

APPENDIX 9.2 GREENHOUSE GAS CALCULATION INPUTS

General project inputs

Table 1 General information

LCA timeline	60	years	BS EN 15978
--------------	----	-------	-------------

Table 2 Demolition area schedule (Source: 1917_02_2QA_Area Schedule_Heritage optioneering_Rev_1_240807)

Phase	Unit	Area		
		2025	2026	Total m²
Barnes-Wallis	m²	1592.675	4778.025	6370.7
Wright Robinson	m²	1350.05	4050.15	5400.2
Manchester Meeting Place	m²	565.65	1696.95	2262.6
Morton	m²	796.7	2390.1	3186.8
Moffat	m²	682.675	2048.025	2730.7
Total				19,951

Table 3 Calculation area schedule for construction of the proposed development

Phase	Unit	Area							
		2027	2028	2029	2030	2031	2032	2033	Total m²
Phase A - C1 (office)	m²	10396.55	10396.55	4331.896					25,125
Phase A - C1 (flexible)	m²	1573.24	1573.24	655.517					3,801.997
Phase A - All Service Tunnel	m²	1965							1,965
Phase B - C2 (office)	m²				16772.25	16772.25	11181.5		44,726
Phase B - C2 (community)	m²				289.125	289.125	192.75		771
Phase B - C2 (flexible)	m²				228	228	152		608
Phase C - The Arches (flexible)	m²							884	884
Total									77,881

Embodied carbon (construction GHG emission) inputs

Table 4 Material embodied carbon benchmarks (lifecycle stage A1-A5)

Schedule typologies	Benchmark Name	Benchmark	Unit	Source
Phase A - C1 (office)	GLA 2022 Offices A-C (excluding B6 & B7, including sequestration) WLC benchmark	1400	kgCO ₂ e/m².GIA	Mayor of London, London Plan Guidance, Whole Life-Cycle Carbon Assessments, 2022
Phase A - C1 (flexible)	GLA 2022 Offices A-C (excluding B6 & B7, including sequestration) WLC benchmark	1400	kgCO ₂ e/m².GIA	Mayor of London, London Plan Guidance, Whole Life-Cycle Carbon Assessments, 2022

Schedule typologies	Benchmark Name	Benchmark	Unit	Source
Phase A - All Service Tunnel	Mixed use	488	kgCO ₂ e/m ² .GIA	Carbon Critical Tool, Atkins cited: Methodology to calculate embodied carbon of materials, RICS (2012)
Phase B - C2 (office)	GLA 2022 Offices A-C (excluding B6 & B7, including sequestration) WLC benchmark	1400	kgCO ₂ e/m ² .GIA	Mayor of London, London Plan Guidance, Whole Life-Cycle Carbon Assessments, 2022
Phase B - C2 (community)	High Rise Residential Tower (16-25 storey building)	1250	kgCO ₂ e/m ² .GIA	Carbon Critical Tool, Atkins cited: Methodology to calculate embodied carbon of materials, RICS (2012)
Phase B - C2 (flexible)	High Rise Residential Tower (16-25 storey building)	1250	kgCO ₂ e/m ² .GIA	Carbon Critical Tool, Atkins cited: Methodology to calculate embodied carbon of materials, RICS (2012)
Phase C - The Arches (flexible)	GLA 2022 Retail A-C (excluding B6 & B7, including sequestration) WLC benchmark	1050	kgCO ₂ e/m ² .GIA	Mayor of London, London Plan Guidance, Whole Life-Cycle Carbon Assessments, 2022

Operational GHG emission calculation inputs

Table 5 Operational carbon benchmarks (lifecycle stage B6) for commercial areas

Schedule typologies	Benchmark Name	Electric	Unit	Source
Phase A - C1 (office)	Offices - Air conditioned, standard	226	kWh/m ² /year	CIBSE Guide F (2021)
Phase A - C1 (flexible)	Education (further and higher) - Lecture room, arts	76	kWh/m ² /year	CIBSE Guide F (2021)
Phase A - All Service Tunnel	Education (Higher) - Administration	85	kWh/m ² /year	CIBSE Guide F (2021)
Phase B - C2 (office)	Education (further and higher) - Lecture room, arts	76	kWh/m ² /year	CIBSE Guide F (2021)
Phase B - C2 (community)	Education (further and higher) - Lecture room, arts	76	kWh/m ² /year	CIBSE Guide F (2021)
Phase B - C2 (flexible)	Education (further and higher) - Lecture room, arts	76	kWh/m ² /year	CIBSE Guide F (2021)
Phase C - The Arches (flexible)	Entertainment - Social clubs	110	kWh/m ² /year	CIBSE Guide F (2021)

Table 6 BEIS (2024) and SAP (2016) emissions factors.

	kgCO ₂ /kWh	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+
DESNZ	Grid Domestic-DESNZ projections (DESNZ Measuring and reporting environmental impacts: guidance for businesses, 2024)	0.131	0.098	0.073	0.063	0.054	0.049	0.042	0.033	0.026	0.021	0.020	0.020	0.018	0.018	0.017	0.016	0.015	0.015	0.009	0.008	0.008	0.008	0.005	0.005	0.003	0.003
DESNZ	Grid Domestic-DESNZ projections (DESNZ Measuring and reporting environmental impacts: guidance for businesses, 2024)	0.129	0.096	0.072	0.062	0.053	0.049	0.041	0.032	0.025	0.020	0.020	0.019	0.018	0.018	0.017	0.016	0.015	0.014	0.009	0.008	0.008	0.008	0.005	0.005	0.003	0.002
DESNZ	Grid Domestic-DESNZ projections (DESNZ Measuring and reporting environmental impacts: guidance for businesses, 2024)	0.127	0.095	0.070	0.061	0.052	0.048	0.040	0.032	0.025	0.020	0.019	0.019	0.018	0.017	0.016	0.015	0.015	0.014	0.009	0.008	0.008	0.007	0.005	0.005	0.003	0.002
SAP	Grid SAP 2016 Consultation	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.136
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

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

Building/Use	Benchmark name	Benchmark	Source
Phase A - C1 (office)	Further and Higher Education - Office and consulting areas	0.103 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Offices - Offices with canteen (per person)	45 L/day/person	BG 85_2024 Mechanical Criteria
Phase A - C1 (flexible)	General Assembly and Leisure, Clubs, Theatres - Generic office area	0.116 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Places of assembly - Restaurants (per person)	7 L/day/person	BG 85_2024 Mechanical Criteria
Phase B - C2 (office)	Further and Higher Education - Office and consulting areas	0.103 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Offices - Offices with canteen (per person)	45 L/day/person	BG 85_2024 Mechanical Criteria

Building/Use	Benchmark name	Benchmark	Source
Phase B - C2 (community)	General Assembly and Leisure, Clubs, Theatres - Generic office area	0.116 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Places of assembly - Restaurants (per person)	7 L/day/person	BG 85_2024 Mechanical Criteria
Phase B - C2 (flexible)	General Assembly and Leisure, Clubs, Theatres - Generic office area	0.116 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Places of assembly - Restaurants (per person)	7 L/day/person	BG 85_2024 Mechanical Criteria
Phase C - The Arches (flexible)	General Assembly and Leisure, Clubs, Theatres - Generic office area	0.116 occupant density	BREEAM UK New Construction - Version 6.1.0)
	Places of assembly - Restaurants (per person)	7 L/day/person	BG 85_2024 Mechanical Criteria
All schedule typologies	Carbon factor for water supply	0.15311 kg CO ₂ per m ³ of water supplied	Department for Energy Security and Net Zero (DESNZ) Greenhouse Gas Reporting: Conversion Factors 2024
	Carbon factor for the treatment of foul water	0.18574 kg CO ₂ per m ³ of water supplied	

Table 8 Assumptions and conversion factors used for GHG emissions associated with operational transport for the proposed development

Assumed mode of transport	Assumed Distance travelled (km)	Source of assumed distance travelled	Annual trips	Number of trips over 60-year lifecycle	Carbon factor (total kgCO ₂ e per km)	Lifetime GHG emissions (tCO ₂ e)
HGVs	108	Department for Transport Domestic Road Freight Statistics, United Kingdom: 2018 (publishing.service.gov.uk)	5,840	350,400	All HGVs, average laden 0.872960	33,036
Cars	13	Nimblefins Average Car Journeys in the UK Nimblefins	59,495	3,569,700	Average cars, unknown fuel 0.166910	7,746