Air Quality Neutral Assessment: Institute of Neurology and Dementia Research Institute, 256 Gray's Inn Road

July 2022

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1 Introduction

1.1 This report provides the Air Quality Neutral assessment for Plot 1 of the commercial development at the site of the Eastman Dental Hospital, 256 Gray's Inn Road in Camden. Planning permission was granted in 2019 for the partial redevelopment of the site, including to the former Royal Free Hospital (Plot 1), subject to a number of conditions, including Condition 40, which states:

"Prior to commencement of above ground works on each Plot, an 'investigation and proposals' report demonstrating that the relevant building would be Air Quality Neutral, shall be submitted to and approved by the local planning authority in writing. The development shall thereafter be constructed and maintained in accordance with the approved details.

Reason: To ensure the development does not contribute negatively to the air quality of the area and to safeguard the amenities of the prospective occupiers, adjoining premises and the area generally in accordance with the requirements of policies A1, CC1, CC2 and CC3 of the Camden Local Plan 2017".

1.2 The London Plan[1] sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The key policy relating to air quality is Policy SI 1 on *Improving air quality*, Part B1 of which sets out three key requirements for developments:

"Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits

c) create unacceptable risk of high levels of exposure to poor air quality".

1.3 The Policy then details how developments should meet these requirements, stating:

"In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

…"

1.4 Plot 1 comprises 17,500 m^2 of 'D1 non-residential institution' land use. Plot 1, which forms part of the wider scheme, is 'car-free', with only two patient/visitor accessible parking spaces and three staff

[1] GLA (2021), The London Plan: The Spatial Development Strategy for London

accessible parking spaces. The energy centre, designed to provide heat, hot water and electricity for the entire site, is located in Plot 1, and comprises:

- Five steam boilers, each with a gross fuel input of 732 kW;
- Six Low Temperature Hot Water (LTHW) boilers, each with a gross fuel input of 676 kW; and
- An emergency generator, with a gross fuel input of 3,628 kW.

1.5 The purpose of the London Plan's requirement that development proposals be 'Air Quality Neutral' is to prevent the gradual deterioration of air quality throughout Greater London. The air quality neutrality of Plot 1 has been assessed following the methodology provided in the latest Greater London Authority's (GLA's) London Plan Guidance (Air Quality Neutral)[2], which is currently in consultation stage, but expected for formal adoption soon.

1.6 Paragraph 4.1.3 of GLA's Air Quality Neutral consultation draft[2] specifies that "*where major developments meet the definition of 'car-free', they can be assumed to meet the TEB and rest of Section 4 does not apply".* Plot 1 has no parking provision and is classified as car free. It is therefore air quality neutral in terms of transport emissions and this assessment focusses on building emissions (i.e. emissions from the energy centre) only.

1.7 Paragraph 3.3.1 of the GLA's Air Quality Neutral consultation draft[2] states that "*Backup plant installed for emergency and life safety power supply, such as diesel generators, may be excluded from the calculation of predicted building emissions".* As such, the emissions associated with the backup generator are not considered further.

[2] GLA (2021), London Plan Guidance - Air Quality Neutral. Consultation Draft

2 'Air Quality Neutral' Methodology

2.1 The GLA's consultation draft of London Plan Guidance; Air Quality Neutral[2] provides an approach to assessing whether a development is air quality neutral. The approach is to compare the emissions from the building's energy use against defined benchmarks for buildings in London.

2.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table 1; the relevant land use row and energy source column for Plot 1 have been highlighted in grey for clarity.

Table 1: Building Emissions Benchmark NO_x Emission Rates ($gNO_x/m^2/annum$)

Land Use [a]	Individual Gas Boilers	Gas Boiler Network	CHP + Gas Boiler Network	Heat Pumps + Gas Boiler Network
Residential (including student accommodation and large-scale purpose-built shared living development)	3.5	5.7	7.8	5.7
Retail	0.53	0.97	4.31	0.97
Restaurants and bars	1.76	3.23	14.34	3.23
Offices	1.43	2.62	11.68	2.62
Industrial	1.07	1.95	8.73	1.95
Storage and distribution	0.55	1.01	4.5	1.01
Hotel	9.47	15.42	38.16	15.42
Care homes and hospitals	9.15	14.9	36.86	14.9
Schools, nurseries, doctors' surgeries, other non-residential institutions	0.9	1.66	7.39	1.66
Assembly and leisure	2.62	4.84	21.53	4.84

[a] Separate use classes for commercial uses, including retail and offices, have now been replaced by use class E. If these separate uses are specified in the development proposal, they should be used for this assessment. Where the intended use is not specified, or where use class E has been specified, the benchmark for retail should be used.

3 'Air Quality Neutral' Calculations

3.1 The installed boiler plant will meet the NOx emissions standard for boilers (40 mg/kWh) set out in the Sustainable Design and Construction Supplementary Planning Guidance (SPG)[3,4].

3.2 ISG Limited has confirmed that the annual energy demand of Plot 1 from the steam boilers is 79 MWh per year, whilst the demand of the LTHW boilers will be 315 MWh per year.

3.3 Based on the typical operating efficiency of 82% specified in the technical datasheet for the Fulton VSRT-60 Modulating Tubeless Steam Boiler, the demand for the steam boilers corresponds to an annual natural gas consumption of around 96 MWh. This level of usage has been calculated to generate a total annual NOx emission of 3.9 kg[5].

3.4 Based on the gross efficiency of 95.75% specified in the technical datasheet for the Remeha Gas 610 Eco Pro boiler, the demand for the LTHW boilers corresponds to an annual natural gas consumption of around 329 MWh. This level of usage has been calculated to generate a total annual NOx emission of 13.2 kg[6].

3.5 The total Building NOx Emission for Plot 1 is therefore 17.0 kg/annum (3.9 kg + 13.2 kg).

3.6 Table 1 in Section 2 shows the BEBs for each land use category based on the GIA of the relevant land use (D1, non-residential institutions). The GIA for Plot 1 has been provided by ISG Limited. Table 2 shows the calculation of the BEB for Plot 1.

Table 2: Building Emissions and Building Emissions Benchmark

Use Class	GIA (m^2)	NOx Benchmark		NOx Emissions from Development (kg/yr)
		g/m^2/yr	kg/yr	
Schools, nurseries, doctors' surgeries, other non-residential institutions	17,500	1.66	29.1	17.0

3.7 The Total Building NOx Emission of 17.0 kg/annum is less than Total BEB NOx Emission of 29.1 kg/annum. Plot 1 is thus air quality neutral in terms of building emissions.

3 GLA (2014), Sustainable Design and Construction Supplementary Planning Guidance

4 Whilst the GLA's Sustainable Design and Construction SPG was revoked upon publication of the London Plan, it is understood that the GLA still expects the emission standards set within it to be met.

5 Annual NOx emission = annual gas consumption per annum (96,341 kWh) multiplied by emission standard (4 x10^{-5} kg/kWh) = 3.9 kg

6 Annual NOx emission = annual gas consumption per annum (328,982 kWh) multiplied by emission standard (4 x10^{-5} kg/kWh) = 13.2 kg

4 Conclusions

4.1 The building emissions associated with Plot 1 of the consented development are below the relevant benchmark and is therefore air quality neutral with respect to building emissions. Plot 1 is car free and therefore air quality neutral with respect to transport emissions as set out in GLA guidance.

4.2 Plot 1 therefore complies with the requirement of Condition 40, and there is no requirement to consider mitigation measures or off-setting.

5 Glossary

AQC	Air Quality Consultants
BEB	Building Emissions Benchmark
CHP	Combined Heat and Power
GIA	Gross Internal Floor Area
GLA	Greater London Authority
kW	Kilowatt
LTHW	Low Temperature Hot Water
µg/m^3	Microgrammes per cubic metre
MWh	Megawatt Hours
NOx	Nitrogen oxides
SPG	Supplementary Planning Guidance
TEB	Transport Emissions Benchmark

6 Appendices

A1 Professional Experience

Stephen Moorcroft, BSc (Hons) MSc DIC CEnv MIEnvSc MIAQM

Mr Moorcroft is a Director of Air Quality Consultants and has worked for the company since 2004. He has over 35 years' postgraduate experience in environmental sciences. Prior to joining Air Quality Consultants, he was the Managing Director of Casella Stanger, with responsibility for a business employing over 100 staff and a turnover of £12 million. He also acted as the Business Director for Air Quality services, with direct responsibility for a number of major Government projects. He has considerable project management experience associated with Environmental Assessments in relation to a variety of development projects, including power stations, incinerators, road developments and airports, with particular experience related to air quality assessment, monitoring and analysis. He has contributed to the development of air quality management in the UK, and has been closely involved with the LAQM process since its inception. He has given expert evidence to numerous public inquiries, and is frequently invited to present to conferences and seminars. He is a Member of the Institute of Air Quality Management.

Laurence Caird, MEarthSci CSci MIEnvSc MIAQM

Mr Caird is an Technical Director with AQC, with 16 years' experience in the field of air quality including the detailed assessment of emissions from road traffic, airports, heating and energy plant, and a wide range of industrial sources including the thermal treatment of waste. He has experience in ambient air quality monitoring for numerous pollutants using a wide range of techniques and is also competent in the monitoring and assessment of nuisance odours and dust. Mr Caird has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers and process operators. He is a Member of the Institute of Air Quality Management and is a Chartered Scientist.

Dr Frances Marshall, MSci PhD MIEnvSc MIAQM

Dr Marshall is a Principal Consultant with AQC with over eight years' relevant experience. Prior to joining AQC, she spent four years carrying out postgraduate research into atmospheric aerosols at the University of Bristol. Dr Marshall has experience preparing air quality assessments for a range of projects, including residential and commercial developments, road traffic schemes, energy centres, energy from waste schemes and numerous power generation schemes. She has experience in producing air quality assessments for EIA schemes, and has also assessed the impacts of Local Plans on designated ecological areas, prepared Annual Status Reports for Local Authorities, and undertaken diffusion tube monitoring studies. She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.