



100 Chalk Farm Road

Whole Lifecycle Carbon Assessment

Prepared by Whitecode Consulting Ltd

Submitted on behalf of Regal Chalk Farm Limited

January 2024



WHITECODE
CONSULTING

Whole Lifecycle Carbon Assessment Chalk Farm

Prepared for Regal Chalk Farm Limited

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Figure 1.1 Proposed Site Plan

1. Introduction

1.1 Purpose of this Document

This Whole Life Carbon Assessment has been prepared by Whitecode Consulting Ltd on behalf of Regal Chalk Farm Limited ('the Applicant') in support of an application for full planning permission for the redevelopment of 100 Chalk Farm Road ('the Site') within London Borough of Camden ('LBC').

A listed building consent application accompanies the application for works to the adjacent Roundhouse, which is a Grade II* listed building.

The site is located on the south-western side of Chalk Farm Road and borders the mainline railway into Euston, with the Juniper Crescent Housing Estate to the south. It lies within the Regents Canal Conservation Area, to which the existing building on the site is a neutral contributor. To the west, the site is adjacent to the Grade II* listed Roundhouse theatre and live music venue. Beyond that, to the north-west is Chalk Farm Underground Station. To the east is the Petrol Filling Station site, which forms part of the Camden Goods Yard development and is currently in use as a temporary supermarket.

The development will provide 265 student accommodation units, together with 783 sqm (GIA) of commercial space, 24 affordable residential units, with public realm improvements, new areas of landscaping, amenity and play space, and improved accessibility to the site.

The description of development is as follows:

"Demolition of existing buildings and redevelopment of the site to provide two buildings containing purpose-built student accommodation with associated amenity and ancillary space (Sui Generis), affordable residential homes (Class C3), ground floor commercial space (Class E) together with public realm, access, servicing, and other associated works."

Full details and scope of the planning application is described in the submitted Town Planning Statement, prepared by Gerald Eve LLP.

The purpose of this report is to summarise the outcomes of a Whole Life Carbon (WLC) assessment. The results will enable the Design Team to make informed decisions to steer the design process to optimise cost and mitigate environmental impacts.

1.2 Existing Site

The site consists of three 1970s commercial buildings: the main six-storey office building fronting Chalk Farm Road; a two-storey link building which adjoins the Roundhouse; and a three-storey office building to the rear of the site. There are surface and subterranean car parks at the rear.

2. GLA Whole Lifecycle carbon Assessment Guidance

The Greater London Authority 'Whole Life-Cycle Carbon Assessments' guidance was adopted in March 2022 and provides guidance on how to prepare a Whole Life-Cycle Carbon assessment in line with Policy SI2 of the London Plan. Policy SI2 applies to planning applications that are referred to the Mayor.

Planning applicants should continue to follow the GLA's Energy Assessment Guidance to assess and reduce operational emissions and insert the relevant information into the WLC assessment.

Calculating and reducing WLC emissions offers a wealth of benefits including:

- Ensuring that a significant source of emissions from the built environment are accounted for which is necessary in achieving a net zero-carbon city.
- Achieving resource efficiency and cost savings by encouraging the re-use of existing materials instead of new materials and the retrofit and retention of existing structures and fabric over new construction
- Identifying the carbon benefits of using recycled material and the benefits of designing for future reuse and recycling to reduce waste and support the circular economy.
- Encouraging a 'fabric first' approach to building design thereby minimising mechanical plant and services in favour of natural ventilation
- Considering operational and embodied emissions simultaneously to find the optimum solutions for the development over its lifetime.
- Identifying the impact of maintenance, repair and replacement over a building's life cycle which improves life-time resource efficiency and reduces life-cycle costs, contributing to the future proofing of asset value.
- Encouraging local sourcing of materials and short supply chains, with resulting carbon, social and economic benefits for the local economy.
- Encouraging durable construction and flexible design, both of which contribute to greater longevity, reduced obsolescence of buildings and avoiding carbon emissions associated with demolition and new construction.

2.1 LCA Software and Methodology

This WLC assessment has been undertaken using the 'OneClick LCA' software which has been developed to comply with the BS EN 15978: 2011 – Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method requirements and RICS PS *Whole Life Carbon assessment for the built environment* scope (as outlined in Table 2).

The operational carbon emissions are calculated using energy and water consumption taken from the *Energy Strategy* and *Sustainability Statement* prepared by Whitecode Consulting Ltd, June 2023 and submitted with this application. Embodied carbon emissions are calculated within the OneClick LCA software by providing the following information:

- Type of material in each building element
- Quantity of each material per building element (kg or m3)

2.2 LCA Life Cycle Stages and Scope of Assessment

The GLA's guidance references RICS PS and BS EN 15978 which requires the WLC assessment to be undertaken against the following four stages in the life of a typical building, referred to as 'modules':

- Module A1-A5 (Product sourcing and construction stage)
- Module B1 – B7 (Use stage)
- Module C1 – C4 (End of life stages)
- Module D (Benefits and loads beyond the system boundary).

A more detailed explanation of each module is provided in Table 1 below.

Table 1: Life cycle stages and scope of assessment in line with EN 15978: 2011

WHOLE LIFE CARBON ASSESSMENT INFORMATION																	
PROJECT LIFE CYCLE INFORMATION													SUPPLEMENTARY INFORMATION				
A1 – A3 PRODUCT STAGE			A4 – A5 CONSTRUCTI ON PROCESS STAGE		B1 – B7 USE STAGE					C1 – C4 END OF LIFE STAGE				D BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D			
RAW MATERIAL EXTRACTION AND SUPPLY	TRANSPORT TO MANUFACTURING PLANT	MANUFACTURING AND FABRICATION	TRANSPORT TO PROJECT SITE	CONSTRUCTION AND INSTALLATION PROCESS	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	DECONSTRUCTION DEMOLITION	TRANSPORT TO DISPOSAL FACILITY	WASTE PROCESSING	DISPOSAL	REUSE, RECOVERY, RECYCLING POTENTIAL			
					B6 – OPERATIONAL ENERGY USE												
					B7 – OPERATIONAL WATER USE												

This WLC assessment for Chalk Farm covers all building elements listed in Table 2 that are applicable to the project. The building elements are broken down according to the RICS New Rules of Measurement (NRM) classification system level 2 sub-elements. The unit of area measurement to be used is m² of Gross Internal Area (GIA).

Table 2: WLC assessment, building elements (RICS PS).

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

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

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

*** New build projects assessed are considered to commence their development on a cleared, flat site for consistency purposes. Demolition works are often decoupled from new construction projects, hence the responsibility for any emissions arising from demolition is not necessarily solely attributable to the new build project.

2.3 Data Benchmarks

GLA suggests a baseline WLC benchmark for residential developments of <850 kgCO₂e/m²GIA with the aspirational at <500 kgCO₂e/m²GIA for modules A1-A5, while for modules B-C, excluding B6 and B7, the baseline suggested values <350 kgCO₂e/m²GIA and aspirational targets are <300 kgCO₂e/m²GIA.

The GLA's total suggested benchmark for Stages A-C (excluding B6 & B&) is <1200 kgCO₂e/m²GIA and aspirational benchmark is <800 kgCO₂e/m²GIA.

3. Key Assumptions

The below table presents the key assumptions used to assess the lifecycle of the baseline building:

Environmental Indicator	Lifecycle carbon CO ₂ eq
Study Period	60 years in line with GLA guidance
Functional Unit	The Functional Unit for embodied carbon is shown in kgCO ₂ eq per m ² of floor area (GIA) A total GIA of 13,063m ² was used as confirmed by DSDHA
System Boundary	In accordance with BS EN 1579:2011 shown in Table 1
Software Tools	OneClick LCA
Assessment Scope	All buildings and external areas
Elements Considered	In accordance with RICS PS shown in Table 2
Materials Specification	Structural material quantities as provided by Pells Frischmann. Substructure RC was assumed to contain 20% recycled content. External landscape quantities provided by BBUK Studios. Superstructure quantities as provided by DSDHA. DSDHA specified the use of Rock Wool Duo Slap and Rock Wool Flexi insulation and Dulux paint which have been used for the calculations. Services quantities provided by MEP consultants WCL Generic (industry standard) data has been used where product specification was not available.
Expected Lifespan	OneClick LCA default lifespans have been used
Refrigerant Leakage	Refrigerant type R290 has been confirmed by WCL for ASHP's. OneClick LCA default annual leakage rate of 2% and 99% end of life recovery rate has been used
Operational Energy Consumption	The anticipated annual energy consumption both regulated and unregulated has been taken from the Energy Strategy produced by Whitecode Consulting
Water Consumption	Annual water consumption is based on 105 litres per day per person. Based on Crib sheet provided by Gerald Eve, 355 residents in 289 dwellings.
Construction Scenarios	OneClick LCA's average site impact temperate climate (North) has been used
CO ₂ eq Emission Factors	CO ₂ eq Emissions from consuming electricity and water were calculated by OneClick LCA

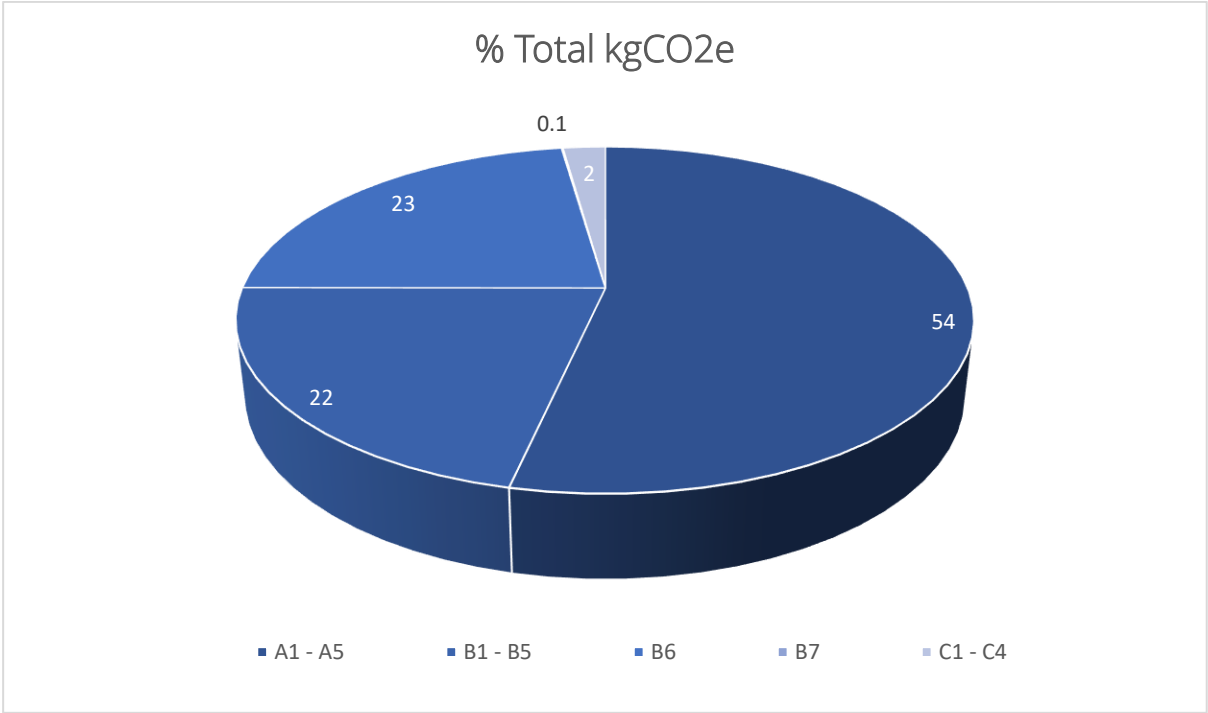
4. Detailed Planning Stage WLC Emissions

The following table presents the breakdown of the emissions by lifecycle for the development. It should be noted that module D is excluded from the total kgCO2e number as per the GLA's WLC guidance requirements.

Result category	A1-A3	A4	A5	B1	B2	B3	B4-B5	B6	B7	C1	C2	C3	C4	TOTAL kg CO2e	D
0.2 Demolition	-	-	-	-	-	-	-	-	-	18,496	-	18,496	-	18,496	-
1 Substructure	872,875	45,785	42,958	-	10,049	2,512	-	-	-		29,257	32,852	-	29,257	-204,403
2.1 Frame	85,723	4,238	3,947	-	10,049	2,512	-	-	-		3,242	277	-	3,242	-19,396
2.2 Upper Floors	877,678	51,277	39,107	-	10,049	2,512	-	-	-		25,711	2,625	-	25,711	-215,402
2.3 Roof	98,128	6,481	4,704	-	10,049	2,512	268	-	-	-	3,362	6,384	44	3,362	-22,450
2.4 Stairs & Ramps	37,793	2,699	1,735	-	10,049	2,512	-	-	-	-	1,353	138	-	1,353	-9,916
2.5 Ext. Walls	5,439,159	21,959	278,337	-	10,049	2,512	76,089	-	-	-	72,595	72,779	220	72,595	-2,714,760
2.6 Windows & Ext. Doors	117,147	244	-	-	10,049	2,512	119,317	-	-	-	1,877	27	21	1,877	-34,735
2.7. Int. Walls & Partitions	173,343	1,016	16,627	-	10,049	2,512	107709.61	-	-	-	8,204	290	31	8,204	-43,158
2.8 Int. Doors	15,643	78	-	-	10,049	2,512	15,952	-	-	-	60	29,048	8	60	-
3 Finishes	243,567	3,407	32,497	-	10,049	2,512	1,278,285	-	-	-	6,294	73,032	11	6,294	-338,759
4 Fittings, furnishings & equipment	77,354	1,374	3,580	-	10,049	2,512	141,081	-	-	-	4,408	6,525	14	4,408	-
5 Services (MEP)	1,230,410	2,416	10,054	227	10,049	2,512	2,083,478	-	-	-	8,751	777	144	8,751	-1,158,782
6 Prefabricated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Existing bldg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Ext. works	28,181	388	1,834	-	10049	2,512	10,317	-	-	-	491	58	-	53,830	-8,297
Other	-	-	38,175	-	-	-	-	-	-	-	-	-	-	38,175	-
TOTAL kg CO2e	9,297,001	141,362	473,555	227	130,630	32,656	3,832,497	4,199,29	15,999	18,496	165,606	224,812	495	18,438,711	-7,808,543

4.1 Results by Life Cycle Stages

The graph below presents the embodied carbon emissions breakdown attributed to stages A to C. The total carbon emissions are dominated by A1-A5 Stages which are associated with material production, transportation and site operations. This is the biggest contributor accounting for 54% of the total WLC emissions.



5. Comparison with GLA Benchmarks

The table below shows that the development within the GLA baseline benchmark for Stages A1-A5 and Stages B-C.

Overall, the development exceeds the WLC aspirational benchmark for Stages A-C.

Stages	WLC Benchmark	Aspirational Benchmark	Chalk Farm WLC
	kgCO ₂ e/m ² GIA		
Stages A1-A5	<850	<500	759
Stages B-C (excl. B6 & B7)	<350	<300	337
Stages A-C (excl. B6 & B7)	<1200	<800	1088

A schedule of specified materials and quantities are provided in the schedule in Appendix A.

6. Factors Contributing to Embodied carbon Savings

prepared by Whitecode Consulting, January 2024 and submitted with this application. The end of life scenarios highlighted in the CE report have been included in this WLC assessment.

This section outlines decisions made to reduce whole life cycle carbon and brief recommendations on potential measures that could be implemented to further reduce the scheme’s embodied carbon emissions.

Where the required level detailed material specification was absent, average industry standard practice assumptions have been used as per RICS PS’s default specifications at this stage. There are opportunities for improvements beyond the RICS PS recommended specifications to reduce the embodied carbon of key materials.

Stages A1-A5 Product and Construction Process Stages

The results show that the development is comfortably within GLA’s Benchmark for Stage A1-A5. This has been achieved by implementing the following carbon saving solutions:

Decisions Implemented	WLC reduction potential (kg CO ₂ e/m ² GIA)
30% GGBS in superstructure concrete	9.39
Specification of products with EPD’s	13.6
Use of R290 Refrigerant	2.1
Reuse of existing terrazzo tiling	0.09

Stages B Use Stage

Carbon emissions, associated with use, maintenance, repair and refurbishment/replacement accounts for around 22% of the overall carbon emissions. Due to lack of appropriate data, maintenance (B2) has been estimated at 10kgCO₂/m² GIA and Repair (B3) have been estimated at 25% of B2 emissions in line with RICS PS. Once project specific data is available, e.g maintenance strategy reports, O&M manuals, the WLC can be updated. Where specific project data in respect refurbishment/ replacement is not available, OneClick LCA uses assumptions.

Carbon associated with regulated operational energy contributes 23% to the overall whole life carbon emissions for the development. The regulated and unregulated energy for the development has been taken from the *Energy Strategy* prepared by Whitecode Consulting, January 2024 and submitted with this application, which follows the London Plan 2021’s energy hierarchy Be Lean, Be Clean, Be Green in reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand. Several passive measures have been considered including significantly improved fabric ‘U’ values; improved air tightness; and minimised cold bridging which have all contributed to reducing operational energy. High efficiency heat pumps and PV have been proposed to further reduce carbon emissions. At this stage, all feasible options for reducing carbon in Stage B6 and B7 have been included in the assessment.

Stages C1 – C4 End of Life Carbon

Carbon associated with the End of Life stages account for around 2% of the overall carbon. Options for deconstruction, waste management and disposal have been addressed in the *Circular Economy Assessment* (CE)

7. Opportunities for Further Reducing Embodied Carbon

To improve the results even further, the design team could consider the following:

Opportunities	WLC reduction potential (kg CO ₂ e/m ² GIA)
50% GGBS in sub-structure	14.19

Additionally, RICS default distances have been used for this assessment. Consideration should be given to using materials which are manufactured as locally to the site as possible.

Procuring more materials with a certified Environmental Product Declaration (EPD) would ensure that these materials perform better, in terms of embodied carbon, than a generic material.

8. Conclusion

As a GLA referrable development, a Whole Life Cycle Carbon Assessment has been undertaken for the Chalk Farm development, as required in the London Plan 2021's policy SI 2.

The results from the assessment indicate that the development is within the GLA benchmark for Stages A1-A5 with emissions totalling 759 kgCO₂e/m² GIA.

The results for Stage B-C (excluding B6 & B7) indicate that the development is also within the GLA benchmark with emissions totalling 337 kgCO₂e/m² GIA.

Overall, the development is comfortably within the WLC benchmark for Stages A-C with emissions totalling 1088 kgCO₂e/m².

By selecting products with lower embodied carbon, as described in section 6, the development can expect to achieve a saving of 25.18 kgCO₂/m² when compared to a Notional baseline.

By undertaking a WLC, and engaging with Circular Economy, Chalk Farm development has demonstrated that every option for reducing carbon emissions has been considered and implemented where feasible.

Appendix A – Building Materials Specification and Quantities

Section	Resource	Quantity	Unit	Comment	Service life	EOL Process	Construction	Data Source
1.1.1 Standard Foundations	Ready-mix concrete, normal-strength, generic, C40/50 (5800/7300 PSI), 20% recycled binders in cement (400 kg/m3 / 24.97 lbs/ft3)	3245000	kg	Piles and Pile Caps	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 400 kg / m3	Ready-mix concrete for structures (beams, columns, piling)	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	208000	kg	Piles and Pile Caps	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
1.1.3 Lowest Floor Construction	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 20% GGBS content in cement (300 kg/m3 / 18.72 lbs/ft3) (One Click LCA)	1420000	kg	Lowest Floor	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 400 kg / m3	Ready-mix concrete, high strength	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	70000	kg	Lowest Floor	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
	EPS insulation panels, graphite, L= 0.037 W/mK, R= 2.7 m2K/W, 100 mm, 1.5 kg/m2, 15 kg/m3, compressive strength 85kPa, 45% recycled polystyrene, Lambda=0.037 W/(m.K) (One Click LCA)	2929.5	kg	Lowest Floor	60	Plastic-based material incineration	EPS (expanded polystyrene) insulation	One Click LCA
1.1.5 Basement Retaining Walls	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 20% GGBS content in cement (300 kg/m3 / 18.72 lbs/ft3) (One Click LCA)	1022000	kg	Basement floor and walls	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 500 kg / m3	Ready-mix concrete for external walls and floors	One Click LCA
	Bentonite membrane for waterproofing of underground walls and foundations, 5.98 kg/m2, Membrane bentonitique pour l`étanchéité et l`imperméabilisation	11678.94	kg	Basement floor and walls	60	Plastic-based material incineration	Plastic membranes	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	50000	kg	Basement floor and walls	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.1 Frame	Ready-mix concrete, normal-strength, generic, C40/50 (5800/7300 PSI), 30% recycled binders in cement (400 kg/m3 / 24.97 lbs/ft3)	519000	kg	Concrete Columns	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 500 kg / m3	Ready-mix concrete, high strength	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	45000	kg	Concrete Columns	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.2 Upper Floors	Ready-mix concrete, normal-strength, generic, C40/50 (5800/7300 PSI), 30% recycled binders in cement (400 kg/m3 / 24.97 lbs/ft3)	6478700	kg	Beams and floors	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 500 kg / m3	Ready-mix concrete, high strength	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	176360	kg	Beams and floors	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.3 Roofs	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 30% recycled binders in cement (300 kg/m3 / 18.72 lbs/ft3)	810000	kg	Roof slab - Pells	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 400 kg / m3	Ready-mix concrete for structures (beams, columns, piling)	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	24300	kg	Roof slab - Pells	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
	EPS insulation panels, graphite, L= 0.037 W/mK, R= 2.7 m2K/W, 100 mm, 1.5 kg/m2, 15 kg/m3, compressive strength 85kPa, 45% recycled polystyrene, Lambda=0.037 W/(m.K) (One Click LCA)	2929.5	kg	Roof - area confirmed by RK	60	Plastic-based material incineration	EPS (expanded polystyrene) insulation	One Click LCA
	Bitumen roof waterproofing system, multi-layer, fully torched, top: 3.8 mm, 4.8 kg/m2, bottom: 3.1 mm, 3.9 kg/m2 (European Waterproofing Association)	16991.1	kg	Roof - area confirmed by RK	30	Landfilling (for inert materials)	Bitumen and other roofing	One Click LCA EPD Flexible Bitumen Sheets for Roof Waterproofing European Waterproofing Association (EWA)
2.4.Stairs and ramps	Reinforcement steel (rebar), generic, 90% recycled content, A615	9282	kg	5% of floor slab as per email from Pells	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 10% (typical) recycled binders in cement (300 kg/m3 / 18.72 lbs/ft3)	340970	kg	5% of floor slab as per email from Pells	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	One Click LCA

2.5.External walls	Cement bonded wood particle board, 10 mm, 13.5 kg/m2, 1350 kg/m3, CENTRIS-Basic (CIDEM Hranice)	80946	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	30	Wood incineration	Particleboard	Environmental Product Declaration Cement-bondede particleboards CETRIS
	Facing clay bricks,	140688.83	kg	Loadbearing Brickwork Wall - DSDHA	60	Brick/stone crushed to aggregate (for sub-base layers)	Brick, common clay brick	FDES
	Gypsum board, windproofing, 9.5 mm, 7.2 kg/m2, 757.89 kg/m3, Windliner-X/Utvendig-X type EH2 (GU-X) (Norgips)	56804.21	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	30	Gypsum recycling	Specialty gypsum board	EPD Norgips Windliner-X/Utvendig-X type EH2 (GU-X)Norgips Norge AS
	Gypsum interior plaster, gross density: 900.0 kg/m3	16189.2	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	30	Gypsum recycling	Gypsum plaster (interior applications)	ÖKOBAUDAT 2021-II (25.06.2021)
	Polyethylene vapour barrier membrane, 0.15 mm, 0.14 kg/m2 (One Click LCA)	1119.26	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	30	Plastic-based material incineration	Plastic membranes	One Click LCA
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615 (One Click LCA)	117000	kg	External Walls from Pells	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
	Ready-mix concrete, normal strength, generic, C32/40 (4600/5800 PSI) with CEM II/B-V, 30% GGBS content in cement (300 kg/m3; 18.7 lbs/ft3 total cement) (One Click LCA)	1688000	kg	External Walls from Pells	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	One Click LCA
	Rock wool insulation panels, L=0.035 W/mK, R=4.29 m2k/W, 150 mm, 9 kg/m2, 60 kg/m3, Lambda=0.035 W/(m.K), Rainscreen Duo Slab 150mm (ROCKWOOL,	48899.52	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	60	Landfilling (for inert materials)	Rock wool insulation	EPD ROCKWOOL® stone wool product: FLEXI 1200x600x100
	Rock wool insulation panels, L=0.037 W/mK, R=2.63 m2k/W, 100 mm, 3.3 kg/m2, 33 kg/m3, Lambda=0.037 W/(m.K), FLEXI 1200x600x100 (ROCKWOOL, UK	35859.65	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	60	Landfilling (for inert materials)	Rock wool insulation	EPD ROCKWOOL® stone wool product: FLEXI 1200x600x100
	Steel purlins and framing, 7850 kg/m3 (Voestalpine Metsec plc)	1118389.5	kg	Loadbearing Brickwork Wall & Metsec SFS Infill Wall - DSDHA	60	Steel recycling	Structural steel and steel profiles	EPD Purlins and Framing Voestalpine Metsec plc
2.5.3.Solar / Rain screening	Structural steel profiles, generic, 60% recycled content, I, H, U, L, and T sections, S235, S275 and S355	146245.5	kg	Metsec SFS Infill Wall - DSDHA	60	Steel recycling	Structural steel and steel profiles	One Click LCA
	Aluminium extrusion mill finished profiles (Hydro Extrusion Italy srl)	358506	kg	Extruded fin	60	Aluminium recycling	Aluminium	EPD ALUMINIUM PROFILES IMPLEMENTED WITH HYDRO RESTORE INNOVATIVE, FELTRE BILLET PRODUCED BY HYDRO EXTRUSION ITALY SRL ORNAGO AND FELTRE SITEEPD ALUMINIUM PROFILES IMPLEMENTED WITH HYDRO RESTORE INNOVATIVE, FELTRE BILLET PRODUCED BY HYDRO EXTRUSION ITALY SRL ORNAGO AND FELTRE SITE
2.5.3.Solar / Rain screening	Ceramic tiles, 20 kg/m2 (RAK Ceramics P.J.S.C)	16220	kg	Glazed Tile rain screen	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	EPD Ceramic & Porcelain Tiles
	Terracotta façade panel, 35 kg/m2, Zéphir Evolution 20, Zéphir Evolution 25, Zéphir Evolution 30 (yc modline 1 et modline 2), Zéphir Evolution 40 (TERREAL)	145110	kg	Profiled terracotta panels	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	FDES
2.6.1.External Windows	Aluminium frame window triple glazed, non-operable, 0% recycled aluminium, 1.48 m x 2.18 m, 30.7 kg/m2 (One Click LCA)	40317.76	kg	DSDHA	30	Glass-containing product recycling (80 % glass)	Aluminium frame windows	One Click LCA

2.6.2.External doors	Aluminium framed double glazed doors, per m2, 79.5% glass, 15.7% aluminium, 2.2% steel, 44 kg/m2, width:1.23m, height:2.18m, 6mm toughened and 8.8mm laminated glass. Edge Symmetry (Optima)	8712	kg	DSDHA	30	Glass-containing product recycling (80 % glass)	Aluminium-framed glass doors	EPD Aluminium Framed Double Glazed Doors
2.7.Internal walls and partitions	Glass wool insulation panels, unfaced, generic, L = 0.031 W/mK, R = 3.23 m2K/W (18 ft2°Fh/BTU), 25 kg/m3 (1.56 lbs/ft3), (applicable for densities: 0-25 kg/m3 (0-1.56 lbs/ft3)), Lambda=0.031 W/(m.K)	5928.75	kg	Metsec C Stud Independent Twin Frame Partition - Party walls & Common Walls - DSDHA	60	Landfilling (for inert materials)	Glass wool insulation	One Click LCA
	Glass wool/mineral wool insulation, acoustic partition roll, L = 0.039W/mK, T: 50-65 mm, 18 kg/m3, APR1200 (Isover)	5994	kg	Metsec Studwork Frame. Internal dwelling walls - DSDHA	60	Landfilling (for inert materials)	Glass wool insulation	EPD Acoustic Partition Roll (APR1200) 50 and 65 mm, Isover Saint Gobain 2015
	Gypsum interior plaster, gross density: 900.0 kg/m3	55582.2	kg	Metsec C Stud Independent Twin Farme Partition - Party walls; Common walls; Metsec Studwork Frame. Internal dwelling walls - DSDHA	30	Gypsum recycling	Gypsum plaster (interior applications)	ÖKOBAUDAT 2021-II (25.06.2021)
	Gypsum plaster board, regular, generic, 6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3)	30072	kg	Metsec C Stud Independent Twin Farme Partition - Party walls; Common walls; Metsec Studwork Frame. Internal dwelling walls - DSDHA	30	Gypsum recycling	Regular gypsum board	One Click LCA
	Structural steel profiles, generic, 60% recycled content, I, H, U, L, and T sections, S235, S275 and S355	28480.73	kg	Metsec C Stud Independent Twin Farme Partition - Party walls; Common walls; Metsec Studwork Frame. Internal dwelling walls - DSDHA	60	Steel recycling	Structural steel and steel profiles	One Click LCA
2.8 Internal doors	Doors with wooden frame, interior, Portes intérieures de communication avec huisserie bois (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFFAUT)	15756	kg	55mm thick, Solidcore timber doorset.	30	Wood-containing product incineration (80% wood)	Wood-framed glass doors	MDEGD_FDES
	Ceramic floor tile, 10 mm, average density 2000 kg/m3 (Mosa)	1088	kg	Floor type 03 - Tile Floor	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	EPD Vloertegelcollectie Koninklijke Mosa
	Gypsum plasterboard, 12.5 mm, 8.985 kg/m2 (average product weight) (Etex Building Performance)	69716.41	kg	Knauf Metal Furring (MF) Suspended Ceiling system. Faced in 15mm Knauf Plasterboard	30	Gypsum recycling	Regular gypsum board	EPD GTEC Plasterboard
	Metal ceiling membranes with acoustic fleece, 0.5 mm, 3.62 kg/m2 (Knauf Ceiling Solutions GmbH & Co. KG)	23406.92	kg	Knauf Metal Furring (MF) Suspended Ceiling system. Faced in 15mm Knauf Plasterboard	30	Steel recycling	Suspended ceiling systems	EPD Metal Ceiling Membranes (0.5 mm, with acoustic fleece)

3.Internal finishes	Self-levelling screed, 1 mm, 2.25 kg/m2, Gyylon® EXCELIO (Anhydritec)	1252575	kg	Floor type 01 - Painted Screed; Floor type 02 - Clay Sets to Lobby; Floor type 03 - Tile Floor; Floor type 04 - Carpet Floor	30	Cement/mortar use in a backfill	Leveling screeds (for floors)	EPD Gyylon EXCELIO Flowing Screed
	Water-based epoxy floor paint, 1.44 kg/l, 6 m2/l, 0.48 kg/m2, Dulux Trade High Performance Floor Paint (AkzoNobel)	980.34	kg	Floor type 01 - Painted Screed	10	Landfilling (for inert materials)	Paints, coatings and lacquers	EPD DULUX TRADE HIGH PERFORMANCE FLOOR PAINT
	Emulsion for interior use with recycled paint content, 0.168 kg/m2, 1.4 kg/l, Dulux Trade Evolve Matt (AkzoNobel, plant Prudhoe)	1553.83	kg	Walls	15	Landfilling (for inert materials)	Paints, coatings and lacquers	EPD RTS EPD, Water-borne interior paints
	Waterproof, protective, flexible coating, 1.5 kg/l, Lastogum (PCI Augsburg)	1641	kg	Floor type 02 - Clay Sets to Lobby; Floor type 03 - Tile Floor	10	Landfilling (for inert materials)	Sealants (silicone and others)	Oekobau.dat 2017-I, EPD Wasserdichte, flexible Schutzschicht PCI Lastogum unter Keramikbelägen in Dusche und Bad PCI Augsburg GmbH
	Tile mortar, for interior floors and walls, 0.45 kg/m2, Weberbond lino comfort, Weberbond contact, Weberbond LVT, Weberbond grip, Weberbond primo	492.3	kg	Floor type 02 - Clay Sets to Lobby; Floor type 03 - Tile Floor	10	Cement/mortar use in a backfill	Tile adhesive	EPD WEBERBOND
	Tufted carpet tile with nylon 6.6 pile material and bitumen backing, 4.4 kg/m2, maximum surface pile weight 400 g/m2 (One Click LCA)	35098.8	kg	Floor type 04 - Carpet Floor	7	Plastic-based material incineration	Carpet flooring	One Click LCA
	Wall bricks slips, 240 x 71 x 14 mm, 24 kg/m2, 2100 kg/m3 (Bundesverband der Deutschen Ziegelindustrie)	17236.8	kg	Floor type 02 - Clay Sets to Lobby	60	Brick/stone crushed to aggregate (for sub-base layers)	Brick, common clay brick	EPD Riemchen
5.0 Services	Acrylic bathtub, 14.5 kg/unit, Allibert, Aquarine (NEW BATH)	1305	kg	Bath - assume one per private resi	20	Landfilling (for inert materials)	Sanitary ware	FDES
	Acrylic shower tray, 32 kg/unit 120x90 cm, Receveur de douche acrylique [Long. 120 cm Larg. 90 cm] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	13856	kg	Shower tray - assume one per dwelling plus additional for 2 and 3 bed	20	Landfilling (for inert materials)	Sanitary ware	MDEGD_FDES
	Air handling unit, with heat recovery through plate heat exchanger, 10 000 m3/h (5885.8 ft3/min), 1256 kg/unit (2769 lbs/unit)	4274.27	kg		25	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Air/air heat pump, ducted, 61.5 kg/unit, P= 5 kW, PAC air air gainable [P=5kW] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	307.5	kg	Student Cores: CLADE ROWAN PROPANE - 1x SN/150, 2x SN/225 Resi Core: CLADE ROWAN PROPANE - 2x SN/150	15	Metal-containing product recycling (90 % metal)	HVAC equipment with refrigerant	MDEGD_FDES
	Corrugated plastic pipes, 0.138 kg/m, FFKuS-EM-F-105 co2ntrol (Fränkische Rohrwerke Gebr. Kirchner GmbH & Co.)	7237.44	kg		20	Plastic-based material incineration	Pipes (water, heating, sewage)	EPD FFKuS-EM-F-105 co2ntrol® FRÄNKISCHE Rohrwerke Gebr. Kirchner GmbH & Co. KG
	District heat distribution center, per 1kW	3893.58	kg		30	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Drinking water supply piping network, per m2 GIFA (residential buildings)	3389.6	kg		25	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Electric operated passenger elevator, 320 tkm life cycle, 7395 kg/unit, rated load 907-2268 kg, MonoSpace® 500 DX (Kone)	44370	kg		20	Metal-containing product recycling (90 % metal)	Elevators and escalators	EPD KONE MonoSpace® 500 DX for North America
	Electricity distribution system, cabling and central, for all building types, per m2 GFA	51408.72	kg		30	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Emergency evacuation lighting, 0.604 kg/unit, 0 The environmenal data is representative of the following products : <cat.number list> (LEGRAND)	178.88	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Fluorescent lamp, T8-18W, 0.07 kg/unit	56.21	kg		15	Metal-containing product recycling (90 % metal)	Lighting	ÖKOBAUDAT 2021-II (25.06.2021)
	Heat distribution piping network, per m2 heated area, all building types	2402.97	kg		30	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Interior LED projector, P= 14 à 30 W, Projecteur intérieur LED (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	3743.69	kg		15	Metal-containing product recycling (90 % metal)	Lighting	MDEGD_FDES

3.0 Services	Interior projector LED 14 W, Projecteur intérieur LED 14W (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	590.2	kg		15	Metal-containing product recycling (90 % metal)	Lighting	MDEGD_FDES
	Junction box, 0.154 kg/unit, IP55 100x100 (B05534), B05534, B05546 (Hager SE)	315.35	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Lighting management sensors, 0.31 kg/unit, 0 488 06 (LEGRAND)	1004.65	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Low voltage cable, Section conductrice de 5 mm2 à 120 mm2, Câble basse tension 0,6/1kV (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	21397.7	kg		15	Metal-containing product recycling (90 % metal)	Cables	MDEGD_FDES
	Photovoltaic polycrystalline panel, per m2, 14.5 kg/m2, 210 Wp (One Click LCA)	2552	kg	86 PV 1754mm x 1164mm	20	Metal-containing product recycling (90 % metal)	Energy production systems from renewable	One Click LCA
	Power cable connectors, Connecteur permettant de rassembler des câbles de transport d´énergie (DONNEE ENVIRONNEMENTALE	1017.1	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	MDEGD_FDES
	Recessed box for electrical equipment, 0.031 kg/unit, EMX 101340 EMX 101440 EMX 101150 (REXEL)	210.64	kg			Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Sanitary ceramics including washbasins, toilets, urinals, cisterns and kitchen sinks, Washbasins 800x450x170 mm 16 kg/unit, toilets	17709	kg	WC and wash basin - assume 1 per dwelling	20	Landfilling (for inert materials)	Sanitary ware	EPD Sanitary ceramic DURAVIT AG
	Sewage water drainage piping network, per m2 GIFA (residential buildings)	2393.88	kg		25	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Socket outlet 2P+T, 0.173 kg/unit, Plexo 2P+T - 16 A - IP55 (LEGRAND)	2320.22	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Ventilation ducting, per m linear, D: 63 mm (2.48 in)	3630.42	kg		40	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Water circulation radiator, per 1kW / unit	67865.91	kg		30	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Waterproof lighting, P=18 W, Luminaire étanche IP>54 (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAULT)	1024.66	kg		15	Metal-containing product recycling (90 % metal)	Lighting	MDEGD_FDES
	Light switch, 0.113 kg/unit, 077001L (mécanisme) / 078801L (plaque) / 080250 (support) mécanisme : 077001L - 079201L - 079101L - plaque : 078801L - 079301L - support : 080250 (LEGRAND)	450.35	kg		15	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
8.0 External Works	Marble products for flooring and cladding, 12 mm, 29.7 kg/m2, FLAIR LINE - POLARE product (QUARELLA)	1188	kg	Terrazo tiles - made from crushed brick on site	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	EPD Marble based products
	Paving bricks and pavers, 200 x 100 x 52 mm, 52 mm, 98 kg/m2, 2000 kg/m3, Paver (Bundesverband der Deutschen Ziegelindustrie e.V.)	140088	kg	Confirmed in Mat 01 RFI	60	Brick/stone crushed to aggregate (for sub-base layers)	Brick, common clay brick	EPD Pflasterziegel und Pflasterklinker
	Cement mortar, gross density: 2000 kg/m3	27740	kg		30	Cement/mortar use in a backfill	Mortar (masonry/bricklaying)	ÖKOBAUDAT 2021-II (25.06.2021)



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