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Greenhouse Gas Appendices: H1 Development

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Experts in air quality
management & assessment



Document Control

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11.1. Legislation, Policy and Guidance

A11.1 In preparing this GHG assessment, consideration has been given to the requirements of national, regional and local planning policies.

National Planning Policy

National Planning Policy Framework

A11.2 The National Planning Policy Framework (NPPF)¹ sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which is an environmental objective:

“to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”.

A11.3 Part 14 of the framework is entitled *“Meeting the challenge of climate change, flooding and coastal change”* and sets out the strategy for minimising the climate change effects of new development. Paragraph 149 describes that *“new development should be planned for in ways that can help to reduce greenhouse gas emissions through its location, orientation and design”*. The section describes how renewable and low-carbon energy sources should be considered in planning applications for development of any scale.

A11.4 Paragraph 150 states that *“New development should be planned for in ways that [...] can help reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards.”*

A11.5 Paragraph 151 describes further that *“to help increase the use and supply of renewable and low carbon energy and heat, plans should: a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts); b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and c) identify opportunities for development to draw its*

¹ Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework, Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf.

energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers”.

A11.6 In determining planning applications, the NPPF requests that planning authorities should expect new development to:

- comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

Climate Change Act (2008)²

A11.7 The overarching Act in relation to climate is the Climate Change Act 2008. The Act introduces a legally binding target to reduce the UK's GHG emissions to at least 80% below 1990 levels by 2050. It also provides for a Committee on Climate Change (CCC) with power to set out carbon budgets binding on the Government for 5-year periods.

A11.8 In the 2009 budget, the first three carbon budgets were announced which set out a binding 34% CO₂e reduction by 2020; and the Government has since adopted the fourth and fifth carbon budgets to reduce CO₂e by 50% by 2025 and 57% by 2030.

A11.9 The CCC also produces annual reports to monitor the progress in meeting these carbon budgets. Consequent upon the enactment of the Climate Change Act, a raft of policy at national and local level has been developed aimed at reducing carbon emissions.

Climate Change Act 2008 (2050 Target Amendment) Order 2019³

A11.10 In June 2019, the Government passed an order to amend the 2050 carbon emissions target in the Climate Change Act 2008 from 80 % below 1990 levels to zero net carbon (i.e. 100 % below 1990 levels). This new target will essentially end the UK's contribution to climate change by 2050.

Energy Act (2013)⁴

A11.11 The Energy Act makes a provision for the setting of a decarbonisation target range, duties in relation to it and for the reforming of the electricity market for the purposes of encouraging low carbon electricity generation.

² Her Majesty's Stationery Office (2008) Climate Change Act 2008.

³ Her Majesty's Stationery Office (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019.

⁴ Her Majesty's Stationery Office (2013) Energy Act 2013.

Climate Change and Sustainable Energy Act (2006)⁵

A11.12 The Climate Change and Sustainability Act enhances the contribution of the UK to combating climate change and securing a diverse and viable long-term energy supply by boosting the number of heat and electricity microgeneration installations in the United Kingdom.

The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting⁶

A11.13 The National Adaptation Programme sets out government's response to the second Climate Change Risk Assessment, showing the actions government is, and will be, taking to address the risks and opportunities posed by a changing climate. It forms part of the five-yearly cycle of requirements laid down in the Climate Change Act 2008 to drive a dynamic and adaptive approach to building our resilience to climate change.

The Clean Growth Strategy⁷

A11.14 The Clean Growth Strategy sets out a comprehensive set of policies and proposals that aim to accelerate the pace of "clean growth", i.e. deliver increased economic growth and decreased emissions. In the context of the UK's legal requirements under the Climate Change Act, the UK's approach to reducing emissions has two guiding objectives:

1. To meet our domestic commitments at the lowest possible net cost to UK taxpayers, consumers and businesses; and
2. To maximise the social and economic benefits for the UK from this transition.

A11.15 The Strategy contains policies relating to the delivery of clean, smart and flexible power, including reducing power costs for homes and businesses and more transparent carbon pricing. It effectively replaces the "The Carbon Plan: delivering our Low Carbon Future" published in 2011.

Approved Documents L1A⁸ and L2A⁹

A11.16 The Ministry of Housing, Communities and Local Government has published a series of 'Approved Documents' which provide guidance on ways to meet building regulations. The latest version of the

⁵ Her Majesty's Stationery Office (2006) Climate Change and Sustainable Energy Act 2006.

⁶ Defra (2018) The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting.

⁷ HM Government (2017) The Clean Growth Strategy.

⁸ The Ministry of Housing, Communities and Local Government (2016) Approved Document L1A, Conservation of Fuel and Power in new dwellings, 2013 edition incorporating 2016 amendments – for use in England.

⁹ The Ministry of Housing, Communities and Local Government (2016) Approved Document L2A, Conservation of Fuel and Power in new buildings other than new dwellings, 2013 edition incorporating 2016 amendments – for use in England.

Approved Documents L1A and L2A on the Conservation of Fuel and Power define the energy efficiency requirements for new buildings (domestic and non-domestic). The baseline Part L compliant CO₂ emissions calculated for the Development and presented within the Energy Strategy were determined in accordance with the methodology detailed within these Approved Documents.”

Regional Policy

*The London Plan*¹⁰

A11.17 The London Plan establishes strategic planning policy for London over the next 20 – 25 years and promotes the fundamental objective of accommodating London’s population and economic growth through sustainable development. It sets out the Spatial Development Strategy for Greater London and the Development Plans of all London Boroughs must eventually comply with the general requirements of the London Plan.

A11.18 The London Plan includes planning policies both for reducing energy consumption within buildings and, significantly, promoting the use of decentralised electricity generation and renewable energy. These policies cover the role of boroughs in supporting the Mayor’s Energy strategy and the requirements of planning applications.

A11.19 To support borough planners, the Mayor published additional guidance documents including ‘Integrating Renewable Energy into New Developments: A Toolkit for Planners, Developers and Consultants’, Supplementary Planning Guidance, “Sustainable Design and Construction”¹¹, 2014, and ‘GLA Draft Guidance on preparing energy assessments’¹².

A11.20 The GLA guidance on energy assessments states that:

“Each application is considered on its merits, taking into account the individual characteristics of the development. Case-specific energy comments for each development are provided at Stage 1 and 2 of the GLA planning process by GLA energy officers to ensure applications comply with London Plan policy. However, for the avoidance of doubt, energy assessments must:

- *be submitted at the planning application stage, not submitted post planning in response to a condition;*
- *report estimated site-wide regulated CO₂ emissions and reductions (broken down for the domestic and non-domestic elements of the development), expressed in tonnes per annum, after each stage of the energy hierarchy;*

¹⁰ GLA (2021) The London Plan: The Spatial Development Strategy for Greater London. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

¹¹ GLA (2014) Sustainable Design and Construction Supplementary Planning Guidance (SPG).

¹² GLA (2020) Draft Energy Assessment Guidance.

- *demonstrate how the net zero carbon target for major domestic and nondomestic development will be met, with at least a 35% on-site reduction beyond Part L 2013 and proposals for making up the shortfall to achieve net zero carbon, where required;*
- *commit to reducing regulated CO2 emissions by 10 percent below those of a development compliant with Part L 2013 of the Building Regulations through energy efficiency measures alone, and by 15% for non-residential applications;*
- *include information demonstrating that the risk of overheating has been mitigated through the incorporation of passive design measures;*
- *demonstrate that connection to existing or planned district heating networks has been prioritised and provide correspondence to support this;*
- *commit to a communal heat network to allow connection to existing or planned district heating networks identified in the area;*
- *minimise the number of energy centres and provide a single point of connection to the District Heating Network (DHN);*
- *investigate suitable low carbon and/or renewable heating plant for installation within the energy centre if connection can't be made to an area wide network;*
- *investigate and commit to maximising the installation of renewable technologies (including the potential for storage) on site;*
- *include information on how the building's actual energy performance will be monitored post-construction and report the energy and carbon performance on the GLA's online platform; and*
- *align with related documents and assessments that are submitted as part of the planning application, e.g. Whole Life-Cycle Carbon Assessments, Air Quality Assessments, Sustainability Statements."*

A11.21 The London Plan recognises that energy efficiency should come before energy supply considerations and has suggested a simple strategy known as the Mayor's Energy Hierarchy, which is described in *Policy SI 2: Minimising greenhouse gas emissions*. The process follows good practice in the design of low carbon buildings and comprises three distinct stages and order of application:

1. Use Less Energy (Be Lean);
2. Supply Energy Efficiently (Be Clean);
3. Use Renewable Energy (Be Green); and
4. Monitor, verify and report on energy performance (Be Seen)

- A11.22 As stated in Policy SI 2, the Mayor will expect all major developments to include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the above Energy Hierarchy.
- A11.23 As detailed above, as per the GLA guidance on energy assessments, Policy SI.2 of the London Plan also requires major developments to achieve a 35% reduction in carbon dioxide emissions. Residential development should achieve 10%, and non-residential development should achieve 15% through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided via a cash in lieu contribution or off-site provision if the delivery can be certain.
- A11.24 For major developments, Policy SI 2 also requires unregulated emissions (plant or requirement not covered by Building Regulations) should be calculated and carbon emissions minimised.
- A11.25 Policy S1 2 also states that for developments referable to the Mayor the whole lifecycle carbon emissions should be calculated through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Whole Life-Cycle Carbon Assessments Guidance Pre-consultation draft¹³

- A11.26 This guidance document explains how to prepare a Whole Life-Cycle Carbon (WLC) assessment in line with Policy SI 2 of the London Plan.
- A11.27 It defines Whole Life-Cycle Carbon (WLC) emissions as the carbon emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal. As such they capture a building's operational carbon emissions from both regulated and unregulated energy use, as well as its embodied carbon emissions, i.e. those 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.
- A11.28 The draft guidance confirms that the Mayor's net zero-carbon target continues to apply to the operational emissions of a building. The WLC requirement is therefore not subject to this target but, as set out in London Plan Policy SI 2, planning applicants are required to calculate the embodied emissions of the development, as well as the operational emissions, and demonstrate how these can be reduced as part of the WLC assessment.
- A11.29 The guidance confirms that planning applicants should continue to follow the GLA's Energy Assessment Guidance to assess and reduce operational emissions and insert the relevant information into the WLC assessment.
- A11.30 It should be noted that this assessment is not intended as a WLC in line with the draft guidance, but is a holistic greenhouse gas assessment designed to satisfy the requirements of the EIA Regulations

¹³ GLA, 2020. Whole Life-Cycle Carbon Assessments guidance Pre-consultation draft. (April 2020)

2017. The scope of this assessment goes beyond the requirements of the GLA WLC approach, and does not specifically follow the guidance in producing the assessment.

Sustainable Design and Construction Supplementary Planning Guidance¹⁴

A11.31 In April 2014, the Mayor published the Sustainable Design and Construction Supplementary Planning Guidance (SPG) to provide guidance to developers. This SPG details the Mayor's standards, covering a wide range of sustainability measures that major developments are expected and encouraged to meet. It covers the following areas:

- Resource Management;
- Adapting to Climate Change and Greening the City; and
- Pollution Management

Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy¹⁵

A11.32 This strategy sets out the Mayor's strategic approach to limiting further climate change and securing a low carbon energy supply for London.

A11.33 To limit further climate change impacts, the Mayor has set a target to reduce London's CO₂ emissions by 60% on 1990 levels by 2025. The strategy details the programmes and activities that are on-going across London to achieve this. This strategy also details policies and activities underway to reduce CO₂ emissions from new development and transport through The London Plan and the Mayor's Transport Strategy.

London Environment Strategy¹⁶

A11.34 The London Environment Strategy, published in May 2018, sets out an action plan for environmental improvement in London up to 2050 and covers a range of core environmental aspects including energy and climate change, air quality, green infrastructure, waste and noise.

A11.35 The strategy sets a series of targets, including the aim to make London a zero carbon city by 2050; reiterating the same commitment as is included in the draft New London Plan. The strategy sets out a series of measures designed to achieve this aim, which are focussed upon delivering zero-carbon

¹⁴ Greater London Authority (2014) Sustainable Design and Construction, Supplementary Planning Guidance, London: Greater London Authority.

¹⁵ Greater London Authority (2011) Delivering London's Energy Future: The Mayor's Climate Change Mitigation Energy Strategy.

¹⁶ Greater London Authority (2018) London Environment Strategy.

energy, zero-carbon transport and zero-carbon development. The strategy also sets out plans for retro-fitting existing buildings to enable them to be considered to be zero-carbon.

Local Policies

*Local Plan 2011-2029*¹⁷

A11.36 The London Borough of Southwark has a Supplementary Planning Document (SPD) dealing with planning obligations, which states that:

“We will seek to secure mitigation where schemes do not meet the development plan target for reducing carbon dioxide emissions. Contributions will be placed in a green fund and used to reduce carbon dioxide emissions in projects elsewhere in the borough. Details of the green fund and projects will be set out on our website. Contributions may be reduced where a developer can directly off-set any shortfall in carbon dioxide reductions from a scheme by implementing a carbon dioxide saving project off-site, where the saving exceeds what might otherwise be provided and where (in Southwark Council’s opinion) this can be achieved within a reasonable timeframe. Measures could include directly funding or installing community energy and retrofitting projects.

Carbon dioxide emissions which are secured either through an off-site project proposed by a developer or through a project funded through the green fund will be expected to provide either the carbon dioxide saving or the financial equivalence to the carbon dioxide saving that would otherwise be required on the development site.

Section 106 planning obligations will not be secured to provide funding towards the strategic projects specified on our Regulation 123 list, which currently includes Canada Water district heating/Combined Heat and Power.”

A11.37 The SPD sets out the threshold of the development and the relevant cost calculation for CO₂ reduction.

¹⁷ Southwark Council (2015) Section 106 Planning Obligations and Community infrastructure Levy (CIL) SPD

11.2. ICE Carbon Coefficients and Calculations

A11.1 Table A2.1 provides the calculations of construction building materials and the assumptions applied. The calculation of mass from volume follows simple mathematics, whereby mass is equal to volume multiplied by density.

Table A2.1: Construction Materials and Calculation of Mass ^a

Material	Quantity of Material and Unit	Assumed Thickness (mm)	Calculated Volume (m ³)	Assumed Density (kg/m ³)	Calculated Mass (kg)
Concrete	21,149 m ³	-	21,149	2,400	50,758,368
Rebar	2,974 T	-	-	-	2,974,000
Steel	3,509 T	-	-	-	3,509,000
Blockwork walls	1,323 m ³	100	1,323	2,100	277,830
Excavation	38,970 m ³	-	38,970	1,602	62,429,940
Insulation	6,840 m ²	-	-	40	41,040
Waterproof membrane	8,493 m ²	3	25	1,400	35,671
Cellcore heave board	3,685 m ²	225 ^c	829	1,050	870,581
Aluminium	22,539 m ²	1 - 30	118	2,710	319,956
Timber to soffit	2,541 m ²	250 ^d	635	660	419,265
CLT	41,716 m ²	45 ^e	40,000	500 ^f	938,610
Paving to colonnade - granite	670 m ²	25	13	2,750	36,850
Gravel/ blast to main roof	1,683 m ²	-	-	120	201,960

^a All numbers rounded.

^b Thickness according to the Structural Timber Association¹⁸.

^c Density according standard insulation specifications¹⁹

^d Density according to Timbmet²⁰

^e Density according to Greenspec²¹.

^f Density according to BS Holz²².

¹⁸ Structural Timber Association (2014) *Engineering Bulletin*. Available at: <http://www.structuraltimber.co.uk/assets/InformationCentre/eb8.pdf>

¹⁹ Insulation Shop (2021) Available at: https://www.insulationshop.co/225mm_cellcore_hx_s_under_slab_eps.html

²⁰ Timbermet (2016): Available at: <http://www.timbmet.com/wp-content/uploads/2016/02/7900-Timber-Brochure-2016-v27-LATEST-VERSION.pdf>

²¹ Greenspec (2021) *CLT – Performance Characteristics*. Available at: <https://www.greenspec.co.uk/building-design/crosslam-timber-performance-characteristics/#:~:text=Density%3A%20480%E2%80%93500%20kg%2F,brick%20or%20concrete%20%2F%20concrete%20blockwork.>

²² BS Holz (2021) *Design and Strength Classes*. Available at: https://www.glued-laminated-timber.com/glued-laminated-timber/glued-laminated-timber-made-of-beech-and-hybrid-beams-made-of-beech/spruce/strength-classes/mn_44339

11.3. Construction Traffic Data

Table A3.1: Total Construction Traffic

Phase	LGV (<3.5t)	Rigid HGV (3.5 – 7.5t)	Articulated HGV (>7.5t)
Site setup and demolition	42	59	319
Basement excavation and piling	1193	1193	2585
Sub-structure	170	170	339
Super-structure	171	156	1094
Cladding	56	56	451
Fit-out, testing and commissioning	2120	265	265

11.4. Extract from Energy Statement

Table 1: Summary of PLOT H1 CO₂ emissions for each stage of the hierarchy

	CO ₂ Emissions (tCO ₂ /yr)		
	Regulated	Unregulated	Total
Notional building using SAP10 (TER)	712	657	1,369
Be Lean	541	657	1,198
Be Clean	442	657	1,099
Be Green	441	657	1,098

Source: Hurley Palmer Flatt (2020) Elephant Park Plot H1

11.5. Extract from London Atmospheric Emissions Inventory

Borough	Values										Total
	Road Transport	Aviation	River	Rail	Industry	NRMM	Domestic and Commercial	Domestic and Commercial Oth	Other		
Barking and Dagenham	125,822	-	7,341	1,513	238,056	15,301	182,271	13,320	20,343	665,168	
Barnet	351,999	223	-	2,477	172	6,440	436,584	5,669	12,340	871,303	
Bexley	170,922	10,331	6,261	782	17,718	12,367	245,014	6,602	47,348	519,406	
Brent	185,617	313	-	7,936	10,026	11,301	367,533	7,294	733	531,364	
Bromley	225,200	1,397	-	690	-	4,548	400,503	8,763	12,889	653,389	
Camden	132,703	-	-	4,615	-	5,143	327,206	5,076	21	474,765	
City	44,302	1,603	2,033	-	-	1,311	83,037	921	-	133,212	
City of Westminster	212,884	-	1,741	2,209	-	6,289	436,210	7,030	42	668,405	
Croydon	216,163	280	-	1,323	5,092	7,670	424,300	5,741	17,308	677,877	
Ealing	255,513	164	-	9,637	-	12,324	392,784	9,111	12,294	631,827	
Enfield	323,347	397	-	474	792,013	17,218	332,321	7,873	43,840	1,523,484	
Greenwich	207,816	8,328	6,583	556	10,180	17,016	331,354	6,498	10,549	536,880	
Hackney	108,457	147	-	769	26	11,573	232,307	2,446	-	355,125	
Hammermith and Fulham	101,117	13,532	81	2,002	40	4,705	227,089	3,636	84	352,345	
Haringey	117,540	-	-	1,947	-	10,565	284,366	3,114	-	418,151	
Harrow	123,392	237	-	3,305	28,058	2,312	297,045	3,184	5,197	463,330	
Havering	335,107	3,690	579	1,842	13,513	11,322	237,767	7,760	254,636	326,276	
Hillingdon	366,256	634,258	-	8,773	74,516	24,646	348,014	32,830	168,379	1,718,273	
Hounslow	252,871	36,682	98	348	20,000	18,880	261,869	6,791	61,383	718,321	
Islington	85,427	-	-	1,474	10,659	5,861	243,388	3,022	-	349,829	
Kensington and Chelsea	100,046	1,719	15	1,307	-	2,871	243,212	2,368	87	352,225	
Kingston	144,779	-	36	511	14,000	1,617	187,788	2,154	162	351,047	
Lambeth	145,532	-	1,182	851	-	6,200	357,425	2,777	-	514,026	
Lewisham	141,220	12	2	1,295	404,000	11,859	282,882	2,854	1,644	845,767	
Merton	118,501	-	-	660	1	2,690	223,780	3,585	11,171	360,389	
Newham	168,382	43,640	1,734	2,197	224,951	25,282	315,183	14,494	5,356	807,820	
Redbridge	231,301	1,062	-	652	13	2,572	301,779	5,638	51,758	534,776	
Richmond	146,340	38,463	241	121	10,000	1,396	254,150	3,590	2,397	456,688	
Southwark	144,280	1,601	2,596	653	-	6,568	325,217	3,542	43	484,501	
Sutton	100,829	44	-	-	2,751	3,061	204,252	4,462	16,691	332,090	
Tower Hamlets	150,891	15,950	7,020	2	-	12,263	335,540	5,026	6,816	533,509	
Waltham Forest	160,141	738	-	1,864	13	11,544	262,742	4,321	1,647	443,010	
Wandsworth	152,354	12,006	136	1,292	26	3,917	345,234	3,193	1,408	520,167	
NonGLA	2,945,599	33,779	30,481	12,405	85,114	8,686	1,358,659	60,444	619,155	5,154,522	
Grand Total	8,799,911	*****	68,763	76,482	*****	309,318	11,213,486	267,718	*****	*****	

