

Land at Barnham, Eastergate and Westergate (BEW Parcel SC1) Environmental Statement

Chapter G: Air Quality

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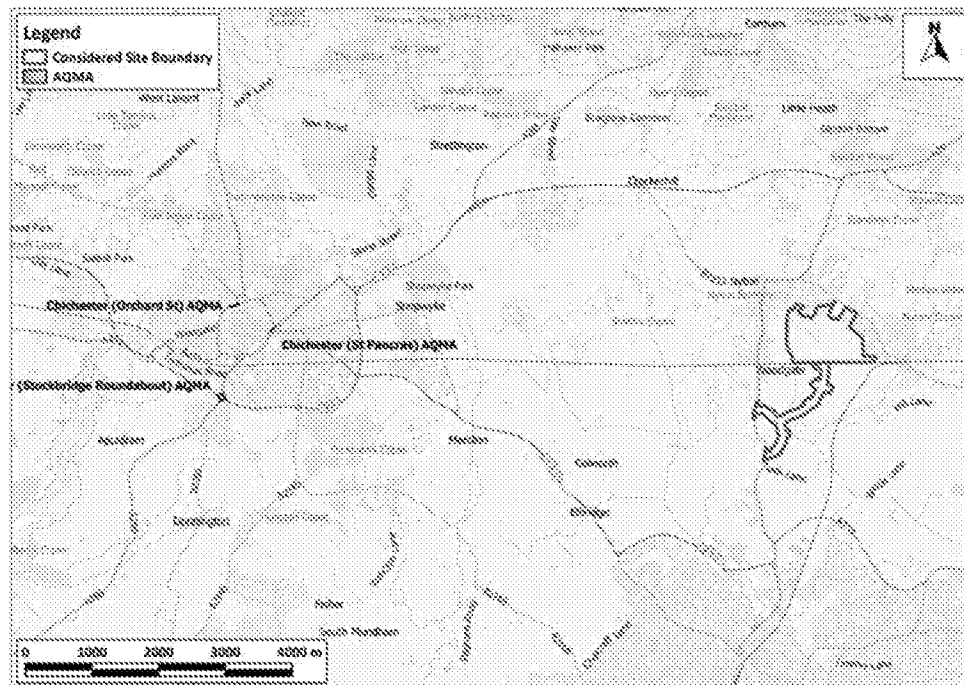
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G1.0 Introduction

- G1.1 This Chapter forms part of an Environmental Statement ('ES') which sets out the findings of an Environmental Impact Assessment ('EIA') of the proposed residential led mixed use development of land near the villages of Barnham, Eastergate and Westergate ('BEW') in West Sussex. The proposals also include the realignment of the A29 strategic route south of Barnham Road.
- G1.2 The Proposed Development forms a first phase of a wider strategic allocation of land which is known for the purposes of this ES as 'BEW Parcel SC1'. A description of the background to the proposal, including its role as part of the strategic allocation; the relationship of this chapter to the wider ES; and a description of the site and the development is provided at Chapters A to C of this ES.
- G1.3 Chapter N considers cumulative effects including a review of the potential for effects associated with the development of the wider strategic allocation at BEW.
- G1.4 This chapter should be read in conjunction with Chapters A, B, C and N.
- G1.5 This Chapter reports the assessment of the potential for likely significant environmental effects arising from the Proposed Development in relation to air quality.
- G1.6 The Proposed Development will lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties along the affected road network. New residents of the Proposed Development will also be subject to the impacts of 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}).
- G1.7 There is also the potential for the construction activities to impact upon both existing and new properties. The main pollutants of concern related to construction activities are dust and PM₁₀ associated with construction dust emissions.
- G1.8 The location and setting of the Proposed Development are shown in Figure G1.1, along with the relevant nearby Air Quality Management Areas. It should be noted that the Proposed Development only proposes new homes in the area north of the railway lines; the areas within the redline boundary to the south of the railway lines relate to infrastructure works only (the realigned A29).

Figure G1.1: Proposed Development Setting in the Context of Air Quality



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| G1.9 | The new homes within the Proposed Development will be over 1 km from the nearest potential sources of odour; Lidsey oil field and waste water treatment works. Significant odour impacts over such a distance are extremely unlikely, especially given that there are existing sensitive receptors between these odour sources and the residential areas within the Proposed Development. No other potentially significant sources of odour or emissions have been identified in the vicinity of the site. It has not been considered necessary to address odour impacts further in this chapter, as it is judged that there will be none. |
| G1.10 | This chapter describes existing local air quality conditions (base year 2019), and the predicted air quality in the future assuming that the Proposed Development does, or does not, proceed. The assessment of traffic-related impacts focus on the year 2024, which is the anticipated year of first occupation of any of the new homes. It also considers the traffic related impacts in 2030 including the wider site allocation; assessing the impacts of development-generated traffic cumulatively with that generated by the wider site allocation and impacts of road traffic on future residents of the wider allocation. The assessment of construction dust impacts focuses on the anticipated duration of the works. |
| G1.11 | This chapter has been prepared taking into account all relevant local and national guidance and regulations, including the Air Quality and Emissions Mitigation Guidance for Sussex (Sussex-air Air Quality Partnership, 2020) . |
| G1.12 | The chapter should be read in conjunction with the following technical appendices provided at Volume 2 to this ES: <ol style="list-style-type: none"> 1 Appendix G1 - Construction Dust Assessment Procedure 2 Appendix G2 - EPUK & IAQM Planning for Air Quality Guidance 3 Appendix G3 - Professional Experience |

- 4 **Appendix G4 - Modelling Methodology**
- 5 **Appendix G5 - Receptor Locations**
- 6 **Appendix G6 - Emissions Mitigation Statement**
- 7 **Appendix G7 – Email Consultation with Arun District Council**

About the Authors

- G1.13 AQC has provided independent expert advice and assessments covering all ambient air quality issues, since 1993. It has a strong and proven track record in providing air quality services to private and public sector clients, both within the UK and internationally. The team that have prepared this chapter, and their professional experience, are summarised in Appendix G3.
- G1.14 Air quality, odour and dust assessments are completed for several hundred projects each year. They cover a wide range of developments, from small residential schemes in Air Quality Management Areas to major mixed-use schemes, as well as schemes for new roads, industrial installations and airports.
- G1.15 AQC has been closely involved with the development of air quality management in both the UK and Europe for over 25 years. The Company has held contracts with Defra to carry out appraisals of the Reviews & Assessments of air quality being undertaken by all UK local authorities, as well as appraisals of Air Quality Grant Applications. It has also advised Government departments in the UK, South Africa and Australia.
- G1.16 AQC led the development of the technical guidance for local authorities, covering the Review & Assessment requirements of Local Air Quality Management. The Company has also been closely involved in developing the guidance published by the Institute of Air Quality Management and by Environmental Protection UK, which sets out the requirements for air quality assessments, including how to describe and assess the significance of operational impacts.
- G1.17 AQC has also provided extensive input into the Institute of Air Quality Management's guidance documents on assessing the significance of impacts from construction dust, and on monitoring in the vicinity of demolition and construction sites. This guidance is widely used in the UK.

G2.0 Policy Context

- G2.1 All European legislation referred to in this chapter is written into UK law and will remain in place beyond 2020, unless amended, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

National Policy

Air Quality Strategy

- G2.2 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.

Clean Air Strategy 2019

- G2.3 The Clean Air Strategy (Defra, 2019) 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. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment. As a result, improvements associated with this strategy are not taken into account in this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

- G2.4 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) 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, and 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 states that the Government wants to see between 50 and 70% of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.
- G2.5 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. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NO_x emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

National Planning Policy Framework (NPPF) 2021

- G2.6 The National Planning Policy Framework (NPPF) (2021a) 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 (Paragraph 8c) is an environmental objective:
- “to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”.*
- G2.7 To prevent unacceptable risks from air pollution, Paragraph 174 of 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”.*
- G2.8 Paragraph 185 states:
- “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”.*
- G2.9 More specifically on air quality, Paragraph 186 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”.*
- G2.10 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2021b), 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 Limit Values. 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, or where the need for emissions reductions has been identified”.*
- G2.11 Regarding plan-making, the PPG states:

“It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality”.

G2.12 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan *“identifies measures that will be introduced in pursuit of the objectives and can have implications for planning”*. In addition, the PPG makes clear that *“Odour and dust can also be a planning concern, for example, because of the effect on local amenity”*.

G2.13 Regarding the need for an air quality assessment, the PPG states that:

“Whether 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 have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the Proposed Development would be particularly sensitive to poor air quality in its vicinity”.

G2.14 The PPG sets out the information that may be required in an air quality assessment, making clear that:

“Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific”.

G2.15 The PPG 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 will need to be locationally specific, will depend on the Proposed Development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented”.

Local Policy

Local Transport Plan

G2.16 The West Sussex Transport Plan 2011-2026 (West Sussex County Council, 2011), was adopted in February 2011, which after consultation with both the public and strategic partners, identified the following objectives:

- *“promoting economic growth;*
- *tackling climate change;*
- *providing access to services, employment and housing; and*
- *improving safety, security and health”.*

G2.17 The Plan sets out the Strategic Road Network within West Sussex, which includes the A259 between the A27 at Chichester to the A29 at Bognor Regis, along which development generated traffic is expected to travel. The Plan states:

“The A259 plays a complementary role to the A27 and experiences heavy congestion in many places. This affects all vehicles including public transport, causing air quality and noise issues. Some junctions along the route have high casualty rates and are in need of improvements to address the casualty rates.”

G2.18 The approach to tackling these issues includes “developing improvements to key sections and junctions along the A259 including the Bognor Regis relief road and the section of the A259 between Worthing and Southwick (and into Brighton & Hove) to support the delivery of new housing”.

G2.19 The Plan refers to specific strategic aims targeted for Arun, to tackle the identified issues:

“Our strategy aims to tackle the identified transport issues as and when funding becomes available. To ensure that the regeneration aspirations of the coastal plain are delivered and the identified transport issues are addressed we will make certain that all new schemes and developments contribute and support in some way the following:

- increasing use of sustainable modes of transport;*
- improving network efficiency in order to improve journey time and air quality;*
- improving safety for all road users;*
- discouraging HGVs from using unsuitable roads; and*
- improving accessibility between communities and larger towns within the District”.*

Arun Local Plan 2011 – 2031

G2.20 The Arun Local Plan 2011 – 2031 was adopted in July 2018 (Arun District Council, 2018). The Barnham/Eastergate/ Westergate site is identified in the Local Plan as one of a number of strategic housing allocations, which are sites that have been identified to provide residential development to meet local housing needs throughout the plan period.

G2.21 Policy QE SP1 of the Local Plan refers specifically to quality of the environment and states that:

“The Council requires that all development contributes positively to the quality of the environment and will ensure that development does not have a significantly negative impact upon residential amenity, the natural environment or upon leisure and recreational activities enjoyed by residents and visitors to the District.

The location of existing industrial and commercial uses, including waste management uses, must be taken into consideration when assessing proposals for development sensitive to noise, light, odour and outputs to air. This is to ensure that land allocated for these uses are protected and to ensure that the amenity of new developments and facilities is safeguarded from the impacts of incompatible land uses.”

G2.22 Policy QE DM3 on air pollution states:

“All major development proposals will be required to assess the likely impacts of the development on air quality and mitigate any negative impacts by:

- Ensuring the development is located within easy reach of established public transport services;*
- Maximising provision for cycling and pedestrian facilities;*
- Encouraging the use of cleaner transport fuels on site, through the inclusion of electric car charging points; and*

- *Contributing towards the improvement of the highway network where the development is predicted to result in increased congestion on the highway network.*

Development proposed nearby any Air Quality Management Area (AQMA) declared within the District within the Plan period, will require an air quality assessment to identify likely impacts of development upon the designated area. Developers will be required to ensure delivery of the actions set out within any Air Quality Action Plan”.

Barnham Eastergate and Westergate (BEW) Framework Masterplan (November 2020)

- G2.23 The Barnham Eastergate and Westergate masterplan (JTP, 2021) demonstrates how the requirements for the site as set out in Policy H SP2c SD5 can be delivered. It incorporates community facilities including schools, shops and a library to reduce the need to travel. In terms of connectivity, it includes a number of elements that seek to reduce travel by private car including; integrating with the existing pedestrian and cycle links to the surrounding villages, delivering an east-west link between the existing A29 and the new A29 and establishing a sustainable link to Barnham Station. These will all help to minimise the air quality impact of the Proposed Development.

Air Quality and Emissions Mitigation Guidance for Sussex Authorities

- G2.24 The Air Quality and Emissions Mitigation Guidance for Sussex (Sussex-air Air Quality Partnership, 2020) has been developed with local authorities across Sussex to provide a consistent approach for assessing the potential air quality impacts of development- and transport-related emissions, and a common framework for mitigating those impacts. The guidance provides a checklist to determine whether a detailed air quality assessment and/or an emissions mitigation assessment is required. As the Proposed Development is a ‘major’ development, as defined by the Town and Country Planning (Development Management Procedure) Order (England) 2015, the checklist concludes that both a detailed air quality assessment and emissions mitigation assessment are required.
- G2.25 To assist with the emissions mitigation assessment, the guidance provides a framework for calculating the appropriate costs associated with the development’s emissions, using the Defra IGCB Air Quality Damage Costs (Defra, 2020e) for specific pollutants, and appropriate mitigation options.
- G2.26 The guidance also requires an assessment of construction dust impacts, following the Institute of Air Quality Management (IAQM): *Guidance on the assessment of dust from demolition and construction* (IAQM, 2016), combined with an appropriate statement of mitigation.

Air Quality Action Plans

National Air Quality Plan

- G2.27 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018a) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve

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

the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for 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

- G2.28 Arun District Council has not declared any AQMAs and thus has not prepared an air quality action plan.
- G2.29 Chichester District Council has declared three AQMAs for exceedances of the annual mean nitrogen dioxide objective; Chichester St Pancras, which covers an area along St Pancras Road; Chichester Orchard Street, covering an area along Orchard Street at the eastern end of the street where it meets Northgate; and Chichester Stockbridge Roundabout, which encompasses the Stockbridge roundabout at the junction of the Chichester bypass (A27) and Stockbridge Road. The Council has developed an Air Quality Action Plan (Chichester District Council, 2015), which builds on what has been achieved by the previous documents and sets out the basis for understanding air quality and its impacts through monitoring and reporting.

G3.0 Assessment Methodology & Significance Criteria

Assessment Criteria

- G3.1 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) as amended.
- G3.2 The UK-wide objectives for nitrogen dioxide and PM₁₀, as set out in Table G3.1, were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective was 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, 2021). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2021). 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.
- G3.3 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, 2021). 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.
- G3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations (2010). 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 normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT’s Joint Air Quality Unit (JAQU).
- G3.5 The relevant air quality criteria for this assessment are provided in Table G3.1.

Table G3.1 Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

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

^a As prescribed in the Air Quality (England) Regulations (2000) as amended.

^b 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, 2021).

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

Construction Dust Criteria

G3.6 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM (2016) has been used. Full details of this approach are provided in Appendix G1 and are summarised as follows:

- Step 1: Screen the Need for a Detailed Assessment
- Step 2: Assess the Risk of Dust Impacts
 - a Step 2A – Define the Potential Dust Emission Magnitude
 - b Step 2B – Define the Sensitivity of the Area
 - c Step 2C – Define the Risk of Impacts
- Step 3: Determine Site-specific Mitigation Requirements
- Step 4: Determine Significant Effects

Screening Criteria

Road Traffic Assessments

G3.7 Environmental Protection UK (EPUK) and the IAQM 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 G2, 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.

G3.8 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix G2) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be 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”.

- G3.9 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they are also used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link. The screening criteria are exceeded for the Proposed Development and therefore this approach has been used to inform definition of the study area, as discussed in Paragraph G3.13.

Railway Emissions

- G3.10 Defra guidance (Defra, 2021) outlines that large numbers of moving diesel locomotives can give rise to high levels of nitrogen dioxide close to railway tracks.
- G3.11 The guidance outlines where there may be the potential for an exceedance of the nitrogen dioxide objectives, as a result of emissions from diesel locomotives, with the following criteria:
- where residential properties are within 30 m of railway lines;
 - where there are large numbers of diesel locomotive movements (these lines are identified in the Defra guidance); and
 - where background annual mean nitrogen dioxide concentrations are greater than 25 µg/m³.
- G3.12 Only locations which meet all three of these criteria require further assessment.

Assessment Methodology

Study Area

- G3.13 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest, in conjunction with the screening criteria discussed in Paragraphs G3.7 to G3.11. It includes the application site itself and all of the roads along which the development will lead to a change in traffic flows that might have a potentially significant impact on air quality. A relatively large number of roads exceeded the screening criteria for detailed assessment discussed in Paragraph G3.8; professional judgement has been applied in determining which of these roads required detailed assessment (the experience of the consultants who undertook this assessment is set out in Appendix G3).
- G3.14 The focus has been on roads where there are sensitive receptors closest to the road and the development-generated changes in traffic flows are greatest, combined with higher baseline flows (and thus higher baseline concentrations); these are the roads along which the worst-case impacts will occur. Impacts will be less along quieter roads and those with smaller development-generated changes (i.e. only marginally above the screening thresholds), thus it was not considered necessary to model every road that triggered the screening criteria. Thus, the impacts presented in Section G5.0 are for worst-case locations and the assessment in this regard can be considered robust.
- G3.15 The study area is shown in Figure G3.1.

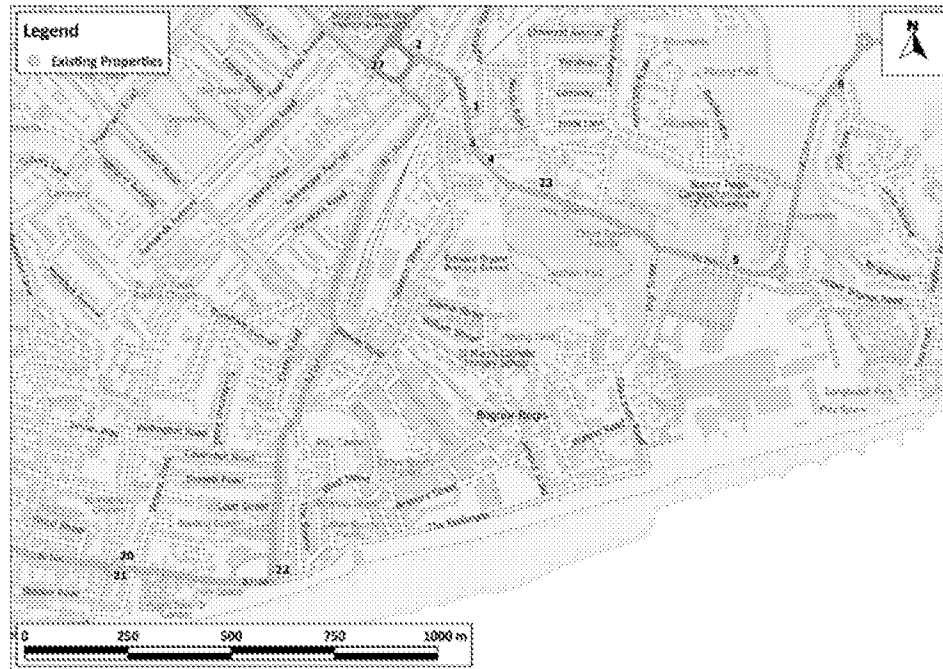
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As defined in the approach developed by the IAQM (2016), the construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles within 500m of the site (as stated in Appendix G1). The IAQM guidance notes that these distances are deliberately chosen to be conservative, and beyond these the impacts of construction dust would be not significant. The specific areas considered are detailed in Section G5.o.

Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations within the Proposed Development and along the local road network. Receptors have been identified to represent worst-case exposure locations (these being at the façades of the residential properties closest to the sources). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the Proposed Development will be greatest.

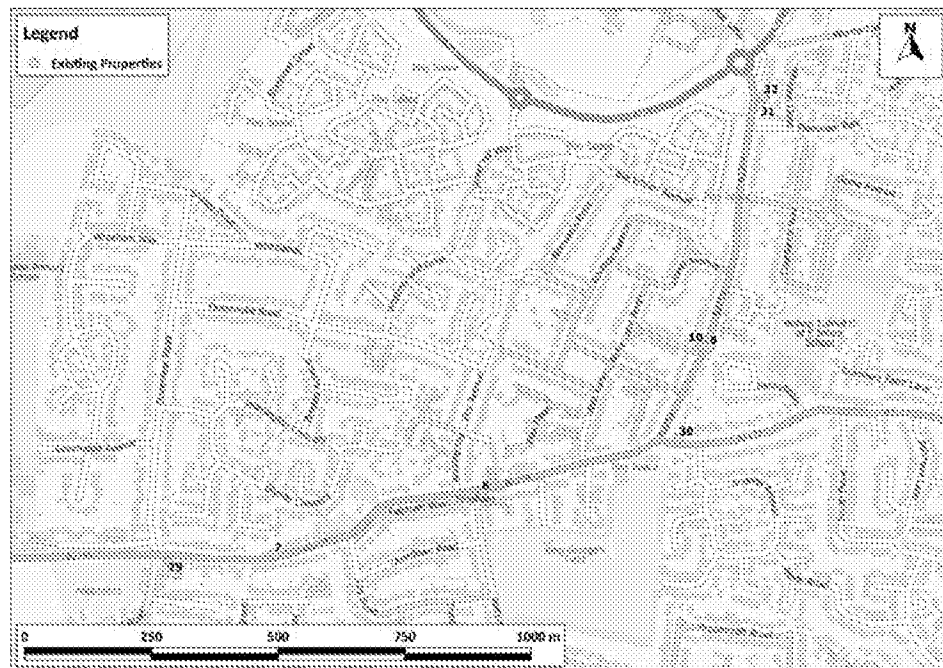
Ninety-one existing residential properties have been identified as receptors for the assessment. Five additional receptor locations have been identified within the new development, which represent worst-case exposure to existing sources and the proposed realigned A29; these five receptor locations are considerably closer to the roads than any new homes within the development will be, thus they will over-state pollutant concentrations for new receptors within the development. These locations are described in Table G5.1 in Appendix G5 and shown in Figure G3.2 to Figure G3.10. In addition, concentrations have been modelled at five of the monitoring sites shown in (see Section G4.0), in order to verify the model outputs (see Appendix G4 for verification method). These are diffusion tubes Barn20, Bog10, Bog12, Bog13 and Yap19.

Figure G3.2: Modelled Receptors – South Bognor Regis



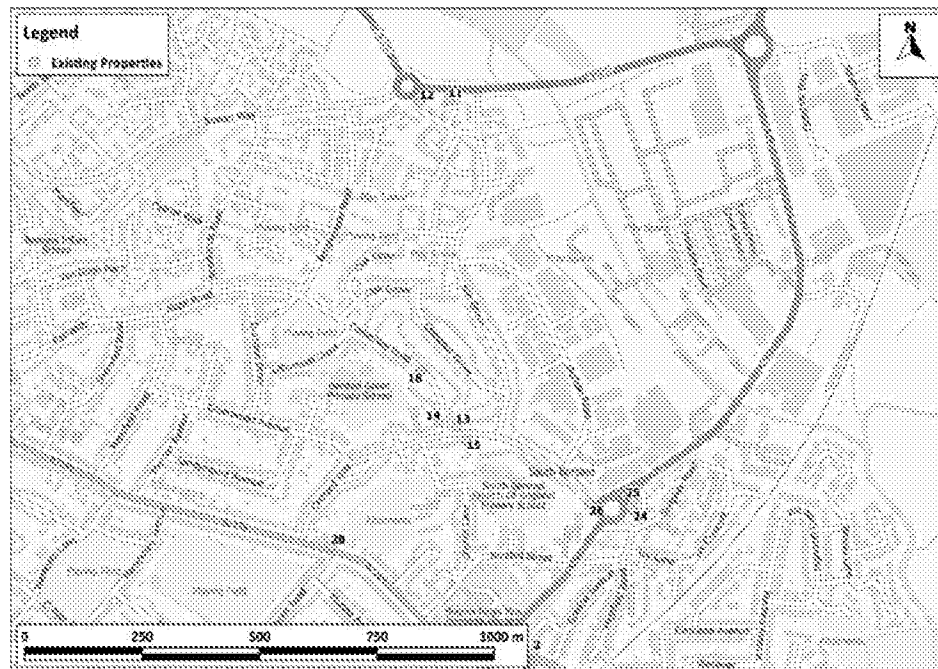
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Figure G3.3: Modelled Receptors – East Bognor Regis



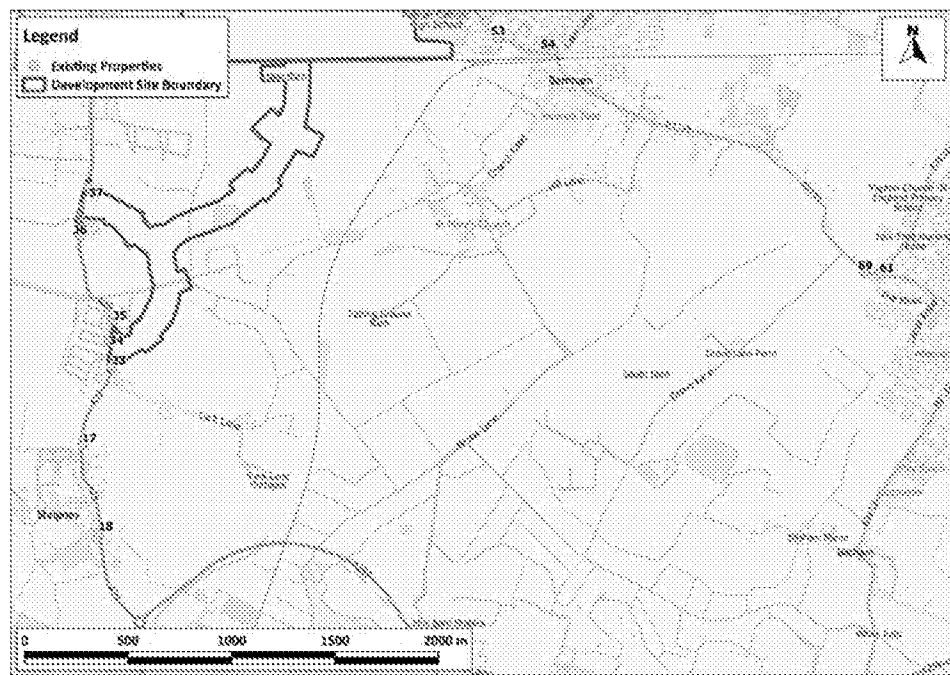
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Figure G3.4: Modelled Receptors – North Bognor Regis



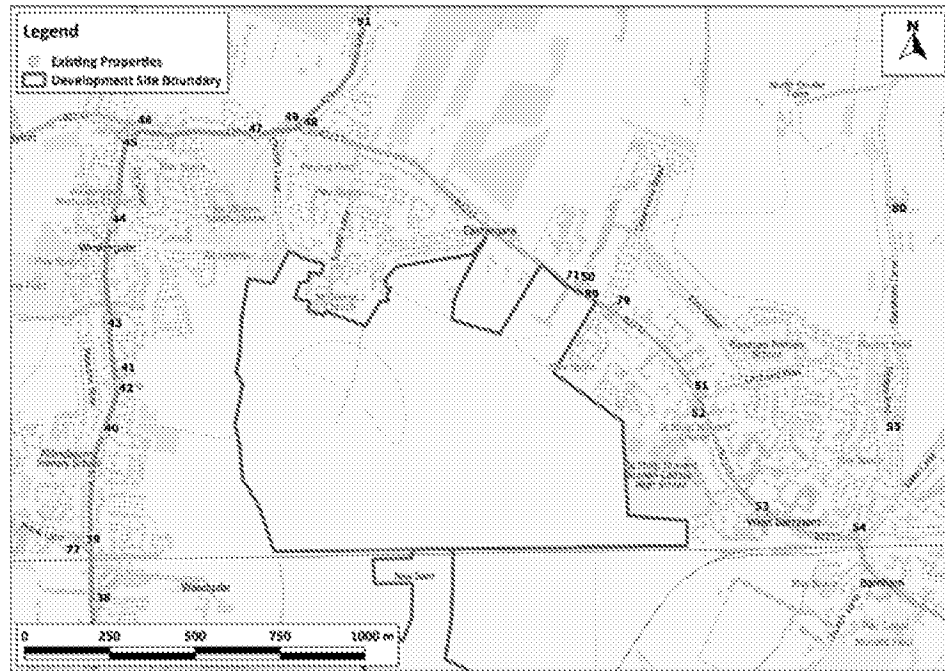
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Figure G3.5: Modelled Receptors – South Barnham and Yapton



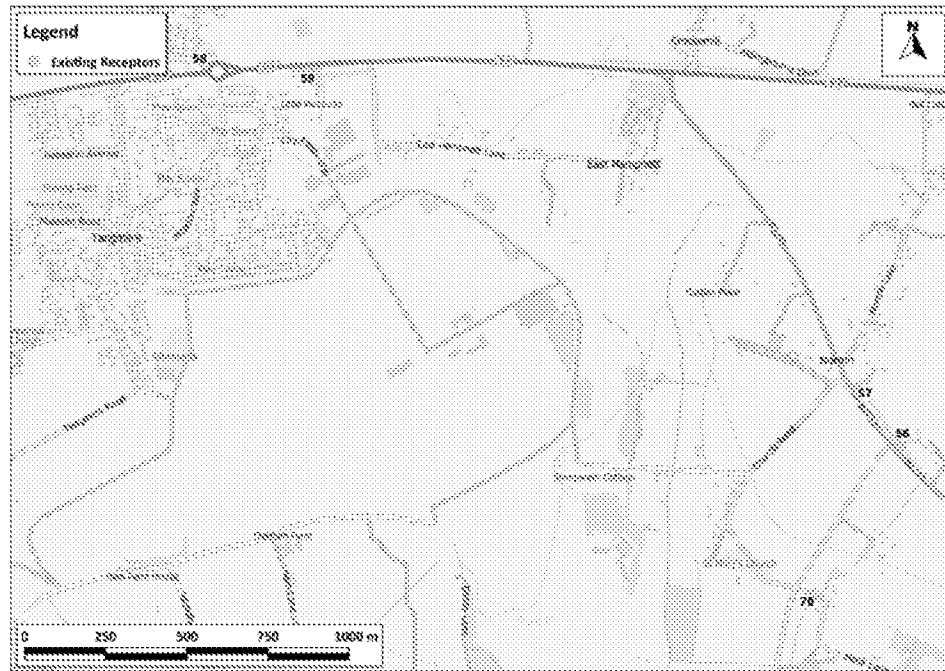
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Figure G3.6: Modelled Receptors – Barnham, Eastergate and Westergate



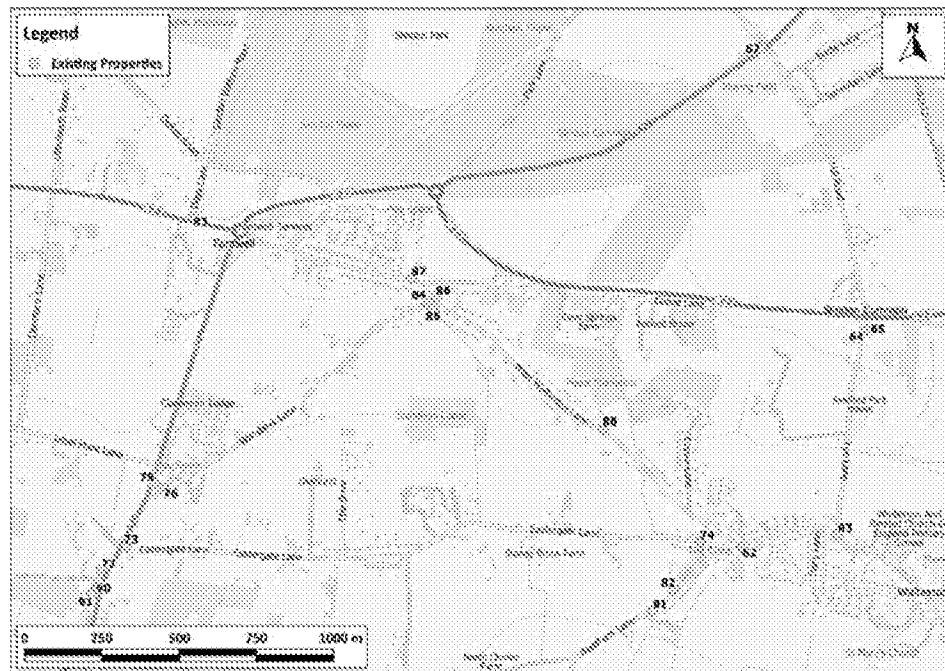
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Figure G3.7: Modelled Receptors – Crockerhill, Tangmere and Norton



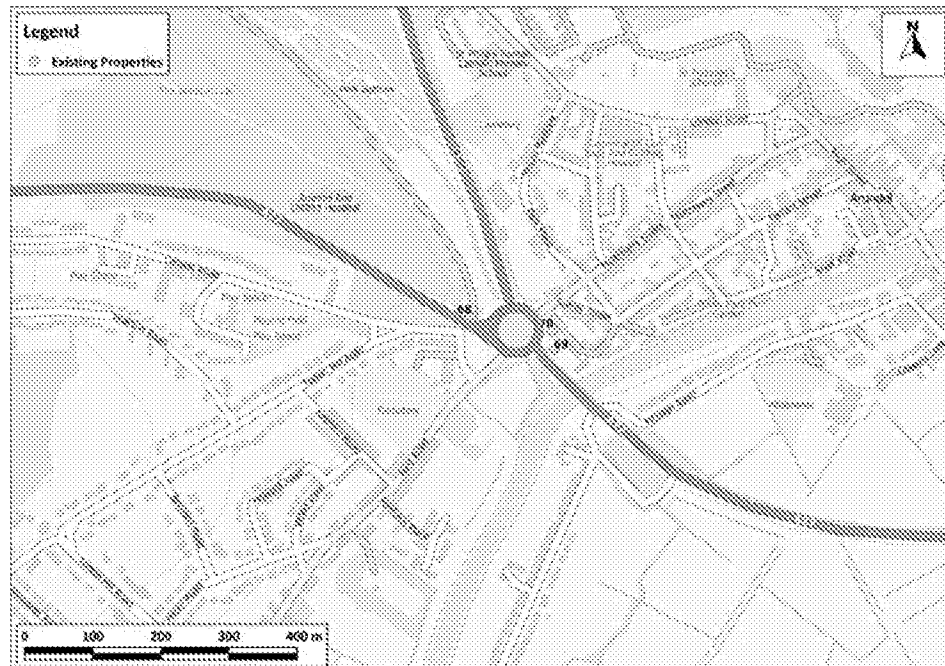
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Figure G3.8: Modelled Receptors – Fontwell, Slindon Common and Walberton



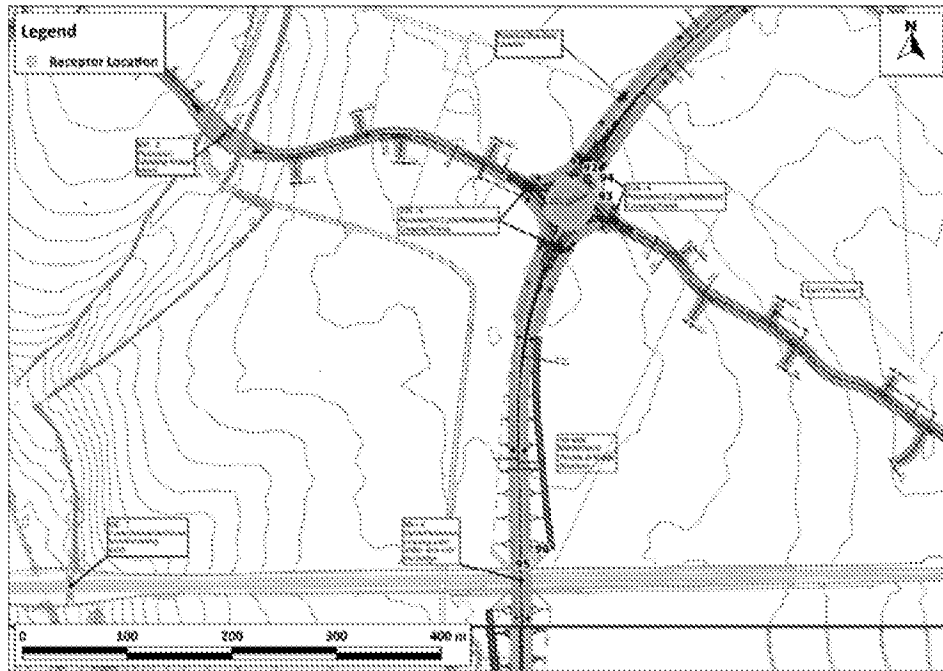
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Figure G3.9: Modelled Receptors – Arundel



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Figure G3.10: Modelled Receptors – Proposed Development Site



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Existing Conditions

- G3.19 Existing sources of emissions and baseline air quality conditions 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 (Defra, 2020a);
 - local sources have been identified 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 Arun District Council and Chichester District Council. The local monitoring carried out by these Councils is considered appropriate for model verification purposes;
 - background concentrations have been defined using Defra's 2018-based background maps (Defra, 2020b). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen oxides and nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020a). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted. Justification for this approach is set out in Appendix G4; and
 - whether or not there are any exceedances of the annual mean EU limit value for nitrogen dioxide (discussed in Paragraphs 10G3.1 to G3.5 and set out in Table G3.1) in the study area has been identified using the maps of roadside concentrations published by Defra (2020c; 2020d). 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, 2020d), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Construction Impacts

- G3.20 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix G1 explains the approach in more detail.

Road Traffic Impacts

Modelling Methodology

- G3.21 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v10.1) (Defra, 2020b). Details of the model inputs and the model verification are provided in Appendix G4.

Assessment Scenarios

- G3.22 Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for the following five scenarios:
- 1 base year **2019**;
 - 2 the proposed year of first occupation of Parcel SC1 (**2024**) **without the Proposed Development** in place (hereafter referred to as "2024 without scheme"). This scenario includes the land West of Bersted, Cala land parcel (350 homes), Pye Homes (160 homes), Landacre, land south of Barnham Road and Land north of Barnham Road sites as committed schemes, as do all other future scenarios;
 - 3 **2024 with Parcel SC1** assumed to be complete and fully occupied along with the committed schemes described in 2 (hereafter referred to as "2024 with scheme");
 - 4 a further future scenario of **2030**, representing the year of first occupation of the extended site allocation, **with identical assumptions to 2024 without scheme** (hereafter referred to as "2030 without scheme"); and
 - 5 **2030 with the wider allocation in place**, representing the combined impacts of both Parcel SC1 and the remaining site allocation, which does not form part of this planning application (hereafter referred to as "2030 with scheme"). This scenario includes the redistribution of traffic resultant of development-related changes to roads infrastructure.
- G3.23 The traffic data provided for the 2024 and 2030 future year scenarios modelled were derived from traffic models for the years 2031 and 2038, respectively; the application of this data to the earlier years modelled in this assessment is discussed further in Paragraph G3.40, and is worst-case.
- G3.24 Predictions for 2024 and 2030 are based on a return to 'typical' activity levels and assume no impact as a result of the Covid-19 pandemic in the relevant year, to ensure a worst-case

assessment (as the influence of the pandemic has generally been to reduce concentrations of the pollutants considered in this assessment); see Paragraphs G3.38 and G3.39 ‘Assumptions and Limitations’.

Impact Description

G3.25 The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table G3.2 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document (the term ‘minor’ has been used where the guidance uses the term ‘slight’, for consistency throughout the ES). For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table G3.2 Air Quality Impact Descriptors for Individual Receptors for All Pollutants a

Long-Term Average Concentration at Receptor in Assessment Year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Negligible	Minor	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the “Without Scheme” concentration where there is a decrease in pollutant concentration and the “With Scheme” concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency ‘Environmental Assessment Level (EAL)’.

Railway Impacts

G3.26 The potential for significant impacts as a result of emissions from railway locomotives on the lines adjacent to the Proposed Development has been considered by comparing the development scenario to the criteria set out in the Defra guidance (Defra, 2021).

Damage Cost Calculations

G3.27 The calculation of damage costs has utilised the most recent EFT (Defra, 2020b), used to determine the development’s transport emissions, alongside Defra’s damage cost toolkit (Defra, 2020e), used to determine the associated damage costs for those emissions.

G3.28 The calculation process includes:

- identifying the additional trips or vehicle numbers generated by the Proposed Development;

- calculating the emissions from these trips for the pollutants of concern (NO_x and PM_{2.5}) using the EFT, for each of the five scenarios assessed, starting with the year of opening. This calculation has assumed a 10 km trip length and a 50 kph average speed;
- calculating the damage costs for the specific pollutant emissions using the damage cost toolkit, based on the costs for road transport in a large urban area. The toolkit allows for reductions in emissions over time, applies a discount in line with HM Treasury's Green Book and also adjusts for inflation; and
- extracting the 'Central' total value for each pollutant and summing these for use as the damage cost total for the scheme.

Significance Criteria

Construction Dust Significance

- G3.29 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

- G3.30 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 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; the experience of the consultants preparing the chapter is set out in Appendix G3. Full details of the EPUK/IAQM approach and the process of judging significance are provided in Appendix G2.
- G3.31 Generally, it is likely that a 'moderate' or 'substantial' impact will give rise to a significant effect and a 'negligible' or 'minor' impact will not have a significant effect, but such judgements are always more likely to be valid at the two extremes of impact severity. In addition to the impact descriptors the decision should take into account other factors such as duration of the impact, the number of people affected, overall concentrations and uncertainty in the model results.
- G3.32 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 chapter, 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 frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

Consultation

- G3.33 The assessment follows a methodology agreed with Arun District Council via the Scoping report and subsequent email correspondence between James Cross (Strategic Sites Project Officer, Arun District Council), Joanne Lewis (Air Quality officer, Arun District Council), the planning team at Lichfields and Jamie Dennis (Air Quality Consultants), between the 11th and 29th January 2021. Specifically, the following key points were discussed and agreed:

- a site-specific air quality monitoring survey would not be necessary for the site. This is based upon the impacts of Covid-19 on traffic flows, meaning any air quality monitoring data would be subject to the same uncertainties as the pandemic's impact on traffic flows. The existing data available from Arun District Council's 2019 monitoring was seen as more appropriate for model verification purposes;
- odour impacts as a result of emissions from the Lidsey Sewage Treatment Works are highly unlikely given the distance between the works and the new residential areas within the Proposed Development (see Paragraph G1.9);
- the assessment should consider the Sussex Air Quality Guidance (Sussex-air Air Quality Partnership, 2020) (see Appendix G6);
- the effects of the development-generated road traffic emissions on the Pagham Harbour SAC/SPA/Ramsar site with relation to nitrogen deposition should be considered (see Paragraph G5.35); and
- the in-combination impacts of the Proposed Development on air quality within the AQMA's located in Chichester District Council will be considered.

G3.34 The full correspondence is available in Appendix G7.

Assumptions and Limitations

Uncertainty/Limitations

G3.35 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

G3.36 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix G4). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2019) concentrations. LAQM.TG16 (Defra, 2021) provides guidance on the evaluation of model performance. Based on the analysis in Appendix G4, the model performance is considered to be good.

G3.37 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra's EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v10.1 for future-year forecasts in this report is industry standard and provides a robust assessment, given that the model has been verified against measurements made in 2019.

G3.38 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet (which affect the vehicle emission factors used in the model) and the uptake of other new technologies, as well as population increases etc.. In early 2020, activity

in the UK was disrupted by the COVID-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect a return to more typical activity levels in the future. Thus, 2020 is likely to present as an atypically low pollution year for roadside pollutant concentrations, as is 2021.

G3.39 It is not currently possible to make robust predictions of the rate at which travel activity patterns will return to historically-normal levels; or the extent of any long-lasting changes to travel behaviour. The most robust approach to making future-year projections is thus to base these on measurements made during 2019, and to use activity forecasts made before the impact of the pandemic was understood, which is the approach that has been taken in this assessment.

Assumptions

G3.40 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- the application of traffic flows for the years 2031 and 2038 to the assessment years 2024 and 2030 will over-state traffic volumes on the local road network, which in turn will result in higher concentrations being predicted than are actually likely to occur. Further, as emissions are set to reduce as years go on, carrying out the assessment in an earlier year will result in more emissions from vehicles and further overstate impacts. Hence, if there is a delay in implementation of the development then impacts will be smaller than stated in this assessment;
- the assumption that all committed developments, and the Proposed Development, are complete and fully occupied in 2024. This will have overestimated the traffic emissions and hence the 2024 concentrations. In reality, the development is not expected to be completed until 2031, thus it will not be generating its full traffic volumes until this year. As a result, modelling the full development traffic in the year 2024 will greatly over-state the impacts of the Proposed Development;
- the assumption that the full allocation is complete and fully occupied in 2030. This will have overestimated the traffic emissions and hence the 2030 “With Scheme” concentrations and the impacts of the scheme in this year. The full allocation is only expected to be completed in 2038, but emission factors provided by EFT v10.1 only extend up to 2030, which is why this earlier year has been modelled. As emission are expected to reduce over time, modelling the future scenario using 2030 emission factors is a worst-case approach; and
- the assumption that the Shoreham meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix G4).

G4.0 Baseline Conditions

Existing Conditions

Relevant Features

- G4.1 The Proposed Development is mostly bounded by the villages of Woodgate and Westergate to the west, Eastergate to the north, Barnham to the east and railway lines to the south. The site boundary also adjoins the B2233 Barnham Road. It currently consists primarily of active agricultural land.

Industrial Sources

- G4.2 No significant industrial or waste management sources have been identified that are likely to affect the Proposed Development, in terms of air quality or odour.

Local Air Quality Monitoring

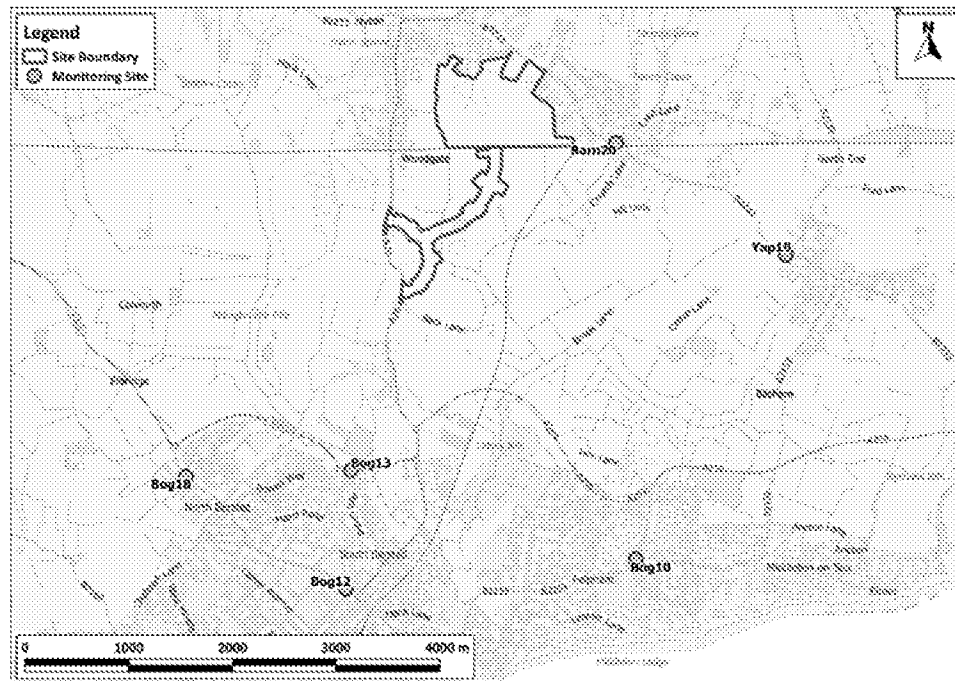
Arun District Council

- G4.3 Arun District Council does not undertake any automatic monitoring. The Council does, though, operate a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by South Yorkshire Air Quality Samplers (using the 50% TEA in acetone method). These include two along the B2233 (one outside Barnham Train Station and another at the junction with North End Road in Yapton), and four sites in Bognor Regis (including one adjacent to the A259, a section of road identified within the Sussex Transport Plan as an area of heavy congestion and causing air quality issues). Annual mean results for these monitoring sites for the years 2015 to 2019 are summarised in Table G4.1 and the locations are shown in Figure G4.1. The monitoring data have been taken from Arun District Council's 2020 Annual Status Report (Arun District Council, 2020).

Table G4.1 Summary of Annual Mean NO₂ Monitoring in Arun (2015-2019) (µg/m³)

Site No.	Site Type	Location	2015	2016	2017	2018	2019
Barn20	Roadside	Barnham Station, B2233	-	-	21	20	18
Bog10	Roadside	Flansham Lane, B2259	30	26	26	25	20
Bog12	Roadside	48 Chichester Road, B2259	30	26	28	31	26
Bog13	Roadside	Rowan Way, A259	21	26	26	28	24
Bog18	Roadside	445 Chichester Road, B2259	-	-	-	21	18
Yap19	Roadside	Yapton Road, B2233	-	-	17	17	15
Objective			40				

Figure G4.1 Arun District Council Monitoring Locations



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G4.4 There have been no measured exceedances of the annual mean objective at any of these monitoring locations. There are no clear trends in the measured concentrations during the period 2015 to 2019.

G4.5 No monitoring of PM₁₀ or PM_{2.5} concentrations is undertaken in Arun.

Chichester District Council

G4.6 Chichester District Council operates an automatic monitor and a number of diffusion tubes within and surrounding the three AQMAs identified in Paragraph G2.29. Diffusion tubes are prepared and analysed by Gradko Environmental, using the 50% TEA in acetone method. Monitoring locations are shown in Figure G4.2, while annual mean results for the years 2015 to 2019 are summarised in Table G4.2 and results relating to the 1-hour mean objective are summarised in Table G4.3. Exceedances of the objectives are shown in bold. Monitoring data have been taken from Chichester District Council's 2020 Draft Annual Status Report (Chichester District Council, 2020).

Table G4.2 Summary of Annual Mean NO₂ Monitoring in Chichester (2015-2019) (µg/m³)

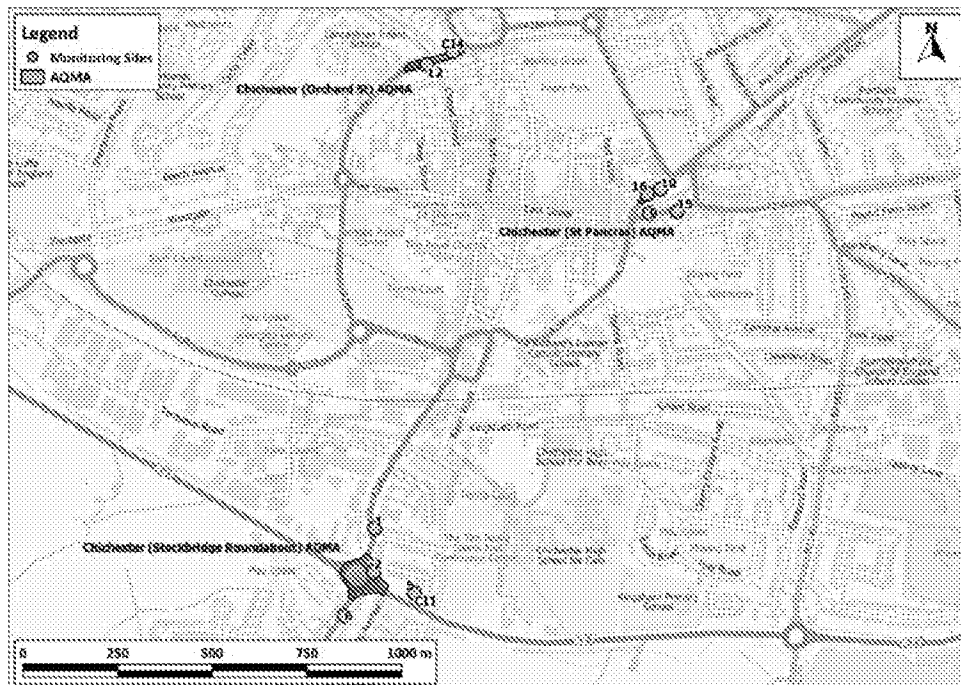
Site No.	Site Type	Location	2015	2016	2017	2018	2019
CI1	Stockbridge	Suburban	34	34	33	29	28
CI4	Orchard Street	Roadside	-	29	23	22	21
1	Kings Ave/ Southbank Jct	Roadside	30	33	29	27	25
2	Claremont Court	Roadside	42	42	39	33	33
5	Cabin	Suburban	34	35	34	29	28
6	Stockbridge Road South	Roadside	41	43	36	34	33
9	Hornet	Roadside	40	41	38	36	34

Site No.	Site Type	Location	2015	2016	2017	2018	2019
CI1	Stockbridge	Suburban	34	34	33	29	28
CI4	Orchard Street	Roadside	-	29	23	22	21
10	St Pancras	Roadside	46	51	44	45	42
12	174 Orchard St	Roadside	33	38	33	33	30
15	Sussex Cleaners	Roadside	-	-	-	32	31
16	Nag's Head	Roadside	-	-	-	38	37
Objective			40				

Table G4.3 Summary of Hours With NO₂ Concentrations Above 200 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019
CI1	Suburban	Stockbridge	0	0	0	0	0
CI4	Roadside	Roadside	0	0	0	0	0
Objective			18				

Figure G4.2 Relevant Monitoring Locations in Chichester District



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G4.7

There have been consistent exceedances of the annual mean NO₂ objective at the St Pancras monitor within the St Pancras AQMA. Concentrations at all other monitors have been in compliance with this objective since 2017. The monitoring shows a downward trend in measured concentrations over time. There were no exceedances of the hourly mean objective at either of the two automatic monitors between 2015 to 2019.

- G4.8 The CI1 suburban automatic monitoring station also measures PM₁₀ concentrations. Annual mean results for the years 2015 to 2019 are summarised in Table G4.4, while results relating to the daily mean objective are summarised in Table G4.5. There are no monitors measuring PM_{2.5} concentrations in Chichester.

Table G4.4 Summary of Annual Mean PM10 Monitoring (2015-2019) (µg/m³)

Site No.	Site Type	Location	2015	2016	2017	2018	2019
CI1	Suburban	Stockbridge	21	20	19	18	19
Objective			40				

Table G4.5 Number of Days with PM10 Concentrations Above 50 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019
CI1	Suburban	Stockbridge	3	2	1	0	0
Objective			35				

- G4.9 There have been no exceedances of the annual or 24-hour mean PM₁₀ objectives between 2015 and 2019. There has been a gradual downward trend in both annual mean concentrations and the number of days with concentrations above 50 µg/m³. It is considered highly unlikely that there would be any exceedances of the PM₁₀ or PM_{2.5} objectives along any roads in the study area.

Exceedances of EU Limit Value

- G4.10 There are no AURN (Defra, 2020f) monitoring sites within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2020d), which are used to report exceedances of the limit value to the EU, do not identify any exceedances within the study area in 2019. As such, and given that concentrations are expected to reduce over time, there is considered to be no risk of a limit value exceedance in the vicinity of the Proposed Development.

Background Concentrations

- G4.11 Estimated background concentrations in the study area based on Defra mapped background concentrations (Defra, 2020d) are set out in Table G4.6 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table G4.6 Estimated Annual Mean Background Pollutant Concentrations in 2019, 2024 and 2030 (µg/m³)

Year	NO ₂	PM ₁₀	PM _{2.5}
2019	9.0 - 13.5	12.2 - 15.1	8.4 - 10.3
2024	7.6 - 11.3	11.3 - 14.1	7.7 - 9.5
2030	6.9 - 9.9	11.3 - 14.0	7.7 - 9.5
Objectives	40	40	25^a

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

Modelled Baseline Concentrations

G4.12 Modelled 2019 baseline concentrations are presented below alongside future baseline concentrations, for ease of comparison.

Future Baseline

G4.13 Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see Appendix G5 for receptor locations). The results, which cover both the existing (2019) and future year (2024, 2030) baselines (Without Scheme), are set out in Table G4.7 for nitrogen dioxide, PM₁₀ and PM_{2.5}. The modelled road components of nitrogen oxides have been increased from those predicted by the model based on a comparison with local measurements (see Appendix G4 for the verification methodology).

Table G4.7 Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide, PM₁₀ and PM_{2.5} (µg/m³) at Existing Receptors a

Receptor	NO ₂			PM ₁₀			PM _{2.5}		
	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme
1	19.0	15.3	11.9	14.2	13.4	13.4	9.9	9.2	9.2
2	23.5	18.3	13.7	15.4	14.5	14.5	10.7	10.0	10.0
3	17.6	14.3	11.3	14.1	13.3	13.3	9.8	9.1	9.1
4	18.8	15.1	11.8	14.2	13.4	13.4	9.9	9.2	9.2
5	28.3	22.3	15.8	14.2	13.6	13.6	9.7	9.1	9.1
6	16.8	13.8	10.8	13.3	12.5	12.5	9.1	8.5	8.5
7	22.0	17.4	12.8	14.6	13.8	13.9	10.1	9.4	9.5
8	29.9	22.9	16.1	14.9	14.1	14.2	10.3	9.6	9.6
9	21.0	17.6	12.8	14.8	14.1	14.2	10.3	9.7	9.7
10	17.8	14.8	11.1	14.5	13.7	13.8	10.1	9.5	9.5
11	23.0	17.4	12.8	16.0	15.0	14.9	10.4	9.6	9.5
12	23.6	17.7	13.0	15.9	14.9	14.8	10.4	9.6	9.5
13	17.5	14.7	11.6	15.1	14.2	14.2	10.5	9.8	9.8
14	16.5	13.9	11.1	15.0	14.1	14.1	10.4	9.7	9.7
15	17.0	14.3	11.3	15.0	14.2	14.1	10.5	9.8	9.7
16	16.2	14.1	11.2	15.0	14.2	14.2	10.4	9.8	9.8
17	21.3	16.4	12.1	15.5	14.7	14.7	9.8	9.1	9.1
18	18.6	14.8	11.1	15.2	14.4	14.5	9.6	9.0	9.0
19	17.9	14.5	10.8	13.0	12.2	12.2	8.9	8.3	8.3
20	15.0	12.3	9.6	12.9	12.0	12.0	8.8	8.1	8.1
21	16.7	13.6	10.3	13.0	12.1	12.1	8.9	8.2	8.2
22	15.1	12.2	9.4	12.6	11.7	11.7	8.7	8.0	8.0
23	20.3	15.9	12.3	14.3	13.4	13.4	9.9	9.2	9.2
24	23.4	18.2	13.6	15.4	14.5	14.5	10.7	10.0	10.0
25	26.3	20.6	14.9	15.6	14.8	14.8	10.8	10.1	10.1
26	18.3	15.0	11.8	15.1	14.2	14.2	10.5	9.8	9.8
27	21.4	16.8	12.7	14.3	13.4	13.4	9.9	9.2	9.2
28	23.3	18.1	13.5	15.5	14.7	14.7	10.7	10.0	10.0

Receptor	NO ₂			PM ₁₀			PM _{2.5}		
	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme
29	23.3	18.0	13.1	14.5	13.6	13.7	10.0	9.3	9.3
30	20.3	15.4	11.6	14.5	13.7	13.7	10.2	9.4	9.5
31	24.5	19.5	13.8	14.9	14.2	14.2	10.4	9.7	9.8
32	22.8	17.9	12.9	14.7	14.0	14.0	10.3	9.6	9.6
33	22.4	17.2	12.5	15.6	14.8	14.9	9.8	9.2	9.2
34	15.7	12.3	9.6	14.9	14.1	14.1	9.5	8.8	8.8
35	20.7	16.2	12.2	15.6	14.7	14.8	9.7	9.0	9.0
36	22.8	17.7	13.1	15.8	15.0	15.0	9.8	9.1	9.1
37	22.1	17.5	12.9	15.7	14.9	15.0	9.7	9.1	9.1
38	20.3	16.2	12.1	15.0	14.2	14.2	9.8	9.1	9.1
39	19.1	15.1	11.5	14.8	14.0	14.0	9.7	9.0	9.0
40	23.2	17.5	13.0	15.3	14.4	14.5	9.9	9.2	9.2
41	18.1	14.2	11.4	14.8	14.0	14.1	9.7	8.9	9.0
42	22.7	17.7	13.1	15.2	14.4	14.4	9.9	9.2	9.2
43	20.6	15.8	11.8	15.2	14.3	14.4	9.8	9.0	9.0
44	26.1	19.2	13.8	15.7	14.8	14.9	10.0	9.3	9.3
45	19.6	14.6	11.0	15.0	14.1	14.1	9.7	8.9	8.9
46	24.9	17.9	12.7	15.3	14.4	14.4	9.9	9.1	9.1
47	27.1	19.9	14.1	15.2	14.3	14.3	10.0	9.3	9.3
48	31.5	20.9	14.6	15.3	14.2	14.1	10.1	9.2	9.2
49	26.6	19.0	13.6	14.9	14.0	14.0	9.9	9.1	9.1
50	14.1	12.1	9.5	13.5	12.6	12.6	9.1	8.4	8.4
51	18.3	14.1	11.1	14.6	13.7	13.7	9.6	8.9	8.9
52	17.5	13.8	10.9	14.6	13.7	13.6	9.6	8.8	8.8
53	18.6	14.7	11.4	14.6	13.7	13.7	9.6	8.9	8.9
54	15.8	12.4	9.8	14.1	13.2	13.2	9.4	8.7	8.7
55	14.6	11.0	9.1	14.1	13.1	13.1	9.4	8.6	8.6
56	14.9	11.7	9.1	14.5	13.6	13.6	9.2	8.5	8.5
57	16.0	12.3	9.4	14.6	13.7	13.7	9.3	8.6	8.6
58	38.5	25.9	17.4	16.6	15.7	15.7	10.4	9.6	9.6
59	30.0	21.4	14.8	15.7	14.9	14.9	10.0	9.3	9.3
60	16.5	12.6	9.6	14.4	13.5	13.5	9.5	8.7	8.7
61	19.1	13.8	10.3	14.5	13.5	13.5	9.5	8.7	8.7
62	13.5	10.6	8.6	13.8	12.9	12.9	9.2	8.5	8.4
63	14.8	11.3	9.1	13.9	13.0	13.0	9.2	8.5	8.5
64	20.5	14.9	11.0	14.1	13.2	13.2	9.3	8.6	8.6
65	19.5	14.3	10.6	14.1	13.2	13.2	9.3	8.6	8.6
66	21.8	14.9	10.8	14.0	13.0	13.0	9.4	8.6	8.5
67	22.7	15.4	11.1	14.1	13.1	13.1	9.4	8.6	8.6
68	34.3	23.5	16.1	15.1	14.2	14.2	10.2	9.4	9.4

Receptor	NO ₂			PM ₁₀			PM _{2.5}		
	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme	2019	2024 without scheme	2030 without scheme
69	31.3	21.3	14.7	14.9	13.9	13.9	10.0	9.2	9.2
70	26.7	18.3	13.0	14.6	13.6	13.6	9.8	9.0	9.0
71	13.6	11.9	9.4	13.4	12.6	12.5	9.1	8.4	8.4
72	17.0	12.1	9.7	13.8	12.8	12.8	9.2	8.4	8.4
73	20.7	16.9	12.6	14.2	13.4	13.5	9.4	8.8	8.8
74	12.7	10.2	8.4	13.8	12.9	12.8	9.2	8.4	8.4
75	19.4	16.0	12.0	14.1	13.4	13.5	9.4	8.8	8.8
76	15.4	12.4	9.9	13.8	12.9	12.9	9.2	8.5	8.5
77	15.1	12.5	10.0	14.5	13.7	13.7	9.5	8.8	8.8
78	12.4	11.1	9.0	14.3	13.5	13.5	9.1	8.5	8.5
79	16.3	12.8	9.8	13.6	12.7	12.7	9.2	8.5	8.5
80	11.6	9.2	7.9	13.9	12.9	12.9	9.1	8.3	8.3
81	12.1	9.4	8.0	13.9	13.0	12.9	9.1	8.3	8.3
82	11.4	9.1	7.8	13.8	12.9	12.9	9.1	8.3	8.3
83	32.6	23.0	16.4	16.2	15.4	15.4	10.7	9.9	9.9
84	15.1	11.3	9.1	13.5	12.5	12.5	9.1	8.3	8.3
85	14.3	10.8	8.8	13.4	12.5	12.5	9.1	8.3	8.3
86	14.5	10.9	8.8	13.4	12.5	12.5	9.1	8.3	8.3
87	14.9	11.4	9.0	13.5	12.5	12.5	9.1	8.3	8.3
88	13.0	10.0	8.3	13.8	12.8	12.8	9.2	8.4	8.4
89	14.4	12.2	9.6	13.5	12.6	12.6	9.1	8.4	8.4
90	17.6	12.3	9.9	14.4	13.3	13.3	9.6	8.7	8.7
91	15.3	11.7	9.6	14.2	13.3	13.3	9.5	8.7	8.7
Objectives	40			32 b			25 c		

^a Exceedances of the objective are shown in bold.

^b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG16 (Defra, 2021). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

G4.14 The predicted annual mean concentrations of nitrogen dioxide are below the annual mean objective in 2019 at all receptors, with all being well below (under 75% of) the objective by 2024 and onwards. The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at every receptor in 2019, 2024 and 2030; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph G3.2).

G4.15 The predicted annual mean concentrations of PM₁₀ and PM_{2.5} are well below the relevant annual mean objectives at all receptors, in 2019, 2024 and 2030. The annual mean PM₁₀ concentrations are below 32 µg/m³ and it is, therefore, unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

G5.0 Potential Effects

Built in Mitigation

G5.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The Proposed Development incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- realignment of the A29 through the Proposed Development itself, taking traffic emissions away from properties along the existing road; and
- new roads constructed well away from any sensitive receptors, wherever possible.

During Construction

Construction Traffic

G5.2 The construction works will generate HDV movements throughout the construction period, from 2023 up to 2031, but these will be variable in number and routing. Any impacts will be temporary and will not have a significant lasting effect on local air quality. Furthermore, typical traffic volumes generated by the site during the construction works will be considerably lower than the operational traffic generation, and below the relevant screening criteria of 100 AADT for heavy vehicles and 500 AADT for light vehicles recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase because they will be negligible.

On-Site Exhaust Emissions

G5.3 The IAQM guidance (IAQM, 2016) states:

“Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur”.

G5.4 The Proposed Development is large, however the areas within it in which NRMM and site traffic will typically operate will be well away from any existing sensitive properties. It is therefore judged that there is no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

G5.5 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix G1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude - Demolition

- G5.6 There will be a requirement to demolish a small number of farm buildings, to the north of the application site, with a total volume of under 20,000 m³. Based on the example definitions set out in G1.1 in Appendix G1, the dust emission class for demolition is considered to be *small*.

Potential Dust Emission Magnitude - Earthworks

- G5.7 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2021). There are a variety of soils across the site, most of which have the potential to be moderately dusty, but with some areas where there is the potential for the soil to be highly dusty.

- G5.8 The site, including the east-west link route, covers over 1,000,000 m² and a substantial proportion will be subject to earthworks. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table G1.1 in Appendix G1, the dust emission class for earthworks is considered to be *large*.

Potential Dust Emission Magnitude - Construction

- G5.9 Construction will involve some 1200 brick built residential properties and a school, with a total building volume of over 100,000 m³. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. Based on the example definitions set out in Table G1.1 in Appendix G1 the dust emission class for construction is considered to be *large*.

Potential Dust Emission Magnitude - Trackout

- G5.10 The number of heavy vehicles accessing the site, which may track out dust and dirt, is currently unknown, but given the large size of the site it is reasonably likely that maximum daily outbound vehicle movements will exceed 50 per day. Based on the example definitions set out in Table G1.1 in Appendix G1 the dust emission class for trackout is considered to be *large*.

Table G5.1 Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Large
Trackout	Large

Sensitivity of the Area

- G5.11 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM₁₀ concentrations.
- G5.12 The IAQM guidance explains that residential properties and schools are 'high' sensitivity receptors to dust soiling (Table G1.2 in Appendix G1). Both are also classified as being of 'high' sensitivity to human health effects. There are approximately 70 residential properties within 20m of the site boundary, as well as two schools and a nursery (see Figure G5.1). Homes within the Proposed Development are also expected to begin to be occupied in 2024, while construction on the rest of the site is ongoing. As such, future residents may also be subject to construction

dust impacts, and there are effectively more than 100 sensitive receptors that could be impacted within 20 m of the site boundary. However, construction will not be taking place across the whole site at the same time; rather it will be built out area by area, so for most of the construction works there will be considerably fewer sensitive receptors in proximity to the works.

Figure G5.1: 20 m Distance Band around Site Boundary

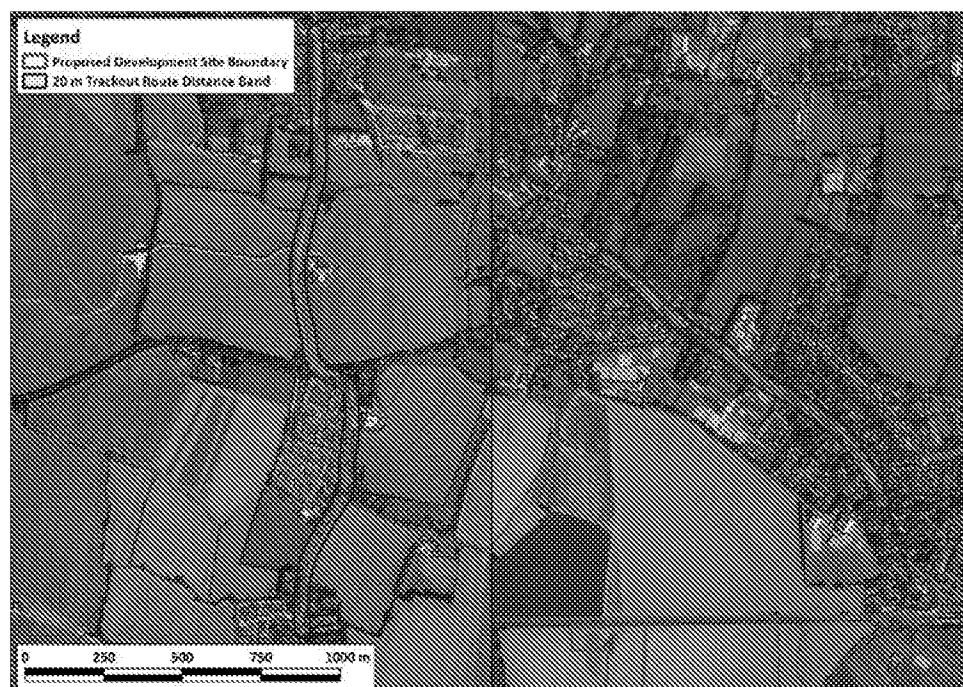


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G5.13

Table G5.1 shows that the dust emission magnitude for trackout is *large* and Table G1.3 in Appendix G1 thus explains that there is a risk of material being tracked 500 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are over 100 residential properties within 20 m of the roads along which material could be tracked (see Figure G5.2).

Figure G5.2: 20 m Distance Band around Possible Trackout Routes



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Sensitivity of the Area to Effects from Dust Soiling

- G5.14 Using the information set out in Paragraph G5.12 and Figure G5.1 alongside the matrix set out in G1.3 in Appendix G1, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph G5.13 and Figure G5.2 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

- G5.15 The matrix in G1.4 in Appendix G1 requires information on the baseline annual mean PM_{10} concentration in the area. Receptors 33 to 37 in Figure G3.5 and 50, 71, 79 and 89 in Figure G3.6, are situated along main roads near to the site. The maximum predicted baseline PM_{10} concentration at these receptors is $15.8 \mu g/m^3$ (Table G4.7) and this value has been used. Using the information set out in Paragraph G5.12 and Figure G5.1 alongside the matrix in Appendix G1 and Figure G5.1, the area surrounding the onsite works is of 'medium' sensitivity to human health effects. Using the information set out in Paragraph G5.13 and Figure G5.2 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'medium' sensitivity.

Summary of the Area Sensitivity

- G5.16 Table G5.2 summarises the sensitivity of the area around the proposed construction works.

Table G5.2 Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Medium Sensitivity	Medium Sensitivity

Risk and Significance

- G5.17 The dust emission magnitudes in Table G5.1 have been combined with the sensitivities of the area in Table G5.2 using the matrix in Table G1.7 in Appendix G1, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table G5.3. These risk categories have been used to determine the appropriate level of mitigation as set out in Section G6.0 (step 3 of the assessment procedure).

Table G5.3 Summary of Risk of Impacts without Mitigation

Source	Dust Soiling	Human Health
Demolition	Medium Risk	Low Risk
Earthworks	High Risk	Medium Risk
Construction	High Risk	Medium Risk
Trackout	High Risk	Medium Risk

- G5.18 The impacts will be direct, temporary, and medium term. The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016), as discussed further in section G7.0.

During Operation

Impacts at Existing Receptors

- G5.19 The Proposed Development will generate traffic volumes that exceed the EPUK/IAQM screening thresholds on a number of local roads, thus a detailed assessment is required. Receptor locations are described in Table G5.1 in Appendix G5 and shown in Figure G3.2 to Figure G3.9.

Road Traffic Impacts from the full occupation of Parcel SC1 – 2024

Nitrogen Dioxide

- G5.20 Predicted annual mean concentrations of nitrogen dioxide in 2024 for existing receptors are set out in Table G5.4 for both the "Without Scheme" and "With Scheme" scenarios. The impact at each receptor is also described using the impact descriptors given in Table G3.2.

Table G5.4 Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2024 (µg/m³)

Site No.	Without Scheme	With Scheme	% Change *	Impact Descriptor
1	15.3	15.4	0	Negligible
2	18.3	18.5	0	Negligible
3	14.3	14.4	0	Negligible
4	15.1	15.3	0	Negligible
5	22.3	22.7	1	Negligible
6	13.8	14.0	0	Negligible
7	17.4	17.8	1	Negligible
8	22.9	23.3	1	Negligible
9	17.6	18.0	1	Negligible
10	14.8	15.1	1	Negligible

Site No.	Without Scheme	With Scheme	% Change *	Impact Descriptor
11	17.4	17.4	0	No Change
12	17.7	17.7	0	No Change
13	14.7	14.8	0	Negligible
14	13.9	14.0	0	Negligible
15	14.3	14.3	0	Negligible
16	14.1	14.2	0	Negligible
17	16.4	17.0	1	Negligible
18	14.8	15.3	1	Negligible
19	14.5	14.6	0	Negligible
20	12.3	12.4	0	Negligible
21	13.6	13.7	0	Negligible
22	12.2	12.3	0	Negligible
23	15.9	16.1	1	Negligible
24	18.2	18.4	0	Negligible
25	20.6	20.8	1	Negligible
26	15.0	15.1	0	Negligible
27	16.8	16.9	0	Negligible
28	18.1	18.2	0	Negligible
29	18.0	18.4	1	Negligible
30	15.4	15.8	1	Negligible
31	19.5	19.8	1	Negligible
32	17.9	18.2	1	Negligible
33	17.2	17.9	2	Negligible
34	12.3	12.6	1	Negligible
35	16.2	16.7	1	Negligible
36	17.7	18.3	1	Negligible
37	17.5	17.8	1	Negligible
38	16.2	16.8	2	Negligible
39	15.1	15.6	1	Negligible
40	17.5	18.1	2	Negligible
41	14.2	14.2	0	Negligible
42	17.7	17.5	0	Negligible
43	15.8	15.9	0	Negligible
44	19.2	19.8	2	Negligible
45	14.6	14.8	0	Negligible
46	17.9	18.4	1	Negligible
47	19.9	20.7	2	Negligible
48	20.9	21.7	2	Negligible
49	19.0	19.6	1	Negligible
50	12.1	13.3	3	Negligible
51	14.1	14.5	1	Negligible
52	13.8	14.1	1	Negligible
53	14.7	15.1	1	Negligible

Site No.	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
54	12.4	12.7	1	Negligible
55	11.0	11.2	1	Negligible
56	11.7	11.8	0	Negligible
57	12.3	12.4	0	Negligible
58	25.9	26.0	0	Negligible
59	21.4	21.6	0	Negligible
60	12.6	12.9	1	Negligible
61	13.8	14.1	1	Negligible
62	10.6	10.7	0	Negligible
63	11.3	11.6	1	Negligible
64	14.9	15.3	1	Negligible
65	14.3	14.4	0	Negligible
66	14.9	15.0	0	Negligible
67	15.4	15.5	0	Negligible
68	23.5	23.6	0	Negligible
69	21.3	21.4	0	Negligible
70	18.3	18.4	0	Negligible
71	11.9	13.1	3	Negligible
72	12.1	12.4	1	Negligible
73	16.9	18.1	3	Negligible
74	10.2	10.3	0	Negligible
75	16.0	16.9	2	Negligible
76	12.4	13.0	2	Negligible
77	12.5	12.8	1	Negligible
78	11.1	11.2	0	Negligible
79	12.8	13.3	1	Negligible
80	9.2	9.4	1	Negligible
81	9.4	9.7	1	Negligible
82	9.1	9.3	0	Negligible
83	23.0	23.4	1	Negligible
84	11.3	11.8	1	Negligible
85	10.8	11.1	1	Negligible
86	10.9	11.3	1	Negligible
87	11.4	11.5	0	Negligible
88	10.0	10.1	0	Negligible
89	12.2	13.2	2	Negligible
90	12.3	12.5	0	Negligible
91	11.7	11.9	0	Negligible
Objective	40		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

G5.21

The annual mean nitrogen dioxide concentrations are well below the objective at all receptors. Despite changes in concentrations of as much as 3% (relative to the objective), total

concentrations are sufficiently low that the impacts are all described as *negligible* and thus not significant.

PM₁₀ and PM_{2.5}

G5.22

Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2024 for existing receptors are set out in Table G5.5 for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given in Table G3.2.

Table G5.5 Predicted Impacts on Annual Mean PM₁₀ and PM_{2.5} Concentrations in 2024 (µg/m³)

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
2	14.5	14.5	0	Negligible	10.0	10.0	0	Negligible
3	13.3	13.3	0	Negligible	9.1	9.1	0	Negligible
4	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
5	13.6	13.6	0	Negligible	9.1	9.1	0	Negligible
6	12.5	12.5	0	Negligible	8.5	8.5	0	Negligible
7	13.8	13.9	0	Negligible	9.4	9.4	0	Negligible
8	14.1	14.2	0	Negligible	9.6	9.6	0	Negligible
9	14.1	14.2	0	Negligible	9.7	9.7	0	Negligible
10	13.7	13.8	0	Negligible	9.5	9.5	0	Negligible
11	15.0	15.0	0	Negligible	9.6	9.6	0	Negligible
12	14.9	14.9	0	Negligible	9.6	9.6	0	Negligible
13	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
14	14.1	14.1	0	Negligible	9.7	9.7	0	Negligible
15	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
16	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
17	14.7	14.8	0	Negligible	9.1	9.1	0	Negligible
18	14.4	14.5	0	Negligible	9.0	9.0	0	Negligible
19	12.2	12.2	0	Negligible	8.3	8.3	0	Negligible
20	12.0	12.0	0	Negligible	8.1	8.1	0	Negligible
21	12.1	12.1	0	Negligible	8.2	8.2	0	Negligible
22	11.7	11.7	0	Negligible	8.0	8.0	0	Negligible
23	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
24	14.5	14.5	0	Negligible	10.0	10.0	0	Negligible
25	14.8	14.8	0	Negligible	10.1	10.1	0	Negligible
26	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
27	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
28	14.7	14.7	0	Negligible	10.0	10.0	0	Negligible

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
29	13.6	13.7	0	Negligible	9.3	9.4	0	Negligible
30	13.7	13.7	0	Negligible	9.4	9.5	0	Negligible
31	14.2	14.2	0	Negligible	9.7	9.8	0	Negligible
32	14.0	14.0	0	Negligible	9.6	9.6	0	Negligible
33	14.8	14.9	0	Negligible	9.2	9.2	0	Negligible
34	14.1	14.1	0	Negligible	8.8	8.8	0	Negligible
35	14.7	14.8	0	Negligible	9.0	9.0	0	Negligible
36	15.0	15.0	0	Negligible	9.1	9.1	0	Negligible
37	14.9	15.0	0	Negligible	9.1	9.1	0	Negligible
38	14.2	14.3	0	Negligible	9.1	9.1	0	Negligible
39	14.0	14.0	0	Negligible	9.0	9.0	0	Negligible
40	14.4	14.5	0	Negligible	9.2	9.3	0	Negligible
41	14.0	14.0	0	Negligible	8.9	9.0	0	Negligible
42	14.4	14.4	0	Negligible	9.2	9.2	0	Negligible
43	14.3	14.4	0	Negligible	9.0	9.1	0	Negligible
44	14.8	14.9	0	Negligible	9.3	9.3	0	Negligible
45	14.1	14.1	0	Negligible	8.9	8.9	0	Negligible
46	14.4	14.5	0	Negligible	9.1	9.1	0	Negligible
47	14.3	14.4	0	Negligible	9.3	9.3	0	Negligible
48	14.2	14.3	0	Negligible	9.2	9.3	0	Negligible
49	14.0	14.0	0	Negligible	9.1	9.1	0	Negligible
50	12.6	12.7	0	Negligible	8.4	8.5	0	Negligible
51	13.7	13.8	0	Negligible	8.9	8.9	0	Negligible
52	13.7	13.7	0	Negligible	8.8	8.9	0	Negligible
53	13.7	13.8	0	Negligible	8.9	8.9	0	Negligible
54	13.2	13.3	0	Negligible	8.7	8.7	0	Negligible
55	13.1	13.1	0	Negligible	8.6	8.6	0	Negligible
56	13.6	13.6	0	Negligible	8.5	8.5	0	Negligible
57	13.7	13.7	0	Negligible	8.6	8.6	0	Negligible
58	15.7	15.7	0	Negligible	9.6	9.6	0	Negligible
59	14.9	14.9	0	Negligible	9.3	9.3	0	Negligible
60	13.5	13.6	0	Negligible	8.7	8.7	0	Negligible
61	13.5	13.6	0	Negligible	8.7	8.7	0	Negligible
62	12.9	12.9	0	Negligible	8.5	8.5	0	Negligible
63	13.0	13.0	0	Negligible	8.5	8.5	0	Negligible
64	13.2	13.3	0	Negligible	8.6	8.6	0	Negligible

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
65	13.2	13.2	0	Negligible	8.6	8.6	0	Negligible
66	13.0	13.1	0	Negligible	8.6	8.6	0	Negligible
67	13.1	13.2	0	Negligible	8.6	8.6	0	Negligible
68	14.2	14.2	0	Negligible	9.4	9.4	0	Negligible
69	13.9	14.0	0	Negligible	9.2	9.2	0	Negligible
70	13.6	13.6	0	Negligible	9.0	9.1	0	Negligible
71	12.6	12.7	0	Negligible	8.4	8.5	0	Negligible
72	12.8	12.8	0	Negligible	8.4	8.4	0	Negligible
73	13.4	13.6	0	Negligible	8.8	8.8	0	Negligible
74	12.9	12.9	0	Negligible	8.4	8.4	0	Negligible
75	13.4	13.5	0	Negligible	8.8	8.8	0	Negligible
76	12.9	13.0	0	Negligible	8.5	8.5	0	Negligible
77	13.7	13.7	0	Negligible	8.8	8.8	0	Negligible
78	13.5	13.5	0	Negligible	8.5	8.5	0	Negligible
79	12.7	12.8	0	Negligible	8.5	8.5	0	Negligible
80	12.9	13.0	0	Negligible	8.3	8.3	0	Negligible
81	13.0	13.0	0	Negligible	8.3	8.4	0	Negligible
82	12.9	12.9	0	Negligible	8.3	8.3	0	Negligible
83	15.4	15.4	0	Negligible	9.9	10.0	0	Negligible
84	12.5	12.6	0	Negligible	8.3	8.4	0	Negligible
85	12.5	12.5	0	Negligible	8.3	8.3	0	Negligible
86	12.5	12.5	0	Negligible	8.3	8.3	0	Negligible
87	12.5	12.6	0	Negligible	8.3	8.4	0	Negligible
88	12.8	12.9	0	Negligible	8.4	8.4	0	Negligible
89	12.6	12.7	0	Negligible	8.4	8.5	0	Negligible
90	13.3	13.3	0	Negligible	8.7	8.7	0	Negligible
91	13.3	13.3	0	Negligible	8.7	8.7	0	Negligible
Objective	32 ^b		-	-	25 ^c		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

^b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG16 (Defra, 2021). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

- G5.23 The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the Proposed Development, and the impacts are all *negligible* and thus not significant. As the annual mean PM₁₀ concentrations are all below 32 µg/m³, it is also unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors.

Road Traffic Impacts from the full occupation of the Wider Allocation - 2030

Nitrogen Dioxide

- G5.24 Predicted annual mean concentrations of nitrogen dioxide in 2030 for existing receptors are set out in Table G5.6 for both the “Without Scheme” and “With Scheme” scenarios. The impact at each receptor is also described using the impact descriptors given in Table G3.2.

Table G5.6 Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2030 (µg/m³)

Site No.	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	11.9	12.1	1	Negligible
2	13.7	13.9	1	Negligible
3	11.3	11.5	0	Negligible
4	11.8	12.0	1	Negligible
5	15.8	16.7	2	Negligible
6	10.8	11.1	1	Negligible
7	12.8	13.2	1	Negligible
8	16.1	16.5	1	Negligible
9	12.8	13.1	1	Negligible
10	11.1	11.3	1	Negligible
11	12.8	12.8	0	Negligible
12	13.0	12.9	0	Negligible
13	11.6	11.8	0	Negligible
14	11.1	11.3	0	Negligible
15	11.3	11.5	0	Negligible
16	11.2	11.4	0	Negligible
17	12.1	13.9	5	Negligible
18	11.1	12.4	3	Negligible
19	10.8	11.0	1	Negligible
20	9.6	9.7	0	Negligible
21	10.3	10.5	0	Negligible
22	9.4	9.6	0	Negligible
23	12.3	12.6	1	Negligible
24	13.6	14.2	2	Negligible
25	14.9	15.7	2	Negligible
26	11.8	12.2	1	Negligible
27	12.7	12.9	0	Negligible
28	13.5	13.7	0	Negligible
29	13.1	13.5	1	Negligible
30	11.6	11.9	1	Negligible
31	13.8	14.1	1	Negligible

Site No.	Without Scheme	With Scheme	% Change *	Impact Descriptor
32	12.9	13.1	1	Negligible
33	12.5	14.6	5	Negligible
34	9.6	9.3	-1	Negligible
35	12.2	10.3	-5	Negligible
36	13.1	10.4	-7	Minor Beneficial
37	12.9	10.8	-5	Negligible
38	12.1	10.5	-4	Negligible
39	11.5	10.2	-3	Negligible
40	13.0	10.0	-7	Minor Beneficial
41	11.4	10.1	-3	Negligible
42	13.1	10.3	-7	Minor Beneficial
43	11.8	9.5	-6	Minor Beneficial
44	13.8	10.5	-8	Minor Beneficial
45	11.0	10.1	-2	Negligible
46	12.7	12.0	-2	Negligible
47	14.1	11.8	-6	Minor Beneficial
48	14.6	12.7	-5	Negligible
49	13.6	11.6	-5	Negligible
50	9.5	11.4	5	Negligible
51	11.1	12.0	2	Negligible
52	10.9	11.4	1	Negligible
53	11.4	11.7	1	Negligible
54	9.8	10.0	1	Negligible
55	9.1	9.8	2	Negligible
56	9.1	9.5	1	Negligible
57	9.4	9.9	1	Negligible
58	17.4	17.7	1	Negligible
59	14.8	15.1	1	Negligible
60	9.6	9.6	0	Negligible
61	10.3	10.3	0	Negligible
62	8.6	8.9	1	Negligible
63	9.1	9.5	1	Negligible
64	11.0	11.5	1	Negligible
65	10.6	10.8	0	Negligible
66	10.8	11.1	1	Negligible
67	11.1	11.4	1	Negligible
68	16.1	16.4	1	Negligible
69	14.7	14.9	0	Negligible
70	13.0	13.1	0	Negligible
71	9.4	11.3	5	Negligible
72	9.7	9.8	0	Negligible
73	12.6	13.3	2	Negligible
74	8.4	8.2	0	Negligible

Site No.	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
75	12.0	12.8	2	Negligible
76	9.9	10.4	1	Negligible
77	10.0	9.8	-1	Negligible
78	9.0	9.8	2	Negligible
79	9.8	10.7	2	Negligible
80	7.9	8.4	1	Negligible
81	8.0	8.6	2	Negligible
82	7.8	8.2	1	Negligible
83	16.4	16.5	0	Negligible
84	9.1	9.5	1	Negligible
85	8.8	9.1	1	Negligible
86	8.8	9.1	1	Negligible
87	9.0	9.2	0	Negligible
88	8.3	8.4	0	Negligible
89	9.6	11.1	4	Negligible
90	9.9	9.6	-1	Negligible
91	9.6	9.3	-1	Negligible
Objective	40		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

G5.25 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors. Despite increases in concentrations of as much as 4% (relative to the objective), total concentrations are sufficiently low that all impacts relating to concentrations increases are described as *negligible* and thus not significant. There are also a number of beneficial changes in concentration due to the realignment of the A29, reaching improvements of up to 8% of the objective, and resulting in *minor beneficial* impacts. These improvements are localised to dwellings along the existing A29, north of the proposed junction adjacent to Sack Lane and west of the Church Lane junction, where traffic flows will decrease as a result of the A29 realignment.

PM₁₀ and PM_{2.5}

G5.26 Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2024 for existing receptors are set out in Table G5.7 for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given in Table G3.2.

Table G5.7 Predicted Impacts on Annual Mean PM10 and PM2.5 Concentrations in 2030 (µg/m³)

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
2	14.5	14.6	0	Negligible	10.0	10.0	0	Negligible

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
3	13.3	13.3	0	Negligible	9.1	9.1	0	Negligible
4	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
5	13.6	13.8	0	Negligible	9.1	9.2	0	Negligible
6	12.5	12.6	0	Negligible	8.5	8.5	0	Negligible
7	13.9	13.9	0	Negligible	9.5	9.5	0	Negligible
8	14.2	14.3	0	Negligible	9.6	9.7	0	Negligible
9	14.2	14.3	0	Negligible	9.7	9.8	0	Negligible
10	13.8	13.8	0	Negligible	9.5	9.5	0	Negligible
11	14.9	14.9	0	Negligible	9.5	9.5	0	Negligible
12	14.8	14.8	0	Negligible	9.5	9.5	0	Negligible
13	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
14	14.1	14.1	0	Negligible	9.7	9.7	0	Negligible
15	14.1	14.2	0	Negligible	9.7	9.8	0	Negligible
16	14.2	14.2	0	Negligible	9.8	9.8	0	Negligible
17	14.7	15.1	1	Negligible	9.1	9.3	1	Negligible
18	14.5	14.8	1	Negligible	9.0	9.1	1	Negligible
19	12.2	12.3	0	Negligible	8.3	8.3	0	Negligible
20	12.0	12.0	0	Negligible	8.1	8.2	0	Negligible
21	12.1	12.2	0	Negligible	8.2	8.2	0	Negligible
22	11.7	11.8	0	Negligible	8.0	8.0	0	Negligible
23	13.4	13.5	0	Negligible	9.2	9.2	0	Negligible
24	14.5	14.6	0	Negligible	10.0	10.0	0	Negligible
25	14.8	14.9	0	Negligible	10.1	10.2	0	Negligible
26	14.2	14.3	0	Negligible	9.8	9.8	0	Negligible
27	13.4	13.4	0	Negligible	9.2	9.2	0	Negligible
28	14.7	14.7	0	Negligible	10.0	10.1	0	Negligible
29	13.7	13.7	0	Negligible	9.3	9.4	0	Negligible
30	13.7	13.7	0	Negligible	9.5	9.5	0	Negligible
31	14.2	14.3	0	Negligible	9.8	9.8	0	Negligible
32	14.0	14.0	0	Negligible	9.6	9.6	0	Negligible
33	14.9	15.3	1	Negligible	9.2	9.4	1	Negligible
34	14.1	13.9	-1	Negligible	8.8	8.7	0	Negligible
35	14.8	14.3	-2	Negligible	9.0	8.7	-1	Negligible
36	15.0	14.3	-2	Negligible	9.1	8.7	-2	Negligible
37	15.0	14.4	-2	Negligible	9.1	8.8	-1	Negligible
38	14.2	13.9	-1	Negligible	9.1	8.9	-1	Negligible

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
39	14.0	13.7	-1	Negligible	9.0	8.8	-1	Negligible
40	14.5	13.8	-2	Negligible	9.2	8.9	-2	Negligible
41	14.1	13.7	-1	Negligible	9.0	8.8	-1	Negligible
42	14.4	13.8	-2	Negligible	9.2	8.9	-1	Negligible
43	14.4	13.9	-2	Negligible	9.0	8.8	-1	Negligible
44	14.9	14.1	-2	Negligible	9.3	8.9	-2	Negligible
45	14.1	13.9	0	Negligible	8.9	8.8	0	Negligible
46	14.4	14.2	0	Negligible	9.1	9.0	0	Negligible
47	14.3	13.8	-2	Negligible	9.3	9.0	-1	Negligible
48	14.1	13.8	-1	Negligible	9.2	9.0	-1	Negligible
49	14.0	13.6	-1	Negligible	9.1	8.9	-1	Negligible
50	12.6	12.9	1	Negligible	8.4	8.6	1	Negligible
51	13.7	13.9	1	Negligible	8.9	9.0	0	Negligible
52	13.6	13.7	0	Negligible	8.8	8.9	0	Negligible
53	13.7	13.8	0	Negligible	8.9	8.9	0	Negligible
54	13.2	13.2	0	Negligible	8.7	8.7	0	Negligible
55	13.1	13.2	0	Negligible	8.6	8.7	0	Negligible
56	13.6	13.7	0	Negligible	8.5	8.5	0	Negligible
57	13.7	13.8	0	Negligible	8.6	8.6	0	Negligible
58	15.7	15.7	0	Negligible	9.6	9.6	0	Negligible
59	14.9	15.0	0	Negligible	9.3	9.3	0	Negligible
60	13.5	13.5	0	Negligible	8.7	8.7	0	Negligible
61	13.5	13.5	0	Negligible	8.7	8.7	0	Negligible
62	12.9	12.9	0	Negligible	8.4	8.5	0	Negligible
63	13.0	13.0	0	Negligible	8.5	8.5	0	Negligible
64	13.2	13.3	0	Negligible	8.6	8.6	0	Negligible
65	13.2	13.3	0	Negligible	8.6	8.6	0	Negligible
66	13.0	13.1	0	Negligible	8.5	8.6	0	Negligible
67	13.1	13.2	0	Negligible	8.6	8.6	0	Negligible
68	14.2	14.3	0	Negligible	9.4	9.4	0	Negligible
69	13.9	14.0	0	Negligible	9.2	9.2	0	Negligible
70	13.6	13.6	0	Negligible	9.0	9.1	0	Negligible
71	12.5	12.9	1	Negligible	8.4	8.6	1	Negligible
72	12.8	12.8	0	Negligible	8.4	8.4	0	Negligible
73	13.5	13.6	0	Negligible	8.8	8.9	0	Negligible
74	12.8	12.8	0	Negligible	8.4	8.4	0	Negligible

Site No.	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
75	13.5	13.7	1	Negligible	8.8	8.9	0	Negligible
76	12.9	13.0	0	Negligible	8.5	8.5	0	Negligible
77	13.7	13.7	0	Negligible	8.8	8.8	0	Negligible
78	13.5	13.7	1	Negligible	8.5	8.6	0	Negligible
79	12.7	12.9	1	Negligible	8.5	8.6	0	Negligible
80	12.9	13.0	0	Negligible	8.3	8.4	0	Negligible
81	12.9	13.1	0	Negligible	8.3	8.4	0	Negligible
82	12.9	13.0	0	Negligible	8.3	8.4	0	Negligible
83	15.4	15.4	0	Negligible	9.9	9.9	0	Negligible
84	12.5	12.6	0	Negligible	8.3	8.4	0	Negligible
85	12.5	12.5	0	Negligible	8.3	8.3	0	Negligible
86	12.5	12.5	0	Negligible	8.3	8.3	0	Negligible
87	12.5	12.6	0	Negligible	8.3	8.4	0	Negligible
88	12.8	12.8	0	Negligible	8.4	8.4	0	Negligible
89	12.6	12.9	1	Negligible	8.4	8.6	1	Negligible
90	13.3	13.3	0	Negligible	8.7	8.7	0	Negligible
91	13.3	13.2	0	Negligible	8.7	8.7	0	Negligible
Objective	32 ^b		-	-	25 ^c		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

^b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG16 (Defra, 2021). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

G5.27 The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the Proposed Development. All impacts, relating to both increases and decreases in concentration, are *negligible* and thus not significant. As the annual mean PM₁₀ concentrations are all below 32 µg/m³, it is also unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors.

Impacts within Chichester AQMAs

G5.28 The development-generated flows for the 2024 scenario, which are based on 2031 traffic data that reflects the full development-generated traffic, are most relevant for initial screening of the impacts of the Proposed Development.

G5.29 These flows indicate that development-generated traffic entering the Stockbridge Roundabout AQMA are above the screening threshold of 100 LDVs (the screening threshold for inside of an AQMA), but below the 500 LDV screening threshold for outside of an AQMA. The most recent monitoring undertaken within the Stockbridge Roundabout AQMA shows that annual mean nitrogen dioxide concentrations are well below the objective (see Table G3.1) and have been below the objective in every year since at least 2015. The EPUK/IAQM guidance states:

“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.”

G5.30 The higher screening threshold of 500 LDVs is, therefore, more appropriate within the Stockbridge Roundabout AQMA, and this will not be exceeded, thus a detailed assessment of the impacts of the operation of the Proposed Development in this AQMA is not necessary.

G5.31 In the St Pancras and Orchard Street AQMA, the additional traffic generated by the Proposed Development is below the screening threshold of 100 LDVs. Therefore, the Proposed Development will not result in a significant impact in these AQMAs.

G5.32 As such, it is concluded that the Proposed Development will not have a significant impact on air quality in any of the AQMAs in Chichester.

Impacts on Future Residents of the Development

Assessment of Road Traffic Emissions

G5.33 Predicted worst-case air quality conditions for future residents of the Proposed Development, including the wider allocation and taking account of emissions from the existing and proposed road network, are set out in Table G5.8 for Receptors 92 to 96 (receptor locations are described in Table G5.1 in Appendix G5 and shown in Figure G3.10). All of the values are well below the objectives. As the locations selected are worst-case, it can be concluded that concentrations throughout the site will be well below the objectives in both future scenarios. Air quality for future residents within the development will thus be acceptable and impacts negligible.

Table G5.8 Predicted Annual Mean Concentrations of Nitrogen Dioxide (NO₂), PM₁₀ and PM_{2.5} in 2024 and 2030 for New Receptors in the Proposed Development (µg/m³)

Receptor	2024			2030		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
92	12.0	14.0	8.6	14.0	14.8	9.1
93	11.5	13.9	8.6	13.0	14.6	9.0
94	11.3	13.9	8.6	12.6	14.5	9.0
95	8.6	13.6	8.4	12.4	14.7	9.0
96	8.6	13.6	8.4	11.2	14.4	8.9
Objective	40	32 a	25 b	40	32 a	25 b

^a While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in IAQM.TG16 (Defra, 2021). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

Assessment of Railway Locomotive Emissions

- G5.34 Defra guidance (Defra, 2021) outlines that there is only the potential for an exceedance of the annual mean nitrogen dioxide objective where there is long-term exposure within 30 m of railway lines, these lines see a high volume of diesel passenger trains and the annual mean background concentrations of nitrogen dioxide is above 25 µg/m³. The application site falls outside of these criteria; while the facades of a small number of homes may be within 30 m of the railway lines, the background concentration is well below 25 µg/m³ (see Table G4.6), and these specific railway lines are not identified as having a high volume of diesel passenger trains. It can, therefore, be concluded that there is no risk of an objective exceedance within the Proposed Development as a result of emission from locomotives using the adjacent railway lines.

Impacts on the Pagham Harbour Special Area of Conservation

- G5.35 The traffic data provided by Pell Frischmann indicates that the Proposed Development, in combination with the Strategic Allocation, will generate less than 50 AADT within 200 m of the Pagham Harbour SAC/SPA/Ramsar. Increases in traffic of under 50 AADT in-isolation are considered below the de minimis threshold for consideration of impacts in-combination with other plans and projects. This has been used in numerous previous assessments as an indicator of whether detailed assessment of ecological impacts is necessary for developments. Thus, ecological impacts are judged to be 'not significant'.

Significance of Operational Air Quality Effects

- G5.36 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 G2 and takes account of the assessment that:
- pollutant concentrations within the Proposed Development will be well below the objectives throughout the site, thus future residents will experience acceptable air quality and impacts *negligible*;
 - pollutant concentrations at all of the selected worst-case existing receptors along the local road network will be well below the air quality objectives, and all of the impacts are predicted to be *negligible* in the 2024 scenario; and
 - all of the impacts are predicted to be either *negligible* or *minor beneficial* in the 2030 scenario;
 - all the impacts described above will be indirect and long-term.

G6.0

Mitigation and Monitoring

During Construction

G6.1

Table G6.1 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2016) that should be incorporated into the specification for the works. These measures should be written into a Dust Management Plan to form part of the CEMP prepared by the lead contractor and will be secured via a planning condition. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table G6.1 Best Practice Mitigation Measure Recommended for the Works

Measure	Desirable	Highly Recommended
Communications		
Develop and implement a stakeholder communications plan that includes community engagement before and during work on site		✓
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager		✓
Display the head or regional office contact information		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management		✓
Site Management		
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken		✓
Make the complaints log available to the local authority when asked		✓
Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book		✓
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes		✓
Monitoring		
Undertake daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust. Record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and		✓

window sills within 100 m of the site boundary, with cleaning to be provided if necessary		
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions		✓
Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction (IAQM, 2018)		✓
Preparing and Maintaining the Site		
Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible		✓
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period		✓
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)		✓
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)		✓

Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓
Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods		✓
Waste Management		
Avoid bonfires and burning of waste materials		✓
Measures Specific to Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	✓	
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground		✓
Avoid explosive blasting, using appropriate manual or mechanical alternatives		✓
Bag and remove any biological debris or damp down such material before demolition		✓
Measures Specific to Earthworks		
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable		✓
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable		✓
Only remove the cover from small areas during work, not all at once		✓
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible		✓
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place		✓
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery		✓

For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust	✓	
Measures Specific to Trackout		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;		✓
Record all inspections of haul routes and any subsequent action in a site log book;		✓
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems or mobile water bowsers, and regularly cleaned;		✓
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);		✓
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and		✓
Access gates should be located at least 10 m from receptors, where possible		✓

During Operation

G6.2 The assessment has demonstrated that the overall air quality effect of the Proposed Development will be **Not Significant**; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

G6.3 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 (which is written into UK law).

Air Quality Damage Costs

G6.4 As stated in Paragraphs G2.24 and G2.25, to comply with the Air Quality and Emissions Mitigation Guidance for Sussex Authorities (Sussex-air Air Quality Partnership, 2020) developments classed as 'major' are expected to prepare an emissions mitigation assessment, in which air quality 'damage costs' are used to determine appropriate levels of mitigation. The costs associated with transport emissions from the Proposed Development have been calculated in accordance with this guidance. The calculated cost is £337,176, with details of the calculation and the full emissions mitigation statement set out in Appendix G6.

Proposed Mitigation Measures

- G6.5 The development will include mitigation in the form of a Framework Travel Plan, a framework upon which subordinate Travel Plans, individualised to each development parcel, will be based. The Plan aims to promote sustainable travel and sets out the following measures to minimise its impact on the local road network:
- assignment of a Travel Plan Coordinator to manage the plan, produce a bi-annual newsletter, oversee delivery, build awareness and engagement with stakeholders, monitor progress and promote Travel Plan measures;
 - promotion of sustainable travel options to residents prior to occupation via provision of a travel pack, which references key services, facilities, car-share databases, local cycling clubs, public transport timetables, walking and cycling routes, Ultra Low Emission Vehicles infrastructure information, taxi company details and bike purchase and maintenance information;
 - promotion of public transport use via provision of bus timetables, route and fare information and rail service information;
 - promotion of walking and cycling via provision for walking and cycling route maps, personalised journey/travel planning advice from the Travel Plan Coordinator and cycle parking; and
 - promotion electric vehicle uptake by providing information on local EV and Ultra Low Emission Vehicle dealerships, charging infrastructure, maintenance services, environmental benefits and financial incentives to ownership.
 - investigation into the possibility of implementing new EV and Ultra Low Emission Vehicle infrastructure a site-wide travel website or social media account.
- G6.6 With the above measures, air quality impacts will remain **Not Significant**.

G7.0 Residual Effects

During Construction

G7.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section G6.0 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be **Not Significant**.

G7.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

During Operation

G7.3 The residual impacts will be the same as those identified in Section G5.0. The overall effects of the Proposed Development will be negligible and **Not significant**.

G8.0 Summary & Conclusions

G8.1 The assessment has considered the impacts of the Proposed Development on local air quality in terms of dust and particulate matter emissions during construction, and emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience. Damage cost calculations have been carried out in accordance with Air Quality and Emissions Mitigation Guidance for Sussex Authorities and are included in Appendix G6. The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.

During Construction

G8.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be **Not Significant**.

During Operation

G8.3 Air quality conditions for future residents of the Proposed Development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site. The effects of emissions from locomotives on the adjacent rail line have been shown to be **Not Significant**.

G8.4 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2024 and 2030, with or without the Proposed Development, and that the emissions from the additional traffic generated by the Proposed Development will either have a **Negligible or Minor Beneficial** impact on air quality conditions at existing receptors along the local road network.

Mitigation

G8.5 The assessment has demonstrated that the overall air quality effect of the Proposed Development will be **Not Significant**. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

Significance

G8.6 The overall operational air quality effects of the Proposed Development are judged to be **Not Significant**.

Policy Implications

G8.7 Taking into account these conclusions, it is judged that the Proposed Development is consistent with Paragraph 180 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 181, as it will not affect compliance with relevant limit values or national objectives. While the Proposed Development will generate additional traffic on the A286 in Chichester, it will not significantly affect air quality at properties along this road, thus it is judged not to affect Chichester District Council's ability to implement its Air Quality Action Plan.

Table G8.1 Summary of effects

Receptor	Sensitivity of Receptor	Nature of potential impact	Proposed mitigation	Residual effect
Construction Phase				
Existing residential properties	High	Adverse	Package of construction mitigation measures written into a DMP, specified in Section G6.0.	Not significant
Operational Phase				
Existing residential properties	High	Negligible to slight beneficial	Realignment of the A29 through the development site, diverting traffic away from existing receptors.	Not significant
Proposed receptors within the scheme	High	Negligible	Setting proposed properties back from the realigned A29 wherever possible.	Not significant

G9.0

Abbreviations & Definitions

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQC	Air Quality Consultants
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
CROW	Countryside and Rights of Way Act
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
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
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
kW	Kilowatt
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
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
NRMM	Non-road Mobile Machinery
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
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
WHO	World Health Organisation

G10.0

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