2014 met data has been used for the road source dispersion modelling. According to the EPUK CHP and Air Quality Guidance 2012 [21], at least three years of met data should be used for dispersion modelling for CHP. As a result, London City Airport met data from 2010 to 2014 were used for the point-source dispersion modelling. Maximum concentration at each receptor points from the five years of modelling scenario was chosen to represent the worst-case scenario.

The wind rose illustrating the data is presented in Appendix B.

5.11 Street Canyon

No street canyons have been identified along the modelled roads and therefore no street canyons have been included in the model.

5.12 Other Model Parameters

The dispersion site surface roughness was set to 1.5m (Large, urban areas) and the Minimum Monin-Obukhov Length (MMOL) was set to 100m (Large conurbations > one million).

The meteorological measurement site surface roughness was set to 0.5m (Parkland, open suburbia) and the MMOL was set to 75m (CERC Guidance).

6 Model Output and Results Discussions

6.1 General

The modelling predicted total oxides of nitrogen (NO_X) at the chosen locations. The base year of 2014 was chosen to predict the NO_X levels at the selected diffusion tube and automatic monitoring station and these values were compared with monitored NO_X and NO_2 result to verify the model predictions. An adjustment factor was determined for the modelling and the factor was applied to predicted values for the opening year in Year 2019. The details of the process are presented below.

6.2 Baseline Conditions

6.2.1 Method

The model adjustment was undertaken using the methodology given in LAQM. TG (16), which requires the determination of the ratio between the measured and modelled road contributed NO_x at each comparison site. The ratio between them, referred to as the adjustment factor, is applied to the modelled road contributed NO_x. The modelled NO_2 is then determined using the Defra NO_x/NO_2 calculator.

6.2.2 Model Verification

The modelled and monitored road contributed NO_x values at the diffusion tube with the ratio between them are given in Table 6.1. The monitored road contributed NO_x was calculated using the Defra NO_x/NO_2 calculator.

Table 6.1 Adjustment Factor, Monitored and Modelled Road Contributed NO_x, 2014

Diffusion Tube	Modelled Road Contributed NOx (excluding background) (μg/m³)	Monitored Road Contributed NOx (excluding background) (μg/m³)	Adjustment Factor
CA23	48.0	104.7	1.970
CA16	39.5	65.6	

The modelled road contributed NO_x is adjusted by the factor 1.970 and then converted to total NO_2 using the NO_x-NO_2 calculator as provided by Defra.

The results, in comparison with the measured total NO_2, together with the ratio between them, are shown in Table 6.2.

Table 6.2 Ratio of the Measured and Modelled total NO_2 for Year 2014

Diffusion Tube	Modelled total NO_2 (μg/m³)	Measured total NO_2 (μg/m³)	Adjustment Factor
CA23	69.7	72.7	0.9996
CA16	61.8	57.8	

The final adjusted total NO_2 concentration predicted at the two diffusion tubes is within ±25% of the measured values, and is therefore considered satisfactory.

Based on the above verification process, the road source NO_x contribution determined by the model was adjusted using the factor of 1.970, then the modelled total NO_2 results were further adjusted by a factor of 0.9996.

In accordance with Defra guidance, the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations as described in Section 5.

6.3 Modelled Results

The predicted NO_2, PM_{10}, and $PM_{2.5}$ values for all future scenarios in 2019 are presented in Table 6.3.

Table 6.3 Modelled NO_2, PM_{10} and $PM_{2.5}$ Concentrations in 2019 (without development, with development)

ID	Receptor	Year 2019 (without development)				Year 2019 (with development)			
		Annual Mean (µg/m³)			No. of Exceedances of 24-Hour Mean PM_{10}	Annual Mean (µg/m³)			No. of Exceedances of 24-Hour Mean PM_{10}
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$	
R1	Oval Rd	36.1	20.8	14.9	4	36.5	20.8	14.9	4
R2	Oval Rd	36.2	20.8	14.9	4	36.3	20.8	14.9	4
R3	Jamestown Rd	36.1	20.8	14.9	4	36.4	20.8	14.9	4
R4	Jamestown Rd-FLAT	38.2	21.2	15.1	5	38.3	21.2	15.1	5
R5	Camden-N-flat	39.5	21.4	15.3	5	39.6	21.4	15.3	5
R6	Parkway	**42.0**	22.1	15.7	7	**42.1**	22.1	15.7	7
R7	Parkway-flat	**40.2**	21.7	15.4	6	**40.3**	21.7	15.4	6
R8	Camden -S-flat	**45.3**	21.9	15.6	6	**45.3**	21.9	15.6	6
R9	Camden -S -flat	**40.3**	21.5	15.3	6	**40.3**	21.5	15.3	6
R10	Camden Rd- E	**44.5**	22.2	15.7	7	**44.6**	22.2	15.7	7
R11	Camden Rd -E	**42.4**	22.0	15.6	6	**42.5**	22.0	15.6	6
R12	Adjacent Building -8F	36.0	20.8	14.9	4	36.8	20.8	14.9	4
R13	Adjacent Building -5F	36.0	20.8	14.9	4	36.7	20.8	14.9	4
R14	Adjacent Building -1F	36.0	20.8	14.9	4	36.7	20.8	14.9	4
R15	Adjacent Building -GF	36.0	20.8	14.9	4	36.7	20.8	14.9	4
PR1	North Building-FRONT-GF	36.0	20.8	14.9	4	36.1	20.8	14.9	4
PR2	North Building-FRONT-6F	36.0	20.8	14.9	4	36.0	20.8	14.9	4
PR3	North Building-BACK-6F	36.0	20.8	14.9	4	37.1	20.8	14.9	4
PR4	North Building-Middle-Front	36.1	20.8	14.9	4	36.9	20.8	14.9	4

Table 6.3 Modelled NO_2, PM_{10} and $PM_{2.5}$ Concentrations in 2019 (without development, with development)

ID	Receptor	Year 2019 (without development)				Year 2019 (with development)			
		Annual Mean ($\mu g/m^3$)			No. of Exceedances of 24-Hour Mean PM_{10}	Annual Mean ($\mu g/m^3$)			No. of Exceedances of 24-Hour Mean PM_{10}
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$	
PR5	North Building-Middle-Front	36.0	20.8	14.9	4	36.9	20.8	14.9	4
PR6	North Building-Middle-Back	36.0	20.8	14.9	4	37.0	20.8	14.9	4
PR7	South Building- Middle-Front	36.1	20.8	14.9	4	36.5	20.8	14.9	4
PR8	South Building- Middle-Front	36.1	20.8	14.9	4	36.5	20.8	14.9	4
PR9	South Building- Middle-Back	36.0	20.8	14.9	4	36.5	20.8	14.9	4
PR10	South Building- Middle-Front	36.1	20.8	14.9	4	36.3	20.8	14.9	4
PR11	South Building- Middle-Front	36.1	20.8	14.9	4	36.3	20.8	14.9	4
PR12	South Building- Middle-Back	36.1	20.8	14.9	4	36.3	20.8	14.9	4

Exceedances of annual mean objective highlighted in Bold.

7 Discussion of Results

Comparison with the National Air Quality Objectives and with the Operation of the Proposed Development in 2019:

- The objective for the annual mean NO_2 concentration is 40 µg/m³. This objective is forecast to be met at receptors PR1 to PR12, which are representative of the proposed development
- The annual mean objective is forecast to be exceeded at six existing receptors in all future scenarios (with and without scheme), due to existing poor air quality
- According to LLAQM.TG (16) guidance, exceedance of the 1-hour NO_2 mean objective is generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m^3. Since the annual mean NO_2 concentration at all the receptors are lower than 60 µg/m^3, it is unlikely the 1-hour mean will be exceeded at any of the above locations
- The objective for the annual mean PM_{10} concentration is 40 µg/m³. The forecast suggested that this objective will be met at all of the selected sensitive receptors
- LAQM.TG (16) guidance provides guidance on calculating the number of exceedances, as a 24-hour mean PM_{10} concentration, of 50 µg/m^3. In all scenarios, the number of exceedance is considerably below the limit of 35.
- The objective for the annual mean $PM_{2.5}$ concentration is 25 µg/m³. The forecast suggested that this objective will be met at all of the selected sensitive receptors
- In the 2019 'with development' scenario, no new exceedances are created at existing receptors

7.1 Significance of Impact

EPUK and IAQM published guidance in May 2015 to ensure that air quality is adequately considered in the land-use planning and development control processes[22]. This guidance is for assessing the significance of air quality impacts at selected 'receptors' by using the changes in concentrations relative to the AQAL and the long term average concentration at each receptor. AQAL could be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level' (EAL).

The impact descriptors used in this assessment are summarised in Table 7.1.

Table 7.1 Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

*Changes are rounded up to the nearest whole percentage. Changes of less than 0.5% of the AQAL are considered imperceptible.

Table 7.2 shows that there is a slight increase in NO_2 concentrations at all of the modelled existing receptors in the 2019 with development future scenario, with 2-5% the largest percentage change in NO_2 concentrations relative to the AQAL.

The largest impact descriptors ('Slight Adverse') are seen on various floors of the adjacent building but the overall NO_2 concentrations are still below the annual mean objective at these receptors. Impact descriptors at all other existing receptors are negligible.

Tables 7.2 to 7.4 show that although there is a very slight increase in NO_2, PM_{10} and $PM_{2.5}$ concentrations at all of the modelled existing receptors in the 2019 with development future scenario, the percentage change in concentrations relative to the AQAL is below 1% and therefore considered to be '**Negligible**'.

Table 7.2 NO_2 Annual Mean Concentration Changes and Associated Impact at Existing Sensitive Receptors in 2019 (without development, with development)

	Receptor Name	Predicted Annual Mean NO_2 Concentration 2019 ($\mu g/m^3$)	Long Term Average Concentration at Receptor in Assessment Year 2019	Pollutant Concentration Change 2019 ($\mu g/m^3$)	% Change Relative to AQAL in 2019	2019 Impact Descriptor
R1	Oval Rd	36.5	76-94% of AQAL	0.4	1%	Negligible
R2	Oval Rd	36.3	76-94% of AQAL	0.1	0%	Negligible
R3	Jamestown Rd	36.4	76-94% of AQAL	0.2	1%	Negligible
R4	Jamestown Rd-FLAT	38.3	95-102% of AQAL	0.1	0%	Negligible
R5	Camden-N-flat	39.6	95-102% of AQAL	0.0	0%	Negligible
R6	Parkway	**42.1**	103-109% of AQAL	0.1	0%	Negligible
R7	Parkway-flat	**40.3**	95-102% of AQAL	0.1	0%	Negligible
R8	Camden -S-flat	**45.3**	110% or more of AQAL	0.0	0%	Negligible
R9	Camden -S -flat	**40.3**	95-102% of AQAL	0.0	0%	Negligible
R10	Camden Rd- E	**44.6**	110% or more of AQAL	0.0	0%	Negligible
R11	Camden Rd -E	**42.5**	103-109% of AQAL	0.0	0%	Negligible
R12	Adjacent Building -8F	36.8	76-94% of AQAL	0.9	2-5%	Slight Adverse
R13	Adjacent Building -5F	36.7	76-94% of AQAL	0.7	2-5%	Slight Adverse
R14	Adjacent Building -1F	36.7	76-94% of AQAL	0.7	2-5%	Slight Adverse
R15	Adjacent Building -GF	36.7	76-94% of AQAL	0.7	2-5%	Slight Adverse

Table 7.3 PM_{10} Annual Mean Concentration Changes and Associated Impact at Existing Sensitive Receptors in 2019

	Receptor Name	Predicted Annual Mean PM_{10} Concentration 2019 (µg/m³)	Long Term Average Concentration at Receptor in Assessment Year 2019	Pollutant Concentration Change 2019 (µg/m³)	% Change Relative to AQAL in 2019	2019 Impact Descriptor
R1	Oval Rd	20.8	75% or less of AQAL	0.0	0%	Negligible
R2	Oval Rd	20.8	75% or less of AQAL	0.0	0%	Negligible
R3	Jamestown Rd	20.8	75% or less of AQAL	0.0	0%	Negligible
R4	Jamestown Rd-FLAT	21.2	75% or less of AQAL	0.0	0%	Negligible
R5	Camden-N-flat	21.4	75% or less of AQAL	0.0	0%	Negligible
R6	Parkway	22.1	75% or less of AQAL	0.0	0%	Negligible
R7	Parkway-flat	21.7	75% or less of AQAL	0.0	0%	Negligible
R8	Camden -S-flat	21.9	75% or less of AQAL	0.0	0%	Negligible
R9	Camden -S -flat	21.5	75% or less of AQAL	0.0	0%	Negligible
R10	Camden Rd- E	22.2	75% or less of AQAL	0.0	0%	Negligible
R11	Camden Rd -E	22.0	75% or less of AQAL	0.0	0%	Negligible
R12	Adjacent Building -8F	20.8	75% or less of AQAL	0.0	0%	Negligible
R13	Adjacent Building -5F	20.8	75% or less of AQAL	0.0	0%	Negligible
R14	Adjacent Building -1F	20.8	75% or less of AQAL	0.0	0%	Negligible
R15	Adjacent Building -GF	20.8	75% or less of AQAL	0.0	0%	Negligible

Table 7.4 $PM_{2.5}$ Annual Mean Concentration Changes and Associated Impact at Existing Sensitive Receptors in 2019

	Receptor Name	Predicted Annual Mean $PM_{2.5}$ Concentration 2019 (µg/m^3)	Long Term Average Concentration at Receptor in Assessment Year 2019	Pollutant Concentration Change 2019 (µg/m^3)	% Change Relative to AQAL in 2019	2019 Impact Descriptor
R1	Oval Rd	14.9	75% or less of AQAL	0.0	0%	Negligible
R2	Oval Rd	14.9	75% or less of AQAL	0.0	0%	Negligible
R3	Jamestown Rd	14.9	75% or less of AQAL	0.0	0%	Negligible
R4	Jamestown Rd-FLAT	15.1	75% or less of AQAL	0.0	0%	Negligible
R5	Camden-N-flat	15.3	75% or less of AQAL	0.0	0%	Negligible
R6	Parkway	15.7	75% or less of AQAL	0.0	0%	Negligible
R7	Parkway-flat	15.4	75% or less of AQAL	0.0	0%	Negligible
R8	Camden -S-flat	15.6	75% or less of AQAL	0.0	0%	Negligible
R9	Camden -S -flat	15.3	75% or less of AQAL	0.0	0%	Negligible
R10	Camden Rd- E	15.7	75% or less of AQAL	0.0	0%	Negligible
R11	Camden Rd -E	15.6	75% or less of AQAL	0.0	0%	Negligible
R12	Adjacent Building -8F	14.9	75% or less of AQAL	0.0	0%	Negligible
R13	Adjacent Building -5F	14.9	75% or less of AQAL	0.0	0%	Negligible
R14	Adjacent Building -1F	14.9	75% or less of AQAL	0.0	0%	Negligible
R15	Adjacent Building -GF	14.9	75% or less of AQAL	0.0	0%	Negligible

8 Construction Impacts

8.1 Site and Surrounding Area

As stated in Section 2.2, the proposed development comprises the demolition of existing buildings as well as the erection of 76 residential units and 1,219 sqm of commercial floor space (Use Class B1) over four, five, six and seven storeys, providing a mix of one, two and three bed apartments. The development includes a landscaped courtyard and communal amenity areas.

The surrounding area mainly consists of residential areas with some local shops and Camden Market approximately 250 meters to the north of the site. Primrose School is located 200 m to the northwest of the site and North Bridge House Preparatory School is 200m to the south of the site.

Impacts associated with the demolition and construction activities have been considered within this assessment, which is based on the recommended approach by the Institute of Air Quality Management (2014)[23].

The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited would depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

8.2 Risk Assessment of Dust Impacts

8.2.1 Potential Dust Emission Magnitude

The dust emission magnitude is based on the scale of anticipated works at the site and has been classified as small, medium or large for each of the four activities; demolition, earthworks, construction and trackout. A summary of the dust emission magnitude for each activity is set out in Table 8.1.

Demolition

It is understood that demolition activities are anticipated to take place between June and September 2017. The approximated total volume of buildings to be demolished has been estimated as approximately 16,000 m^3 and demolition activities will be carried out less than 10 m above ground level.

As the total building volume to be demolished is less than 20,000m^3, it is considered that the dust emission magnitude for demolition activities would be 'Small'.

Earthworks

Earthworks are those activities involved in preparing the site for construction such as excavation of material, haulage, tipping, stockpiling and levelling.

It is understood that earthworks activities are planned to take place between October and November 2017.

The total ground floor area of the site is approximately ~3600m^2. No information is currently available on the soil type, heavy earth moving vehicles, or total materials to be moved in terms of tonnage. Based on the floor area of the site it is considered that the potential dust emission magnitude for earthwork activities would be 'Medium'.

Construction

It is understood that construction activities will last for about two years, taking place between December 2017 and November 2019.

There are a number of factors that can have an impact on the magnitude of dust emission during construction activities, which include the size of the building, materials used for construction, the method of construction and the duration of the build.

The proposed development volume is estimated to be > 100, 000m^3. Construction activities will involve substructure, superstructure and fit out. Based on these factors, it is considered that the dust emission magnitude for construction activities would be 'large'.

Trackout

The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the site as a result of trackout.

It is expected that there will be about three-four movements per day during demolition activities, and between one or two movements per day during earthworks activities.

However, during construction, it is understood that there will be over ten movements per day, therefore, movement of vehicles will be over surfaces with moderate potential for dust release. Given these factors, it is considered that the dust emission magnitude for trackout activities would be 'medium'.

Table 8.1 Summary of Dust Emission magnitude for Each Activity

Source	Magnitude
Demolition	Small
Earthworks	Medium
Construction	Large
Trackout	Medium

8.2.2 Sensitivity of the area

The sensitivity of the surrounding area takes into account the following factors:

- The specific sensitivities of receptors in the area
- The proximity and number of those receptors
- Local background concentrations in the case of PM_{10}
- Site-specific factors i.e. whether there are natural shelters such as trees, to reduce the risk of wind-blown dust

The IAQM distance screening bands for the identification of sensitive receptors are shown in Figure 6.

Based on the IAQM guidance, residential dwellings are considered as 'High' sensitivity receptors in relation to both dust soiling and health effects of PM_{10}. There are more than ten residential units within 20 m of the site, on Oval Road as well as to the north of the proposed development.

IAQM guidance also states that 'in the case of high sensitive receptors with high occupancy (such as schools or hospitals), approximate the number of people likely to be present. Schools are considered to be 'high' sensitivity receptors with regard to dust soiling and human health impacts. There is likely to be >100 students located in Primrose School within a 200 m radius, which makes the sensitivity be 'low'. It should be noted that in cases such as these, only the highest level of area sensitivity needs to be considered further.

According to the Defra mapped PM_{10} background data presented in Table 5.2, the PM_{10} concentration is predicted to be less than 24 μg/m^3 at the site.

Given the above, the sensitivity of the area is considered to be 'high' with regards to dust soiling for demolition, earthworks and construction. Trackout may occur from roads up to 200 m, and there are between 1 and 10 receptors within 20 m of the road used by construction traffic, therefore the sensitivity has been estimate to be 'medium'. Regarding human health impacts, the sensitivity would be 'low' with respect to demolition, construction, earthworks and trackout activities.

Assessment of relevant ecological sites in accordance with the IAQM guidance revealed that there are no sensitive ecological habitats within 20 m of the site.

Therefore, the sensitivity of the area is considered to be 'negligible' with respect to ecological impacts for demolition, construction, earthworks and trackout activities.

Table 8.2 Summary of Sensitivity of Surrounding Area

Potential Impact	Sensitivity of Surrounding Area			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	High	High	High	Medium
Human Health	Low	Low	Low	Low
Ecological	N/A	N/A	N/A	N/A

8.2.3 Defining the Risk of Impacts

The dust emission magnitude as set out in Table 8.1 is combined with the sensitivity of the area (Table 8.2) to determine the risk of both dust soiling and human health impacts, assuming no mitigation measures applied at site. The risk of impacts associated with each activity is provided in Table 8.3 below and has been used to identify site-specific mitigation measures, which are set out in Section 10.

Table 8.3 Summary of Risk Effects to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	Medium Risk	Medium Risk	High Risk	Low Risk
Human Health	Negligible	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

9 Air Quality Neutral Assessment

9.1 General

Policy within the London Plan requires development to be 'air quality neutral', the aim of which is to bring forward development that are air quality neutral or better and that do not degrade air quality in areas where air quality objectives are not currently being achieved. The proposed development is located in London Borough of Camden, which is categorised as an 'Inner' London Borough, and as such the appropriate figures for Inner London were used.

Guidance for undertaking AQNA are given in the following two documents:

- The Air Quality Neutral Planning Support Update 2014 [24]
- Mayor of London Sustainable Design and Construction Supplementary Planning Guidance 2014 [25]

9.2 Method of Assessment

GLA 80371 guidance recommends that the Air Quality Neutral Assessment should focus on the NO_x and PM_{10} emissions and to consider the emissions from the energy sources used within the building and emissions from transport vehicles associated with buildings use.

9.3 Transport Emissions

9.3.1 General

The air quality neutral assessment for the road traffic emissions compares the road traffic emissions from the proposed development with benchmark values based on land usage.

9.3.2 Assessment

The project's Transport Consultant (TC) has provided estimated trip rates for the proposed development; these equate to 46 residential trips and 52 commercial trips per day.

GLA 80371, provides emission factors in terms of g/vehicle-km. Based on these rates, the worst-case annual vehicle emissions associated with the additional vehicle trips are presented in Table 9.1.

Table 9.1 Calculated Emissions for Proposed Traffic

Land use	Annual Traffic Flow (veh / annum)	Emission Rate (g / veh / km)		Average Distance Travelled by Vehicle Per Trip (km)	All Vehicle (Annual Emissions (kg / yr)	
		NO_x	PM_{10}	(C3) / (B1)	NO_x	PM_{10}
Residential (C3)	16790	0.37	0.0665	3.7	23.0	4.1
Commercial (B1)	18980	0.37	0.0665	7.7	54.1	9.7

The benchmark emissions were calculated using the GLA 80371 guidance for the each development type. The emissions are calculated based on the number of dwellings for residential units and the site area for commercial units as presented in Table 9.2 and Table 9.3 respectively.

Table 9.2 Benchmark Emissions for Proposed Development (Residential)

Land use	Number of Dwellings	Benchmark Emission Rate (g/dwelling/annum)		All Vehicle (Annual Emissions (kg/yr)	
		NO_x	PM_{10}	NO_x	PM_{10}
Residential (C3)	76	558	100	42.4	7.6

Table 9.3 Benchmark Emissions for Proposed Development (Commercial)

Land use	Site Area m^2	Benchmark Emission Rate (g/ m^2/annum)		All Vehicle (Annual Emissions (kg/yr)	
		NO_x	PM_{10}	NO_x	PM_{10}
Commercial (B1)	1219	11.4	2.05	13.9	2.5

The transport emissions easily meet the benchmark emissions for the residential component of the proposed development, however emissions from the commercial element of the development exceed the Air Quality Neutral benchmark. GLA 80371 guidance recommends that in circumstances where the benchmark is exceeded, mitigation measures to reduce emissions may be applied on-site or off-site. Where this is not practical or desirable, some form of pollutant offsetting could be applied. Mitigation measures are further considered in Section 10 of this report.

9.4 Operational Energy Plant Emissions

9.4.1 General

The residential units of the proposed development will have gas powered CHP and boilers providing heat, electricity and hot water. The details of the energy requirements and hence the design of the CHP and boilers have not been finalised. The following assessments are based on typical worst-case parameters provided by the mechanical and electrical (M&E) consultant for the scheme.

9.4.2 Assessment

The worst case emission factors and the total amounts of natural gas to be used by each plant were calculated using information provided by the Clients M&E Consultant. However, the final consumption will dependent on good controls commissioning and how the operator uses the building and related services. The emission from the proposed development are presented in Table 9.4.

Table 9.4 Emissions from Proposed Plant

	Annual Gas Consumption (kwh)*1	Emission Factor (mg/kwh)		Annual Emissions (kg/yr)	
		NO_x	PM_{10}	NO_x	PM_{10}*1
CHP	267,692	14.4	-	3.9	-
Gas Boiler	69,771	34.3	-	2.4	-

***1-** The PM_{10} emissions from modern plant are negligible and the manufacturers do not supply factors for it.

The benchmark emissions were calculated using the residential development area and factors contained within GLA 80371 and are presented in Table 9.5.

Table 9.5 Benchmark Emissions for Proposed Development

Land Use	Residential Area (m^2)	Emission Factor (g/m^2)		Annual Emissions (kg/yr)	
		NO_x	PM_{10} *1	NO_x	PM_{10} *1
Residential-(C3)	504	26.2	-	13.2	-

***1-** The PM 10 emissions from modern plant are negligible and the manufacturers do not supply factors for it.

The emissions for the proposed heating plant meet the Air Quality Neutral benchmark and therefore no further action is required.

10 Mitigation Measures

10.1 Construction Phase

Particle generation from construction and demolition activities can be substantially reduced through carefully selected mitigation techniques and effective management. The most effective technique is to control at source, as once particles are airborne, it is difficult to prevent them from dispersing into the surrounding area. However, once airborne, water sprays are probably the most effective method for suppression.

Pre-project planning, implementation and on-site management issues are an essential requirement for effective dust control. This includes, for example environmental risk assessments, method statements, training and satisfying planning requirements. Before the start of a project, it is also important to identify which construction activities are likely to generate dust and to draw up action plans to minimise emissions to the atmosphere. Dust emissions from construction sites will mainly be the sum of a large number of small activities. Therefore, attention to detail is a critical feature of effective management of the total site emissions.

The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance (SPG)[26] provides extensive coverage on the possible dust and emissions control measures. Stakeholder engagement is important, such that local sensitive receptors are notified and consulted properly before any work commence. Site layout should be carefully planned, ensuring dust generating activities and the associated machineries are located away from receptors as far as possible. Green infrastructure is also recommended to control the dispersion of dust, and at the same time improve the local environment.

In terms of mobile vehicles associated with the demolition and construction activities, initial pre-application discussions were held to investigate the possibility of reducing vehicle emissions during the construction phase by considering water-borne delivery of construction materials. However, the tidal nature of Deptford Creek meant that this option could not be integrated into the development proposals. Therefore, any vehicle accessing the site during the construction phase should comply with the Low Emission Zone standards as a minimum requirement. Engine idling should be avoided through careful site vehicles management. Construction Logistics Plans (CLPs) / Construction Traffic Management Plans should be considered, especially for larger development.

As part of the planning application, the Client will prepare a Construction Management Plan (CMP) and agree this with Highways Officers at LBC Council. This will ensure that the construction phase will cause minimal disruption to the surrounding area and neighbours.

Site specific mitigation measures should be set up based on the risk effects as outlined in Table 8.3. Examples of these measures are provided in the IAQM guidance document. In addition to the 'desirable' measures, the IAQM guidance also sets out a number of 'highly recommended' measures which should also be considered for inclusion within the CMP. Specific attention should be paid to the demolition, construction and earthworks activities, as the risk for dust soiling is considered to be 'medium'. These are set out in Appendix C.

Following implementation of the measures recommended for inclusion within the CMP the impact of emissions during construction of the proposed development would be 'not significant'.

10.2 Operational Phase

According to the London Councils Air Quality and Planning Guidance, the Air Pollution Exposure Criteria (APEC) for the proposed development on Centric Close is APEC-A. This guidance suggests that there should be "No air quality grounds for refusal; however mitigation of any emissions should be considered."

Mitigation measures are presented below.

10.2.1 CHP and boilers

The Air Quality Neutral Assessment has indicated that without appropriate abatement, NOx emissions from the energy centre will exceed the benchmark by a considerable level, even with only one CHP unit being operational. With deployment of catalytic converters to reduce NOx emissions to below 40mg/m^3, annual NOx emissions will be greatly reduced. This will minimise pollution impacts on users of the campus, local residents and ecological receptors. Although the Air Quality neutral Benchmark will not be exceeded with the installation and operation of one CHP unit, the benchmark may be exceeded once three or four CHP units are installed into the Energy Centre. It is therefore essential that NOx abatement is incorporated into the final design proposals and that further mitigation is also considered to reduce levels to as low as is practically possible.

It is important that the CHP units will be regularly maintained according to the manufacturer's specification, such that the emission levels will remain at an acceptable level throughout their operational lifetime.

10.2.2 Reducing Vehicle Emissions

A supporting Travel Plan (TP) Statement is being submitted to encourage future residents to use alternative transport modes rather than private vehicles, with an aim to further reduce traffic levels generated by the proposed development. The TP provides a long-term strategy aimed at encouraging future end-users (i.e. residents, employees and visitors) to reduce their dependency on travelling by single occupancy vehicles (SOVs) in favour of the more sustainable modes such as car sharing, public transport, walking and cycling. To accomplish this aim, the TP sets out measures and initiatives, appropriate to future occupiers, thereby ensuring a targeted approach is applied.

The general aims of the plan are as follows:

- Raise awareness of sustainable travel modes available to residents
- Promote healthy lifestyles and sustainable, vibrant local communities
- Encourage good urban design principles that maximise the permeability of the development for walking and cycling
- Improve existing infrastructure and ensure connectivity and assimilation both within the development and between the existing wider community
- Avoid reliance on car usage, especially single occupancy vehicles

Promoting cycling as a mode of sustainable travel is key to encouraging a modal shift away from the use of private cars. The scheme will provide a total of 138 long-stay and five short-stay cycle parking spaces, of which 124 long-stay and two short-stay spaces will be provided for residential use. This is in accordance with relevant London Plan cycle parking standards contained within the London Plan (2016). 4.7 Local cycling routes and information on safe cycling will be provided to all residents as part of their welcome pack.

To minimise the need for future households to own a vehicle and reduce demand for on-site parking, the client is expecting to provide support towards existing car clubs within the vicinity of the site (final details to be agreed).

In addition, all residents and employees will be made aware of the benefits of membership to the car club through various marketing and promotional material including Travel Information Packs. These will contain up-to-date details of public transport services, the location of bus stops and underground stations, and will also contain details of available sustainable modes of transport including car sharing and car club schemes. The Pack will also provide promotional material highlighting the health benefits of walking and cycling. In addition, it will include details of essential contact addresses, telephone numbers and websites administered by the local authority, transport providers and any other organisations related to sustainable modes of transport.