

## 10 Air Quality

### 10.1 Introduction

This report describes the potential air quality impacts associated with the proposed development of Phases 2 and 3 of the Beorma Quarter. The assessment has been carried out by Air Quality Consultants Ltd. on behalf of Hoare Lea.

The application site lies within an Air Quality Management Area (AQMA) declared by Birmingham City Council for exceedence of the nitrogen dioxide objective. Nearby existing, as well as new, residential properties could be subject to the impacts of emissions from the proposed energy plant as part of the proposed scheme. The main air pollutant of concern related to the energy plant is nitrogen dioxide.

The proposed development does not include substantial allowance for car parking spaces (only 30 are envisaged), however, the scheme will still lead to a small increase in traffic on the local roads, which may impact on air quality at existing residential properties. The new residential properties and users of the ground-floor outdoor space will be subject to the impacts of road traffic emissions from the adjacent road network. The main air pollutants of concern related to traffic emissions are nitrogen dioxide and fine particulate matter (PM10 and PM2.5).

This report describes existing local air quality conditions (2013), and the predicted air quality in the anticipated year of opening of the proposed development (2017).

This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with Birmingham City Council.

### 10.2 Legislation and Policy Context

#### 10.2.1 National Policy

##### **Air Quality Strategy**

The Air Quality Strategy published by the Department for Environment, Food, and Rural Affairs (Defra) provides the policy framework (1) for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors:

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1 Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Defra.

industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

### **Clean Air Act 1993**

Small combustion plant of less than 20 MW net rated thermal input are controlled under the *Clean Air Act 1993*. This requires the local authority to approve the chimney height. Plants which are smaller than 366 kW have no such requirement.

### **National Planning Policy**

The National Planning Policy Framework (NPPF) (2012) (2) sets out planning policy for England in one place. It places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. One of the twelve core planning principles notes that planning should “contribute to...reducing pollution”. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.

More specifically the NPPF makes clear that: “Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan”.

### **Planning Practice Guidance**

The NPPF is now supported by Planning Practice Guidance (PPG) (3), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that “Defra carries out an annual national assessment of air quality using

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2 *National Planning Policy Framework* (2012), DCLG.

3 DCLG (2014) *Planning Practice Guidance*, [Online].

modelling and monitoring to determine compliance with EU Limit Values” and “It is important that the potential impact of new development on air quality is taken into account ... where the national assessment indicates that relevant limits have been exceeded or are near the limit”. The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans “identify measures that will be introduced in pursuit of the objectives”.

The PPG states that “Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)”.

The PPG sets out the information that may be required in an air quality assessment, making clear that “Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality”. It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that “Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”.

### 10.2.2 Local Policy

#### **Local Transport Plan**

The West Midlands Local Transport Plan 3 (4) states that the West Midlands Metropolitan area “will aim to develop infrastructure which, wherever practicable, enhances the natural environment (biodiversity/habitats, air quality, water, landscape) or mitigates adverse effects”. It will also aim to improve local air quality in pursuit of UK standards and European Directive limits.

#### **Draft Development Plan**

Birmingham City Council has published a draft Development Plan, which was submitted to the Secretary of State for examination on 1 July 2014. In discussing the environment and sustainability, it states the following:

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4 Centro (2011) *West Midlands LTP3*.

“The City’s green infrastructure network provides a wide range of social, economic and environmental benefits. Specifically it...Promotes human health through air quality improvement and recreation opportunities”.

Policy TP36 on health states that:

“The City Council is committed to reducing health inequalities, increasing life expectancy and improving quality of life by...Seeking to improve air quality and reduce noise within the City”.

While, regarding transport, Policy TP37 states:

“The development of a sustainable, high quality, integrated transport system, where the most sustainable mode choices also offer the most convenient means of travel, will be supported. The delivery of a sustainable transport network will require:

- The facilitation of modes of transport that reduce carbon emissions and improve air quality.
- Building, maintaining and managing the transport network in a way that reduces CO<sub>2</sub>, addresses air quality problems and minimises transport’s impact on the environment.”

Until the Development Plan is formally adopted the saved policies of the 2005 Unitary Development Plan (UDP) (BCC, 2005) (5) remain the relevant planning policy in Birmingham. The UDP states the following in relation to air quality (Policies 3.77 and 3.78):

“The City Council is committed to improving air quality within Birmingham and will require development which minimises or reduces air pollution. This will be addressed in various ways, including:-

- an increase in tree cover throughout the City
- modes of transport which reduce the impact of travel on air pollution
- the use of alternative clean fuels

When assessing planning applications, the implications of new development for air quality will be taken into account.”

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5 BCC (2005) *Birmingham Unitary Development Plan*.

### Air Quality Action Plan

In 2004 the whole of Birmingham was declared an AQMA for exceedences of the nitrogen dioxide and PM10 objectives. The PM10 declaration was subsequently revoked in 2010. In 2011 the Council produced an Air Quality Management Plan (6) for the improvement of air quality within the city. The plan includes a number of actions by which it aims to improve air quality in the city.

## 10.3 Assessment Methodology and Significance Criteria

### 10.3.1 Health Criteria

The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the *Air Quality (England) Regulations, 2000*, Statutory Instrument 928 (2000) (7) and the *Air Quality (England) (Amendment) Regulations 2002*, Statutory Instrument 3043 (2002) (8).

The objectives for nitrogen dioxide and PM10 were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM2.5 objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 µg/m<sup>3</sup> (9). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level.

The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2009). The annual mean objectives for nitrogen dioxide and PM10 are considered to apply at the façades of residential properties, schools, hospitals *etc.*; they do not apply at hotels. The 24-hour objective for PM10 is considered to apply at the same locations as the

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6 Birmingham City Council (2011) *Air Quality Action Plan*.

7 *The Air Quality (England) Regulations, 2000*, Statutory Instrument 928 (2000), HMSO.

8 *The Air Quality (England) (Amendment) Regulations, 2002*, Statutory Instrument 3043 (2002), HMSO.

9 Defra (2009) *Review & Assessment: Technical Guidance LAQM.TG(09)*, Defra.

annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

The European Union has also set limit values for nitrogen dioxide, PM10 and PM2.5. Achievement of these values is a national obligation rather than a local one (Directive 2008/50/EC of the European Parliament and of the Council, 2008 (10)). The limit values for nitrogen dioxide are the same levels as the UK objectives, but applied from 2010 (The Air Quality Standards Regulations (No. 1001), 2010) (11). The limit values for PM10 and PM2.5 are also the same level as the UK statutory objectives, but applied from 2005 for PM10 and will apply from 2015 for PM2.5.

The relevant air quality criteria for this assessment are provided in *Table 10.1*.

**Table 10.1:** *Air Quality Criteria for Nitrogen Dioxide, PM10 and PM2.5*

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m <sup>3</sup>
Fine Particles (PM <sub>10</sub> )	24-hour Mean	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m <sup>3</sup>
Fine Particles (PM <sub>2.5</sub> ) <sup>a</sup>	Annual Mean	25 µg/m <sup>3</sup>

a The PM2.5 objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

### 10.3.2 Environment Agency Assessment Criteria

The Environment Agency has considered potential impacts from industrial and boiler emission in its H1 guidance (Environment Agency, 2011). This explains that regardless of what the baseline environmental conditions are, a process can be considered as insignificant if:

10 Directive 2008/50/EC of the European Parliament and of the Council (2008).

11 The Air Quality Standards Regulations (No. 1001) (2010), Stationery Office.

- the long-term (annual mean) process contribution is <1% of the long-term environmental standard; and
- the short-term (24-hour mean or shorter) process contribution is <10% of the short-term environmental standard.

It should be recognised that these criteria determine when an impact can be screened out as insignificant. They do not imply that impacts will necessarily be significant above these levels merely that above these levels there is a potential for significant impacts that should be assessed using a detailed assessment methodology such as detailed dispersion modelling (as has been carried out for this project in any event).

The approach taken in this assessment is to use detailed dispersion modelling in the first instance, and to apply the Environment Agency screening criteria to the model outputs. Where impacts are shown to be below these screening criteria, they are judged to be insignificant. Where this initial screening shows the potential for significant impacts, then an assessment of the predicted total concentrations needs to be carried out following the IAQM guidance described below.

### 10.3.3 Descriptors for Air Quality Impacts and Assessment of Significance

#### Operational Significance

There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. The approach developed by the IAQM (12), and incorporated in Environmental Protection UK's (EPUK's) guidance document on planning and air quality (13), has therefore been used. This approach includes elements of professional judgement. Full details of this approach are provided in *Appendix 10*, along with the professional experience of the consultants preparing the report.

It is important to differentiate between the terms impact and effect with respect to the assessment of air quality. The term impact is used to describe a change in pollutant concentration at a specific location. The term effect is used to describe an environmental response resulting from an impact, or series of impacts. Within this report, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the

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12 Institute of Air Quality Management (2009) *Position on the Description of Air Quality Impacts and the Assessment of their Significance*, IAQM.

13 Environmental Protection UK (2010) *Development Control: Planning for Air Quality*, EPUK.

frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

### 10.3.4 Assessment Approach

#### Consultation

The assessment follows a methodology agreed with Birmingham City Council via a telephone discussion and subsequent email correspondence between Peter Porter (Air Quality Officer at Birmingham City Council) and Suzanne Hodgson (Air Quality Consultants) held on 17th September and 23rd October 2014.

#### Existing Conditions

Existing sources of emissions within the study area have been defined using a number of approaches. Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (14) and the Environment Agency's website 'what's in your backyard' (15). Local sources have also been identified through discussion with Birmingham City Council's environmental health team, as well as through examination of the Council's Air Quality Review and Assessment reports.

Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. This covers both the study area and nearby sites, the latter being used to provide context for the assessment. The background concentrations across the study area have been defined using the national pollution maps published by Defra (16). These cover the whole country on a 1x1 km grid. Current exceedences of the annual mean EU limit value for nitrogen dioxide have been identified using the maps of roadside concentrations published by Defra (17). These are the maps, currently based on 2012 data, used by the UK Government, together with the results from national AURN monitoring sites that operate to EU data quality standards, to report exceedences of the limit value to the EU.

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14 Defra (2014d) *UK Pollutant Release and Transfer Register*, [Online], Available: [prtr.defra.gov.uk](http://prtr.defra.gov.uk).

15 Environment Agency (2014) *'what's in your backyard'*, [Online], Available: <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>.

16 Defra (2014a) *Defra Air Quality Website*, [Online], Available: <http://laqm.defra.gov.uk/>.

17 Defra (2014e) *UK Ambient Air Quality Interactive Map*, [Online], Available: <http://uk-air.defra.gov.uk/data/gis-mapping>.

### Impacts of the Proposed Energy Plant

#### Sensitive Locations

In terms of the potential impacts from the proposed energy plant, nitrogen dioxide concentrations have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent worst-case exposure within these locations. Seven receptors locations, across varying floor levels, representing existing residential properties, have been identified for the assessment; the locations of which are described in *Table 10.2* and shown in *Figure 10.1*. Twenty-four receptor locations, across varying floor levels, have also been identified within the development. The locations are shown in *Figure 10.2* and the modelled floor heights for each phase are described in *Table 10.3*.

**Table 10.2:** *Description of Receptor Locations, Existing Properties*

Receptor	Description
Receptor 1	Residential property above Fancy Silk Store (First to Third Floors)
Receptor 2	Residential property adjacent to The Old Bull Tavern (First to Third Floors)
Receptor 3	Residential property above No. 1 Digbeth (First to Third Floors)
Receptor 4	Residential property above The Old Bull Tavern (First to Third Floors)
Receptor 5	Residential property at The Brollyworks (Ground to Second Floors)
Receptor 6	Residential property at The Brollyworks (Ground to Second Floors)
Receptor 7	Residential property at The Brollyworks (Ground to Second Floors)
Receptors modelled at a height of 1.5 m, 4.5 m and 7.5 m for the first, second and third floors respectively.	

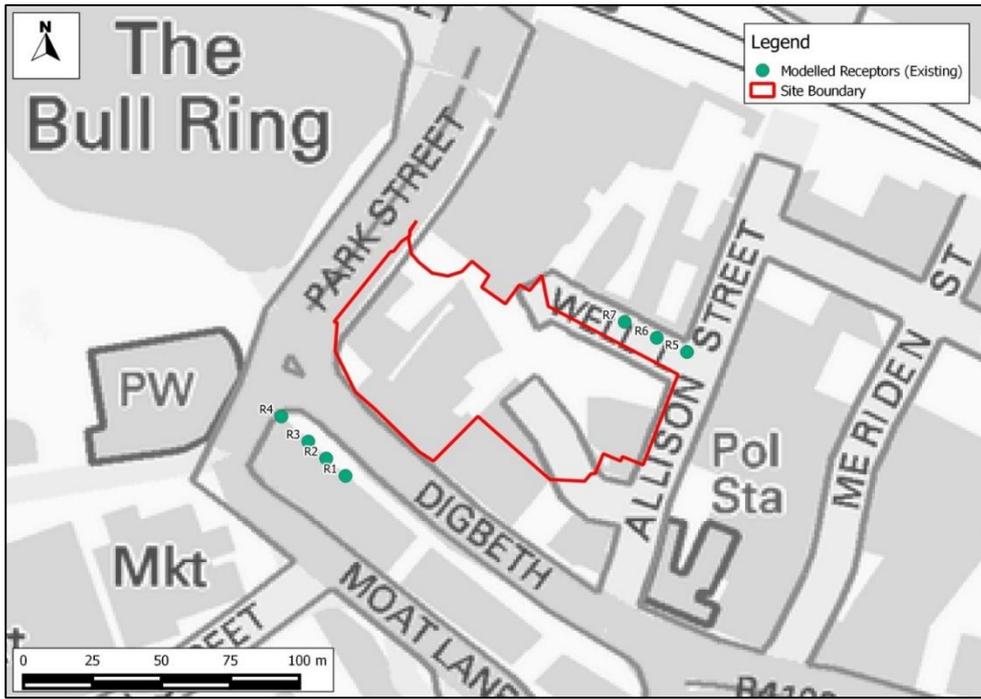


Figure 10.1: Modelled Receptor Locations, Existing Properties

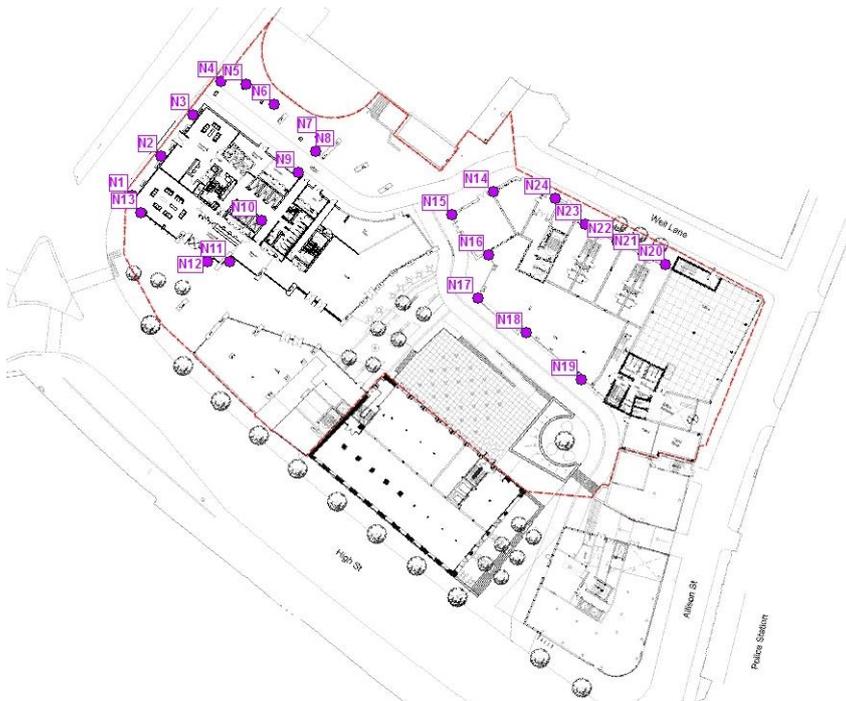


Figure 10.2: Modelled Receptor Locations, New Properties

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**Table 10.3: Modelled Floor Levels for Each Phase**

Floor Level	Receptor Number	Modelled Floor Height (m)	
		Phase 2	Phase 3
Ground	N20 to N23	-	1.5
First	N16, N20 to N23	-	4.5
Second	N14 to N19	-	7.5
Third	N14 to N19	-	10.5
Fourth	N14 to N19	-	13.5
Fifth	N14 to N17, N23	-	16.5
Sixth	N14 to N17, N23	-	19.5
Seventh	N14 to N17, N23	-	22.5
Eighth	N14 to N17, N23	-	25.5
Ninth	N14 to N17, N23	-	28.5
Tenth	N14 to N17, N23	-	31.5
Eleventh	N14 to N17, N23	-	34.5
Twelfth	N14 to N17, N23	-	37.5
Thirteenth	N1, 3, 5, 7, 9, 11	54.3	40.5
Fourteenth	N2, 4, 6, 8, 10, 12, 13	57.3	-
Fifteenth	N1, 3, 5, 7, 9, 11	60.3	-
Sixteenth	N2, 4, 6, 8, 10, 12, 13	63.3	-
Seventeenth	N1, 3, 5, 7, 9, 11	66.3	-
Eighteenth	N2, 4, 6, 8, 10, 12, 13	69.3	-
Nineteenth	N1, 3, 5, 7, 9, 11	72.3	-
Twentieth	N2, 4, 6, 8, 10, 12, 13	75.3	-
Twenty-First	N1, 3, 5, 7, 9, 11	78.3	-
Twenty-Second	N2, 4, 6, 8, 10, 12, 13	81.3	-
Twenty-Third	N1, 3, 5, 7, 9, 11	84.3	-
Twenty-Fourth	N2, 4, 6, 8, 10, 12, 13	87.3	-

Floor Level	Receptor Number	Modelled Floor Height (m)	
		Phase 2	Phase 3
Twenty-Fifth	N1, 3, 5, 7, 9, 11	90.3	-
Twenty-Sixth	N2, 4, 6, 8, 10, 12, 13	93.3	-
Twenty-Seventh	N1, 3, 5, 7, 9, 11	96.3	-
Twenty-Eighth	N2, 4, 6, 13	99.3	-
Twenty-Ninth	N1, 3, 5	102.3	-

In addition, concentrations have been modelled for a gridded area which covers both on-site and off-site receptors for the year 2017. The gridded area, which covers an approximate 300 m area around the site boundary, has been modelled for the ground floor (1.5 m) and the 28th floor (99.5 m). The latter has been modelled to show predicted process contributions at the terrace level located at the 28th floor, which will be located near to the proposed energy plant stacks, for assessment against the 1-hour mean nitrogen dioxide objective.

### 10.3.5 Assessment Scenarios

Predictions of nitrogen dioxide concentrations have been carried out assuming that the plant is installed in 2017.

### 10.3.6 Modelling Methodology

The impacts of emissions from the proposed energy plant have been modelled using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. Entrainment of the plume into the wake of the building has been simulated within the model. The model input parameters are set out in *Appendix 10*.

### Road Traffic Impacts

The proposed development is not anticipated to generate a significant volume of road traffic. Future baseline traffic data and trip generation information have been provided by the project’s Transport Consultant and compared to the screening criteria published by EPUK (18) to allow a qualitative assessment to be made of the potential impacts of the proposed development on local air quality.

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18 Environmental Protection UK (2010) *Development Control: Planning for Air Quality*, EPUK.

The new residential properties and users of the open space of the proposed development will be subject to the impacts from road traffic emissions from the adjacent road network, due to the location of the site adjacent to a busy junction in the heart of Birmingham city centre. These potential impacts have been considered based on the distance of the new properties to the pollution sources, a consideration of baseline air quality and the likelihood of exceedence of the air quality objectives, using the professional judgment of the consultants preparing the assessment.

## 10.4 Baseline Conditions

### 10.4.1 Industrial sources

A search of the UK Pollutant Release and Transfer Register (14) and Environment Agency's 'what's in your backyard' (15) websites did not identify any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

### 10.4.2 Air Quality Review and Assessment

Birmingham City Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. In 2004 the entire city was declared an AQMA for exceedences of the nitrogen dioxide and PM10 objectives, although the declaration for PM10 was revoked in 2010.

#### Local Air Quality Monitoring

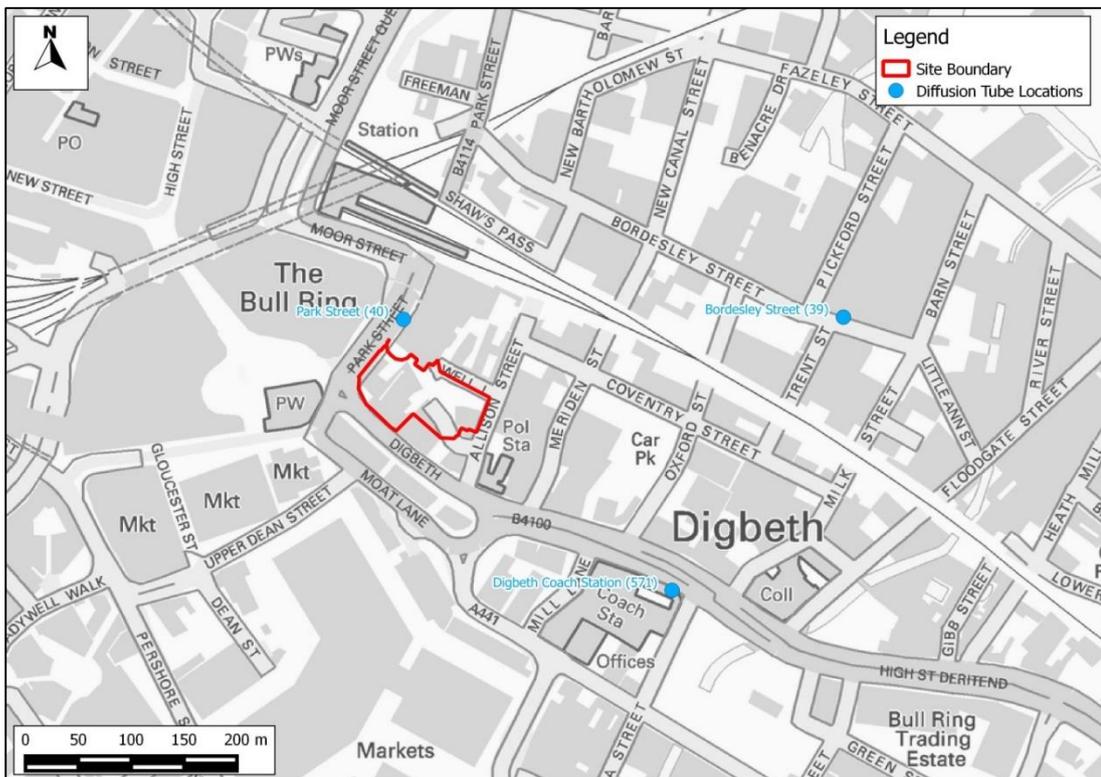
Birmingham City Council operates a number of automatic air quality monitoring stations within its area, the closest of these to the proposed development being a monitoring station at Moor Street Queensway, approximately 250 m North West of the Application site. This monitoring station only became operational in June 2013, thus no calendar year annual mean is available at the time of writing this report.

The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes, none of which currently operate near to the application site. Historic diffusion tube monitoring data is however available for monitoring locations along Digbeth High Street; results for three diffusion tube monitoring locations near to the application site for the period 2003 to 2007 are summarised in

*Table 10.4* and the monitoring locations are shown in *Figure 10.3*.

**Table 10.4:** Summary of Annual Mean Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Monitoring (µg/m<sup>3</sup>) (2003 – 2007)

Site No.	Site Type	Location	2003	2004	2005	2006	2007
571	R	High Street (adjacent to Digbeth coach station)	<b>62.6</b>	<b>60.3</b>	<b>58.1</b>	<b>58.2</b>	<b>55.4</b>
39	R	Bordesley Street	-	-	-	<b>43.0</b>	-
40	R	Park Street	-	-	-	<b>64.0</b>	-
<b>Objective</b>			<b>40</b>				
Exceedences of the objectives are shown in bold							



**Figure 10.3:** Site Boundary and Monitoring Locations

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In the period 2003 to 2007, measured concentrations exceeded the annual mean objective at all monitoring sites. At the diffusion tube site located on Park Street, the measured concentration in 2006 exceeded 60 µg/m<sup>3</sup>; indicating that concentrations may have exceeded

the 1-hour mean objective value at this location. It is worth noting there is no relevant exposure to the 1-hour objective in this location. With no recent monitoring, it is difficult to determine current pollutant concentrations at this location, however, due to this area being heavily trafficked and congested, it is considered likely they remain high in this area.

No monitoring of PM10 or PM2.5 concentrations is undertaken close to the proposed development and it is not thought that there are any exceedences of the objectives for these pollutants, given that the AQMA declaration for PM10 has been revoked.

#### **Exceedences of EU Limit Value**

There are no AURN monitoring sites within 1 km of the development site with which to identify exceedences of the annual mean nitrogen dioxide limit value. Neither Park Street nor Digbeth High Street are included in the national map of roadside annual mean nitrogen dioxide concentrations, used to report exceedences of the limit value to the EU (19), although this map does show a number of exceedences along busy roads in and around Birmingham city centre. This map shows 2012 exceedences. Detailed maps of predicted future year exceedences are not available.

#### **Background Concentrations**

In addition to these locally measured concentrations, estimated background concentrations in the study area have been determined for 2013 and the proposed year of first occupation 2017 (*Table 10.5*). In the case of nitrogen dioxide, two sets of future-year backgrounds are presented to take into account uncertainty in future year vehicle emission factors. The derivation of background concentrations is described in *Appendix 10*. The background concentrations are all below the objectives.

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19 Defra (2014c) *UK Ambient Air Quality Interactive Map*, [Online], Available: <http://uk-air.defra.gov.uk/data/gis-mapping>.

**Table 10.5:** Estimated Annual Mean Background Pollutant Concentrations in 2013 and 2017 ( $\mu\text{g}/\text{m}^3$ )

Year	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2013 <sup>a</sup>	35.2	20.8	13.9
2017 – Without Reductions in Traffic Emissions <sup>b</sup>	33.8	n/a	n/a
2017 – With Reductions in Traffic Emissions <sup>c</sup>	32.4	19.6	12.7
<b>Objectives</b>	<b>40</b>	<b>40</b>	<b>25</b>

n/a = not applicable  
a This assumes that road vehicle emission factors in 2013 remain the same as in 2011 (Appendix 10)  
b This assumes that road vehicle emission factors in 2017 remain the same as in 2011.  
c This assumes that road vehicle emission factors reduce between 2013 and 2017 at the current 'official' rates

## 10.5 Assessment of Project Impact

### 10.5.1 Proposed Energy Plant

Concentrations have been predicted at seven locations at the façades of local properties at a range of heights, as described in *Table 10.2* and shown in *Figure 10.1*. The predicted concentrations at the specified points are shown in *Table 10.6*.

**Table 10.6:** Predicted Process Contribution of Energy Plant to Nitrogen Dioxide (NO<sub>2</sub>) Concentrations ( $\mu\text{g}/\text{m}^3$ ) at Existing Properties

Receptor Number	Annual Mean Concentration							
	$\mu\text{g}/\text{m}^3$				% of Objective			
	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor
R1	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1
R2	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1
R3	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1
R4	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1
R5	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	-

Receptor Number	Annual Mean Concentration							
	µg/m <sup>3</sup>				% of Objective			
	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor
R6	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	-
R7	<0.1	<0.1	<0.1	-	0.1	0.1	0.1	-

Receptor Number	99.79 <sup>th</sup> Percentile of 1-hour NO <sub>2</sub>							
	µg/m <sup>3</sup>				% of Objective			
	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor	Grd. Floor	1 <sup>st</sup> Floor	2 <sup>nd</sup> Floor	3 <sup>rd</sup> Floor
R1	-	0.8	0.8	0.8	-	0.4	0.4	0.4
R2	-	0.9	0.9	0.9	-	0.4	0.4	0.4
R3	-	0.9	0.9	0.9	-	0.5	0.5	0.5
R4	-	0.8	0.8	0.8	-	0.4	0.4	0.4
R5	0.4	0.4	0.4	-	0.2	0.2	0.2	-
R6	0.9	0.9	0.9	-	0.4	0.4	0.4	-
R7	0.9	0.9	0.9	-	0.4	0.4	0.4	-
<b>Objective</b>	40				200			

The results in *Table 10.6* can be compared with the screening criteria recommended by the Environment Agency, as previously described and the following conclusions can be drawn:

- predicted annual mean nitrogen dioxide concentrations (across ground to third floors) at nearby existing properties are well below the screening criterion (1%); and
- predicted 99.79th percentile of 1-hour mean nitrogen dioxide concentrations (across ground to third floors) at nearby existing properties are well below the screening criterion (10%).

Concentrations have also been modelled across a gridded area, to show the extent of the ground-level impacts from the proposed energy plant. The maximum predicted concentrations across the gridded area are presented in *Table 10.7*.

**Table 10.7:** Predicted Maximum Pollutant Concentrations associated with the Proposed Energy Plant ( $\mu\text{g}/\text{m}^3$ ), Ground Level

Pollutant/Averaging Period	Maximum Grid Area Process Contribution		Objective
	$\mu\text{g}/\text{m}^3$	% of Objective	
Annual Mean $\text{NO}_2$	0.2	0.6	<b>40</b>
99.79 <sup>th</sup> Percentile of 1-hour $\text{NO}_2$	1.1	0.6	<b>200</b>
Maximum predicted concentrations from each of the three meteorological years considered			

The results in *Table 10.7* can be compared with the screening criteria recommended by the Environment Agency, as previously described in Section 2, and the following conclusions can be drawn:

- the predicted maximum annual mean nitrogen dioxide concentration (0.6% of the objective) is below the screening criterion (1%);
- the predicted maximum 99.79th percentile of 1-hour mean nitrogen dioxide concentrations (1.1% of the objective) is below the screening criterion (10%).

On the basis of results presented above, the potential for significant impacts from the proposed energy plant at nearby existing properties can be discounted for both the annual mean and 99.79th percentile of 1-hour mean concentrations. Contour plots of the gridded output are provided in *Appendix 10*, for information.

### 10.5.2 Road Traffic Impacts

The Development Control: Planning for Air Quality guidance document published by EPUK (EPUK, 2010) includes screening criteria to help determine whether a new development might have a significant air quality impact and therefore require a detailed assessment to be undertaken, to quantify the potential impact of the proposed development on local air quality at existing receptors. The guidance includes the following criteria to help establish when an air quality assessment is likely to be considered necessary:

*“proposals that will give rise to a significant change in either traffic volume, typically a change in annual average daily traffic (AADT) or peak traffic flows of greater than  $\pm 5\%$  or  $\pm 10\%$ , depending on local circumstances (a change of  $\pm 5\%$  will be appropriate for traffic flows in an AQMA), or in vehicle speed (typically of more than*

*10 kph), or both, usually on a road with more than 10,000 AADT (5,000 if ‘narrow and congested’)*”.

Future baseline traffic (20) on Park Street and Digbeth High Street, running adjacent to the site, will be circa 28,900 and 21,500 AADT, respectively. Traffic generated by the proposed development is predicted to be 464 daily trips. This increase in vehicles amounts to between 1.7 to 2.3% of future baseline traffic flows on the adjacent roads. Whilst there will be some heavy duty vehicles (HDVs) associated with the development, these will only be associated with servicing the various uses on the site, which is not expected to increase HDV numbers by a significant amount.

It is acknowledged that due to the high volume of traffic travelling on the roads adjacent to the site, during peak hours, there are periods of heavy congestion in this area. This area forms part of Birmingham’s AQMA and the impact of the high traffic volume and heavy congestion in the area is represented in historic nitrogen dioxide monitoring in the area (see Section 4), which shows measured concentrations well in excess of the annual mean objective. Whilst there is no current monitoring in the area, it is considered very likely that the annual mean objective continues to be exceeded at locations with relevant exposure in this area. The development will increase traffic on these roads, which has the potential to add to congestion in this area and therefore the potential to impact on air quality.

Using the EPUK criteria, the increase in traffic, on its own, associated with the proposed development is not considered to be significant in relation to its impacts on air quality, however, due to the location of the site in the heart of Birmingham city centre, the increase in traffic has the potential to add to congestion on Park Street and Digbeth High Street during peak times, which could have an adverse impact on local air quality at nearby existing residential properties.

### **10.5.3 Impacts of Existing Pollution Sources on Proposed Development**

#### **Proposed Energy Plant**

Concentrations have been predicted at locations at the façades of new properties within the proposed development, at a range of heights, as described in Table 10.3 and shown in *Figure*

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20 Baseline traffic data for 2006 were taken from the air quality assessment carried out for the previous planning application for the Beorma Quarter (Salhia Investments Ltd., 2009). The baseline data has been factored forwards to the future baseline year (2017) using a growth factor provided by the project’s Transport Consultant (Aecom). The growth factor applied to the data was 1.0436.

10.2. The predicted concentrations at the specified points in Phases 2 and 3 are shown in *Appendix 10*.

The results in *Appendix 10* can be compared with the screening criteria recommended by the Environment Agency, as previously described in Section 2 and the following conclusions can be drawn:

- predicted annual mean nitrogen dioxide concentrations at new properties within the proposed development are well below the screening criterion (1%); and
- predicted 99.79th percentile of 1-hour mean nitrogen dioxide concentrations at new properties within the proposed development are well below the screening criterion (10%).

Concentrations have also been modelled across a gridded area at a height of 99.5 m (the height of the roof top terrace of Phase 2), to show the extent of impacts from the proposed energy plant at this level. There is only relevant exposure to the 1-hour mean nitrogen dioxide objective at the roof terrace. The predicted maximum 99.79th percentile of 1-hour mean nitrogen dioxide concentrations was  $8.1 \mu\text{g}/\text{m}^3$  (8.1% of the objective). This is below the Environment Agency's screening criterion of 10%. A contour plot of the terrace level gridded output is provided in *Appendix 10*, for information.

On the basis of results presented above, the potential for significant impacts from the proposed energy plant at new properties within the proposed development can be discounted for both the annual mean and 99.79th percentile of 1-hour mean concentrations.

#### **10.5.4 Road Traffic Impacts**

##### **New Residential Units**

New residents of the proposed development have the potential to be affected by nearby local pollution sources, namely road traffic emissions from the adjacent Park Street and Digbeth High Street.

With respect to Phase 2 of the proposed development, it is expected that there will be no significant traffic-related impacts on the new properties of the proposed scheme, since residential properties do not begin until the thirteenth floor, at which level the influence of road traffic emissions will be minimal and concentrations similar to background values, which are below the air quality objectives.

With respect to Phase 3, there are live/work units on the ground floor and residential apartments starting at the first floor. Phase 3 will, however, be set more than 50 m from the main roads (Park Street and Digbeth) and will be shielded by the proposed buildings

comprising Phase 2 and the existing coldstore building of Phase 1. On this basis, it is considered unlikely there will be an exceedance of the air quality objectives at Phase 3.

It is considered therefore that air quality conditions for new residents of the proposed development would be acceptable.

#### Outdoor Space

Being located at a busy junction in the centre of Birmingham, there is the potential for exceedance of the short-term nitrogen dioxide objective in outdoor space of the proposed development, where people are likely to spend more than 1-hour. As discussed in paragraph 4.6, there is a small potential that the 1-hour objective may be exceeded at locations very near to the road in this area, since a measured concentration higher than 60  $\mu\text{g}/\text{m}^3$  was recorded in 2006.

Most proposed outdoor seating space, including restaurants, cafés and seating areas are located in the courtyard (Orwell Place and Terrace) formed by Phases 1, 2 and 3. These spaces are located far enough away from the main roads (Park Street and Digbeth High Street) and will be shielded by the buildings in this area, such as not to be at risk of exceeding the 1-hour mean objective.

Outdoor seating space is also proposed to the west of the proposed St. Martin's Passage. The exact location of this seating has not yet been determined, however, bearing in mind the results of the 2006 monitoring on Park Street and the business of the junction, there is a small potential that the 1-hour mean objective may be exceeded at locations close to Park Street and/or Digbeth High Street. As a precaution, it is recommended that outdoor seating space should not be located closer than 5 m to the kerbs of these roads.

## **10.6 Assessment of Cumulative Impacts**

It is determined that there will be no cumulative effects from surrounding schemes.

## **10.7 Impact Mitigation and Residual Effects**

### **10.7.1 Proposed Energy Plant**

The assessment has demonstrated that the impacts from the proposed energy plant will not be significant, therefore it is not considered necessary to propose specific air quality mitigation measures for emissions from this source.

### 10.7.2 Road Traffic Impacts

The assessment has demonstrated that the scheme will not cause any exceedences of the air quality objectives in areas where they are not currently exceeded, however, there may be slight adverse impacts at existing residential properties adjacent to the site where the objective is currently exceeded.

The proposed development will include a Travel Plan, which will provide measures, information and support initiatives that will provide staff, visitors and residents with the opportunity to reduce the number of car borne trips to and from the development by facilitating the use of sustainable travel; such measures would contribute to reducing emissions. Measures incorporated within the Travel Plan will include promotion of walking, cycling and use of public transport to reduce the need to travel by single occupancy car. Further details on these measures are provided within the Travel Plan for the proposed development.

Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation. The Council's Air Quality Action Plan, when it is implemented, should also help deliver improved air quality. It is not considered practicable to propose further mitigation measures for this scheme.

To prevent exposure to the 1-hour nitrogen dioxide objective, it is recommended that outdoor seating areas located to the west of the proposed St. Martin's Passage should not be located within 5 m of the kerbs of the nearby main roads, namely Park Street and Digbeth High Street. The outdoor seating in this area should be limited to benches *etc.*, and not outdoor seating for restaurants and cafés, which may encourage more time spent in this location.

## 10.8 Summary

The air quality impacts associated with the proposed development of Phases 2 and 3 of the Beorma Quarter, in Birmingham city centre, have been assessed. Existing conditions within the study area show poor air quality. The proposed development lies in an AQMA declared by Birmingham City Council.

The operational impact of the proposed energy plant on local air quality at existing and new residents of the proposed development has been assessed. Emissions from the proposed energy plant will have a negligible impact on air quality at existing and new properties.

Using criteria suggested by EPUK, the increase in traffic volume associated with the proposed development is not considered to likely lead to a significant change in air quality, however due

to the potential to add to congestion on Park Street and Digbeth High Street, roads located adjacent to the site, it is judged there is the potential for slight adverse impacts to occur at some first-floor existing residential properties near to the site.

The scheme will include a number of travel plan measures which will encourage modes of travel other than car usage and thereby reduce emissions. These, combined with longer term measures brought in through EU legislation, will help to mitigate the air quality impacts.

There will be no significant impact from road traffic emissions at the facades of the proposed scheme and air quality conditions for new residents would be acceptable. Most of the outdoor seating space will be suitable for its proposed use; it is however recommended outdoor seating space to the west of the proposed St. Martin's Passage be located more than 5 m from the kerbs of the nearby main roads, Park Street and Digbeth High Street. This is to prevent possible exposure to the 1-hour mean nitrogen dioxide objective in this location.

The overall operational air quality impacts of the proposed development are judged to be minor adverse. This conclusion is based on there being the potential for slight adverse impacts at several existing residential properties where concentrations exceed the nitrogen dioxide objective.

Based upon the appraisal of AIR QUALITY impacts discussed above, the residual impacts associated with the **Construction Phase** are deemed to be of **LOW** significance and short-term and temporary in nature. The residual impacts associated with the **Operational Phase** are deemed to be **INSIGNIFICANT** and long-term or permanent in nature.