



Plevna Crescent Greenhouse Gas Assessment

Greenhouse Gas Assessment Report

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1. Executive Summary

An assessment of the potential greenhouse gas (GHG) emissions associated with the Proposed Development at Plevna Crescent has been undertaken in support of the required planning application to Haringey Council, London. The assessment considered both the embodied and operational emissions of the Proposed Development.

The estimate of climate change contributions from GHG emissions associated with the Proposed Development were limited in scope and accuracy due to limited information and unknown variables concerning the Proposed Development at the time of the assessment. Estimates of the quantity of GHG emissions from the Proposed Development are therefore subject to significant uncertainty.

The results of the assessment can be summarised as follows:

- The embodied emissions associated with the Proposed Development are estimated to be **6,202 tonnes of carbon dioxide equivalent (tCO₂e)**.
- The emissions arising from the operational phase of the Proposed Development are estimated to be **240 tCO₂e / year**.

2. Introduction

This assessment evaluates the potential GHG emissions associated with the construction and operation of the Proposed Development at Plevna Crescent, Haringey, London. A reasonable scenario for carbon emissions associated with the Proposed Development has been quantified through a GHG assessment which considers both embodied and operational carbon. The assessment is based on benchmark figures and limited data, and therefore should be considered only as an estimate.

3. Methodology

3.1 Overview

The assessment methodology is a streamlined version of the European standard EN 15978:2011, Sustainability of Construction Works – Assessment of Environmental Performance of Buildings – Calculation Method (CEN European Committee for Standardization, 2011).

An emissions inventory for the construction phase was developed focused on the embodied emissions of constructed buildings and the operation of construction plants and machinery. A corresponding emissions inventory for the operational phase was also developed based on annualised energy consumption estimates.

The CEN standard is useful when considering the discrete steps in a construction project's lifecycle and the significant contributors to GHG emissions within each step. A further classification of GHG typology into direct and indirect emissions has also been applied using the GHG Protocol (Greenhouse Gas Protocol, 2004) which classifies GHG emissions into scopes. Emissions sources considered in the assessment include:

- Scope 1 emissions - direct emissions of GHGs from the project, i.e. from combustion of fossil fuels such as natural gas and diesel;
- Scope 2 emissions - indirect emissions of GHGs caused by the use of grid electricity by the project and hence necessitating combustion of fossil fuels by gas and coal-fired electricity generating installations outside the project's physical boundary; and
- Scope 3 emissions – other indirect emissions which are the result of activities not owned or controlled by the project developer, but that the developer indirectly affects in its value chain.

3.1.1 Scope 1 Emissions

The Proposed Development's scope 1 emissions are the emissions associated with the combustion of fossil fuels during the construction phase by construction plants and machinery. The emissions have been estimated based on previous research undertaken by ITPenergised. Once in operation, the Proposed Development will be fully electric throughout its use phase.

3.1.2 Scope 2 Emissions

The Proposed Development's scope 2 emissions are the emissions associated with electricity usage during the operation phase of the buildings' life cycle. The calculations are based on the gross internal floor area of the Proposed Development, and an assumed electricity consumption rate in kilowatt hour (kWh) per square metre (m²) per year.

3.1.3 Scope 3 Emissions

Scope 3 emission sources for the Proposed Development include the extraction of raw materials, transportation of raw materials to manufacturers, manufacturing of building materials, transportation of building materials to site, building component replacements, building refurbishments, and end of life activities. These emissions have been estimated using a benchmark figure for embodied carbon in buildings in tonnes of carbon dioxide equivalent per square metre of gross internal floor area. The benchmark was produced by One Click LCA (2021) whose research provides embodied carbon benchmark data for European buildings.

3.2 Assessment Scope

The scope of the GHG assessment includes activities within the boundary of the Proposed Development. The assessment considers the embodied carbon associated with the construction of buildings and structures, and the operational emissions of the Proposed Development. The life cycle modules (as defined by EN 15978:2011) which are included within the project's scope are presented in **Table 1**.

Table 1 – GHG Assessment Scope

EN 15978 module		Included	Notes
A1-A3	Product stage	✓	Estimated based on One Click LCA benchmark.
A4	Transport to project site	✓	Estimated based on One Click LCA benchmark.
A5	Construction and installation process	✓	Estimated based on research developed by ITPENERGISED.
B1	Use	X	Excluded due to lack of data and benchmark figures.
B2	Maintenance	X	Excluded due to lack of data and benchmark figures.
B3	Repair	X	Excluded due to lack of data and benchmark figures.
B4	Replacement	✓	Estimated based on One Click LCA benchmark.
B5	Refurbishment	✓	Estimated based on One Click LCA benchmark.
B6	Operational energy use	✓	Estimated based on research from BEIS (2019).
B7	Operational water use	X	Excluded due to lack of data and benchmark figures.
C1-C4	End of life stage	✓	Estimated based on One Click LCA benchmark.
D	Benefits and loads beyond the system boundary.	X	Excluded due to lack of data and benchmark figures.

3.3 Input Parameters

A number of input parameters were required in order to quantify the carbon footprint, these are specified in **Table 2**.

Table 2 – GHG Assessment Input Parameters and Emission Factors

Source of GHG Emissions	Phase of Development	Input Data	Emissions Factor Source	Description
Embodied carbon emissions	Construction (A1-A4), use (B4-B5), and end of life (C1-C4)	Gross internal floor area of buildings	Embodied Carbon Benchmarks for European Buildings (One Click LCA, 2021)	The scope of the benchmark covers the product stage (materials extraction, manufacturing etc.), transport to project site, replacement, refurbishment, and the end-of-life stage (demolition, disposal etc.).

Source of GHG Emissions	Phase of Development	Input Data	Emissions Factor Source	Description
Construction plants and machinery	Construction (A5)	Duration of construction period and size of development area	ITPenergised research based GHG emissions factor per unit area	The calculation estimates GHG emissions from fossil fuel powered construction plants and machinery.
On-site electricity consumption	Operation (B6)	Gross internal floor area of buildings	BEIS Energy consumption in new domestic buildings 2015 – 2017 (BEIS, 2019), and DESNZ 2023 GHG conversion factors (Department for Energy Security and Net Zero, 2023)	Electricity consumption is based on the mean electricity consumption per square metre in flats in 2017 that are not gas users. Electricity consumption is converted into the associated emissions using the relevant emission factor from the DESNZ dataset.

3.4 Assumptions and Limitations

Assumptions have been made in place of detailed design data for the Proposed Development and the uncertainty of the carbon footprint calculated is accordingly relatively large.

The following emissions sources were examined in limited detail due to information being unavailable and high levels of uncertainty:

- The embodied carbon of bulk construction materials (concrete, steel, asphalt and cladding materials etc.) for buildings and associated infrastructure - The GHG emissions associated with the bulk construction materials are included within the embodied carbon estimation.
- Transportation of bulk construction materials to the site of the Proposed Development - The GHG emissions associated with the transportation of bulk construction materials are included within the embodied carbon estimation.
- End of life embodied emissions - The GHG emissions associated with the end of life stage are included within the embodied carbon estimation.
- Construction and installation process – The emissions were estimated based on a benchmark developed by ITPenergised as project-specific data was limited. The construction period, which is used in the calculation, may be subject to change depending on resource availability, weather conditions, and other limiting factors.

4. Results

4.1 Construction

The GHG assessment for construction phase emissions calculated the embodied emissions of buildings from construction materials and the operation of construction plants and machinery. The results of the assessment are presented in **Table 3**.

Table 3 – GHG Assessment of Construction Phase Emissions

Source of GHG Emissions	GHG Emissions (tCO ₂ e)
Embodied carbon (scope 3)	6,139*
Construction plants and machinery (scope 1)	63
Total	6,202

* This figure includes embodied emissions associated with life cycle modules A1-A4, B4-B5, and C1-C4.

GHG emissions from the embodied emissions of constructed buildings were estimated based on the gross internal floor area of the Proposed Development to be developed into residential buildings (11,582 m²). The gross internal floor area was obtained from the architects' plans.

An average value for embodied emissions per metre square for Western European residential buildings (0.53 tCO₂e/m²) was used as an indicative figure for the quantity of embodied emissions per m² of internal floor area for the Proposed Development. The embodied carbon benchmark was sourced from research by One Click LCA (2021). The benchmarks are based on a consistent dataset calculated in line with EN 15978:2011 and Level(s) methodologies for life-cycle modules A1-A4, B4-B5, and C1-C4.

ITPnergised has developed a very approximate emissions factor for construction operations covering site preparation and building works, based on detailed breakdowns of plant typology and usage patterns from historic projects. A factor of 0.4 tCO₂e per hectare per working day has been assumed. A worked area of 0.413 hectares for the Proposed Development was used based on the size of the Proposed Development area, it does not include the wider site which is not enabled for development due to its status as an ecological area. An estimate of 380 days spent operating construction plants and machinery was established based on a 5 day working week spent over an estimated 76 weeks of construction activities. The 76 weeks of construction activities was sourced from timelines produced as part of the development plans in 2019.

4.2 Operation

GHG emissions from the operational phase of the Proposed Development were estimated based on estimated annual energy requirements to operate the units to be built within the Proposed Development based on the gross internal floor area. The Proposed Development consists of 119 units over 4 apartment blocks and the units will consume only electrical energy.

The electricity demand for the Proposed Development has been estimated based on annual energy consumption research published by BEIS (2019). A benchmark of 100 kWh/m², which represents the annual mean electricity consumption for a flat not using gas in 2017, has been used.

GHG emissions from electricity demand have been estimated based on UK grid average emissions for electricity generation based on the most recent available UK grid average emissions factors for 2023 published by the UK Government Department for Energy Security and Net Zero (Department for Energy Security and Net Zero, 2023).

Operational emissions from electricity supplied from grid electricity are estimated to be 240 tCO₂e per year, as shown in **Table 4**. This figure is expected to decrease over the Proposed Development's lifetime as the UK grid is projected to decarbonise.

Table 4 – GHG Assessment of Operational Phase Emissions per Year

Source of GHG Emissions	Electricity (kWh / year)	GHG Emissions (tCO ₂ e / year)
Electricity demand from Proposed Development (scope 2)	1,158,240	240

4.3 Decommissioning

Emissions from the demolition and redevelopment of the Proposed Development will be dependent on contemporary plant, machinery, vehicle, and waste disposal technologies which by the latter half of the 21st century can reasonably be expected to have decarbonised. This phase of the Proposed Development is accounted for within the embodied carbon benchmark figure sourced from One Click LCA (2021); emissions associated with this phase are however considered highly uncertain.

5. References

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