



Air Quality Assessment: Hemlington North Site, Middlesbrough

October 2018



Experts in air quality
management & assessment



Document Control

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1 Introduction

- 1.1 This report describes the potential air quality impacts associated with the proposed residential development at the Hemlington North Site, off Hemlington Village Road in Middlesbrough. The assessment has been carried out by Air Quality Consultants Ltd on behalf of Middlesbrough Council.
- 1.2 The outline planning application for the proposed development will be for some 42 dwellings. The development will lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties. The new residential properties will also be subject to the impacts of road traffic emissions from the adjacent road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}).
- 1.3 This report describes existing local air quality conditions (base year 2017), and the potential traffic-related impacts associated with the proposed development. The report has been prepared taking into account all relevant local and national guidance and regulations and follows an approach agreed with the Environment and Public Protection department at Middlesbrough Council.

2 Policy Context and Assessment Criteria

Air Quality Strategy

- 2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework 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: 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.

Draft Clean Air Strategy 2018

- 2.2 Defra launched a consultation on a new Clean Air Strategy (Defra, 2018a) in May 2018. The draft strategy sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. Responses to the consultation will be used to inform the final UK Clean Air Strategy and detailed National Air Pollution Control Programme to be published by March 2019.

Reducing Emissions from Road Transport: Road to Zero Strategy

- 2.3 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018a) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040. It states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It also states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.
- 2.4 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. If these ambitions

are realised then road traffic-related NO_x emissions can be expected to reduce significantly over the coming decades.

Planning Policy

National Policies

- 2.5 The National Planning Policy Framework (NPPF) (2018) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which is an environmental objective:

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

- 2.6 To prevent unacceptable risks from air pollution, the NPPF states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality”.

and

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development”.

- 2.7 More specifically on air quality, the NPPF makes clear that:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan”.

- 2.8 The NPPF is supported by Planning Practice Guidance (PPG) (DCLG, 2018), 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 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”*.
- 2.9 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”*.
- 2.10 The PPG sets out the information that may be required in an air quality assessment, making clear that *“Assessments should be proportionate 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”*.

Local Policies

- 2.11 Middlesbrough Council's Local Plan is currently under review, and the New Local Plan will be adopted in January 2020. The Middlesbrough Core Strategy (Middlesbrough Council, 2008) was adopted in February 2008. Within the Strategy, Policy CS4 on sustainable development refers to air quality, health, travel and climate change, stating:
- “All development will be required to contribute to achieving sustainable development principles by, where appropriate:...*
- f. promotion of a healthier and safer community for all;*
 - g. being located so that services and facilities are accessible on foot, bicycle, or by public transport. Reliance on the private car must be reduced or minimised and the use of sustainable forms of transport encouraged;...*
 - j. ensuring that biodiversity assets, geodiversity assets, wildlife species, natural habitats, water resources, landscape character, green infrastructure, air quality and water quality; within and outside Middlesbrough are protected. Where possible such assets should be enhanced;...*

o. contributing to reducing the causes and impacts of climate change; and

p. incorporating within developments of 10 dwellings, or a floorspace of 1,000 sq.m, or more onsite renewable energy facilities or energy saving technologies (for example combined heat and power systems, photovoltaic cells and wind turbines) that provide as a minimum 10% of energy requirements. There should be no demonstrable harm to biodiversity interests or on visual or residential amenities or by way of pollution generation. Where such harm is likely it will be necessary to demonstrate that this is outweighed by the benefits contributing to diverse and sustainable energy supplies and reducing carbon emissions; provision should be made to mitigate or compensate for any such harm.

Where necessary development will be phased to ensure the delivery of sustainable communities and adherence to the principles of sustainable development.”

Air Quality Action Plans

National Air Quality Plan

- 2.12 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017a). Alongside a package of national measures, the Plan requires those English Local Authorities (or the GLA in the case of London Authorities) that are predicted to have exceedances of the limit values beyond 2020 to produce local action plans by December 2018. These plans are undertaken in stages (the initial Stage of which was to be completed by the end of March 2018) and must have measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ). There is currently no practical way to take account of the effects of the national Plan in this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the EU limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

- 2.13 Middlesbrough Council has not declared any AQMAs and thus has not prepared an air quality action plan.

Assessment Criteria

- 2.14 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) and the Air Quality (England) (Amendment) Regulations (2002).

- 2.15 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 PM_{2.5} 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 at roadside locations where the annual mean concentration is below 60 µg/m³ (Defra, 2018b). Measurements have also shown that the 24-hour PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2018b). The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 2.16 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, 2018b). 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 mean objective for PM₁₀ is considered to apply at the same locations as the 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.
- 2.17 The European Union has also set limit values for nitrogen dioxide, PM₁₀ and PM_{2.5} (The European Parliament and the Council of the European Union, 2008). The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.
- 2.18 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

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

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2018b).

^b The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Screening Criteria for Road Traffic Assessments

2.19 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)¹ recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m² of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment. The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that *“the criteria provided are precautionary and should be treated as indicative”*, and *“it may be appropriate to amend them on the basis of professional judgement”*.

Descriptors for Air Quality Impacts and Assessment of Significance

2.20 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix A1. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A2.

¹ The IAQM is the professional body for air quality practitioners in the UK.

3 Assessment Approach

Consultation

- 3.1 The assessment follows a methodology agreed with Middlesbrough Council via a telephone discussion between Paul MacGregor (Principal Public Protection Officer at Middlesbrough Council) and Dr Kate Wilkins (Air Quality Consultants) held on 28 September 2018.

Existing Conditions

- 3.2 Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2018c). Any relevant local sources have also been identified through examination of the Council's Air Quality Review and Assessment reports.
- 3.3 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. Background concentrations have been defined using the national pollution maps published by Defra (2018d). These cover the whole of the UK on a 1x1 km grid.
- 3.4 Exceedances of the annual mean EU limit value for nitrogen dioxide in the study area have been identified using the maps of roadside concentrations published by Defra (2017b) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030. These maps are used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to EU data quality standards, to report exceedances of the limit value to the EU. The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2018e), which are available for the years 2009 to 2015, show no exceedances of the limit values anywhere in the UK in 2015.

Road Traffic Impacts

- 3.5 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 2.19 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment.

4 Site Description and Baseline Conditions

- 4.1 The application site is located approximately 5.5 km to the south of Middlesbrough town centre. The site is bounded by Stainton Way to the north and Hemlington Village Road from the southwest to the southeast. The B1365 is beyond a small green area to the east, and joins Stainton Way at a roundabout. The site currently consists of a field, and there is one existing residential property to the west of the site, and assisted living units on the opposite side of Hemlington Village Lane. The Gables Inn pub lies immediately to the southeast of the application site.

Industrial sources

- 4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2018c) has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

- 4.3 Middlesbrough Council currently operates two automatic monitoring stations within its area. Neither of these is in close proximity to the application site. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International Ltd (using the 50% TEA in acetone method). These include one deployed on the A1032 (Acklam Road), some 3.1 km northwest of the application site, and one on Finchley Court close to the A174, approximately 1.3 km northwest of the site. There are also two diffusion tubes located at Captain Cook Primary School on Stokesley Road, and one on The Croft, close to Dixons Bank, approximately 2 km northeast of the application site. Results for the years 2015 to 2017 have been taken from the Council's 2018 Annual Status Report (ASR) (Middlesbrough Council, 2018) and are summarised in Table 2. The monitoring locations are shown in Figure 1.
- 4.4 There is insufficient data to determine trends in the measured concentrations. The M6, M7, M8 and M10 monitor locations are most representative of the section of the application site located closest to Stainton Way. The M9 monitor is located close to a much busier road where pollutant concentrations will be higher than along Stainton Way, but is set back from that road by 23 m. None of the monitors represent the conditions for the majority of the application site, which is set back from the road.

Table 2: Summary of Nitrogen Dioxide (NO₂) Diffusion Tube Monitoring (2015-2017) – Annual Mean (µg/m³)

Site No.	Site Type ^a	Location	Distance to kerb of nearest road (m)	2015	2016	2017
M6	Near Road	Captain Cook Primary School, Marton	12	17.1	20.4	19.6
M7	Near Road	Captain Cook Primary School, Marton	17	17.6	17.3	17.8
M8	Roadside	The Croft, Marton	3 (from A172)	17.8	23.4	17.5
M9	Near Road	Finchley Court	23 (from A174)	17.5	21.5	19.3
M10	Near Road	Acklam Road	10	15.6	18.9	16.8
Objective				40		

^a As described by Middlesbrough Council.

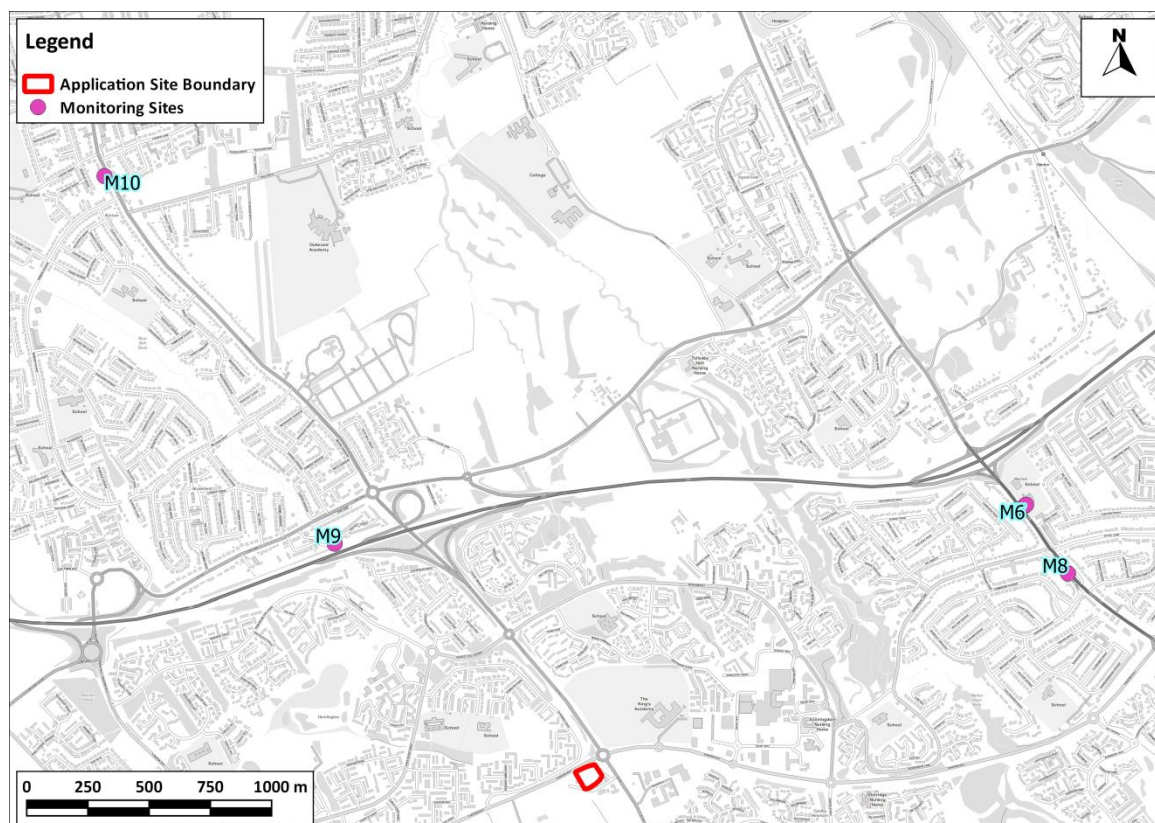


Figure 1: Diffusion Tube Monitoring Locations and Application Site Boundary

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4.5 The 'BH' automatic monitor is located some 5.3 km to the northeast of the application site, and is the closest station which measures PM₁₀ and PM_{2.5} concentrations. The 'ES' monitor, which

closed in 2016, was approximately 6 km north of the application site, and the 'MC' monitor is located approximately 5.5 km to the northwest of the site. Results for the years 2012 to 2017 have been taken from the Council's 2017 and 2018 ASRs (Middlesbrough Council, 2017; 2018), and are summarised in Table 3. The monitoring locations are shown in Figure 2. There are downward trends in annual mean PM_{10} concentrations at the BH and MC monitors between 2013 and 2017, and in annual mean $PM_{2.5}$ concentrations at the MC monitor. There are insufficient data with good data capture at the ES monitor to determine a trend in either PM_{10} or $PM_{2.5}$ concentrations.



Figure 2: Automatic Monitoring Locations and Application Site Boundary

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4.6 In terms of PM₁₀, Middlesbrough Council concluded in its recent ASRs that there are no exceedances of the objectives. It is, therefore, reasonable to assume that existing PM₁₀ levels will not exceed the objectives within the study area.

Table 3: Summary of PM₁₀ and PM_{2.5} Automatic Monitoring (2012-2017)

Site No.	Site Type	Location	2012	2013	2014	2015	2016	2017
PM₁₀ Annual Mean (µg/m³)								
BH	Urban Background	Breckon Hill (AURN)	17.2	19.7	16.2	16.6	13.9	13.4
MC	Urban Background	Macmillan College	17.4	17.8	17.6	17.0 ^a	15.0 ^a	12.0
ES^b	Urban Centre	Elm Street	17.2	17.6	16.9	16.1	13.0 ^c	-
Objective			40					
PM₁₀ No. Days >50 µg/m³								
BH	Urban Background	Breckon Hill (AURN)	9	5	4	6	3	3
MC	Urban Background	Macmillan College	7	3	6	0	0 (24)	0
ES^b	Urban Centre	Elm Street	7	3	2	4	1 ^c	-
Objective			35 (50)^d					
PM_{2.5} Annual Mean (µg/m³)^a								
BH	Urban Background	Breckon Hill (AURN)	10.2	10.8	13.1	10.5	10.2	7.5
MC	Urban Background	Macmillan College	12.2	12.5	12.3	11.9	11.0 ^e	6.7 ^e
ES^b	Urban Centre	Elm Street	12.0	12.3	11.8	11.3	-	-
Objective			25^f					

^a Data has been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, where valid data capture for the full calendar year was less than 75%.

^b Site closed in 2016.

^c Data not annualised due to low data capture (23%).

^d If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

^e PM_{2.5} data has been calculated from PM₁₀ measured data by the Council, using a ratio derived from the Middlesbrough AURN PM_{2.5} and PM₁₀ data.

^f The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Exceedances of EU Limit Value

- 4.7 There are no AURN monitoring sites within 1 km of the development site with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2017b), which are used to report exceedances of the limit value to the EU, and which have been updated to support the 2017 Air Quality Plan, do not identify any exceedances within 1 km of the development site in 2015. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.
- 4.8 As discussed in Paragraph 2.12, Defra has produced an Air Quality Plan (Defra, 2017a) to tackle roadside nitrogen dioxide concentrations in the UK. Within this Plan, Middlesbrough Council is listed as an authority upon which the Government has placed legal duties to "*develop and implement a plan designed to deliver compliance in the shortest time possible*". Middlesbrough Council is on this list due to exceedances of the EU limit value being identified beyond 2020 alongside the A66, which is located over 5.3 km from the application site, thus future limit value exceedances are unlikely to be affected by the proposed development. Middlesbrough Council is, therefore, required to produce a local action plan by the end of 2018, which is undertaken in stages, the first stage being completed by March 2018. This local action plan may include a CAZ, or other measures if they can deliver compliance as quickly as a CAZ.

Background Concentrations

- 4.9 Estimated background concentrations at the application site have been determined for 2017 using Defra's background maps (Defra, 2018d). These cover the whole of the UK on a 1x1 km grid and are published for each year from 2015 until 2030. The background annual mean nitrogen dioxide maps for 2017 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2018), and are set out in Table 4.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2017 ($\mu\text{g}/\text{m}^3$)

Year	NO ₂	PM ₁₀	PM _{2.5}
2017	12.6	10.1	6.6
Objectives	40	40	25 ^a

^a The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5 Impact Assessment

Impacts at Existing Receptors

- 5.1 The trip generation of the proposed development on local roads, as set out in the draft Transport Assessment by Sanderson Associates (Sanderson Associates Ltd, 2018), has initially been compared to the screening criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraphs A1.7 to A1.10 in Appendix A1). Based on a development of 42 homes, there will be a traffic generation of 26 vehicles in the peak AM period, and 28 vehicles in the peak PM period. It is thus considered that the changes in traffic flows on local roads are very unlikely to exceed the screening criterion of 500 vehicle movements per day outside of an AQMA, and there is no requirement for a detailed assessment of road traffic impacts at existing receptors.

Impacts of Existing Sources on Future Residents of the Development

- 5.2 The proposed development is located adjacent to Stainton Way, and close to the roundabout with the B1365. Traffic counts published by the DfT (2018b) show that the annual average daily traffic (AADT) flow along Stainton Way was around 10,100 vehicles in 2016, and along the A1032 (Acklam Road), which joins the B1365 north of the A174, was approximately 17,900 vehicles. Along the A174 and A172 (Stokesley Road / Dixons Bank), the AADTs were approximately 44,000 and 21,800, respectively, in 2016 and 2017. The annual mean nitrogen dioxide concentrations measured close to those roads were all below the objectives between 2015 and 2017 (see Section 4).
- 5.3 The boundary of the application site lies 6 m from the kerb of Stainton Way at its closest point, and 23 m from the roundabout, and these distances are within the range of distances between the monitoring sites and the kerbs of the nearest roads set out in Table 2. As the vehicle flows along Stainton Way and the B1365 are lower than the A174 and A172, it is reasonable to assume that concentrations at the application site will not exceed the objectives. It can therefore be concluded that future residents will experience acceptable air quality, and there is no need for more detailed assessment.

Significance of Operational Air Quality Effects

- 5.4 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A1. More specifically, this judgement takes account of the assessment that:
- air quality conditions across the site are judged to be acceptable for residential use; and

- the traffic generation of the proposed development is expected to be below the screening criterion for requiring a detailed assessment, and thus the impact of development-related traffic emissions on existing receptors will be insignificant.

6 Conclusions

- 6.1 The operational impacts of increased traffic emissions arising from the additional traffic on local roads, due to the development, have been assessed. The impacts of an increase in traffic flows on air quality at existing receptors will be insignificant, and the overall operational air quality effects of the development are judged to be 'not significant'.
- 6.2 The impacts of traffic emissions from local roads on the air quality for future residents have also been assessed. The air quality alongside local roads is judged to be acceptable. Thus, air quality conditions will be acceptable for residential use.
- 6.3 The overall operational air quality effects of the development are judged to be 'not significant'.

7 References

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8 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
EU	European Union
EV	Electric Vehicle
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
kW	Kilowatt
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m³	Microgrammes per cubic metre
NO	Nitric oxide
NO₂	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO ₂ + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the

standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides

OLEV	Office for Low Emission Vehicles
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
RDE	Real Driving Emissions
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide

9 Appendices

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A1 EPUK & IAQM Planning for Air Quality Guidance

A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations”.*

Recommended Best Practice

A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

A1.4 The good practice principles are that:

- New developments should not contravene the Council’s Air Quality Action Plan, or render any of the measures unworkable;

- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) “rapid charge” point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.

A1.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

“It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the “damage cost approach” used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential”.

A1.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to

offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

“There may be a requirement to carry out an air quality assessment for the impacts of the local area’s emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development”.*

Impacts of the Development on the Local Area

A1.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A1.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or

- the development will have a centralised energy facility or other centralised combustion process.

A1.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A1.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

“Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³.”

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable”.

A1.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

“The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive ‘trigger’ for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality”.

A1.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

“The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer”.

A1.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A1.15 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either ‘significant’ or ‘not significant’. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;

- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts. In such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A1.16 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

A1.17 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A2.

A2 Professional Experience

Dr Ben Marner, BSc (Hons) PhD CSci MEnvSc MIAQM

Dr Marner is a Technical Director with AQC and has twenty years' experience in the field of air quality. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has been an expert witness at several public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has extensive experience of using detailed dispersion models, as well as contributing to the development of modelling best practices. Dr Marner has arranged and overseen air quality monitoring surveys, as well as contributing to Defra guidance on harmonising monitoring methods. He has been responsible for air quality review and assessments on behalf of numerous local authorities. He has also developed methods to predict nitrogen deposition fluxes on behalf of the Environment Agency, provided support and advice to the UK Government's air quality review and assessment helpdesk, Transport Scotland, Transport for London, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist. Dr Marner is a member of Defra's Network of Evidence Experts and a member of Defra's Air Quality Expert Group.

Paul Outen, BSc (Hons) MEnvSc MIAQM

Mr Outen is a Senior Consultant with AQC, having joined in 2014. He holds a degree in Environmental Geoscience, having specialised in the study of landfill-related particulate matter for his final year thesis. Prior to joining AQC he worked as an Air Quality Consultant at Odournet UK Ltd for 6 years, undertaking a range of air quality and odour assessments across a number of different industries, as well as managing the sampling/technical department for the company. He now undertakes air quality assessments at AQC, utilising the ADMS dispersion models to assess the impacts of a variety of sources on concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5}.

Dr Kate Wilkins BSc (Hons) MSc PhD

Dr Wilkins joined AQC in January 2018 as an Assistant Consultant. She is currently gaining experience of undertaking air quality assessments and contributing to projects. Prior to joining AQC, Kate completed a PhD at the University of Bristol, researching atmospheric dispersion modelling and satellite remote sensing of volcanic ash. Prior to her PhD she gained a BSc in Environmental Science and an MSc in Environmental Dynamics and Climatic Change. She has also spent a year working at the Environment Agency in Flood Risk Management.

Full CVs are available at www.aqconsultants.co.uk.