19. Greenhouse Gases

Introduction

19.1 This Chapter, which was prepared by Air Quality Consultants Ltd ('AQC'), presents an assessment of the likely significant effects of the Development on Greenhouse Gases (GHG) emissions through consideration of the direct and indirect GHG releases associated with the Development.

19.2 It provides a description of the methods used in the GHG assessment. This includes an assessment of the direct and indirect release of GHGs during Site preparation, demolition and construction works. The GHG assessment also estimates the GHG emissions associated with the completed and operational Development taking a lifecycle approach and presents the numerous mitigation measures and specific design measures provided by the Development to minimise its GHG footprint.

19.3 Where appropriate, mitigation measures are identified to avoid, reduce or offset any significant adverse effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described. The cumulative greenhouse gas effects of the Development and other relevant cumulative schemes are also considered.

19.4 This Chapter is supported by the following appendices, which are provided in **ES Volume 3**.

- **Appendix 19.1**: GHG Planning Policy Context; and
- **Appendix 19.2**: Extract from the London Environment Strategy Implementation Plan.

Assessment Methodology and Significance Criteria

Scope of Assessment

19.5 The 2017 EIA Regulations[1] require that the assessment provides:

"A description of the likely significant effects of the development on the environment resulting from, inter alia:

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".

19.6 This assessment only covers the impact of the project on climate through the quantification of GHGs resulting from the Development. The impact of future climate change on the resilience of the Development has not been addressed in this Chapter; this is addressed in **Chapter 5: The Proposed Development** as well as within the Flood Risk Assessment (**Appendix 12.1**) and Drainage Strategy (**Appendix 12.2**). A Whole Life-Cycle Carbon (WLC) assessment has been completed by Hoare Lea (the Applicant's sustainability consultant) and is submitted as a stand-alone document supporting the planning application, in line with the requirements of Part F of the London Plan[2]. Data from the WLC assessment has been utilised in the preparation of this GHG assessment. The WLC separates the emissions from the Development for the Outline and Detailed planning applications. The data within this assessment are presented separating the Outline and Detailed emissions, however, the emissions are combined for presentation of the total opening year emissions, and for comparison with carbon budget targets.

19.7 The assessment of GHG emissions does not include identification of sensitive receptors, as would normally be undertaken for the majority of technical studies. As GHG emissions do not directly affect specific locations, but instead lead to indirect effects by contributing to climate change.

Impacts on specific areas are not included within this assessment, since the impacts of GHG emissions will affect the global atmosphere they need to be considered in this context.

Assessment Methodology

19.8 The metric for assessing the climate change impacts of GHG emissions, in this assessment is Global Warming Potential (GWP). This is expressed in units of carbon dioxide (CO_2) equivalent (CO_2e) over 100 years. This allows for the emissions of the seven key GHGs: carbon dioxide , methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3) and sulphur hexafluoride (SF_6) expressed in terms of their equivalent global warming potential in mass of CO_2e.

19.9 The GHG assessment has taken a whole life approach to produce a GHG footprint for the Development. The footprint sources considered include GHG emissions:

- embedded in the materials used in the construction of the Development;
- from construction site activities (such as construction plant, site offices, welfare facilities);
- from traffic movements during the demolition and construction;
- from energy consumed by the operation of the Development;
- from water used by the operation of the Development;
- from waste disposal during the operation of the Development;
- from the operational Repair, Maintenance and Refurbishment of the Development;
- from transport associated with the operation of the Development; and
- from demolition/deconstruction and disposal of the building at the end of its life.

19.10 In addition to the emissions sources listed above, there are some minor GHG emissions sources that have been scoped out of the assessment (e.g., waste disposal during the demolition and construction). They are challenging to estimate at this stage of the project as they can depend on how the contractors of the demolition and construction phase, and users of the Development operate. Measures to reduce GHGs from waste disposal have been considered where possible later in this chapter.

Establishment of Baseline Conditions

19.11 The Stag Brewery ceased brewing operations in late 2015 and decommissioning of brewery infrastructure was undertaken following cessation of brewery activities. Works on-Site have been undertaken in 2018 in respect of removal of brewery fixtures and fittings. Most recently, the Site has been used for film production operations and ancillary activities under a temporary planning consent for a period of two years from June 2020. As stated in **Chapter 2: EIA Methodology**, for the purposes of the EIA, the short-term temporary uses currently on the Site have not been assessed on the basis that the Site will be vacated by June 2022. As such, this Chapter assumes that there are no existing activities present on the Site which would generate GHG emissions, and no consideration is made of the emissions that would have occurred prior to the closure of the Brewery.

Transport

19.12 The Site will be vacated by June 2022 and thus not generating any traffic along the local road network; as such, baseline transport emissions have been assumed to be zero.

Energy Consumption

19.13 In terms of the baseline setting for energy use, the Institute of Environmental Management and Assessment (IEMA) guidance[3] acknowledges that baseline energy use for existing buildings can be very difficult to calculate. The IEMA guidance recommends that baseline energy use is considered to be zero, or an alternative baseline is considered, whereby the GHG emissions from an alternative development or building design are considered. In this case, the baseline energy consumption has been assumed to be zero as the Site is will be vacated by June 2022.

Waste Disposal

19.14 The Site will be vacated by June 2022, and as such baseline waste disposal emissions have been assumed to be zero.

Repair, Maintenance and Refurbishment

19.15 The Site will be vacated by June 2022, and as such baseline repair, maintenance and refurbishment emissions have been assumed to be zero.

Baseline and Assessment Scenarios

19.16 **Table 19.1** sets out the assessment scenarios adopted by the assessment, key sources of data and methodologies used.

19.17 The assessment (using the methodologies references in **Table 19.1**) determines the baseline GHG emissions and the GHG from the Development in 2029 (the year the Development is operational i.e., the opening year) and assumes an estimated operational lifetime of 60 years, which is a typical assumption for a development of this type and is in accordance with British Standard EN 15978:2011[4].

19.18 The quantification of annual emissions for the assessment is carried out to allow comparison of the Development's GHG emissions to London-wide GHG emission budgets for context. The 'net emissions' are the change in the GHG emissions between the baseline and the Development, taking account of GHG reduction measures. Offsetting of emissions is also considered in the calculation of residual net GHG emissions.

19.19 The assessment estimates the Development's GHG emissions in the first year of occupation as this provides a worst-case assessment due to the continued decarbonisation of the UK energy supply in the future and increase in sustainable transport in preference to private car use.

Table 19.1: GHG Assessment Scenarios

Development Phase	Life Cycle Module [a]	Baseline	Development	Methods and Data Sources	Reference
Construction: Embedded Carbon	A1-A3	The baseline is assumed to be zero.	The completed Development as described in **Chapter 5** of the ES.	Total GHG emissions associated with the construction materials and activities of the construction phase have been taken from calculations carried out for the WLC assessment.	Whole Life-Cycle Carbon Assessment[5]

Development Phase	Life Cycle Module [a]	Baseline	Development	Methods and Data Sources	Reference
Construction: Site Activities	A5	The baseline is assumed to be zero.	Site activities as described in **Chapter 6** of the ES.	Estimated GHG emissions from site construction plant, welfare offices, lighting, heating etc. during the demolition and construction works taken from calculations carried out for the WLC assessment.	Whole Life-Cycle Carbon Assessment.
Construction: Transport	A4	The baseline is assumed to be zero.	Traffic generated by the construction of the Development.	Estimated GHG emissions from site construction traffic.	Whole Life-Cycle Carbon Assessment.
Operation: Repair, Maintenance and Refurbishment	B1-B5	The baseline is assumed to be zero.	The completed Development as defined in **Chapter 5** of the ES.	Total GHG emissions associated with repair and maintenance have been taken from calculations carried out for the WLC assessment.	Whole Life-Cycle Carbon Assessment.
Operation: Transport	n/a	The baseline is assumed to be zero	Opening year (2029) transport GHG emissions.	Application of calculated 2029 BEIS GHG factors to km travelled by mode, calculated using movements per mode provided by the Transport Consultant, and assumed distance travelled.	Transport Assessment (Stantec).
Operation: Energy	B6	The baseline is assumed to be zero.	Energy usage by the Development, including proposals to meet the Mayor's Climate Change Strategy: be lean, be clean and be green, incorporating extensive energy efficiency measures along with low and zero carbon (LZC) applications.	Development CO_2 from energy use taking into account savings from the Energy Strategy.	Energy Statement (Hoare Lea)[6]
Operation: Water Use	B7	The baseline is assumed to be zero.	Operational water use by the Development.	Estimated GHG emissions from operational water use.	Whole Life Cycle Carbon Assessment.

Development Phase	Life Cycle Module [a]	Baseline	Development	Methods and Data Sources	Reference
End of Life: Demolition, Deconstruction and Disposal	C1-C4	The baseline is assumed to be zero.	Decommissioning of the completed Development as defined in the Whole Life Cycle Carbon Assessment.	GHG emissions associated with demolition and deconstruction and transport and disposal/reuse of the building materials. These emissions have been taken from calculations carried out for the WLC assessment.	Whole Life Cycle Carbon Assessment.

Notes: a Lifecycle modules in accordance with BSEN 15978:2011 and RICS Whole Life Carbon Assessment for the Built Environment (2017). The lifecycle modules are a standardised structure for the reporting of carbon emissions arising over the entire life of a built asset from cradle to grave. Being divided into different stages of the development's life (i.e., material choosing, construction, use, maintenance, repair, operation and deconstruction) allows for each development to be looked at individually as well as in conjunction with one another. The modules are presented for consistency with the WLC assessment.

19.20 Additional detail on assumptions, data and methods by phase and emission source is provided below.

Assessment of the Works

19.21 GHGs associated with the Works relate to those embedded in the materials from which the Development is constructed, with traffic movements generated during the demolition and construction stages, and site activities (mobile machinery and energy consumption) associated with demolition and construction.

Embedded Carbon

19.22 In line with Policy SI 2 of the London Plan, a WLC assessment was undertaken by Hoare Lea which included quantification of the GHG emissions associated with the construction materials and activities during construction. Specifically, this involved calculation of the CO_2e emissions associated with the production of a range of construction materials, including earthworks, superstructure frame, internal walls and finishes, and the activities which used these materials.

19.23 For the purposes of this GHG assessment and for consistency, the value for total CO_2e emissions associated with construction and activities presented in the WLC assessment has been used as the value of the embedded carbon in the Development.

19.24 As this stage the exact volumes of materials to be recycled and reused from the existing building occupying the Site is unknown. Taking a conservative approach it has, however, been assumed that none of the materials from the existing building to be demolished are recycled or reused on-Site.

Site Activities

19.25 Emissions from the demolition and construction site activities include the fuel and electricity consumption of on-site plant, machinery and vehicles as well as emissions associated with the energy consumption of welfare facilities, Site security and lighting, etc.

19.26 CO_2e emissions from construction site activities have been obtained by the WLC assessment.

Construction Traffic

19.27 GHG emissions associated with traffic generated by the demolition and construction works have been obtained from the WLC assessment.

Waste Disposal

19.28 The quantities of demolition and construction waste provided within **ES Chapter 6: Development Programme, Demolition, Alteration, Refurbishment and Construction** were multiplied by the appropriate BEIS factors in order to obtain the GHG emissions associated with waste disposal and recycling. The type of waste, waste quantities and associated GHG factors are presented in **Table 19.2**.

Table 19.2: Construction and Demolition Waste GHG Factors by Type of Waste

Type of Waste	2021 BEIS factor (kg CO_2e/tonne)		Quantity (tonnes)
	Disposal (Landfill or Combustion)	Recycled	
Aggregates	1.239	0.989	21,410
Concrete	1.239	0.989	123,000
Glass	21.294	21.294	250
Metals	1.264	0.989	27,570
Plasterboard	71.950	21.294	5,700
Timber	828.032	21.294	8,620

Completed and Operational Development Assessments

19.29 GHGs associated with the completed and operational Development relate to emissions from repair, maintenance and refurbishment; transport; waste disposal; water usage; and energy use.

Repair, Maintenance and Refurbishment

19.30 GHG emissions associated with the ongoing repair, maintenance and refurbishment of the Development during operation have been obtained from the WLC assessment.

Transport

19.31 GHG emission factors for transport in 2021 (baseline conditions) and 2029 (the first year the Development is fully complete and operational) were determined by applying engine and fuel efficiency factors (sourced from the WebTAG data book[7]) to the BEIS factors, for different types of fuel/energy source, and vehicle size/type. A summary of the 2021 and 2029 GHG emission factors for selected modes of transport used in this GHG assessment are provided in **Table 19.3**.

19.32 The calculation of transportation GHG emissions is carried out by multiplying the transport GHG factors detailed in **Table 19.3** by km travelled by mode per year. Data for the number of trips by mode for use in the calculations have been provided by the Transport Consultants, Stantec.

Table 19.3: Transport GHG Factors by Mode (selected modes)

Activity	Type	Unit	Calculated 2021 factor (kg CO_2e)	Calculated 2029 factor (kg CO_2e) [b]
Car Travel	Average car	km	0.1715	0.1358

Activity	Type	Unit	Calculated 2021 factor (kg CO_2e)	Calculated 2029 factor (kg CO_2e) [b]
HGV	All HGV	km	0.8641	0.8641
Motorcycle Travel	Average motorcycle	km	0.1136	0.0999
Taxis	Black cab	km	0.3062	0.2773
Bus/Coach	Local London bus [a]	passenger.km	0.0772	0.0772
Rail	National rail	passenger.km	0.0355	0.0189
	London Underground	passenger.km	0.0278	0.0150

[a] The GHG factor for London buses has been used for all bus and coach passenger kms as this is a higher factor than for coaches and is therefore a worst-case assumption.

[b] The BEIS factors form 2021 used as this gives the latest factors for the year 2029

Energy Consumption

19.33 GHG emissions associated with the energy use of the Development have been taken from the Energy Strategy (submitted as stand-alone document supporting the planning application), taking account of energy efficiency measures, and low and zero carbon technologies to be incorporated within the Development. These are based on the energy demand of the Development and published GHG emission factors for gas and electricity use (SAP 10).

19.34 It should be noted that for energy consumption during operation, the GHG emissions are presented as CO_2 rather than CO_2e. The use of CO_2 emissions factors (rather than CO_2e) will underestimate the GHG emissions from energy by approximately 1%[1], however these are used for consistency with the Energy Strategy, which was prepared in line with London Plan policy requirements. Any underestimation is minor and will not alter the conclusions of the assessment.

19.35 The assessment considers regulated energy consumption, which is the energy consumption from heating and cooling, lighting, and on-site infrastructure such as lifts, and unregulated energy consumption, which is the electricity consumption from the behaviour of the building's users, such as personal electrical appliances (phones, laptops, televisions etc.), and kitchen appliances.

19.36 Further details on the GHG factors and GHG emissions from energy consumption are provided in the Energy Strategy.

Water Use

19.37 GHG emissions associated with the operational water use of the Development have been obtained from the WLC assessment.

Waste Disposal

19.38 The quantities of operational waste provided within the Operational Waste Management Plan[8] (OWMP) were multiplied by the appropriate BEIS factors in order to obtain GHG emissions associated with waste disposal and recycling. The types of waste and associated factors are presented in **Table 19.4** below.

[1] For UK electricity, CO_2e/kWh is estimated by BEIS to be 0.9% higher than CO_2/kWh.

Table 19.4: Operational Waste GHG Factors by Type of Waste

Type of Waste	2021 BEIS factor (kg CO_2e/tonne)		Quantities (tonnes/year) [a]
	Disposal (Landfill)	Recycling	
Household residual waste	446.2	21.294	575.7
Commercial and industrial waste	446.2	21.294	328.4

[a] A factor of 0.002148 was used to convert the quantities from litres as presented in the OWMP to tonnes.

Net Zero Policy Implications

19.39 The UK has recently legislated a 2050 net zero[9] target following recommendations and analysis completed by the Committee on Climate Change (CCC)[2]. The CCC's Net Zero report has established a "Further Ambition" scenario which considers feasible and cost-effective policy and technology interventions to ensure the UK can meet its new net zero target.

19.40 For power generation under this scenario, the CCC consider that 100% of power generation by 2050 will be low carbon, and for ground transport it forecasts that all ground transportation (apart from small number of HGVs) will be electrically powered. The CCC therefore forecast that power and ground transportation sectors are largely decarbonised by 2050 with any residual emissions removed through technical and or natural means.

19.41 The implications of the UK adopting the net zero target are that it is reasonable to assume that government policies will be brought forward to ensure the net zero target is achieved. The recent government announcement[10] bringing forward the ban on sale of new vehicles that are not electrically powered to 2030 is an example of policy that is being developed.

19.42 For this assessment therefore all operational and ground transportation emissions with the Development (and in the baseline which ensures a conservative approach) are therefore likely to be zero by 2050 at the latest.

End of Life

19.43 Emissions associated with the end of life of the Development include emissions associated with the deconstruction or demolition of the buildings, and transport and disposal of building materials. The impacts of deconstruction include emissions from processing recyclable construction waste flows for recycling until the end-of-waste stage or the impacts of pre-processing and landfilling for waste streams that cannot be recycled based on type of material. Additionally, deconstruction impacts include emissions caused by waste energy recovery.

19.44 End of life CO_2e emissions have been obtained from the WLC assessment.

Significance Criteria

Magnitude of Impact

19.45 There are no impact descriptors for GHG emissions; the approach taken is therefore to consider the calculated GHG emissions from the Development in the context of the Greater London Authority (GLA) carbon budget, as published within the London Environment Strategy Implementation Plan[11].

[2] Net zero has been defined by the CCC to allow for GHG removals to offset any residual GHG emissions in 2050 so that the overall balance of emissions is zero.

Defining Likely Significant Effects

19.46 For GHG emissions there are no recognised significance criteria for determining the scale of the likely effects.

19.47 In terms of defining significance, guidance from IEMA has been adopted, which has identified three underlying principles to inform the assessment of significance, as follows:

- the GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- the consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive – e.g., population, fauna, soil, and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.

19.48 In the absence of any effect criteria or a defined threshold, IEMA recommends that all GHG emissions are significant. This does not mean that the contribution of GHGs from the Development alone will equate to a likely significant effect; for the majority of development projects, the individual contribution to total GHG emissions (from local through to global scale) will be very small. However, the IEMA guidance recognises that the contribution of GHG emissions to climate change is a cumulative global issue, and as such it is important for developments of all scales to acknowledge the significance of any increases in GHG emissions, and that the EIA should ensure the project addresses their occurrence by taking appropriate mitigating action.

19.49 In terms of mitigation, IEMA recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, a development should aim to reduce the residual significance of a project's emissions at all stages. Where additional GHG emissions remain but cannot be further reduced at source, approaches should be considered that compensate the project's remaining emissions, for example through offsetting.

19.50 The approach to defining likely significant effects was carried out in three steps:

- the first step was to compare the Development's GHG emissions in the opening year to the baseline GHG emissions, to determine whether there is a net increase or decrease in GHG emissions as a result of the Development;
- the second step was to compare the calculated change in emissions to local and regional GHG emissions for context; and
- the third step applies expert judgment on the significance of those emissions taking into account the changes in emissions, their contribution to regional GHG emissions, their consistency with relevant policy, and an evaluation of the mitigation measures proposed to avoid, reduce and compensate GHG emissions. It is noted that even with mitigation, any increase in GHGs will be a permanent global significant adverse effect.

Assumptions, Exclusions and Limitations

19.51 It is necessary to make a number of assumptions when undertaking a GHG assessment; assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- embedded carbon is based on embedded carbon for currently available materials;
- no activity currently present at the Site;
- half of all construction waste will be recycled;

- WLC emissions are based on the size of the development and assume decarbonisation of the grid;
- multimodal trips generated by the Development do not account for changes in travel behaviour;
- energy use is based on information available at the time of assessment, factors such as energy and thermal efficiency may improve in future years; and
- the model of energy plant used may be different from that assessed, at the time of construction.

Baseline Conditions

Construction Phase

19.52 The baseline embedded carbon for demolition and construction relates to the existing buildings on the Site. The majority of the existing buildings will be demolished, with the exception of the Maltings (Building 4) which will be refurbished and the façade of the former hotel and bottling building which will be retained. Any embedded carbon in the demolition materials is not additional to this project and a worst-case assumption is taken that none of the materials are recycled or reused on site and, therefore, the baseline embedded carbon is assumed zero.

Operational Phase

19.53 GHG emissions associated with repairs, maintenance and refurbishment of the baseline were assumed to be zero.

19.54 GHG emissions associated with baseline transport were assumed to be zero.

19.55 Details on the energy emissions from the existing Site are unavailable. For the purposes of this assessment, and in line with the IEMA guidance recommendations, a worst-case assumption has been used whereby the baseline energy emissions were assumed to be zero.

19.56 A summary of the estimated baseline GHG emissions is provided in **Table 19.5**.

Table 19.5: Summary of Baseline GHG Emissions

Development Phase		Baseline CO_2e Emissions (tonnes/annum)	Comment/Rationale
Demolition and Construction		0	Assumed that no materials at existing Site are recycled or reused
The Completed and Operational Development	Repairs, Maintenance and Refurbishment	0	Assumed none (worst-case assumption)
	Transport	0	The Site will be in unoccupied June 2022, as such transport emissions assumed to be zero
	Energy	0	Baseline energy emissions are assumed to be zero (worst-case assumption
Total		**0**	**Construction + Operation**

19.57 As shown in **Table 19.5** the total assumed baseline GHG emissions are zero.

Likely Significant Effects

The Works

Embedded Carbon

19.58 As described in Paragraph 19.22, the value for total CO_2 emissions associated with construction materials and activities was calculated as part of the WLC assessment.

19.59 The total embedded CO_2e emissions for the outline element of the Development from construction to practical completion (lifestyle modules A1-A3) are 13,360 tonnes, and those for the detailed element of the Development are 45,793 tonnes. The total embedded CO_2e emissions are 59,153 tonnes and based on a construction period of approximately 7 years, this equates to 8,450 tonnes/annum.

19.60 Since the Development is to be constructed on land that is already developed and does not lead to a significant loss in habitat, no land use change[3] GHG emissions are assumed to occur.

Construction Site Activities

19.61 Emissions from the construction site activities (lifestyle module A5) are up to 1,058 tonnes CO_2e from the outline application, and 4,051 from the detailed application, as set out in the WLC assessments. The total emissions are 5,108 tonnes CO_2e and based on a construction period of approximately 7 years, this equates to 730 tonnes CO_2e/annum.

Construction Traffic

19.62 Emissions from the Development-generating demolition and construction traffic (lifestyle module A4) are up to 287 tonnes CO_2e from the outline element of the Development and 1,080 tonnes from the detailed element of the Development, as set out in the WLC assessments. The total construction traffic emissions are 1,367 tonnes and based on a construction period of approximately 7 years, this equates to 195 tonnes CO_2e/annum.

Waste Disposal

19.63 GHG emissions associated with the disposal of waste during the construction phase of the Development has been calculated using the information provided in the **ES Chapter 6: Development Programme, Demolition, Alteration, Refurbishment and Construction**. The total waste disposal emissions are 4,135 tonnes and based on the construction period this equates to 591 tonnes/annum.

Completed Development

Operation – Repair, Maintenance and Refurbishment

19.64 GHG emissions relating to the repair, maintenance and refurbishment of the Development over its lifetime (lifecycle modules B1-B5) are estimated to total up to 2,121 tonnes CO_2e from the outline element of the Development, and 15,240 tonnes from the detailed element of the Development. This totals 17,360 tonnes CO_2e or 289 tonnes CO_2e/annum based on a development lifetime of 60 years.

[3] Land use change can result in GHG emissions, for example by the removal of habitats (e.g., woodland) that act as carbon sinks.

Transport

19.65 As detailed in Paragraph 19.31, the transport assessment (refer to **Appendix 8.1**) has assessed the increase in trips due to the Development as provided by Stantec. The calculation of the transport GHG emissions are presented in **Table 19.6** below in the opening year (2029). The assessment multiplies the calculated 2029 GHG emission factors for each mode of travel (see **Table 19.3**) by the average distance travelled.

Table 19.6: Assessment of GHG emissions from Operational Transport

Mode	Emission Factors CO_2e per km or passenger km (from Table 19.3)	Total Trips per Annum	Distance Travelled per Annum (km) [a]	CO_2e Tonnes (per annum) [b]
		Opening Year (2029)	Opening Year (2029)	Opening Year (2029)
National Rail	0.02376	1,157,415	3,341,457	63
Underground/ DLR	0.01862	233,600	470,237	7
Bus/ Tram	0.07718	1,364,005	1443,117	111
Taxi/ Other	0.28383	318,280	56,017	16
Car	0.14532	946,080	4,406841	598
Car passenger	-	-	-	0
Motorcycle	0.10228	-	-	0
HGV	0.86407	-	-	0
Cycle	-	224,475	30,978	0
Walk	-	4,256,630	2,102,775	0
Total Emissions	**-**			**796**

a Except national rail, underground and bus, which are passenger km.

b CO_2e emissions are calculated by multiplying distance travelled by CO_2e factors by mode. Total based on unrounded values.

19.66 The total GHG transport emissions are calculated as 796 tonnes/annum of CO_2e in the opening year.

Energy Consumption

19.67 The CO_2 emissions from energy consumption of the Development are described in the Energy Strategy accompanying the planning applications. It should be noted that for energy the data presented are CO_2 emissions and not CO_2e emissions. This is to ensure consistency with GLA policy requirements.

19.68 The Energy Strategy compares the Development, comprising Application A (domestic and non-domestic uses) and Application B (non-domestic uses) to a notional "baseline" of compliance with Part L Building Regulations. This is not the same as the baseline in this GHG assessment but is important in demonstrating that the Development meets the CO_2 emission policy requirements of the London Plan (see paragraph 19.13).

19.69 **Table 19.7** to **Table 19.9** summarise the improvement in performance for Application A, domestic and non-domestic and Application B, respectively for regulated and unregulated CO_2 emissions, taking into account measures to address Policy SI 2 of the London Plan to 'be lean, be clean, be green and be seen', including offsets to meet the GLA target for zero carbon development and

target to achieve minimum on-site carbon reductions of 35% compared to Part L of the Building Regulations, including a 10% reduction achieved by energy demand reduction alone (Be Lean) for domestic developments and 15% for non-domestic developments.

Table 19.7: Assessment of CO_2 Emissions from Energy Consumption – Application A (domestic)

Regulated Emissions (t/CO_2/annum)	
No Energy Strategy assuming Part L compliance	1,279
After energy demand reduction (Be Lean)	1,156
% Improvement after Be Lean (i.e., energy efficiency measures only)	10%
After renewable energy (Be Green)	299
% Improvement after Be Lean, Be Clean, Be Green	67%
Net Emissions	299
Unregulated Emissions (t/CO_2/annum)	
With Energy Strategy	297
Regulated Unregulated Emissions (t/CO_2/annum)	
Net Emissions	596

Table 19.8: Assessment of CO_2 Emissions from Energy Consumption – Application A (non-domestic)

Regulated Emissions (t/CO_2/annum)	
No Energy Strategy assuming Part L compliance	317
After energy demand reduction (Be Lean)	281
% Improvement after Be Lean (i.e., energy efficiency measures only)	11%
After renewable energy (Be Green)	128
% Improvement after Be Lean, Be Clean, Be Green	48%
Net Emissions	128
Unregulated Emissions (t/CO_2/annum)	
With Energy Strategy	192
Regulated Unregulated Emissions (t/CO_2/annum)	
Net Emissions	320

Table 19.9: Assessment of CO_2 Emissions from Energy Consumption – Application B (non-domestic)

Regulated Emissions (t/CO_2/annum)	
No Energy Strategy assuming Part L compliance	104
After energy demand reduction (Be Lean)	88
% Improvement after Be Lean (i.e., energy efficiency measures only)	15%
After renewable energy (Be Green)	35
% Improvement after Be Lean, Be Clean, Be Green	51%
Net Emissions	35
Unregulated Emissions (t/CO_2/annum)	
With Energy Strategy	43
Regulated Unregulated Emissions (t/CO_2/annum)	
Net Emissions	78

19.70 **Table 19.7** to **Table 19.9** show that the Development will achieve a 67%, 48% and 51% improvement, for Application A domestic and non-domestic uses and Application B respectively, in site-wide regulated carbon emissions over Part L 2013 compliance. The increase in energy demand meets the 15% improvement by energy demand reduction for non-domestic uses and 10% improvement for domestic uses. The total emissions from energy usage from the Development will be 994 tonnes CO_2e per year.

Waste Disposal

19.71 GHG emissions associated with the general refuse and recyclable waste generated during the operational phase of the Development have been calculated using the information provided in the WMP[8], and are 18,452 tonnes, and based on a Development lifetime of 60 years, this equates to 308 tonnes/annum.

Operation – Water Use

19.72 The WLC estimate the emissions from the operational water use of the Development (lifecycle module B7) to be 35 tonnes from the outline element of the Development, and 132 tonnes from the detailed element of the Development. The total lifetime water usage emissions are 167 tonnes, and based on a Development lifetime of 60 years, this equates to 3 tonnes/annum.

End of Life

19.73 The WLC estimates the emissions from the deconstruction and disposal of the building at the end of its practical life (lifecycle modules C1-C4) are 94 tonnes from the outline element of the Development, and 2,263 tonnes from the Detailed. Based on a Development lifetime of 60 years, this equates to 39 tonnes/annum (although all of these emissions will occur in at the end of the building's life).

Total GHG Emission Footprint

19.74 **Table 19.10** and **Figure 19.1** summarises the GHG emissions for the Development in the opening year[4] for each footprint element. The GHG emissions from embedded materials used in construction are annualised assuming a 60-year life[5] and emissions from construction transportation are annualised assuming an approximate 7-year construction period. Annualising the embedded GHG emissions allows them to be compared on a like-for-like basis to the operational GHG emissions which are reported on a per annum basis.

19.75 As shown in **Table 19.10** the Development will result in a new increase in GHG emissions in the opening year of 12,395 tonnes. This is the first step of the assessment of significance as described in Paragraph 19.47.

Table 19.10: GHG Footprint for the Development of the Opening Year (2029) [a]

Development Phase	Footprint Element	Tonnes of CO_2e/annum		
		Baseline	Opening Year	Net Emissions
Construction	Embedded	0	8,450	8,450
	Site Activities	0	730	730
	Transport	0	195	195
	Waste Disposal	0	591	591
Operation	Repair, Maintenance and Refurbishment	0	289	289
	Transport	0	796	796
	Energy	0	994	994
	Waste Disposal	0	308	308
	Water Use	0	3	3
End of Life	Demolition, Deconstruction and Disposal	0	39	39
Total		**0**	**12,395**	**12,395**

[a] All figures are rounded.

19.76 As shown in **Table 19.10** the Development will result in a new increase in GHG emissions in the opening year of tonnes. This is the first step of the assessment of significance as described in Paragraph 19.47.

GHG Comparison

19.77 The second step in determining the likely significant effects is to compare the net change in GHG emissions in the opening year to London-wide GHG budgets (see Paragraph 19.45). This has been undertaken for the operational phase of the Development.

[4] Which is defined as the first year of operational emissions (2029).
[5] Which is considered standard for a development of this type.

London Environment Strategy Implementation Plan Targets

19.78 **Table 19.11** presents residual CO_2e data for the Development with a comparison to carbon budget levels taken from the London Environment Strategy Implementation Plan Targets[11] for the year 2029.

19.79 Comparison of the GHG emissions from the Development with those within the Implementation Plan shows that the Development during construction would account for 0.008% of the total GLA budget and 0.004% of the transport emissions budget. During operation the Development would account for 0.013% of total GLA budget emissions and 0.014% of the transport emissions budget.

Table 19.11: Comparison of Opening Year CO_2e Emissions, Development vs GLA [a]

Footprint Element	Opening Year CO_2e emissions (tonnes) Development	Carbon budget level (tCO_2e)	Notes	Development as % of GLA
Construction Transport	195	5,500,000	-	0.004%
Construction Total [a]	1,156	18,000,000	-	0.008%
Operational Transport	796	5,500,000	-	0.014%
Operational Total	2,389	18,000,000	-	0.013%

[a] Embedded Carbon emissions are not included within the GLA budget, and so excluded from the Development emissions for comparison.

GHG Comparisons Summary

19.80 IEMA guidance makes clear that any increase in GHG emissions might be considered significant; however, as presented in **Table 19.11**, the residual emissions are a small component (maximum of 0.013%) in the target for GLA emissions in 2029. The principles of the IEMA guidance are that where GHGs cannot avoided, that mitigation should be provided to minimise GHGs. The mitigation is discussed in the following section.

Mitigation Measures and Likely Residual Effects

19.81 Mitigation adopted by the Development is described in this section for each element of the GHG footprint.

The Works

Construction

19.82 Reducing GHG emissions from the construction phase should be focussed on procurement of sustainable materials, with consideration to the carbon footprint of the material from the extraction of raw materials to production of construction products and the transport of products from factory to Site.

Embedded Construction

19.83 A Framework Construction Management Statement (FCMS) and Site Waste Management Plan (SWMP) have been prepared to support the planning applications, which set out the approach to

and targets for waste management, redirecting from landfill, and improving recycling and re-use rates. This includes endeavouring to achieving the following waste targets:

- accordance with the Waste Hierarchy;
- to increase the recycling and composting of municipal waste by 65% by 2030; and
- to increase the recycling, composting and reuse of commercial and industrial (C&I) waste by 70% by 2030.

19.84 During the Works, the Applicant will implement a Construction Environmental Management Plan (CEMP). The CEMP will detail control measures and activities to be undertaken to minimise environmental effects, including matters regarding waste management, and energy and water usage and would be secured via planning condition.

19.85 The CEMP, in terms of waste management, contains measures to minimise waste generation, opportunities for reuse and recycling, and consideration of alternatives to removing waste by methods other than by road. In terms of energy usage, all relevant contractors are required to investigate opportunities to minimise and reduce the use of energy so as to avoid any likely significant adverse effects associated with excessive energy consumption and resulting GHG emissions.

19.86 In terms of machinery and plant use, and site energy usage, energy consumption monitoring and reduction plans are currently in place and all relevant contractors are required to investigate opportunities to minimise and reduce the use of energy so as to avoid excessive energy consumption and resulting GHG emissions. This includes measures such as use of low emission or electric plant and machinery, on site engine idling policy and energy efficient site lighting. During site establishment, small power operations and tower crane and hoist use utilise grid-generated electrical energy.

Demolition and Construction Transport

19.87 Walking, cycling and other sustainable forms of transport would be promoted, and pedestrian site access would be segregated from the road by physical barriers to ensure safety upon arrival and departure, with separate pedestrian gates and footways provided. Cycle parking facilities will be provided. A staff Travel Plan will be prepared by the main contractor to encourage the use of sustainable modes of transport considering the good level of public transport accessibility in the immediate area to the site. In terms of construction transport, the FCMS contains a draft Construction Logistics Plan (CLP) submitted as part of a suite of documents for the planning applications. The CEMP is likely to include a detailed CLP which will set out the measures to reduce the environmental impact from the construction stage and to optimise the efficient delivery and collection of goods and materials to the site.

Completed Development

Transport

19.88 Measures to reduce GHG emissions from transport are aimed at reducing the number of overall transport trips to and from the Development, but in particular reducing the private car trips and promoting more sustainable, low carbon transport modes such as cycling and walking. In particular, the Development will provide long and short stay cycle parking in line with the London Plan requirements.

19.89 The Development will also be supported by residential and workplace Travel Plans, which will set out measures to reduce private vehicle trips and encourage low carbon travel. A Travel Welcome

Pack for future residents will be produced which sets out active travel and public transport options. These travels plans will be agreed with LBRuT.

19.90 Overall, the Site itself is in a well-connected location for public transport, providing a wide range of transport services including national rail and the London bus network.

Energy Consumption

19.91 Key mitigation measures adopted by the Development to minimise GHG emission from energy use over the buildings' operational phase include the following:

- high performance building fabric;
- high performance solar glazing and very low u-values;
- high level of air-tightness, reducing heat loss;
- air-source heat pumps (ASHPs) and photovoltaics (PVs) for heating and central hot water systems;
- openable windows to enable effective natural ventilation and passive colling strategy, along with Mechanical Ventilation with Heat Recovery (MVHR) providing constant fresh air;
- reliance on electricity as the main fuel, rather than fossil fuels; and
- lighting control systems to detect occupant use, along with low energy fittings, to reduce energy use.

19.92 The Development achieves an on-site regulated carbon reduction of 67% for domestic uses within Application A, 48% for non-domestic uses within Application A, and 51% for non-domestic uses within Application B respectively, as seen in **Table 19.7** to **Table 19.9**, relative to Part l of the Building Regulations. This is better than the London Plan policy requirement of a 35% reduction.

Summary

19.93 The final stage of assessment of significance as described in paragraph 19.47 is to consider the residual GHG emissions in the context of the proposed mitigation and relevant policy targets.

19.94 The data in **Figure 19.1** and **Table 19.10** sets out that there will be residual net annual GHG emissions of 10,983 tonnes. The mitigation measures described from Paragraph 19.81 will be implemented to avoid, reduce and compensate the GHG emissions during construction and throughout the lifetime of the Development; however, residual GHG emissions will remain.

19.95 For operational transport and energy emissions, annual emissions are anticipated reduce to net zero by 2050 in line with the UK Government's commitments to climate change as discussed in paragraph 19.39. In addition, offsetting of regulated energy consumption will reduce the regulated energy emissions to net zero in the year of opening, in accordance with Policy SI 2 of the London Plan.

19.96 The GHG emissions resulting from the Development are very small in the context of local GHG emissions, contributing a maximum of 0.013% to GLA GHG emissions target for 2029 (see **Table 19.11**).

19.97 As described in Paragraph 19.70, the Development meets the relevant climate change policy requirements of Policy SI 2 of the London Plan relating to energy.

19.98 In terms of transport emissions and emissions during construction, there are no planning policies that are directly relevant to meeting targets or reductions in emissions terms, but the Development meets the policy requirements of the London Plan including meeting the car parking requirements

of Table 10.3 and Policy T6 of the London Plan (designed to minimise private parking) and the cycle parking requirements of Table 10.2 of the London Plan (designed to maximise secure and convenient cycle parking and storage).

19.99 For GHG it is not appropriate to assess the significance of effects for different emissions sources separately, and the judgement on significance relates to the single whole project GHG footprint from all activities associated with the Works and the Completed Development. The residual effect in this case is judged to be an **indirect**, **permanent**, **significant adverse effect**. This is however judged to be acceptable as the Development is compliant with all relevant policy relating to GHG and climate change. In addition, it does not conflict with the Government or GLA's efforts to decarbonise the economy in line with the Paris Agreement on climate change as all of the Development's operational emissions (e.g. electrical energy and transport) can be decarbonised by policies and incentives delivered nationally, regionally or locally.

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5 Hoare Lea (2022) Former Stag Brewery Whole Life Cycle Assessment.

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9 Her Majesty’s Stationery Office, 2019. The Climate Change Act 2008 (2050 Target Amendment) Order 2019.

10 https://www.theguardian.com/environment/2020/sep/21/uk-plans-to-bring-forward-ban-on-fossil-fuel-vehicles-to-2030.

11 Mayor of London (2018) London Environment Strategy Implementation Plan.