

APPENDIX 10-A GREENHOUSE GAS CALCULATION INPUTS

General project inputs

Table 1 General information

LCA timeline	60	years	BS EN 15978
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Table 2 Calculation area schedule and phase timing for the proposed development

Plot	Unit	Area			
		2022	2023	2024	Total m²
Building A 2 Bed Flats	m²	2,294.65	2,294.65	2,294.65	6,884
Building B Offices	m²		178.055	178.055	356.1
Building B 2 Bed Flats	m²		534.355	534.355	1,068.7
Hard Landscaping	m²			328.3	328.3

Embodied carbon (construction GHG emission) inputs

Table 3 Material embodied carbon benchmarks and low, med, high assumptions for the proposed development

Schedule typologies	Embodied carbon benchmarks (RICS, 2014)	Low	Medium	High	Unit
		Buro Happold’s past project experience (15% reduction)	RICS (2014) and WRAP (2017) benchmarks		
Building A 2 Bed Flats	High Rise Residential Tower (16-25 storey building)	1,062.5	1,250	1,437.5	kgCO ₂ e/m²
Building B Offices	Medium Rise Office Block (5-10 storey buildings)	875.5	1,030	1,184.5	kgCO ₂ e/m²
Building B 2 Bed Flats	Medium Rise Apartment/Condo (6-10 storey building)	731	860	989	kgCO ₂ e/m²
Hard Landscaping	Hard landscaping	85	100	115	kgCO ₂ e/m²

Table 4 Transport, construction, use and demolition embodied carbon benchmarks.

	Year	Low	Medium	High	Unit	Reference
Total on-site energy use	0	13,000	14,000	15,000	kgCO ₂ /£m	BRE SMART Waste KPI from RICS 2017 draft professional statement
Total site transport and delivery	0	2,441	2,910	3,379	kgCO ₂ /£m	BH past project monitored data
Use	15 onwards	40%	45%	50%	% of raw material embodied carbon	BH past project monitored data
Demolition	0 & end of life	3	3.5	4	kgCO ₂ /£m	RICS 2017 draft professional statement

Operational GHG emission calculation inputs

Table 5 Operational carbon based on benchmarks for the proposed development

Schedule typologies	Fossil	Electric	Unit	Source
Building A 2 Bed Flats	0	100	kWh/m²/y	Department for Business, Energy & Industrial Strategy statistics on the gas and electricity consumption of domestic new builds in England and Wales.
Building B Offices	0	257.7	kWh/m²/y	CIBSE benchmarks.
Building B 2 Bed Flats	0	100	kWh/m²/y	Department for Business, Energy & Industrial Strategy statistics on the gas and electricity consumption of domestic new builds in England and Wales.
Hard Landscaping	N/A	N/A	N/A	N/A

Table 6 BEIS (2019) and SAP (2016) emissions factors.

	kgCO ₂ /kWh	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050+
BEIS	Grid Domestic- BEIS projections (BEIS Measuring and reporting environmental impacts: guidance for businesses, 2019)	0.107	0.112	0.104	0.105	0.099	0.105	0.100	0.092	0.083	0.073	0.061	0.057	0.049	0.041	0.041	0.041	0.041	0.041	0.041	0.040	0.038	0.037	0.036	0.034	0.033	0.032	0.030	0.029	0.028
BEIS	Grid Commercial/Public sector- BEIS projections (BEIS Measuring and reporting environmental impacts: guidance for businesses, 2019)	0.105	0.110	0.102	0.103	0.097	0.103	0.098	0.090	0.081	0.072	0.060	0.056	0.048	0.040	0.040	0.040	0.040	0.040	0.040	0.039	0.038	0.036	0.035	0.034	0.032	0.031	0.030	0.028	0.027
BEIS	Grid Industrial- BEIS projections (BEIS Measuring and reporting environmental impacts: guidance for businesses, 2019)	0.103	0.108	0.100	0.101	0.095	0.101	0.096	0.088	0.080	0.070	0.059	0.055	0.048	0.039	0.039	0.039	0.039	0.039	0.039	0.038	0.037	0.036	0.034	0.033	0.032	0.030	0.029	0.028	0.027
SAP	Grid SAP 2016 Consultation	0.229	0.229	0.229	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183	0.183
SAP	Gas SAP 2016 Consultation	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208	0.208

Table 7 Benchmarks and conversion factors used for GHG emissions associated with operational water consumption for the proposed development.

Benchmark name	Benchmark	Source
Residential water consumption	120 litres per person per day	BSRIA Rules of Thumb Edition for Building Services (5 th Edition)
Office water consumption	45 litres per person per day	BSRIA Rules of Thumb Edition for Building Services (5 th Edition)
Typical office occupancy	8 – 13 m2 per workspace (8m2 taken as worst case)	BSRIA Rules of Thumb Edition for Building Services (5 th Edition)
Carbon factor for water supply	0.149 kg CO2 per m3 of water supplied	Department for Business, Energy & Industrial Strategy Greenhouse Gas Reporting: Conversion Factors 2021