

Brighton & Hove City Council

Portslade Village Centre

Whole Life Carbon Statement

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Table of Contents

1	Executive summary	4
1.1	Scope	4
1.2	Development description	4
1.3	Estimated Whole Life Carbon Emissions	4
2	Introduction	5
2.1	Development Description	5
2.2	Whole Life Carbon Assessment	5
3	Methodology	5
3.1	Assessment scope	5
3.2	Operational carbon emissions	5
3.3	Embodied carbon assessment and end-of-life emissions	5
3.4	Whole Life Carbon Scenarios	6
3.5	Data sources	6
4	Data Inputs	6
4.1	Operational Carbon Assessment	6
4.2	Embodied carbon and end-of-life assessment	6
5	Results	9
6	Conclusion	14

1 Executive summary

1.1 Scope

This document has been prepared on behalf of Brighton & Hove City Council in order to outline the predicted whole life carbon emissions for the Portslade Village Centre development.

This report provides a RIBA Stage 2 Whole Life Carbon (WLC) assessment for the project, situated on Courthope Close, Portslade. The assessment has been carried out in line with the guidance provided by RICS Whole Life Carbon professional statement: Whole Life Carbon Assessment (WLC) for the Build Environment (2017).

1.2 Development description

The redevelopment of Portslade Village Centre will consist of the demolition of the existing inefficient and underutilised building community facility, and the development of two residential building consisting of 28 new apartments, to increase needed available housing at an affordable cost as well as the provision of a new community centre. These will create urgently needed housing in the area, at affordable prices.

1.3 Estimated Whole Life Carbon Emissions

The estimated Whole Life Carbon emissions of the development are summarised in the table below:

Table 1 - Summary table of the Whole Life Carbon Emissions of the Proposed Development.

Whole Life Carbon Scenario	Whole Life Carbon Emissions (kg CO ₂)
Portslade Village Centre – Non-Decarbonised Scenario	3,583,931
Portslade Village Centre – Decarbonised Scenario	1,762,381

The development is anticipated to produce **514 kgCO_{2e}/m²** of embodied carbon emissions which surpasses the RIBA Climate Challenge 2025 embodied carbon target (800 kgCO_{2e}/m²). This is accounting for the domestic and non-domestic spaces.

2 Introduction

Consult Sustainability have been appointed to undertake an updated RIBA Stage 2 Whole Life Carbon (WLC) Assessment for the Portslade Village Centre, hereafter referred to as the Proposed Development. This assessment is established upon the WLC assessment methodology aligned with RICS Whole Life Carbon professional statement, 2017.

2.1 Development Description

Proposed Development can be described as:

The redevelopment of Portslade Village Centre will deliver 28 new apartments, to increase needed available housing at an affordable cost as well as the provision of a new community centre.

2.2 Whole Life Carbon Assessment

The aim of the present assessment is to assess the WLC for the Proposed Developments, defined as 'carbon emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal.' This assessment captures the operational carbon emissions for the Proposed Development from both regulated and unregulated energy use, as well as its embodied carbon emissions, i.e., emissions associated with raw material extraction, manufacture and transport of building materials, construction and the emissions associated with maintenance, repair, and replacement as well as dismantling, demolition, and eventual material disposal.

The above-mentioned life cycle stages breakdown is in line with RICS Whole Life Carbon professional statement: Whole Life Carbon Assessment (WLC) for the Built Environment, released in 2017.

This guideline standardises WLC assessment and enhances consistency in outputs by providing guidance on implementing the broad appraisal methodology set out in EN 15978: Sustainability of Construction Works.

3 Methodology

3.1 Assessment scope.

This assessment covers of the following sections:

- Total operational carbon emissions (regulated plus unregulated);
- Embodied carbon emissions; and any future potential carbon emissions 'benefits',

This assessment has been undertaken in line with the RICS Professional Statement: Whole Life Carbon Assessment for the Built Environment.

3.2 Operational carbon emissions

The operational carbon emissions for the WLC assessment have been determined following SAP calculations.

Sample flats have been modelled and an area weighted approach has been applied to the development in order to provide an indicative figure. This encompasses carbon emissions related to both regulated and unregulated energy uses, accumulated over a 60-year study period.

3.3 Embodied carbon assessment and end-of-life emissions

To assess the embodied carbon for the project, One Click LCA has been used as the Life Cycle Assessment (LCA) tool to make allocations for the anticipated materials quantities in an inventory analysis. Material inputs have been allocated using materials where their associated Environmental Product Declarations (EPDs) information is available. Where information on material specification is not available, conservative assumptions used database EPDs have been used.

EPDs are produced by manufacturers and identify the carbon emissions of a product. By scheduling the materials proposed for the development, the overall carbon emissions can be approximated.

Due to limitations in the LCA tool's material database, in cases where a specified material is not recorded in the database, the most similar datapoint in terms of material composition is selected instead.

In line with standard UK practice, the LCA process and results included by this report have been assessed in line with BS 15978:2011 and the RICS Professional Statement: Whole Life Carbon assessment for the built environment. All EPDs used have been produced in line with the requirements of BS EN 15804:2012. Therefore, each material has been assessed against the following lifecycle stage:

- A1-A3: Product stage
- A4: Material transportation to site
- A5: On site construction
- B4-B5: Replacement and maintenance
- C1-C4: End of life

Furthermore, in line with RICS Whole Life Carbon professional statement guidance, the assessment covers the following construction and building elements:

- Demolition
- Facilitating works
- Substructure

- Superstructure (frame, upper floors, roof, stairs and ramps, external walls, windows and external doors, internal walls and partitions, internal doors)
- Finishes
- Fittings, furnishings, and equipment
- Building services
- Prefabricated buildings and building units
- Work to existing building
- External works (hard and soft landscaping, fencing, fixtures, drainage, services) Life cycle assessment impacts.

This assessment will report on the impact of the above-mentioned elements throughout different lifecycle stages of the development. The impact is quantified via the embodied carbon of the development defined as 'global warming potential' with the annotation 'CO2 equivalent (CO2e)'.

3.4 Whole Life Carbon Scenarios

The present assessment has been carried out based on 2 scenarios:

- Assessment 1: Based on using the SAP 10 Carbon factor for module B6 Operational Energy use.
- Assessment 2: Decarbonisation scenario based on using FES 2020 Carbon factor, produced by the National Grid for modules B4. B6,

3.5 Data sources

Considering the current project stage (RIBA Stage 3), and the limitations regarding the information available for quantities, a flexible approach has been followed utilising a dataset of product specific EPD's and more generic data calculated within the LCA tool.

Table 2 - Types of data typically required for a WLC assessment.

Data points	Data Source
Bill of Quantities	Bill of Quantities can be used for calculation of uncertain quantities which are not product specific, however it has to be noted that often an allowance is made at early design stages which may reduce accuracy. This information must be updated at different design stages in order to provide and updated WLC.
IES-VE Model	IES-VE model can help in determining the quantity of main building elements but there is limited functionality in calculating the volume of materials. Furthermore, IES model outputs can be used to generate energy consumption data.

Architectural/Structural Drawings and Area schedule	Information provided by design team has been used as reference where required.
Relevant standards and benchmarks	Where sufficient information is not available, for example regarding MEP services, relevant standards, guidelines and benchmarks are used to estimate material quantity and composition.

4 Data Inputs

This section provides further information on the input parameters used in the present Whole Life Carbon assessment.

4.1 Operational Carbon Assessment

The following table documents the Operational Carbon emissions that have been calculated within SAP and are further detailed as part of the Energy Strategy.

Table 3 - Operational energy estimation

Operational Carbon Data points	Regulated kWh (annual)	Unregulated kWh (annual)
Portslade Village Centre	85,033	57,464

The development at Portslade Village Centre aims to reduce water consumption to less than 95 litres per person per day, in line with the recommended target set out in the RIBA 2025 targets and has estimated the following total amount:

- Portslade Village Centre: 85 people – 8,075 litres/day (l/d)

4.2 Embodied carbon and end-of-life assessment.

Table 4 lists the building elements covered by the assessment, in line with the RICS Professional Statement: Whole Life Carbon assessment for the built environment.

The structural and architectural drawings have been used as the main source to inform this study. The material inputs have been verified with the design team as best as possible at this stage of the design.

For the project elements that were not covered within the drawings, estimations based on design intent and information available has been used to inform the assessment at this stage of the design process.

Table 4 - Data used in the embodied carbon assessment

No.	Building Part/Element Group	Building Element	Basis for Information
-	Demolition	0.1 -Toxic/ hazardous/ contaminated material treatment	An allowance for contaminated land removal and treatment has not been provided for the Proposed Development.
		0.2 Major demolition works	Separate allowances for site excavation and demolition works have been included in the assessment using OneClick LCA software average deconstruction and demolition scenario.
0	Facilitating works	0.3 & 0.5 Temporary/ Enabling Works	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		0.4 Specialist groundworks	No specialist ground works were included separately. The individual ground works were accounted for in the relevant sub structure / external landscaping sections
1	Substructure	1.1 Substructure	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
2	Superstructure	2.1 Frame	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		2.2 Upper floors incl. balconies	
		2.3 Roof	
		2.4 Stairs and ramps	
		2.5 External walls	
		2.6 Windows and external Doors	

No.	Building Part/Element Group	Building Element	Basis for Information
		2.7 Internal walls and Partitions	
		2.8 Internal doors	
3	Finishes	3.1 Wall finishes	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		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**	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
5	Building services/MEP	5.1–5.14 Services incl. building-related* and nonbuilding-related**	Separate allowances for Building services/MEP have been included in the assessment using OneClick LCA software averages.
6	Prefabricated Buildings and Building Units	6.1 Prefabricated buildings and building units	No prefabricated elements are applicable.
7	Work to Existing Building	7.1 Minor demolition and alteration works	N/A
8	External works	8.1 Site preparation works	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		8.2 Roads, paths, paving and surfacing	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		8.3 Soft landscaping, planting, and irrigation systems	The available information as per provided, marked up, structural and architectural drawings and confirmed correspondence with structural engineer.
		8.4 Fencing, railings, and walls	Due to the early stage of the design (RIBA Stage 2) this information is not yet available and as such has not been included in the assessment.
		8.5 External fixtures	

No.	Building Part/Element Group	Building Element	Basis for Information
		8.6 External drainage	Due to the early stage of the design (RIBA Stage 2) this information is not yet available and as such has not been included in the assessment.
		8.7 External services	Due to the early stage of the design (RIBA Stage 2) this information is not yet available and as such has not been included in the assessment.
		8.8 Minor building works and ancillary buildings	
*	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.		

Table 5 further outlines the information and data sources that have been used in different life cycle stages of the development.

Table 5 - The Life Cycle Modules included in the assessment and commentary on the data source

Module	Description	Commentary of Data Source
A1-A3 Construction Materials	Raw material supply (A1) includes emissions generated when raw materials are taken from nature, transported to industrial units for processing and processed. Loss of raw material and energy are also taken into account. Transport impacts (A2) include exhaust emissions resulting from the transport of all raw materials from suppliers to the manufacturer's production plant as well as impacts of production of fuels. Production impacts (A3) cover the manufacturing of the production materials and fuels used by machines, as well as	EPD's which align with the exact product (where known) or the most applicable similar product has been considered.

Module	Description	Commentary of Data Source
	handling of waste formed in the production processes at the manufacturer's production plants until end-of-waste state.	
A4 Transportation to site	A4 includes exhaust emissions resulting from the transport of building products from manufacturer's production plant to building site as well as the environmental impacts of production of the used fuel.	Where available, case specific transport distances were used. Other transport distances were estimated based on typical average transport distances each material provided by OneClick LCA.
A5 Construction/installation process	A5 covers the exhaust emissions resulting from using energy during the site operations, the environmental impacts of production processes of fuel and energy and water as well as handling of waste until the end-of-waste state	Due to lack of site-specific construction data, the climate zone average construction impact was used based on OneClick LCA data scenario.
B1-B5 Maintenance and material replacement	The environmental impacts of maintenance and material replacements (B1-B5) include environmental impacts from replacing building products after they reach the end of their service life. The emissions cover impacts from raw material supply, transportation, and production of the replaced new material as well as the impacts from manufacturing the replaced material and handling of waste until the end-of-waste state.	Due to lack of accurate information at this stage, EPD and OneClick LCA data points were used
B6 Energy use	The considered use phase energy consumption (B6) impacts include exhaust emissions from any building level energy production as well as the environmental impacts of production processes of fuel and externally produced energy. Energy transmission losses are also considered.	Energy consumption taken from the Part L Energy assessment calculations for the project.
B7 Water use	The considered use phase water consumption (B7) impacts include the environmental impacts of production	Water consumption has been based on recommended target set out in the RIBA 2025 targets.

Module	Description	Commentary of Data Source
	processes of fresh water and the impacts from wastewater treatment.	
C1-C4 Deconstruction	The impacts of deconstruction include impacts for processing recyclable construction waste flows for recycling (C3) until the end-of-waste stage or the impacts of pre-processing and landfilling for waste streams that cannot be recycled (C4) based on type of material. Additionally, deconstruction impacts include emissions caused by waste energy recovery.	Due to lack of detailed information, default OneClick LCA's values have been used for the present assessment.
D External impacts/end-of-life benefits	External benefits for re-used or recycled material types include the positive impact of replacing virgin-based material with recycled material and the benefits of the energy which can be recovered from the materials.	Due to lack of detailed information, default OneClick LCA's values have been used for the present assessment.

5 Results

The following pages provide the summary of the estimated Whole Life Carbon Emissions of the development based on the 2 assessed scenarios.

Table 6 - WLC emissions for each lifecycle module, using the SAP 10 Carbon factor for module B6 Operational Energy use.

Global warming (GWP) grouped by classification breakdown								
Category	A1-A3 Materials	A4 Transport	A5 Construction	B1-B5 Maintenance and Refurbishment	B6 Energy	B7 Water	C1-C4 End of Life	Total kg CO2
Foundation, sub-surface, basement and retaining walls	67,639	7,568	0	0	0	0	3,188	78,395
External walls and facade	87,022	868	0	840	0	0	1,934	90,665
Columns and load-bearing vertical structures	42,221	1,522	0	0	0	0	1,090	44,833
Internal walls and non- bearing structures	102,970	649	0	0	0	0	4,084	107,703
Floor slabs, ceilings, roofing decks, beams and roof	333,175	3,260	0	40,101	0	0	27,645	404,181
Other structures and materials	550,255	2,044	0	38,971	0	0	11,842	603,112
Windows and doors	114,602	247	0	45,898	0	0	1,723	162,471
Construction site scenarios	0	0	40,463	0	0	0	0	40,463
Electricity use	0	0	0	0	1,992,104	0	0	1,992,104
Total water consumption	0	0	0	0	0	50,112	0	50,113
Deconstruction/demolition scenarios	0	0	0	0	0	0	9,890	9,890
Total kg CO2	1,297,884	16,159	40,463	125,810	1,992,104	50,113	61,397	3,583,931

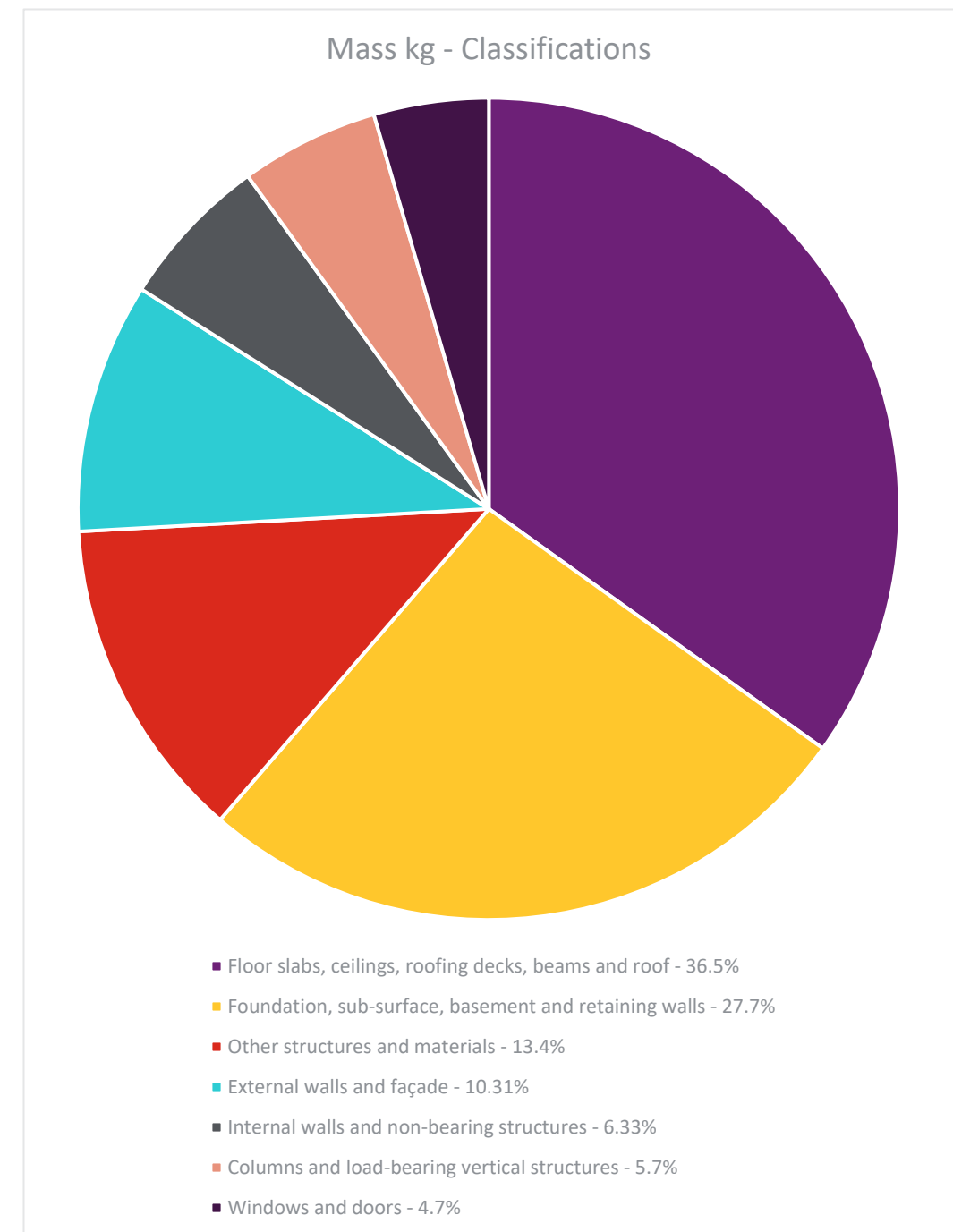
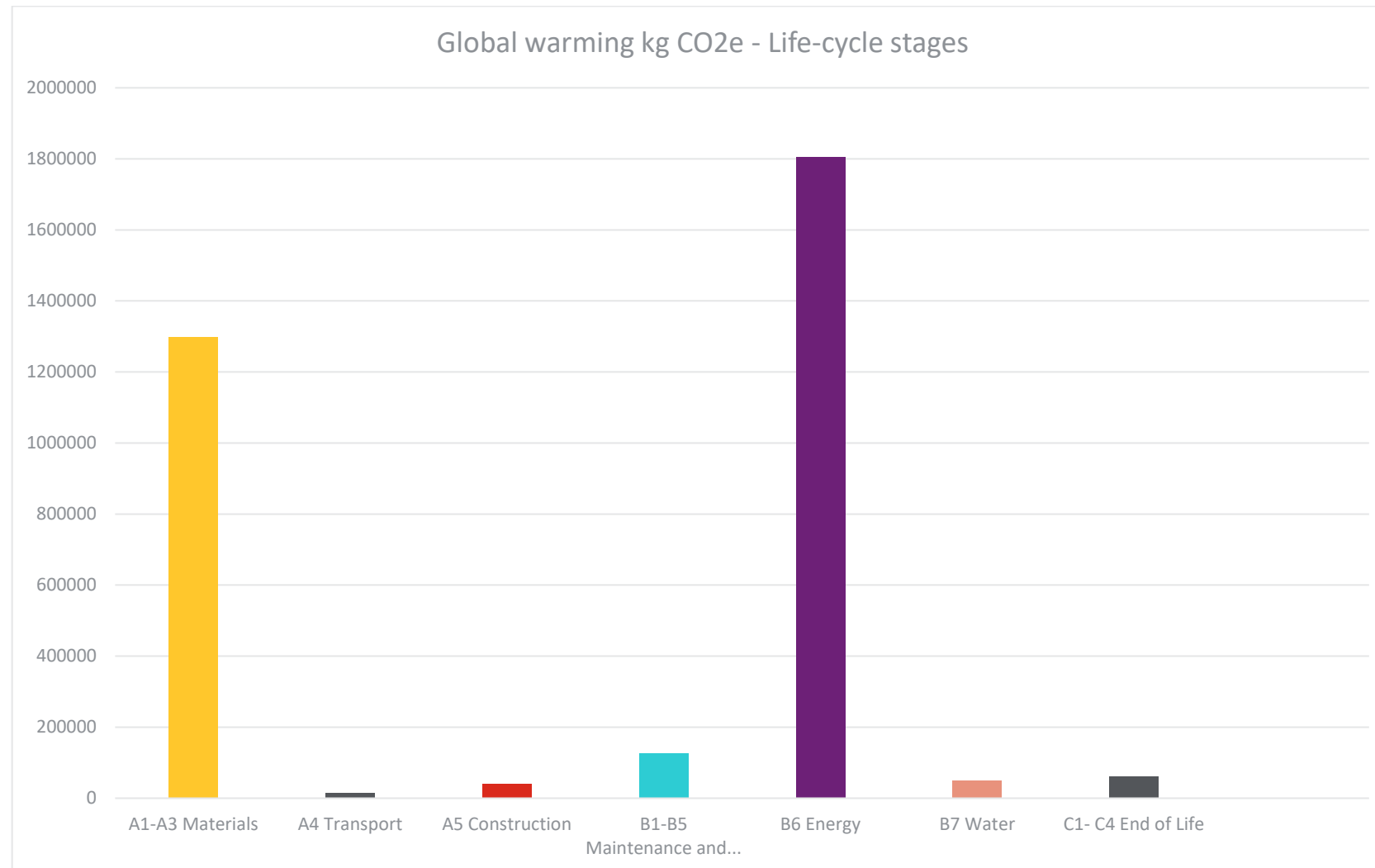


Figure 1- WLC per lifecycle stage (left), WLC per RICS category (right) – Assessment 1: using the SAP 10 Carbon factor for module B6 Operational Energy use

Table 7 - WLC emissions for each lifecycle module, using the FES 2020 Carbon factor for modules B4. B6.

Global warming (GWP) grouped by classification breakdown								
Category	A1-A3 Materials	A4 Transport	A5 Construction	B1-B5 Maintenance and Refurbishment	B6 Energy	B7 Water	C1-C4 End of Life	Total kg CO2
Foundation, sub-surface, basement and retaining walls	67,639	7,568	0	0	0	0	3,188	78,395
External walls and facade	87,022	868	0	840	0	0	1,934	90,665
Columns and load-bearing vertical structures	42,221	1,522	0	0	0	0	1,090	44,833
Internal walls and non- bearing structures	102,970	649	0	0	0	0	4,084	107,703
Floor slabs, ceilings, roofing decks, beams and roof	333,175	3,260	0	40,101	0	0	27,645	404,181
Other structures and materials	550,255	2,044	0	38,971	0	0	11,842	603,112
Windows and doors	114,602	247	0	45,898	0	0	1,723	162,471
Construction site scenarios	0	0	40,463	0	0	0	0	40,463
Electricity use	0	0	0	0	170,554	0	0	154,490
Total water consumption	0	0	0	0	0	50,112	0	50,113
Deconstruction/demolition scenarios	0	0	0	0	0	0	9,890	9,890
Total kg CO2	1,297,884	16,159	40,463	125,810	170,554	50,113	61,397	1,762,381

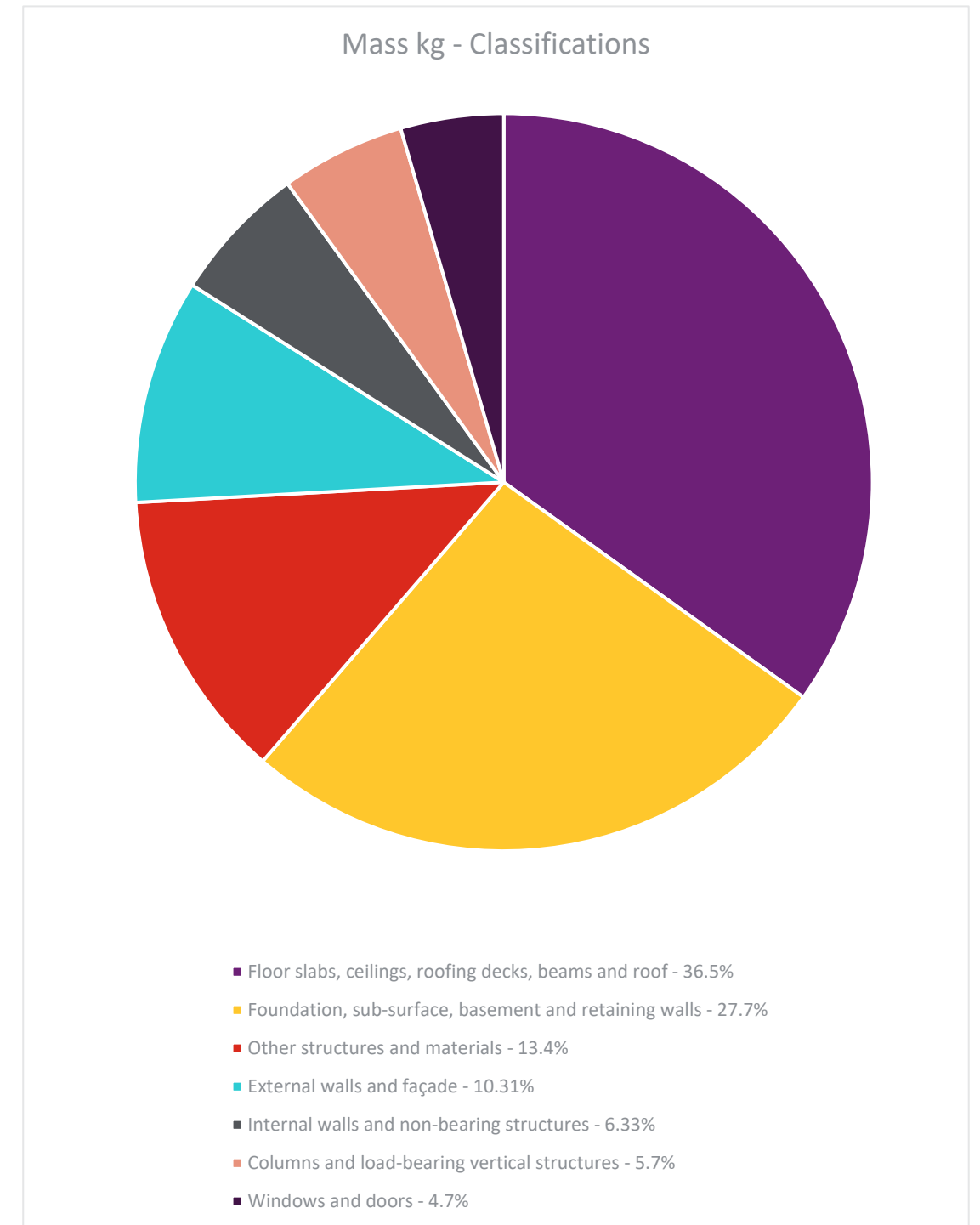
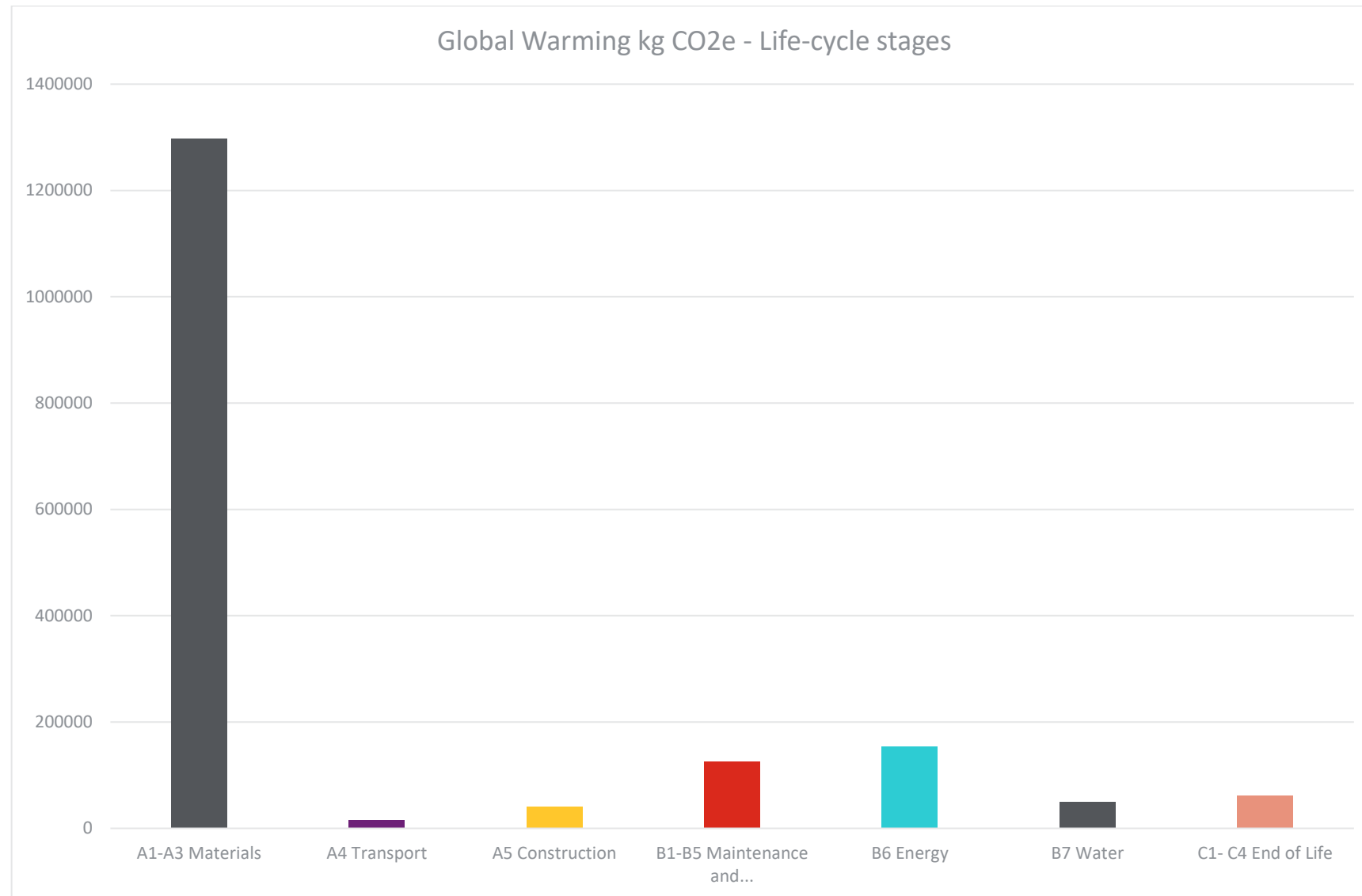


Figure 2 - WLC per lifecycle stage (left), WLC per RICS category (right) – Assessment 2: using the FES 2020 Carbon factor for modules B4. B6.

6 Conclusion

This report has provided the indicative results to the Whole Life Carbon emissions estimated for Portslade Village Centre project, completed following RICS Whole Life Carbon professional statement: Whole Life Carbon Assessment (WLC) for the Build Environment.

The results for the assessment are as summarised below:

Table 8 - Summary table of the Whole Life Carbon Emissions of Phase One of the Proposed Development

Whole Life Carbon Scope	Whole Life Carbon Emissions (kg CO ₂)
Portslade Village Centre – Non-Decarbonised Scenario	3,396,296
Portslade Village Centre – Decarbonised Scenario	1,746,317

The development is anticipated to produce **514 kgCO_{2e}/m²** of embodied carbon emissions which surpasses the RIBA Climate Challenge 2025 embodied carbon target (800 kgCO_{2e}/m²). This is accounting for the domestic and non-domestic spaces.