 7.3N Dense Block	223.00	M3	190	Precast concrete blocks, 440 x 190 x 215 mm, Enviroblock Dense 7,3N (Aggregate Industries)
INTERNAL WALL	18mm sand, cement and lime internal render		M3	18	sand and cement render on both sides of the internal walls prior to finishes
INTERNAL WALL	100mm wide 7.3N Dense Block	12.00	M3	100	Precast concrete blocks, 440 x 100 x 215 mm, Enviroblock Dense 7,3N (Aggregate Industries)
INTERNAL WALL					
INTERNAL WALL					
Columns and load-bearing vertical structures					
COLUMN					
COLUMN					
3. HORIZONTAL STRUCTURES: BEAMS, FLOORS AND ROOFS					
Basemnt floor slab					
SLAB	damp proof membrane	400	M2	0.25	
SLAB	150mm Kingspan Kooltherm K103 floorboar	65	M3	150	
SLAB	separation layer	433	M2	0.25	polythene vapour control layer (VCL)
SLAB	100mm floor screed	39	M3		
SLAB	wood floor adhesive in litres	260	UNIT		
SLAB	stone and marble adhesive in litres	187	UNIT		
SLAB	22mm solid wood flooring	260	M2	22	oak flooring
SLAB	22mm stone flooring	187		22	marble flooring
Ground floor slab					
SLAB	250mm RC 30/37 Concrete Slab	84	M3	250	250mm RC 30/37 Concrete Slab Concrete grade C32/40
SLAB	suspended timber floor joists	242	M2	200	timber joists 47x200mm
SLAB	150mm Kingspan Kooltherm K103 floorboar	37	M3	150	
SLAB	22mm structural plywood	242	M2	22	
SLAB	wood floor adhesive in litres	170	UNIT		
SLAB	22mm solid wood flooring	170	M2	22	oak flooring
SLAB	stone and marble adhesive in litres	75	UNIT		
SLAB	22mm stone flooring	75	M2	22	marble flooring
SLAB	floor void	242	M2	140	
SLAB	services void under ground floor slab	301	M2	150	
SLAB	suspended ceiling grid	301	M2		
SLAB	2 x 12.5mm plasterboard ceiling	301	M2	25	2 nr. Layer of 12,5mm 'Gyproc WallBoard' taped and jointed, with skim finish.
SLAB					
Upper floors					
SLAB	suspended timber floor joists (FIRST FLOOR)	256	M2	200	timber joists 47x200mm
SLAB	150mm Kingspan Kooltherm K103 floorboar	38	M3	150	
SLAB	22mm structural plywood	256	M2	22	
SLAB	wood floor adhesive in litres	171	UNIT		
SLAB	22mm solid wood flooring	171	M2	22	oak flooring
SLAB	stone and marble adhesive in litres	88	UNIT		marble flooring
SLAB	22mm stone flooring	88	M2		
SLAB	resilient bar	256	M2		
SLAB	2 x 12.5mm plasterboard ceiling	256	M2	25	2 nr. Layer of 12,5mm 'Gyproc WallBoard' taped and jointed, with skim finish.
SLAB	UC 203x203 Steels	13	UNIT		number of steel beams
SLAB	suspended timber floor joists (SECOND FLOOR)	238	M2	200	timber joists 47x200mm
SLAB	150mm Kingspan Kooltherm K103 floorboar	36	M3	150	
SLAB	22mm structural plywood	238	M2	22	
SLAB	wood floor adhesive in litres	198	UNIT		
SLAB	22mm solid wood flooring	198	M2	22	oak flooring
SLAB	stone and marble adhesive in litres	44	UNIT		
SLAB	22mm stone flooring	44	M2	22	marble flooring
SLAB	resilient bar	238	M2	17	
SLAB	2 x 12.5mm plasterboard ceiling	238	M2	25	2 nr. Layer of 12,5mm 'Gyproc WallBoard' taped and jointed, with skim finish.
SLAB	UC 203x203 Steels	6	UNIT		number of steel beams
Roof					
ROOF	timber roof joists piched roof	425	M2	200	timber joists 47x200mm flat section of the roof included, insulation between joists
ROOF	Roof slate tiles	234	M2	6	Bugail Capital Grade Welsh Slate Roof Tile in Blue/Grey
ROOF	slate battens	234	M2	38	
ROOF	38 x 38 mm counter battens	234	M2	38	
ROOF	breathable membrane		UNIT	0.25	100 mm vertical lap between runs of Kingspan nilvent® sealed by the placement of the counter batten
ROOF	breathable membrane	425	M2	0.25	Breathable sarking membrane e.g. Kingspan nilvent
ROOF	150mm Kingspan Kooltherm® K107 between rafters	425		150	
ROOF	3 mm skim coated Kingspan Kooltherm® K118 under rafters			50	product thickness 37.5mm +12.5mm plasterboard
ROOF	22mm structural plywood	182	M2	22	
ROOF	Fibreglas GRP roofing	178	M2	18	
ROOF	lead roof flashing and covering	146	M2	2.24	Code 5 Lead Flashing
ROOF					
ROOF	green roof	6	M2		green roof over bean storage
BEAM	UC 203x203 Steels	6	UNIT		
BEAM	UC 203x203 Crank Steels	4	UNIT		
4. OTHER STRUCTURES AND MATERIALS					
Other structures and materials					
STAIRS	precast concrete staircase with marble coverings	35	M2		
STAIRS					
Windows and doors					
WINDOW	Double glazing Sash windows	35.0	UNIT		74m2 of glazing
WINDOW					
DOOR	Double glazing double casement patio doors	12.0	UNIT		53m2 of glazing
DOOR	External double front doors	1.0	UNIT		5.5m2 door area
DOOR	External single doors	3.0	UNIT		12m2 door area
DOOR	Internal single doors	52.0	UNIT		
DOOR	Internal double doors	20.0	UNIT		
Finishings and coverings					
HORIZONTAL FINISH	Reconstituted stone	64	M		Reconstituted stone- copping, cornice, window surround & sills, front portico, plinths and other features.
HORIZONTAL FINISH	Reconstituted stone	22	UNIT		Haddonstone TecStone wet-cast reconstituted stone. Portland 01 Aggregate size: 0-10mm continuously graded Light Acid Etched Finish Mortar joint to match stone

HORIZONTAL FINISH	Portland stone	64	M2	22	Rear patio and steps
HORIZONTAL FINISH	Portland stone	30	M2	22	front lightwell and front steps
HORIZONTAL FINISH	Portland stone	45	M2	80	boundary wall copings
HORIZONTAL FINISH	Portland stone	6	M2	22	stone steps
HORIZONTAL FINISH	Glass balustrades	37	M3	23	toughened glass
VERTICAL FINISH	Portland stone	1	UNIT		Front Portico Steps & Landing. Natural Portland stone. Uniform with little colour variation Texture finish suitable for slip resistance.
VERTICAL FINISH	metal staircase with portland stone covers	6	M2		

5. EXTERNAL AREAS AND SITE ELEMENTS

SITE	brick boundary wall	56	M3		
SITE	Resin Bound Permeable driveway.	178	M2		Resin bound paving is SuDS compliant meaning drainage water can permeable through and help reduce the risk of puddling or flooding.
SITE	Lawn bounded by stone trim	211	M2		
SITE					
SITE					
SITE					
SITE					
SITE					
SITE					
SITE					

6. BUILDING SERVICES

SYSTEMS	ASHP for heating and cooling				Daikin/ERLQ014CV
	Basement flooding pump				
SYSTEMS	Pool and Plunge pool pump and filter equipment				
SYSTEMS	RAPID CHARGING POINT (50+ kw)	2	UNIT		
SYSTEMS	Ductwork				
SYSTEMS	Piping				
SYSTEMS	Electric wiring				
BUILDINGTECH	PV panels				

Refurbished Building - Materials RFI

CLASS	IFCMATERIAL	QUANTITY	UNIT	THICKNESS_MM	Product specification / assumptions
1. FOUNDATIONS AND SUBSTRUCTURE:					
Foundation, sub-surface, basement and retaining walls					
FOUNDATION	concrete hardstanding	116	M3	400	Concrete (including details of strength class and cement content) no rebar
FOUNDATION	solid brick foundation perimeter wall	26	M3	460	brick foundation wall, without insulation, including: joining mortar and clay bricks
FOUNDATION	solid brick internal foundation wall	10	M3	460	brick foundation wall, without insulation, including: joining mortar and clay bricks
2. VERTICAL STRUCTURE AND FAÇADE					
External walls and facade					
EXTERNAL WALL	solid brick masonry wall	82.50	M3	380	brick masonry wall, without insulation, including: joining mortar and clay bricks
EXTERNAL WALL					
EXTERNAL WALL					
EXTERNAL WALL					
EXTERNAL WALL					
EXTERNAL WALL					
Internal walls and non-bearing structures					
INTERNAL WALL	solid brick wall	6.10	M3	150	brick internal wall, without insulation, including: joining mortar and clay bricks
INTERNAL WALL					
INTERNAL WALL					
INTERNAL WALL					
INTERNAL WALL					
Columns and load-bearing vertical structures					
COLUMN	solid brick wall	19.40	M3	380	brick internal wall varies 160mm, 230mm, 380mm, without insulation, including: joining mortar and clay bricks
COLUMN	chimney stacks	12.30	M3		brick, including: joining mortar and clay bricks
3. HORIZONTAL STRUCTURES: BEAMS, FLOORS AND ROOFS					
Ground floor slab					
SLAB	concrete floor	9	M3	200	garage, boiler room, hall, toilet and storage behind kitchen on ground floor
SLAB	suspended timber floor	170	M2	130	timber joists 55x130mm
SLAB	solid wood boards	170	M2	22	rest of ground floor area 22mm thick solid wood borads
SLAB	underlay	170	M2	12	foam underlay ols type 12mm
SLAB	carpet	169	M1	9	wool carpet 10mm
SLAB	lath and plaster ceilings	208	M2	40	lath and plaster decorative ceilings
Upper floors					
SLAB	suspended timber floor FIRST FLOOR	150	M2	200	timber joists 47x200mm
SLAB	solid wood boards	150	M2	22	22mm thick solid wood borads
SLAB	underlay	150	M2	12	foam underlay ols type 12mm
SLAB	carpet	150	M2	10	wool carpet 10mm
SLAB	lath and plaster ceilings	150	M2	40	lath and plaster decorative ceilings
SLAB					
SLAB	suspended timber floor SECOND FLOOR(LOFT SPACE)	137	M2	200	timber joists 47x200mm
	lath and plaster ceilings	137	M2	40	lath and plaster decorative ceilings
Roof					
ROOF	timber roof joists piched roof	190	M2	200	timber joists 47x200mm flat section of the roof included, no insulation at present
ROOF	asphalt flat roof covering	129	M2	20	asphalt flat roof covering, no insulation at present
ROOF	lead roof flashing and covering	51	M2	1.8	code 4 lead roof flashing and covering
ROOF	clay tiles pitched roof	159	M2	15	red clay mission type roof
ROOF					
BEAM					
BEAM					
4. OTHER STRUCTURES AND MATERIALS					
Other structures and materials					
STAIRS	timber staircase	9	M2		old solid timber decorative staircase with solid timber balustrade
STAIRS					
Windows and doors					
WINDOW	simgle glazed timber sash windows	33.0	UNIT		
WINDOW	big arched stained glass window next to main staircase	1.0	UNIT		
WINDOW	single glazed crittall casement windows	8.0	UNIT		
DOOR	timber external doors, one of them double	4.0	UNIT		
DOOR	internal timber doors	35.0	UNIT		two sets of double doors
Finishings and coverings					
HORIZONTAL FINISH					
HORIZONTAL FINISH					
HORIZONTAL FINISH					
HORIZONTAL FINISH					
HORIZONTAL FINISH					
HORIZONTAL FINISH					
VERTICAL FINISH	ornamental porch with two columns made of timber and metal elements	1	UNIT		
VERTICAL FINISH					
5. EXTERNAL AREAS AND SITE ELEMENTS					
SITE	stone steps	4	M2	100	
SITE	brick steps	3	M2	120	
SITE	precast concrete paving slabs	246	M2	40	
SITE	concrete paving	82	M2	100	
SITE	brick and stone coping boundary	32	M3		
SITE					
SITE					
SITE					
SITE					
SITE					
6. BUILDING SERVICES					
SYSTEMS	Gas combi boiler heating and hot water system				
SYSTEMS					
SYSTEMS	Ductwork				
SYSTEMS	Piping				
SYSTEMS	Electric wiring				
SYSTEMS					
BUILDINGTECH					