100 Avenue Road

Whole Lifecycle Carbon Assessment

February 2025

REGAL

Whole Lifecycle Carbon Assessment

100 Avenue Road

Prepared for Regal Avenue Road Limited

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Contents

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1. Introduction

1.1 Purpose of this Document

This Whole Life Carbon Assessment has been prepared by Whitecode Consulting Ltd on behalf of Regal Avenue Road Limited ('the Applicant') in support of an f s.73 Amendment Application for the redevelopment of 100 Avenue Road ('the Site') within London Borough of Camden ('LBC').

The Implemented Permission (ref. 2014/2617/P) was granted via Appeal (ref. APP/X5210/W/14/3001616) on 18 February 2016. It has been subject to further scheme amendments facilitated under Section 96a of the Town & Country Planning Act (1990) (As Amended) and has been lawfully implemented, which was confirmed with a certificate of lawfulness issued on 8 February 2018 (ref: 2017/6884/P).

Whilst demolition works and basement construction works have undertaken by the previous owner (Essential Living), above ground construction works in respect of the Implemented Permission have stalled.

Regal Avenue Road Limited acquired the Site in 2024 and intend to bring forward the scheme as soon as practicable, subject to securing some amendments to the Implemented Permission to ensure its deliverability and compliance with the latest standards / Building Regulations.

The description of s.73 Amendment Application development is as follows:

"Demolition of the existing building and redevelopment comprising residential units (Class C3) and flexible commercial, business and service use (Class E) and community use (Class F2(b)) with associated works including enlargement of the existing basement level to contain disabled car parking spaces and cycle parking, landscaping and access improvements."

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 Development Proposals

The development will provide 1187.7m^2 Class E commercial floorspace and 1372.1m^2 Class F2(b) community floorspace along with 237 residential units. There are two buildings proposed for the site comprising 'the Tower' which will be at least 25 storeys and 'the Lower Block' which will be at least 7 storeys.

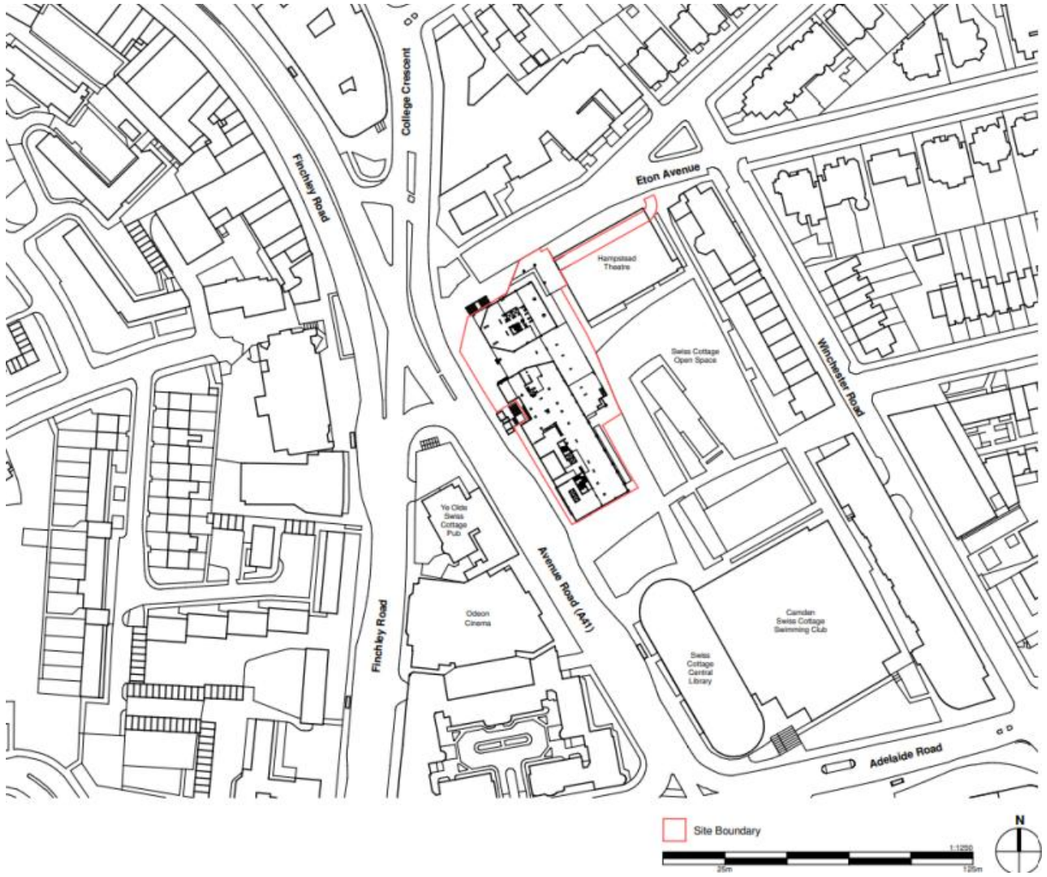


Figure 1.1: Proposed development

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.

It is also a requirement of Camden Local Plan Policy CC1 expects all developments to optimise resource efficiency by minimising materials required and using materials with low embodied carbon content

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, December 2024 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 CONSTRUCTION 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	TRNSPORT TO PROJECT SITE	CONSTRUCTION AND INSTALLATION PROCESS	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	DECONSTRUCTION DEMOLITON	TRANSPORT TO DISPOSAL FACILITY	WASTE PROCESSING	DISPOSAL	REUSE, RECOVERY, RECYCLING POTENTIAL
					B6 – OPERATIONAL ENERGY USE									
					B7 – OPERATIONAL WATER USE									

This WLC assessment for the Site 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 Surfacings 8.3 Soft landscaping, Planting and Irrigation Systems 8.4 Fencing, Railings and Walls 8.5 External fixtures 8.6 External drainage 8.7 External Services

* 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 $kgCO_2e/m^2GIA$ with the aspirational at <500 $kgCO_2e/m^2GIA$ for modules A1-A5, while for modules B-C, excluding B6 and B7, the baseline suggested values <350 $kgCO_2e/m^2GIA$ and aspirational targets are <300 $kgCO_2e/m^2GIA$.

The GLA's total suggested benchmark for Stages A-C (excluding B6 & B&) is <1200 $kgCO_2e/m^2GIA$ and aspirational benchmark is <800 $kgCO_2e/m^2GIA$.

3. Key Assumptions

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

Environmental Indicator	Lifecycle carbon CO_2eq
Study Period	60 years in line with GLA guidance
Functional Unit	The Functional Unit for embodied carbon is shown in $kgCO_2eq$ per m^2 of floor area (GEA) A total GIA of 26,690m^2 was used as confirmed by Montagu Evans
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	Materials specifications and quantities have been provided by the design team. Structural material quantities provided by Robert Bird Group. External landscape quantities provided by Turkington Martin Superstructure quantities as provided by Cartwright Pickard and Robert Bird. Robert Bird confirmed the use of PT slabs. 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 R32 has been confirmed by WCL for ASHP's and WSHP'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 person per day. Based on Crib sheet provided by Montagu Evans, 237 dwellings – 24 studios, 78 1Bed, 98 2Bed and 37 3Bed
Construction Scenarios	OneClick LCA's average site impact temperate climate (North) has been used
CO_2eq Emission Factors	CO_2eq Emissions from consuming electricity and water were calculated by OneClick LCA

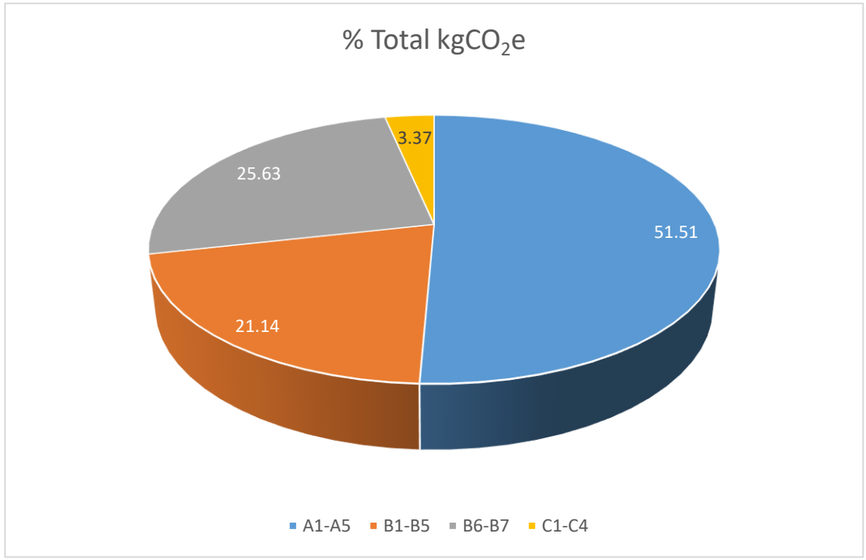
4. Detailed Planning Stage WLC Emissions

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	-	-	-	-	-	-	-	-	-	850	-	-	-	850	
1 Substructure	-	-	-	-	-	-	-	-	-		-	-	-	-	-750,723
2.1 Frame	965,520	38,854	51,855	-	20,531	5,133	0	-	-		97,214 kg CO2e	8,153 kg CO2e	0 kg CO2e	1,187,259	-1,923,858
2.2 Upper Floors	3,109,973	96,096	126,067	-	20,531	5,133	0	-	-		30,160	2,567	0	3,390,527	-1,496,091
2.3 Roof	881,497	37,765	51,382	-	20,531	5,133	108,885	-	-	-	73,734	11,627	13	1,190,566	-390,485
2.4 Stairs & Ramps	18,879	343	197	-	20,531	5,133	28,315	-	-	-	24,035	40,986	0	138,419	-68,909
2.5 Ext. Walls	4,469,435	11,902	76,573	-	20,531	5,133	0	-	-	-	437	52	0	4,584,063	-723,246
2.6 Windows & Ext. Doors	291,420	611	0	-	20,531	5,133	154,827	-	-	-	78,131	4,587	298	506,314	-4,596
2.7. Int. Walls & Partitions	170,248	749	6,404	-	20,531	5,133	296,822	-	-	-	4,701	49,249	64	553,899	-48,490
2.8 Int. Doors	24,808	338	0	-	20,531	5,133	74,209	-	-	-	6,421	231	92	88,083	0
3 Finishes	408,482	3,336	10,447	-	20,531	5,133	26,141	-	-	-	260	44,380	35	186,139	-736,408
4 Fittings, furnishings & equipment	123,910	1,931	5,473	-	20,531	5,133	98,012	-	-	-	11,254	339,863	4	606,109	
5 Services (MEP)	2,042,770	2,795	16,190	1,215,324	20,531	5,133	113,423	-	-	-	10,132	15,080	20	10,040,051	-5,335,442
6 Prefabricated	0	0	0	-	20,531	5,133	2,989,314	-	-	-	10,984	919	168	3,027,048	
7 Existing bldg	0	0	0	-	0	0	0	-	-	-	0	0	0	0	
8 Ext. works	7,922	290	780	-	20,531	5,133	4,242	-	-	-	387	45	0	39,329	-26,230
Other	-	-	207,435	-	-	-	-	-	-	-	-	-	-	207,435	
TOTAL kg CO2e	12,514,864	195,010	552,802	1,215,324	266,900	66,725	3,894,190	6,570,620	28,033	850	347,851	517,740	694	25,746,093	-11,504,479

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 51.51% of the total WLC emissions.



5. Comparison with GLA Benchmarks

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

Overall, the development sits comfortably within the WLC Aspirational benchmark for Stages A-C.

Stages	WLC Benchmark	Aspirational Benchmark	The Site
	$kgCO_2e/m^2$ GIA		
Stages A1-A5	<850	<500	**497**
Stages B-C (excl. B6 & B7)	<350	<300	**236**
Stages A-C (excl. B6 & B7)	<1200	<800	**717**

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

6. Factors Contributing to Embodied carbon Savings

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 Aspirational Benchmark for Stage A1-A5. This has been achieved by implementing the following carbon saving solutions:

Decisions Implemented	WLC reduction potential (kg CO_2e/m^2 GIA)
Reuse of existing substructure	100.03
PT concrete slabs instead of RC slabs reducing concrete volume by 20%	13.62

Stages B Use Stage

Carbon emissions, associated with use, maintenance, repair and refurbishment/replacement accounts for around 21.14% of the overall carbon emissions. Due to lack of appropriate data, maintenance (B2) has been estimated at 10kgCO_2/m^2 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 25.63% 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, December 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 3.37% of the overall carbon. Options for deconstruction, waste management and disposal have been addressed in the *Circular Economy Assessment* (CE) prepared by Whitecode Consulting, December 2024 and submitted with this application. The end of life scenarios highlighted in the CE report have been included in this WLC assessment.

7. Opportunities for Further Reducing Embodied Carbon

To improve the results even further, the design team could consider implementation of the following as the project design progresses:

Opportunities	WLC reduction potential (kg CO_2e/m^2 GIA)
50% GGBS in superstructure	14.8
Use of Etex plasterboard	5.08

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 Site, as required in the London Plan 2021's policy SI 2.

The results from the assessment indicate that the development is within the GLA aspirational benchmark for Stages A1-A5 with emissions totalling 497 $kgCO_2e/m^2$ GIA.

The results for Stage B-C (excluding B6 & B7) indicate that the development is also within the GLA aspirational benchmark with emissions totalling 236 $kgCO_2e/m^2$ GIA.

Overall, the development is comfortably within the WLC aspirational benchmark for Stages A-C with emissions totalling 717 $kgCO_2e/m^2$.

By incorporating measures to reduce embodied carbon, as described in Section 6, the development has achieved a saving of 113.65 $kgCO_2/m^2$ when compared to a Notional baseline.

Further opportunities for reducing embodied carbon have been provided in Section 7 and will be investigated further during detailed design.

Due to lack of specific data regarding repair and maintenance, assumptions have been made for stages B2 and B3 in line with GLA WLC guidance and RICS PS. It is therefore likely that once accurate information is available, emissions associated with these stages will reduce to within the GLA benchmark.

By undertaking a WLC, and engaging with Circular Economy, the Site has demonstrated that every option for reducing carbon emissions has been considered and implemented where feasible at this stage.

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, RC 25/30 (25/30 MPa), with CEM I	9950400	kg	Foundation Piles and Pile Caps, RC rate approx 250kg/m3 (allowing for existing site adjustements and laps)	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 200 kg / m3	Ready-mix concrete for foundations and internal walls	ICE database August 2019, V3.0
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	1036500	kg	Foundation Piles and Pile Caps, RC rate approx 250kg/m3 (allowing for existing site adjustements and laps)	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
1.1.2 Specialist Foundations	Ready-mix concrete, RC 20/25 (20/25 MPa), 25% Cement replacement with blast furnace slag (GGBS)	2520000	kg	Tower Raft, RC rate approx 250kg/m3 (allowing for existing site adjustements and laps) - GGBS replacement for large raft pour to help wiith shrinkage and hydration temperature	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 200 kg / m3	Ready-mix concrete for foundations and internal walls	ICE database August 2019, V3.0
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	262500	kg	Tower Raft, RC rate approx 250kg/m3 (allowing for existing site adjustements and laps)	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
1.1.3 Lowest Floor Construction	Ready-mix concrete, C 30/37, 2380 kg/m3 (BRMCA)	1428000	kg	Ground Floor Slab, RC rate approx 150kg/m3 (allowing for existing site adjustements and laps)	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	EPD UK manufactured generic ready-mixed concrete Produced by members of the British Ready- Mixed Concrete Association (BRMCA) part of the Mineral Products Association (MPA)
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	90000	kg	Ground Floor Slab, RC rate approx 150kg/m3 (allowing for existing site adjustements and laps)	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
1.1.5 Basement Retaining Walls	Ready-mix concrete, C 30/37, 2380 kg/m3 (BRMCA)	740180	kg	Includes Perimeter Walls and Internal Basement walls	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	EPD UK manufactured generic ready-mixed concrete Produced by members of the British Ready- Mixed Concrete Association (BRMCA) part of the Mineral Products Association (MPA)
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	31100	kg	RC rate approx 100kg/m	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.1 Frame	Ready-mix concrete, RC 40/50 (40/50 MPa), with Portland Limestone Cement (14% Limestone)	4752000	kg	Concrete columns and concrete core walls	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 400 kg / m3	Ready-mix concrete for structures (beams, columns, piling)	ICE database August 2019, V3.0
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	424500	kg	Concrete columns and concrete core walls	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA

2.2 Upper Floors	Ready-mix concrete, RC 28/35 (28/35 MPa), 25% Cement replacement with blast furnace slag (GGBS)	11383200	kg	Post-tensioned concrete slabs,	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	ICE database August 2019, V3.0
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	711450	kg	RC rate approx 150kg/m3	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.2.2 Balconies	Structural steel profiles, generic, 0% recycled content (only virgin materials), I, H, U, L, and T sections, S235, S275 and S355	294218	kg	Bolt on balconies	60	Steel recycling	Structural steel and steel profiles	One Click LCA
	Aluminium profiles glass railings, 1.0 x 1.0 m, 20.71 kg/m2, Les fabricants pouvant utiliser les FDES collectives UDM-FFB sont les membres de l Union des Métalliers, les fabricants membres de la section garde-corps du SNFA ainsi que les entreprises qui fabriquent à partir de systèmes commercialisés par les concepteurs gammistes membres du SNFA. La liste complète des membres de L Union des Métalliers peut être consultée sur le site www.metal-pro.org rubrique. Trouver un professionnel. Afin de confirmer que leurs produits remplissent l ensemble des conditions présentées dans le cadre de validité, les métalliers doivent produire une attestation de conformité au cadre de validité, au sein de laquelle sont listés les produits concernés. (UNION	3877.33	kg		30	Landfilling (for inert materials)	Partitioning systems (without windows)	FDES
	Ready-mix concrete, normal-strength, generic, C30/37 (4400/5400 PSI), 10% (typical) recycled binders in cement (300 kg/m3 / 18.72 lbs/ft3)	367200	kg	Bolt on balconies and Enclosed balconies	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
	Waterproof, protective, flexible coating, 1.5 kg/l, Lastogum (PCI Augsburg)	1147.5	kg	Enclosed balconies	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 adhesive, 5 kg/m2, webercol pro (SAINT GOBAIN WEBER FRANCE)	3825	kg	Enclosed balconies	10	Cement/mortar use in a backfill	Tile adhesive	FDES
	Ceramic wall tiles, glazed or unglazed, 7.5 mm, 18 kg/m2 (Seranit (2020), Inönü plant)	14688	kg	Enclosed balconies	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	EPD Ceramic Wall Tiles, ver. 2020
	EPDM based waterproofing membrane with self-adhesive bitumen layer, 2.5 mm, 2.75 kg/m2, RESITRIX® SK W Full Bond, RESITRIX® SW, RESITRIX® SK Partial Bond (Carlisle Construction Materials GmbH)	2576.75	kg	Bolt on balconies	30	Plastic-based material incineration	Plastic membranes	EPD RESITRIX® SK W Full Bond, RESITRIX® SW und RESITRIX® SK Partial Bond
	Tile adhesive, all round, for ceramics, 1-5 mm, 1400 kg/m3, Verlegemörtel (PCI Augsburg)	1311.8	kg	Bolt on balconies	30	Cement/mortar use in a backfill	Mortar (masonry/bricklaying)	Oekobau.dat 2017-I, EPD Flexibilisierter Fliesenkleber PCI Verlegemörtel für keramische Fliesen PCI Augsburg GmbH
	Ceramic tiles, 20 kg/m2 (RAK Ceramics P.J.S.C)	18740	kg	Bolt on balconies	10	Brick/stone crushed to aggregate (for sub-base layers)	Wall and floor tiles	EPD Ceramic & Porcelain Tiles
	Reinforcement steel (rebar), generic, 90% recycled content, A615	18360	kg	Enclosed balconies	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA
2.3 Roofs	Ready-mix concrete, RC 28/35 (28/35 MPa), 25% Cement replacement with blast furnace slag (GGBS)	4504800	kg	Concrete	60	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Ready-mix concrete for external walls and floors	ICE database August 2019, V3.0
	Bitumen roofing membrane, 20 mm, Asphalte pour étanchéité de toiture [ép totale 20mm] (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	0	kg		30	Landfilling (for inert materials)	Bitumen and other roofing	MDEGD_FDES
	Flexible polyolefins based roofing, 1.74 mm, 2.2 kg/m2, THERMOPLAN T (Paul Bauder)	4129.4	kg	Hot melt liquid applied waterproofing (such as Bauder/ Alumasc/ permaquik)	30	Plastic-based material incineration	Plastic membranes	EPD FPO roofing and sealing sheets BauderTHERMOPLAN
	XPS insulation panels, L=0.033 W/mK, R=1.2 m2K/W, 40 mm, 1.25 kg/m2, 31.25 kg/m3, compressive strength 300 kPa, 20% recycled polystyrene, CO2 blowing agent, Lambda=0.033 W/(m.K) (One Click LCA)	14664.06	kg	circa 250mm XPS insulation	60	Plastic-based material incineration	XPS (extruded polystyrene) insulation	One Click LCA
	Gravel, dry bulk density, 1680 kg/m3	315336	kg	Ballast	60	Sand, soil and gravel		LCA inventory for gravel production
	Reinforcement steel (rebar), generic, 97% recycled content (typical), A615	281550	kg	RC rate approx 150kg/m3	60	Steel recycling	Reinforcement for concrete (rebar)	One Click LCA

2.4.Stairs and ramps	Precast concrete part stairs, 1965 kg/unit, EN15804+A2, ref. year 2022	149340	kg	60	Rebar separated (2 %), concrete to aggregate	Other precast concrete products	ÖKOBAUDAT 2022
2.5.External walls	Structural steel profiles, generic, 60% recycled content, I, H, U, L, and T sections, S235, S275 and S355	1788858	kg	60	Steel recycling	Structural steel and steel profiles	One Click LCA
	Clay brick, UK average production, 215 mm x 102.5 mm x 65 mm, 2.13 kg/unit, 1485 kg/m3 (Brick Development Association (BDA) Ltd (2023))	1459870.1	kg	60	Brick/stone crushed to aggregate (for sub-base layers)	Brick, common clay brick	EPD BDA Generic Brick, The Brick Development Association
	Stone wool insulation (stone wool), L = 0.044 W/mK, R = 0.44 m2K/W, 100 mm, 2.2 kg/m2, 22 kg/m3, NyRock® Rainscreen (ROCKWOOL Peninsular S.A.U.)	47475.45	kg	60	Landfilling (for inert materials)	Stone wool insulation	EPD ROCKWOOL® Stone Wool Thermal Insulation for buildings
	Fibre cement boards, 1300 kg/m3 (81.16 lbs/ft3)	112214.7	kg	30	Concrete crushed to aggregate (for sub-base layers), Portland Cement 300 kg / m3	Fibre cement products	One Click LCA
	Stone wool (mineral wool) insulation, unfaced, L = 0.03 W/mK, R = 1 m2K/W, 30mm, 2.1 kg/m2, 70 kg/m3, (Range: 66-80kg/m3), 22% slag content (One Click LCA)	67137	kg	60	Landfilling (for inert materials)	Stone wool insulation	One Click LCA
	Gypsum plaster board, regular, 40% recycled gypsum, 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)	213963.02	kg	30	Gypsum recycling	Regular gypsum board	One Click LCA
2.6.1.External Windows and doors	Mixed aluminium/wood doors and windows, double glazed, biogenic CO2 not subtracted (for CML), 25.687 kg/m2, 1.23m x 1.48m, TONUS, NOEVA, EXTREM, TENSO (MINCO SAS)	122758.17	kg	30	Glass-containing product recycling (80 % glass)	Wooden frame windows	FDES
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)	35495	kg	60	Landfilling (for inert materials)	Glass wool insulation	One Click LCA
	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)	236651	kg	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	29352.34	kg	60	Steel recycling	Structural steel and steel profiles	One Click LCA
2.8 Internal doors	Interior wooden door leaf, solid core, painted, 926x2040x60 mm, 56.18 kg/unit, 3 hinges and lock included, 35dB sound reduction, PL (JELD-WEN Sverige AB)	67977.8	kg	30	Wood-containing product incineration (80% wood)	Wood and wood board doors	EDPSolid Core Door EI30/R'w 35dB PL
3.Internal finishes	Wall paints for interior use, 0.16 mm, 0.249 kg/m2, 1552 kg/m3, Alpha unidecor BL mat, Alpha unidecor BL satin, Alphacryl Morpha, Alphacryl Perlino, Alphacryl Pure Mat SF, Alpha Rezisto Easy Clean, Alpha Rezisto Mat, Alpha Rezisto Anti Marks, Alphacryl Plafond, Alpha Cover Mat, Alpha Projecttex, Alphamat SF, Alphatex SF, Alpha Tex Acryl, Alpha Humitex SF, Alpha Sanocryl, Alpha Sanoprotex, Alpha Tex Schimmelwerend, Alpha	1379.04	kg	15	Landfilling (for inert materials)	Paints, coatings and lacquers	EPD Sikkens Interior Wallpaints
	Plastic vapour control layer, 0.2 mm (Tommen Gram)	2009.84	kg	30	Plastic-based material incineration	Plastic membranes	Gram Dampsperre, Tommen Gram Folie AS (2015)
	Massive wooden flooring/parquet, 22-450 x 44-7000 x 8-35 mm, 11.71 kg/m2 (Verband der Deutschen Parkettindustrie)	195719.31	kg	60	Wood incineration	Plain wood/timber (softwood and hardwood)	Oekobau.dat 2017-I, EPD Kreisförmige, quadratische und rechteckige Stahlbauhohlprofile Vallourec Deutschland GmbH
	Self-levelling screed, 1 mm, 2.25 kg/m2, Gyvlon® EXCELIO (Anhydritec)	611100	kg	30	Cement/mortar use in a backfill	Leveling screeds (for floors)	EPD Gyvlon EXCELIO Flowing Screed
	Gypsum plasterboard for suspended ceiling systems, 12.5 mm, 9 kg/m2, 720 kg/m3	198477	kg	30	Gypsum recycling	Regular gypsum board	NIBE2899
	Aluminium ceiling systems, 5.15 kg/m2 (TAIM)	113572.95	kg	60	Aluminium recycling	Aluminium	EPD Metal ceiling systems made of steelTAIM e.V.

5.0 Services	Passenger elevator car , electrical controls, counter weight, drive and motor of traction (cable) type, 630 kg (8 persons) load capacity, 1.0 m/s speed, 1587.7 kg/unit (USE ONLY WITH Elevator hoistway) (One Click LCA)	7938.5	kg	20	Metal-containing product recycling (90 % metal)	Elevators and escalators	One Click LCA
	Drinking water supply piping network, per m2 GIFA (residential buildings)	6301.39	kg	30	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Sewage water drainage piping network, per m2 GIFA (residential buildings)	4450.31	kg	30	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Heat distribution piping network, per m2 heated area, all building types	4467.2	kg	30	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Air to water heat pump multipurpose unit, 493.4 kW heating, 7050 kg/unit, refrigerant charge 226 kg (R134a), EWYD5504ZXRB2 (Daikin	14100	kg	20	Metal-containing product recycling (90 % metal)	HVAC components and equipment	-
	Air handling unit, with heat recovery through plate heat exchanger, 10 000 m3/h (5885.8 ft3/min), 1256 kg/unit (2769 lbs/unit	7945.88	kg	25	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Fan coil unit, P=1.405 kW, 21.8 kg/unit, - (CARRIER)	11859.2	kg	20	Metal-containing product recycling (90 % metal)	HVAC components and equipment	PEP
	Ventilation ducting, per m linear, D: 63 mm (2.48 in)	6749.07	kg	60	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Electricity distribution system, cabling and central, for all building types, per m2 GFA	95570.64	kg	30	Metal-containing product recycling (90 % metal)	HVAC components and equipment	One Click LCA
	Fluorescent lamp, T8-18W, 0.07 kg/unit, EN15804+A1, ref. year 2018	13166.3	kg	60	Landfilling (for inert materials)	Lighting	ÖKOBAUDAT 2021-II (25.06.2021)
	Insulated switchgear, 422.165 kg/unit, SM6-36 IM (SCHNEIDER ELECTRIC INDUSTRIES SAS)	525.56	kg	60	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Junction box, 0.154 kg/unit, IP55 100x100 (B05534), B05534, B05546 (Hager SE)	678.47	kg	60	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP
	Cable 1-wire, 0.02 kg/m, EN15804+A1, ref. year 2018	3409.12	kg	60	Metal-containing product recycling (90 % metal)	Electrification components and systems	ÖKOBAUDAT 2021-II (25.06.2021)
	Energy Efficient EX Transformers (Copper), EX75T3H, DOE 2016 (SCHNEIDER ELECTRIC INDUSTRIES SAS)	7053.36	kg	60	Metal-containing product recycling (90 % metal)	Electrification components and systems	PEP

5.0 Services	Battery Lithium ion, French average, capacité=200Ah, Batterie Lithium ion (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	8396.85	kg		30	Metal-containing product recycling (90 % metal)	Electrification components and systems	MDEGD_FDES
	Water/water heat pump for collective housing, P=5.6 kW, 222 kg/unit, Daikin Altherma 3 WS : Size 6 (DAIKIN EUROPE N.V. / DAIKIN)	48840	kg		20	Metal-containing product recycling (90 % metal)	HVAC equipment with refrigerant	PEP
	Photovoltaic monocrystalline panel, per m2, 14.5 kg/m2, 224 Wp (One Click LCA)	10320.52	kg		20	Metal-containing product recycling (90 % metal)	Energy production systems from renewable energy	One Click LCA
	Waterborne alkyd modified acrylic paint for industrial painting of metals, anti-corrosive, 1.3 kg/L, solids/weight 60%, spreading rate 5-10 m2/L,	259.18	kg		20	Landfilling (for inert materials)	Paints, coatings and lacquers	EPD FONTECRYL SC-MR 10 TIKKURILA GROUP
	Galvanized steel water supply plumbing, French average, DN=110mm, Réseau d'adduction d'eau en acier galvanisé (DONNEE	44693.07	kg		20	Steel recycling	Hot-dip galvanized/zinc coated steel	MDEGD_FDES
	Communication cable, 0.231 kg/m, Câble PTT 288 [14 paires] - DONNEE ENVIRONNEMENTALE PAR DEFAUT (MINISTERE DE L'ENVIRONNEMENT,	5963.11	kg		60	Landfilling (for inert materials)	Cables	MDEGD_FDES
	Fire sprinkler, 0.072 kg/unit, Sprinkler pendant (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	429.83	kg		20	Steel recycling	Other metals	MDEGD_FDES
	Fire sprinkler, 0.072 kg/unit, Sprinkler pendant (DONNEE ENVIRONNEMENTALE GENERIQUE PAR DEFAUT)	183.81	kg		30	Steel recycling	Other metals	MDEGD_FDES
	Communication cable, 0.231 kg/m, Câble PTT 288 [14 paires] - DONNEE ENVIRONNEMENTALE PAR DEFAUT (MINISTERE DE L'ENVIRONNEMENT,	24016.5	kg		60	Landfilling (for inert materials)	Cables	MDEGD_FDES
	Acrylic bathtub, 14.5 kg/unit, Allibert, Aquarine (NEW BATH)	3436.5	kg	assumed 1 per dwelling	20	Landfilling (for inert materials)	Sanitary ware	FDES
	Ceramic toilet set, 26.93 kg/unit (Ideal Standard International)	11014.37	kg	assumed 1 per studio and 1 bed, 2 per 2 bed	20	Landfilling (for inert materials)	Sanitary ware	EPD Ceramic Toilet set
	Ceramic bathroom washbasin, 16.7 kg/unit, 850 × 460 × 150 mm (One Click LCA)	6830.3	kg	assumed 1 per studio and 1 bed, 2 per 2 bed	20	Landfilling (for inert materials)	Sanitary ware	One Click LCA
8.0 External Works	Sandstone pavers, 15x15x85 cm, 195.8 kg/m2, 2621 kg/m3 (Pierres et Marbres de Wallonie ASBL)	122962.4	kg		60	Brick/stone crushed to aggregate (for sub-base layers)	Natural stone	EPD Pierres et Marbres de Belgique Grès du Bois d`Anthisnes Pavé platine
	Polypropylene (PP) pipe for drainage and sewerage networks, DN 200 mm (8 in), 9.95 kg/m, wall thickness: 18.2 mm (One Click LCA`	110.31	kg		25	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA
	Polyvinyl chloride (PVC) pipe for drainage and sewerage networks, DN 500 mm (20 in), 61.98 kg/m, wall thickness: 26.19 mm (One Click LCA	601.59	kg		25	Metal-containing product recycling (90 % metal)	Pipes (water, heating, sewage)	One Click LCA

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