Air Quality Assessment

Brooklands Allotments and Mayberry Garden Centre

May 2021

www.phlorum.com

Air Quality Assessment

Brooklands Allotments and Mayberry Garden Centre

May 2021

Tates Bros.
Paradise Park,
Avis Road,
Newhaven,
East Sussex, BN9 0DH

Document Control:

Project no.	Project
10224.S	Brooklands Allotments and Mayberry Garden Centre

Report No.	Ver/rev	Written By:	Checked by:	Authorised by:	Date
10224.S	Draft v0	R. Boakes	N. Jenkins	N. Jenkins	24/11/2020
	Final v1	R. Boakes	N. Jenkins	N. Jenkins	12/05/2021

Phlorum Limited

Southern Office: Unit 12, Hunns Mere Way, Woodingdean, Brighton, East Sussex, BN2 6AH

T: 01273 307 167 E: info@phlorum.com W: www.phlorum.com

Contents

Figures:

Appendices:

1. Introduction

1.1 Phlorum Ltd has been commissioned by Folkes Architects, on behalf of Tates Bros. Ltd to undertake an Air Quality Assessment (AQA) for the proposed development at Brooklands Allotments and Mayberry Garden Centre, Portslade. The proposed development sits on and is split by the administrative boundaries of Brighton and Hove City Council (BHCC) and Adur District Council (ADC). The National Grid Reference for the centre of the site is 525200, 105850. The site location is included in Figure 1.

1.2 The proposed development comprises an extension of the existing Mayberry Garden Centre, a new car showroom (B1/B8 land use class) and a car parking facility under the existing overhead power lines.

1.3 ADC's Planning Department provided pre-application advice for the proposed development (PREAPP/0123/20), which stated the requirement for an Air Quality Assessment, in line with Sussex-Air's Air Quality and Emissions Mitigation Guidance for Sussex. The pre-application advice aligns with the requirements set out within the Eastbrook Allotments Development Brief[1], produced by ADC in 2015 to guide future development at this site.

1.4 The main sources of air pollution within the vicinity of the application site are vehicles travelling on the local road network, particularly the adjacent A270 Old Shoreham Road.

1.5 ADC has several Air Quality Management Areas (AQMAs) across the district due to exceedances of the annual mean Air Quality Standard (AQS) for nitrogen dioxide (NO_2). The closest is the Southwick AQMA, which is located on the A270 approximately 1km to the west of the application site.

1.6 BHCC has also declared two AQMAs, in 2013, for exceedances of the annual mean AQS for NO_2. AQMA 1, which encompasses much of the city's major road network, including part of the A270. The AQMA is located approximately 0.25km to the east of the application site. Note this AQMA was amended in November 2020.

1.7 With the proposed development surrounded by AQMAs, this report will assess the impacts of the proposed development's traffic generation on these AQMAs.

1 ADC (2015). Eastbrook Allotments Development Brief.

2. Policy Context

The UK Air Quality Strategy

2.1 The UK Air Quality Strategy (UKAQS)[2] set out air quality standard (AQS) concentrations for a number of key pollutants that are to be achieved at sensitive receptor locations across the UK by corresponding air quality objective (AQO) dates. The sensitive locations at which the standards and objectives apply are those where the population are reasonably expected to be exposed to said pollutants over the particular averaging period.

2.2 For those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to compare concentrations against the standards are areas of residential housing. It is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.

2.3 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time. A summary of the AQS relevant to this assessment are included in Table 2.1, below.

Table 2.1 UK Air Quality Standards.

Pollutant	Averaging Period	Air quality standard ($\mu g.m^{-3}$)	Air quality objective
Nitrogen dioxide (NO_2)	1 hour	200	200 $\mu g.m^{-3}$ not to be exceeded more than 18 times a year
	Annual	40	40 $\mu g.m^{-3}$
Particulate Matter (PM_{10})	24 hour	50	50 $\mu g.m^{-3}$ not to be exceeded more than 35 times a year
	Annual	40	40 $\mu g.m^{-3}$
Particulate Matter ($PM_{2.5}$)	Annual	25	25 $\mu g.m^{-3}$

2 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) July 2007.

2.4 The objectives adopted in the UK are based on the Air Quality (England) Regulations 2000[3], as amended, for the purpose of Local Air Quality Management. These Air Quality Regulations have been adopted into UK law from the limit values required by European Union Daughter Directives on air quality.

2.5 Obligations under the Environment Act 1995 require local authorities to declare an AQMA at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below the objective levels.

2.6 ADC has developed an Air Quality Action Plan in 2007[4], outlining a number of actions and strategies to reduce pollution levels within and surrounding their AQMAs. BHCC developed there AQAP in 2015[5].

National Planning Policy Framework

2.7 The National Planning Policy Framework (NPPF)[6], which was updated in June 2019, sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. A core principle in the NPPF that relates to air quality effects from development is that planning should "contribute to conserve and enhance the natural and local environment". In achieving this, it states in paragraph 170 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: […]

preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability […]".

2.8 With regard to assessing cumulative effects the NPPF states the following at paragraph 180:

"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."

3 The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.
4 ADC (2007). Adur District Council: Local Environment Act 1995 Air Quality Action Plan.
5 BHCC (2015). Brighton & Hove City Council Air Quality Action Plan.
6 Department for Communities and Local Government (DCLG), (2019), National Planning Policy Framework.

2.9 Regarding compliance with relevant limit values and national objectives for pollutants the NPPF, paragraph 181 states:

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

2.10 The NPPF offers a broad framework but does not afford a detailed methodology for assessments. Specific guidance for air quality continues to be provided by organisations such as the Department for Environment, Food and Rural Affairs (Defra), Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM).

National Planning Practice Guidance

2.11 Reference ID 32 (Air Quality) of the National Planning Practice Guidance (PPG)[7], which was updated in November 2019, provides guiding principles on how planning can take account of the impact of new development on air quality. The PPG summarises the importance of air quality in planning and the key legislation relating to it.

2.12 As well as describing the importance of International, National and Local Policies (detailed elsewhere in this report), it summarises the key sources of air quality information. It also explains when air quality is likely to be relevant to a planning decision, stating:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic*

7 Planning Practice Guidance (PPG) 32. (updated Nov 2019). Air Quality. http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/.

composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*

- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*

- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value."*

2.13 Details are also provided of what should be included within an air quality assessment. Key considerations include:

- Baseline local air quality;
- Whether the proposed development could significantly affect local air quality during construction/operation; and
- Whether the development is likely to expose more people to poor air quality.

2.14 Examples of potential air quality mitigation measures are also provided in the PPG.

Local Planning Policy

Adur District Council

2.15 The Adur Local Plan[8] was adopted in 2017 with the intention of guiding development within the district, to improve both the quality of people's lives and the environment in which they live. The following objective is of relevance to air quality, and ADC aim to achieve this by 2032:

8 ADC (2017). Adur Local Plan.

"Objective O9: To improve connectivity within and to Adur's communities as well as to Brighton and Worthing, achieve more sustainable travel patterns and reduce the need to use the private car through public transport services and infrastructure, demand management measures, and new and enhanced cycle and footpaths. These actions will contribute to an improvement in air quality. Innovative sustainable transport measures will be encouraged."

2.16 Following this, a series of policies are provided to achieve the objectives set out in the Local Plan. Of relevance to air quality are 'Policy 8: Shoreham Harbour Regeneration Area', 'Policy 28: Transport and Connectivity' and 'Policy 34: Pollution and Contamination':

Policy 8:

"New development at the harbour will be expected to meet high standards of environmental efficiency and a Sustainability Statement will be required as supporting information to accompany all development proposals in the parts of the Shoreham Harbour Regeneration Area within Adur. The Sustainability Statement should be set out in accordance with the Sustainability Statements Guidance Note for Shoreham Harbour Regeneration Area.

Development will be expected to incorporate low and zero carbon decentralised energy generation, in particular heat networks, and required to either connect, where a suitable system is in place (or would be at the time of construction) or design systems so they are compatible with future connection to a network.

All new development proposals must take into account contaminated land, local noise and air quality impacts and improvements should be sought wherever possible."

Policy 28:

"Ensure new development contributes to the mitigation of air pollution, particularly in Air Quality Management Areas. Air quality assessments may be required. Where practical, new development should be located and designed to incorporate facilities for electric vehicle charging points, thereby extending the current network."

Policy 34:

"Development should not result in pollution or hazards which prejudice the health and safety of the local community and the environment.

New development in Adur will be located in areas most suitable to the use of that development to avoid risks from noise, air, odour or light pollution.

Mitigation measures will need to be implemented for developments that could increase levels of pollution or have a negative impact on drinking water supplies in Adur. Where there are significant levels of increased pollution that cannot be mitigated, development will be refused.

Brighton & Hove City Council

2.17 The Brighton and Hove City Plan[9], adopted in March 2016, is the City's primary planning document. Regarding air quality, Strategic Objective (SO) 11 aims to:

"Provide an integrated, safe and sustainable transport system to improve air quality, reduce congestion, reduce noise and promote active travel."

2.18 Furthermore, SO22 states:

"Across the city apply the principles of healthy urban planning and work with partners to achieve an equality of access to community services (health and learning), to opportunities and facilities for sport and recreation and lifelong learning. Ensure pollution is minimised and actively seek improvements in water, land and air quality and reduce noise pollution."

2.19 The BHCC local plan includes a number of policies of relevance to air quality, including the following:

Retained Policy SU9 – Pollution and nuisance control

"Development that may be liable to cause pollution and / or nuisance to land, air or water will only be permitted where:

a) human health and safety, amenity, and the ecological well-being of the natural and built environment is not put at risk;

b) it does not reduce the planning authority's ability to meet the Government's air quality and other sustainability targets; and

c) it does not negatively impact upon the existing pollution and nuisance situation.

All proposed developments that have a potential to cause pollution and / or nuisance, will be required to incorporate measures to minimise the pollution / nuisance and may invoke the need for an Environmental Impact Assessment. Where appropriate, planning conditions will be

9 Brighton & Hove City Council. (2016). Brighton & Hove City Plan.

imposed and / or a planning obligation sought in order to secure the necessary requirements.

Planning permission will only be granted for development on a site adjacent to an existing pollution / nuisance generating use and / or within an air quality 'hotspot' or potential 'hot spot' where:

i) the effect on the proposed development, its occupiers and users will not be detrimental; and

ii) the proposed development will not make the pollution and / or nuisance situation worse and where practicable, helps to alleviate the existing problem(s).

In applying this policy, particular attention will be given to a proposal' location and its impact on other development, land uses and nature conservation."

Policy CP8 – Sustainable buildings

"All development proposals including conversions, extensions and changes of use will be expected to demonstrate how the development:

'reduces air, land and water pollution and safeguards water supplies if development is within groundwater Source Protection Zones;"

Policy CP18 Healthy City:

"Planning will support programmes and strategies which aim to reduce health inequalities and promote healthier lifestyles through the following:[...]

Development proposals will be expected to protect and improve local air quality and should be appropriately and sensitively designed to mitigate negative impacts on air quality"

2.20 Supporting the above policies is the City Plan Part 2[10], which is currently undergoing consultation and is anticipated to be adopted soon. Although Part 2 is not yet adopted, consideration should be given to the proposed policies of relevance to air quality, including the following:

Policy DM35: Travel Plans and Transport Assessments

10 BHCC (2020). Proposed Submission City Plan Part 2. Brighton & Hove Council's Development Plan.

"3) A Transport Statement or Transport Assessment (as appropriate) is also required for all major developments within AQMAs so that the potential impact of traffic on air quality can be adequately considered within a separate Air Quality Assessment (AQA). Where Transport Statements or Transport Assessments are required for developments elsewhere, as set out in criterion (1), traffic impacts within AQMAs should be considered to inform decisions about whether an AQA is required […]

5) Proposals that could cause significant noise or air quality impacts or create significant disturbance or intrusion during the demolition and construction processes will be required to submit a Construction & Environmental Management Plan."

Policy DM40: Protection of the Environment and Health – Pollution and Nuisance

"Planning permission will be granted for development proposals that can demonstrate they will not give rise nor be subject to material nuisance and/or pollution that would cause unacceptable harm to health, safety, quality of life, amenity, biodiversity and/or the environment (including air, land, water and built form). Proposals should seek to alleviate existing problems through their design.

Proposals liable to cause or be affected by pollution and/or nuisance will be required to meet all the following criteria:

a) be supported by appropriate detailed evidence that demonstrates:

i. the site is suitable for the proposed use and will not compromise the current or future operation of existing uses;

ii. pollution and/or nuisance will be minimised;

iii. appropriate measures can and will be incorporated to attenuate/mitigate existing and/or potential problems in accordance with national and local guidance; and

iv. appropriate regard has been given to the cumulative impact of all relevant committed developments as well as that of the proposal and/or effect of an existing pollution/nuisance source.

b) support the implementation of local Air Quality Action Plans and help support the local authority meet the Government's air quality and other sustainability targets;

c) provide, when appropriate, an Air Quality Impact Assessment to consider both the exposure of future and existing occupants to air pollution, and, the effect of the development on air quality. Air quality improvements and/or mitigation must be included wherever possible;

d) have a positive impact, where practicable, on air quality when located within or close to an Air Quality Management Area and not worsen the problem; [...]"

3. Assessment Methodology

Guidance

3.1 Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16))[11] was followed in carrying out the assessment. Guidance published by the IAQM[12] on the *'Assessment of Dust from Demolition and Construction'* was also used to assess the risk of dust emissions during the construction phase of the proposed development. The Greater London Authority (GLA) Supplementary Planning Guidance[13] on the control of dust from construction has also been referred to, which is considered best practice guidance for the UK. It details a number of mitigation measures that should be adopted to minimise adverse impacts from dusts and fine particles.

3.2 The latest Environmental Protection UK (EPUK) & IAQM guidance on *'Planning for Air Quality'*[14] was also referred to throughout the assessment as well as the IAQM *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*[15].

3.3 ADC and BHCC are members of the Sussex-air partnership, and so the 'Air Quality and emissions mitigation guidance for Sussex (2020)'[16] (AQEMGFS) has been followed in the emissions mitigation assessment.

3.4 Finally, as the proposed development is situated partly in West Sussex, the West Sussex County Council's Parking Guidance[17] provides guidance on electric vehicle parking allocations for new developments – this has been followed in line with the AQEMGFS.

Baseline

3.5 The baseline air quality conditions in the vicinity of the site are established through the compilation and review of appropriately sourced background concentration estimates and local monitoring data.

---

11 Defra. (2021). Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management, Technical Guidance LAQM. TG(16). London: Defra.
12 IAQM. (2014). Guidance on the assessment of dust from demolition and construction.
13 Greater London Authority. (2014). The Control of Dust and Emissions During Construction and Demolition.
14 EPUK & IAQM. (2017). Land-Use Planning & Development Control: Planning For Air Quality.
15 IAQM. (2018). Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites. https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf
16 Sussex-Air (2020). Air Quality and emissions mitigation guidance for Sussex (2020).
17 WSCC (2020). Guidance on Parking at New Developments.

3.6 Defra provides estimated background concentrations of the UKAQS pollutants at the UK Air Information Resource (UK-AIR) website[18]. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km^2 National Grid square locations across the UK. At the time of writing, the most recent background maps were from August 2020 and based on monitoring data from 2018.

3.7 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emissions sources within the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.

3.8 Monitoring at background locations is considered an appropriate source of data for the purposes of describing baseline air quality. ADC and BHCC automatic and non-automatic monitoring data were reviewed to establish baseline air quality. The most recent available data at the time of writing, from ADC's and BHCC's annual status reports (ASRs)[19,20] have been included and assessed.

Construction Phase

3.9 The construction phase of the proposed development will involve a number of activities that could potentially produce polluting emissions to air. Predominantly, these will be emissions of dust. However, they could also include releases of odours and/or more harmful gases and particles.

3.10 The IAQM's guidance to assess the impacts of construction on human and ecological receptors has been followed in carrying out this air quality assessment. The guidance suggests that where a receptor is located within 350m (50m for statutory ecological receptors) of a site boundary and/or 50m of a route used by construction vehicles, up to 500m from the site entrance, a dust assessment should be undertaken. High sensitivity receptors are considered particularly sensitive when located within 20m of a works area. Figure 2 shows receptors that could be sensitive to dust that are located within 350m of the boundaries of the site.

18 Defra: UK-AIR. www.uk-air.defra.gov.uk
19 ADC (2020). Adur District Council 2019 LAQM Air Quality Annual Status Report.
20 BHCC (2020). Brighton & Hove City Council 2019 LAQM Air Quality Annual Status Report.

3.11 The Multi Agency Geographic Information for the Countryside (MAGIC) website[21], which incorporates Natural England's interactive maps, has been reviewed to identify whether any statutory ecological sensitive receptors are situated within 50m of the site boundary or within 50m of any routes used by construction vehicles on the public highway, up to 500m from the site entrance. The nearest statutory site, the South Downs National Park, is situated outside of these boundaries, approximately 800m to the north of the application site and so statutory ecological sites have not been considered further in this assessment.

Construction Significance

3.12 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.

3.13 In the IAQM dust guidance, the first step in assessing the risk of impacts is to define the potential dust emission magnitude. This can be considered 'Negligible', 'Small', 'Medium' or 'Large' for each of the construction stages. Whilst the IAQM provides examples of criteria that may be used to assess these magnitudes, the vast number of potential variables mean that every site is different and therefore professional judgement must be applied by what the IAQM refer to as a "technically competent assessor". The construction phase assessment therefore relies on the experience of the appraiser.

3.14 As such, attempts to define precisely what constitutes a negligible, small, medium or large dust emission magnitude should be treated with caution. Factors such as the scale of the work, both in terms of size and time, the construction materials and the plant to be used must be considered.

3.15 The second step is to define the sensitivity of the area around the construction site. As stated in the IAQM guidance:

"the sensitivity of the area takes into account a number of factors:

- *the specific sensitivities of receptors in the area;*
- *the proximity and number of those receptors;*
- *in the case of PM_{10}, the local background concentrations; and*
- *site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust."*

21 Natural England and MAGIC partnership organisations. Multi Agency Geographic Information for the Countryside. http://www.magic.gov.uk/ (accessed November 2020).

3.16 Based on these factors, the area is categorised as being of 'Low', 'Medium' or 'High' sensitivity.

3.17 When dust emission magnitudes for each stage and the sensitivity of the area have been defined, the risk of dust impacts can be determined. The IAQM provides a risk of impacts matrix for each construction stage. The overall significance for the construction phase can then be judged from the stages assessed. Again, this is subject to professional judgement.

3.18 Combustion exhaust gases from diesel-powered plant and construction vehicles accessing the site will also be released. However, the volumes and periods over which these releases will occur are unlikely to result in any significant peaks in local air pollution concentrations and therefore this has been scoped out of the assessment.

Operational Phase

Road Transport Sources

3.19 Vehicle emissions will arise from the combustion of fossil fuels in vehicle engines and their subsequent release to atmosphere via tailpipe exhausts. The most significant pollutants released by cars and other vehicles are oxides of nitrogen (NO_2/NO_x) and particulate matter (PM_{10} and $PM_{2.5}$). Releases of carbon monoxide (CO) and some volatile hydrocarbons (e.g. benzene and 1,3-butadiene) are of less significance and are not assessed further in this report.

3.20 As it is elevated annual mean concentrations of NO_2 and PM_{10} that have resulted in the declaration of most AQMAs across the UK, these are the pollutants of most concern and they have therefore been the focus of this air quality assessment. $PM_{2.5}$, which is another fraction of particulate matter, has also been considered.

Roads Assessment

3.21 The latest EPUK & IAQM planning guidance[14] provides indicative thresholds for changes in traffic flows which would require a detailed air quality assessment, when in or adjacent to an AQMA. These are a change in 24-hour average annual daily traffic (AADT) flows of >100 light duty vehicles (LDV) and/or >25 heavy duty vehicles (HDV). Changes below these thresholds can be reasonably considered to have an insignificant impact on air quality.

3.22 Traffic data provided by the project's transport consultants, Motion, show the proposed development is anticipated to generate a total of 259 AADT, of which over 100 trips will go through both ADC's and BHCC's nearest AQMAs. As such, a detailed modelling assessment of the proposed development's imapcts on local air quality is considered necessary. Further details of the traffic data used in this assessment is provided in Appendix B of this report.

3.23 In order to determine the potential exposure of existing receptors in the predicted opening year of 2022, emissions from local roads have been assessed using a detailed air dispersion model.

3.24 The model used was ADMS-Roads (version 5), which is produced by CERC and has been validated and approved by Defra for use as an assessment tool for calculating the dispersion of pollutants from traffic on UK roads. The latest Defra Emissions Factor Toolkit (EFT)[22] was used within the model to estimate vehicle emissions.

3.25 Detailed, hourly sequential, meteorological data are used by the model to determine pollutant transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from Shoreham, as it was considered to provide the most representative data of similar conditions to the site. The meteorological data used for this assessment were from 2019, for which air quality monitoring and traffic data were also available. The surface roughness applied to the model for the site was determined using Surface Roughness Values from the Corine Land Cover research paper[23], with values varying across the modelling domain. A factor of 0.0119m was applied to the meteorological site, following guidance from the data provider.

3.26 Discrete model receptors were positioned at the façade of proposed and existing buildings identified as being most at risk from high roadside pollutant levels. Receptors are, therefore, positioned in worst-case locations, for a conservative approach. The receptors were modelled at "breathing height" which is, by convention, 1.5m above ground or relevant floor level.

3.27 Details of sensitive receptors are displayed in Figure 3 and are included in Table 3.1, below.

Table 3.1: Modelled Receptors

Receptor		Height (m)	UK Grid Reference	
ID	Road Link		X	Y
R1	A270 Old Shoreham Rd	1.5	523788.5	106079.4
R2	A270 Old Shoreham Rd	1.5	524018.4	106091
R3	A270 Old Shoreham Rd	1.5	525188.5	105918.4
R4	A293 Trafalgar Rd	1.5	525650.1	105815.9
R5	A293 Trafalgar Rd	1.5	525665.9	105669.7

Note: Grid references are indicative as the model layout is based on Ordnance Survey based mapping which does not accurately portray the width or position of roads.

22 Defra (2020). Emissions Factor Toolkit v10.1.
23 Guedes, R. (2007). Roughness length classification of Corine Land Cover classes.

3.28 All modelled road links are shown in Figure 3, with model inputs included in Appendix B.

Model Verification

3.29 It is recommended, following guidance set out in LAQM.TG(16) that the model results be compared with measured data to determine whether they need adjusting to more accurately reflect local air quality. This process is known as verification and reduces the uncertainty associated with local effects on pollution dispersion and allows the model results to be more site-specific.

3.30 A verification study has been undertaken using local authority monitoring data from 2019 across the modelling domain of the A270 and surrounding arterial roads. Full details of this study are included in Appendix B.

3.31 The model was found to be under-predicting concentrations, which is not unusual and is likely the result of the local dispersion environment; an adjustment factor of **1.53** was, therefore, applied to the model results. Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(16), the RMSE should ideally be within 10% of the relevant air quality standard, but is acceptable where it is within 25% of the AQS. The model verification process calculated a post-adjusted RMSE of 3.1$\mu g.m^{-3}$, which equates to 7.8% of the annual mean AQS for NO_2 and is therefore considered to be acceptable.

Model Uncertainty

3.32 There are a number of inherent uncertainties associated with the modelling process, including:

- Model uncertainty – due to model formulations;
- Data uncertainty – due to inaccuracies in input data, including emissions estimates, background estimates and meteorology; and
- Variability – randomness of measurements used.

3.33 Using a validated air quality model such as ADMS Roads combined with performing model verification accounts for much of this uncertainty. In addition, the most detailed available input data is used and reviewed to ensure accuracy.

3.34 Defra's latest Emissions Factors Toolkit for road transport provides forecasts of NO_x, PM_{10} and $PM_{2.5}$ emissions up to 2030. This is widely used as an input for dispersion models such as ADMS-Roads to estimate future pollutant concentrations close to new developments.

3.35 The latest version of Defra's EFT (v10.1) was released in August 2020 and is expected to provide a far more reasonable match for real world emissions in the current UK fleet than previous versions, however it should be noted that there remains uncertainty regarding future emissions from the vehicle fleet.

3.36 To adequately account for this uncertainty when predicting future pollutant concentrations, background concentrations were predicted to stay the same beyond 2019. Additionally, no improvement in vehicle fleet emissions was assumed beyond 2019 for the 2022 modelling scenarios. Furthermore, modelled receptors were positioned at the façade of the buildings closest to the roadside. As such, this assessment offers a highly conservative, 'worst-case' approach.

Emissions Mitigation Assessment

3.37 Sussex-Air's AQEMGFS advocates that an emissions mitigation assessment (EMA) should be undertaken to outline how air quality impacts from developments might be minimised.

3.38 The purpose of an emissions mitigation assessment is to determine an 'appropriate scale and kind' of mitigation required from a development. They are an alternative way to assess the impact of a development on air quality and they ensure that all developments, even those which have no significant impact on air quality, include appropriate mitigation to offset their potential impact.

3.39 As the proposed development is classified as 'Major', an emissions cost calculation must be undertaken. The emissions cost calculation was undertaken following Sussex-Air's guidance, Defra[24] guidance and Defra's appraisal toolkit[25].

Pollutant Emissions Calculation

3.40 The emissions calculation utilised the latest Defra EFT to determine the total transport related emissions (NO_X & $PM_{2.5}$) that would be generated by the proposed development.

3.41 Defra provides 'damage costs'[24], which are set of impact values, defined per tonne of pollutant for use in this calculation. Damage costs estimate the societal costs associated with changes in pollutant emissions and are then combined with the forecasted emissions changes to provide an approximation valuation of the cost (or benefit) to society caused by development.

3.42 Defra's Appraisal Toolkit, which incorporates the latest damage cost values, was used in the calculation. The principal of the calculation is summarised in the equation below:

EFT output x Damage costs x 5 years = 5 year exposure cost value (in £)

3.43 As a number of the inputs are based on assumptions, the resulting figure should be treated with caution, but it can be used to give an idea of the scale of a development in terms of total generated transport emissions and therefore a gauge of what level of mitigation might be appropriate.

24 Defra Damage Cost (2021) https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance
25 *Defra. Air quality damage cost appraisal toolkit:* https://www.gov.uk/government/publications/assess-the-impact-of-air-quality

3.44 It is usual for costs established in this way to be apportioned to low emission measures associated with a proposed development. In doing this it should be possible for damage costs to be offset.

Consultation

3.45 The scope of assessment, as described throughout Section 3, was accepted in full by both ADC's and BHCC's Environmental Protection departments. Both local authorities emphasised the importance of implementing a suitable mitigation package to offset any incremental air quality impacts caused by the development.

4. Baseline Assessment

4.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the application site.

UK-AIR Background Pollution

4.2 The UK-AIR predicted background pollution concentrations for NO_2, PM_{10} and $PM_{2.5}$ for 2018 to 2023 are presented in Table 4.1. These data were taken from the central grid square location closest to the application site (i.e. grid reference: 525500, 105500).

Table 4.1: 2018 to 2023 background concentrations of pollutants at the application site.

Pollutant	Predicted background concentration (μg.m^{-3})						Averaging Period	Air quality standard concentration (μg.m^{-3})
	2018	2019	2020	2021	2022	2023		
NO_2	16.6	16.0	15.3	14.7	14.2	13.8	annual mean	40
PM_{10}	16.0	15.8	15.5	15.3	15.1	14.9	annual mean	40
$PM_{2.5}$	11.3	11.1	10.9	10.8	10.6	10.5	annual mean	25

4.3 The data in Table 4.1 show that annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$, in the vicinity of the application site between 2018 and 2023, were predicted to be well below their respective AQSs. The data show that in 2020, NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be below their AQSs by 61.7%, 61.2% and 56.4%, respectively. Annual mean background pollutant concentrations are likely to be below their respective AQSs at the application site.

4.4 Concentrations of all pollutants were predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles, but also due to UK national and international plans to reduce emissions across all sectors.

Local Sources of Monitoring Data

4.5 Air quality monitoring is considered an appropriate source of data for the purposes of describing baseline air quality. At the time of writing, the most recent ASRs released by ADC and BHCC included 2019 data.

Automatic Monitoring

4.6 ADC and BHCC currently undertake automatic (continuous) monitoring of NO_2 at five locations. The most recent available data from these monitors are included in Table 4.2.

Table 4.2: NO_2 Monitoring Data from ADC and BHCC Automatic Monitors

Monitor	Authority	Type	Distance from the application site (km)	NO_2 annual mean concentration ($\mu g.m^{-3}$)			
				2016	2017	2018	2019
AD1	ADC	K	3.8	-	-	29.2	26.0
BH0	BHCC	UB	5.4	16.5	16.9	16.3	15.2
BH10	BHCC	R	6.0	**47.1**	**50.3**	**49.5**	**45.7**
BH6	BHCC	R	6.8	**46.2**	**51.1**	37.8	26.9
LL1	BHCC	Ru	29.0	7.8	8.2	7.6	7.2

Note: "K" = Kerbside; "UB" = Urban Background; "R" = Roadside; "Ru" = Rural. **Bold** denotes exceedance of the AQS.

4.7 The data in Table 4.2 show that two monitors exceeded the annual mean NO_2 $40\mu g.m^{-3}$ AQS, between 2016 and 2019. In 2019, only BH10 on North Street exceeded the AQS, by 14.3%. All other monitors were well below the AQS and all monitors have shown an overall decrease in NO_2 concentrations since 2016.

4.8 The nearest urban background monitor to the site is the AURN[26] air quality monitoring station BH0 at Preston Park, Brighton. Data from BH0 was 62% below the AQS in 2019. Given the similarities in concentrations with those estimated by UK-AIR in Table 4.1, it is considered likely that concentrations at BH0 are similar to background concentrations at the application site.

4.9 ADC also undertakes automatic (continuous) monitoring of PM_{10} at AD1, on Shoreham High Street. The most recent available data from this monitor is included in Table 4.3.

26 AURN: Automatic Urban and Rural Network (UK national air quality network operated by Defra)

Table 4.3: PM_{10} Monitoring Data from ADC Automatic Monitor

Monitor	Authority	Type	Distance from the application site (km)	PM_{10} annual mean concentration ($\mu g.m^{-3}$)			
				2016	2017	2018	2019
AD1	ADC	K	3.8	-	-	23.0	24.3

Note: "K" = Kerbside. **Bold** denotes exceedance of the AQS.

4.10 The data in Table 4.3 show that annual mean PM_{10} concentrations at this automatic monitor was well below the $40\mu g.m^{-3}$ AQS. In 2019, concentrations were 39.2% below the AQS.

4.11 BHCC currently undertakes automatic (continuous) monitoring of $PM_{2.5}$ at three locations. The most recent available data from these monitors are included in Table 4.4.

Table 4.4: $PM_{2.5}$ Monitoring Data from BHCC Automatic Monitors

Monitor	Authority	Type	Distance from the application site (km)	$PM_{2.5}$ annual mean concentration ($\mu g.m^{-3}$)			
				2016	2017	2018	2019
BH0	BHCC	UB	5.4	9.0	8.9	8.9	-
BH10	BHCC	R	6.0	11.0	10.6	10.3	9.8
BH6	BHCC	R	6.8	7.2	6.4	5.8	5.7

Note: "UB" = Urban Background; "R" = Roadside. **Bold** denotes exceedance of the AQS.

4.12 The data in Table 4.4 show that annual mean $PM_{2.5}$ concentrations at all three automatic monitors were well below the $25\mu g.m^{-3}$ AQO by over 60% in 2019. Recorded concentrations were consistently below the AQS, between 2016 and 2019.

Non-Automatic Monitoring

4.13 ADC and BHCC also operate extensive non-automatic, NO_2 diffusion tube monitoring networks across their areas. The most recent available monitoring data for diffusion tubes located within 3km of the application site are included in Table 4.5.

Table 4.5: Monitoring data from ADC and BHCC NO_2 diffusion tubes

Monitor	Authority	Type	Distance from the application site (km)	NO_2 annual mean concentration ($\mu g.m^{-3}$)			
				2016	2017	2018	2019
W19-09	BHCC	R	0.3	**40.2**	38.1	**41.7**	39.9
S3	ADC	UB	0.5	17.5	17.2	18.1	16.7
S2	ADC	R	0.6	24.9	26.4	27.0	23.6
W18-10	BHCC	UB	0.7	19.8	22.3	20.2	18.4
W17-09	BHCC	R	0.9	**42.4**	**44.4**	**42.0**	39.2
S8	ADC	R	0.9	30.4	32.8	30.4	27.5
S7	ADC	UB	0.9	14.8	15.1	15.9	14.1
S9	ADC	R	1.1	34.5	35.8	35.0	31.1
W16-09	BHCC	R	1.2	37.8	**40.5**	38.4	33.5
S10	ADC	R	1.7	25.2	24.6	27.0	23.2
S39	ADC	R	1.9	-	-	26.1	21.9
S45	ADC	R	2.8	-	-	-	19.1
W21-10	BHCC	R	3.0	**40.1**	39.4	36.6	34.6
S37	ADC	R	3.0	-	**41.0**	32.6	29.1

Note: "R" = Roadside; "UB" = Urban Background. **Bold** denotes exceedance of the AQS.

4.14 The data in Table 4.5 show that annual mean NO_2 concentrations across ADC and BHCC exceeded the $40\mu g.m^{-3}$ AQS between 2016 and 2019. However, it is noted that there are no exceedances of the AQS within 3km of the application site, in the most recent year, 2019.

4.15 In ADC between 2016 and 2019, only one diffusion tube, S37, recorded any exceedances of the AQS, within 3km of the application site. Concentrations at this diffusion tube have since decreased by over 25%. In fact, all of ADCs diffusion tubes recorded an overall decrease in concentrations between 2016 and 2019, likely due to the roll-out of cleaner vehicle fleets and ADC's Air Quality Action Plan measures. In 2019, the highest recorded concentration in ADC was at S9, in the Southwick AQMA, and was 22.2% below the annual mean AQS.

4.16 In BHCC, all four roadside diffusion tubes within 3km of the application site showed exceedances of the AQS between 2016 and 2019. The closest diffusion tube to the application site, W19-09, is located on Trafalgar Road and is only 0.25% below the AQS in 2019. Nonetheless, it is noted that all of these diffusion tubes show an overall decrease in concentrations between 2016 and 2019, again suggesting that air quality is improving in the local area.

4.17 Lastly, there are several urban background locations across both administrative boundaries, within 3km of the site. Overall, concentrations are similar to those recorded at the automatic AURN station at Preston Park (BH0). As such, this supports the likelihood that BH0 is representative of urban background conditions.

Summary of Data used in Assessment

4.18 The background concentrations referred to in this assessment are based on UK-AIR predictions for particulate matter (PM_{10} and $PM_{2.5}$). For NO_2, the AURN station BH0 is anticipated to be representative of background concentrations across the modelling domain, and so concentrations recorded at this station have been used. For conservative purposes, in this assessment background concentrations are assumed to remain the same beyond 2019.

4.19 Table 4.6 shows the concentrations used for the modelling domain in this assessment.

Table 4.6: Background annual mean concentrations used in this assessment

Pollutant	Concentration ($\mu g.m^{-3}$)
NO_2	15.2
PM_{10}	15.8
$PM_{2.5}$	11.1

5. Construction Phase Impacts

5.1 The construction phase of the proposed development will involve a number of activities that could produce polluting emissions to air. Predominantly, these will be emissions of dust.

5.2 The estimates for the dust emission magnitude for demolition, earthworks, construction and trackout below are based on the professional experience of Phlorum's consultants, information provided by the client and Google Earth imagery.

Dust Emission Magnitude

Demolition

5.3 Site demolition activities are very small, with only 65m^3 of building to be demolished, at a maximum height of less than 10m.

5.4 As such, the overall dust emission magnitude for the demolition stage is considered to be *Small* with reference to IAQM guidance[12].

Earthworks

5.5 The total area of the site within the red line boundary is approximately 2.5ha, which falls into the IAQM's 'Large' dust emission category.

5.6 It is not known exactly what amount of earth would need to be moved during earthworks, but is estimated that between 5 and 10 heavy earth moving vehicles would be used at any one time, falling into the IAQM's 'Medium' dust emission category.

5.7 For conservative purposes, and in the absence of further information, the overall dust emission magnitude for the earthworks stage is considered to be *Large* with reference to IAQM guidance[12].

5.8 It is understood that the site could contain contaminants. Details regarding potential health effects and recommendations on appropriate mitigation measures are not specified in this report. Due to the nature of the contaminated materials this will need to be covered by a separate specialist assessment, if required.

Construction

5.9 During construction, activities that have the potential to cause emissions of dust may include concrete batching, sandblasting and piling. Localised use of cement powder and general handling of construction materials also have the potential to generate dust emissions, as does the effect of wind-blow from stockpiles of friable materials.

5.10 Piling, with a large potential for dust release, is to be carried out on site. However, materials to be used include steel frames with composite aluminium cladding panels, which have a low potential for dust release. The proposed development is likely to have a total construction volume of between 25,000 and 100,000m^3, falling into the IAQMs 'Medium' category.

5.11 Overall, the dust emission magnitude during construction is considered to be *Medium.*

Trackout

5.12 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions and to also add soil to the local road network. During dry weather, soiled roads can lead to dust being emitted due to physical and turbulent effects of vehicles. It is unknown whether unpaved road surfaces will be utilised during construction.

5.13 As well as the type of road surface, the number of daily heavy duty vehicles (HDVs) accessing the site can be used to determine dust emission magnitude during construction: <10 Small; 10-50 Medium; and >50 Large. Less than 10 HDVs are anticipated to visit the site in any one day.

5.14 Approximately 200m of unpaved roads will be used during construction. These roads have a surface material with a low potential for dust release. Overall, the dust emission magnitude for the trackout phase is considered to be *Medium.*

Emission Magnitude Summary

5.15 A summary of the dust emission magnitude as a result of the activities of Demolition, Earthworks, Construction and Trackout as specified in the IAQM guidance, and discussed above, are listed in Table 5.1 below. Overall, the dust emission magnitude is considered to be *Large.*

Table 5.1: Dust Emission Magnitude for the construction activities, based on the IAQM's guidance.

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Medium
Trackout	Medium

Sensitivity of the Area

5.16 Having established the emission magnitudes for each phase above, the sensitivity of the area must be considered to establish the significance of effects. The effect of dust emissions depends on the sensitivity of each receptor.

5.17 High sensitivity human receptors include residential dwellings, schools and hospitals, but can include locations such as car showrooms when considering the impacts of dust soiling.

5.18 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20m of the site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the dust source.

5.19 With the exponential decline in dust with distance from dust generating activities, it is considered that for receptors more than 350m from the site boundary, the risk is negligible. Furthermore, the risks at over 100m only have the potential to be significant in certain weather conditions, e.g. downwind of the source during dry periods.

5.20 The approximate number of high sensitivity human receptors in the vicinity of the site is detailed in Table 5.2 below and shown in Figure 2.

Table 5.2: Approximate number of High Sensitivity Receptors close to the site.

Distance to site (m)	Approximate number of receptors	Receptor Details
<20	10	Residential
<50	50	Residential; Harmony House Nursing Home
<100	100	Residential
<350	>500	Residential; Tates Car Showroom; Nicolas CofE Primary School

5.21 Figure 4 shows that the predominant wind direction at the closest relevant meteorological station at Shoreham Airport (2019) is from the south-west, with frequent strong winds from the north. As shown in Figure 2, there are several residential receptors in close proximity to the north-east. As such, the sensitivity of the area to dust soiling impacts is defined as *High.*

5.22 UK-AIR predicted annual mean concentrations of PM_{10} are below 24µg.m^{-3} at the site. This provides a good indication that PM_{10} concentrations for both annual mean and daily mean concentrations are likely to be below the respective AQSs at the site and adjacent uses. Therefore, the sensitivity of the area to human health impacts is defined as *Low*.

Risk of Impacts

5.23 Having established the potential dust emission magnitudes and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM guidance. These are summarised in Table 5.3.

Table 5.3: Summary of Impact Risk by Construction Stage based on the IAQM's dust guidance.

Stage	Impact Risk		
	Nuisance Dust	Ecology	PM_{10}
Demolition	Medium	Negligible	Negligible
Earthworks	High	Negligible	Low
Construction	Medium	Negligible	Low
Trackout	Medium	Negligible	Low

5.24 Overall, the proposed development is considered to be *High Risk* for nuisance dust soiling effects, *Low* for PM_{10} health effects and to be *Negligible* for ecology, in the absence of mitigation.

Site Specific Mitigation

5.25 The GLA guidance[13] suggests a number of mitigation measures that should be adopted in order to minimise impacts from dusts and fine particles. Appropriate measures that could be included during construction of the proposed development include:

- ideally cutting, grinding and sawing should not be conducted on-site and pre-fabricated material and modules should be brought in where possible;
- where such work must take place, water suppression should be used to reduce the amount of dust generated;
- skips, chutes and conveyors should be completely covered and, if necessary, enclosed to ensure that dust does not escape;

- no burning of any materials should be permitted on site;
- any excess material should be reused or recycled on-site in accordance with appropriate legislation;
- developers should produce a waste or recycling plan;
- following earthworks, exposed areas and soil stockpiles should be re-vegetated to stabilise surfaces, or otherwise covered with hessian or mulches;
- stockpiles should be stored in enclosed or bunded containers or silos and kept damp where necessary;
- hard surfaces should be used for haul routes where possible;
- haul routes should be swept/washed regularly;
- vehicle wheels should be washed on leaving the site;
- all vehicles carrying dusty materials should be securely covered; and
- delivery areas, stockpiles and particularly dusty items of construction plant should be kept as far away from neighbouring properties as possible.

5.26 In addition, the IAQM lists recommended mitigation measures for low, medium and high Dust Impact Risks. The highly recommended mitigation measures for High Risk sites are included in Appendix D of this report.

5.27 Where dust generation cannot be avoided in areas close to neighbouring properties, additional mitigation measures should be put in place, such as: windbreaks, sprinklers, and/or time/weather condition limits on the operation of some items of plant or the carrying out of activities that are likely to generate a particularly significant amount of dust.

Residual Effects

5.28 After the implementation of the mitigation measures listed above and in Appendix D, the significance of each phase of the construction programme will be reduced and the residual significance of impact for the construction phase is expected to be *Negligible*.

6. Operational Phase Assessment

6.1 Results from the ADMS-Roads assessment of the Proposed Development are presented below. Modelled road links and receptor points are displayed in Figure 3.

NO_2

6.2 Modelled results for NO_2 are presented in Table 6.1.

Table 6.1: Predicted annual mean concentrations of NO_2 at the existing receptor points

Receptor Point	Annual Mean NO_2 ($\mu g.m^{-3}$)			Changes due to Proposed Development		
	2019 Baseline	2022 Without	2022 With Dev.	$\mu g.m^{-3}$	As a % of the AQS	EPUK & IAQM Significance
R1	34.7	38.3	38.3	0.1	0.2	Negligible
R2	27.7	30.2	30.3	0.1	0.1	Negligible
R3	22.3	23.7	23.8	0.1	0.1	Negligible
R4	27.2	29.5	29.5	0.0	0.1	Negligible
R5	38.2	**42.3**	**42.4**	0.1	0.2	Negligible

Note: any discrepancies due to rounding. **Bold** denotes exceedances of the AQS

6.3 The data in Table 6.1 show that annual mean concentrations of NO_2 are predicted to exceed the AQS at Receptor R5, on Trafalgar Road (within BHCC's AQMA). The highest concentration was 42.4$\mu g.m^{-3}$ in the 2022 'With Development' scenario, 6% above the AQS. It should be noted that the Proposed Development does not lead to this exceedance, as the concentration 'Without Development' is also above the AQS.

6.4 Regarding the hourly AQS for NO_2 (200$\mu g.m^{-3}$ not to be exceeded more than 18 times a year), LAQM.TG(16) states that if the annual mean is below 60$\mu g.m^{-3}$, this AQS should be met. The data in Table 6.1 show that all modelled annual mean NO_2 concentrations are well below this threshold at all receptor points, in all scenarios, and therefore it is anticipated that the hourly AQS would be achieved. As such, it is not thought that the Proposed Development would lead to the exposure of any existing receptors to unacceptable short-term concentrations of NO_2.

6.5 The largest increase in annual mean NO_2 concentrations predicted as a result of the Proposed Development in 2022 is 0.1µg.m^{-3} at Receptors R1 and R5, within ADCs and BHCCs AQMAs, respectively. This is an increase of 0.2%, with respect to the AQS and is considered to be *Negligible*, with reference to the EPUK and IAQM impact descriptors.

6.6 All other increases are considered to be *Negligible*, and the overall impact of the Proposed Development on NO_2 concentrations in the local area are considered to be insignificant.

PM_{10}

6.7 Modelled results for PM_{10} are presented in Table 6.2.

Table 6.2: Predicted annual mean concentrations of PM_{10} at the existing receptor points

Receptor Point	Annual Mean PM_{10} (µg.m^{-3})			Changes due to Proposed Development		
	2019 Baseline	2022 Without	2022 With Dev.	µg.m^{-3}	As a % of the AQS	EPUK & IAQM Significance
R1	20.1	21.0	21.0	0.0	0.1	Negligible
R2	18.6	19.2	19.2	0.0	0.0	Negligible
R3	17.4	17.7	17.7	0.0	0.0	Negligible
R4	17.6	17.9	17.9	0.0	0.0	Negligible
R5	19.4	20.2	20.2	0.0	0.0	Negligible

Note: any discrepancies due to rounding.

6.8 The data in Table 6.2 show that annual mean concentrations of PM_{10} are all predicted to be below the 40µg.m^{-3} AQS at all modelled receptors in all scenarios. The highest predicted concentration with the Proposed Development is 21µg.m^{-3} at Receptor R1 in the 2022 'With Development' scenario. This is 47.5% below the AQS.

6.9 The Proposed Development is expected to result in a maximum change in annual mean PM_{10} concentrations of 0.1% with respect to the AQS, at Receptor R1. This change is considered to be *Negligible*, with reference to the EPUK & IAQM impact descriptors.

6.10 All increases in annual mean PM_{10} concentrations are predicted to be *Negligible*, with reference to the EPUK & IAQM impact descriptors.

6.11 For PM_{10}, the following equation can be used to derive the number of days that the daily mean limit of 50µg.m^{-3} AQS is likely to be exceeded:

$$\text{No. 24 hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left(\frac{206}{\text{annual mean}}\right)$$

6.12 Using this equation, a concentration of 31.8µg.m^{-3} would result in an exceedance of the short-term AQS. The data in Table 6.2 show that the highest annual mean PM_{10} concentration predicted in the model was 21µg.m^{-3} and therefore, it is unlikely that the short-term AQS will be exceeded.

6.13 Overall, impacts on PM_{10} concentrations are not considered to be significant.

$PM_{2.5}$

6.14 Modelled results for $PM_{2.5}$ are presented in Table 6.3.

Table 6.3: Predicted annual mean concentrations of $PM_{2.5}$ at the existing receptor points

Receptor Point	Annual Mean $PM_{2.5}$ (µg.m^{-3})			Changes due to Proposed Development		
	2019 Baseline	2022 Without	2022 With Dev.	µg.m^{-3}	As a % of the AQS	EPUK & IAQM Significance
R1	13.6	14.1	14.1	0.0	0.1	Negligible
R2	12.7	13.1	13.1	0.0	0.0	Negligible
R3	12.0	12.2	12.2	0.0	0.0	Negligible
R4	12.1	12.4	12.4	0.0	0.0	Negligible
R5	13.3	13.7	13.7	0.0	0.0	Negligible

Note: any discrepancies due to rounding.

6.15 The data in Table 6.3 show that annual mean concentrations of $PM_{2.5}$ are predicted to be well below the 25µg.m^{-3} AQS at all modelled receptors in all scenarios. The highest predicted concentration with the Proposed Development is 14.1µg.m^{-3} at Receptor R1. This is 43.6% below the AQS.

6.16 The Proposed Development is expected to result in a maximum change in annual mean $PM_{2.5}$ concentrations of 0.1%, with respect to the AQS at Receptor R1. This change is considered to be *Negligible*, with reference to the EPUK & IAQM impact descriptors.

6.17 Overall, impacts on $PM_{2.5}$ concentrations are not considered to be significant.

7. Emissions Mitigation Assessment

Emission cost calculation

7.1 Following the March 2021 update to Defra's emissions cost calculation guidance, the emissions cost calculation below has been carried out to estimate the value of the impact of NO_x and $PM_{2.5}$ emitted as a result of the proposed development. Defra's 2020 update of the calculation puts greater emphasis on $PM_{2.5}$ as it is deemed to have greater health implications. As such, the calculation has costed for the impacts of NO_x and $PM_{2.5}$.

7.2 To evaluate the scale of a proposed development's total emissions, Defra recommends an emissions cost calculation using the following formula:

Road Transport Emission Increase (Cost, £) =

Estimated trip rate for 5 years × *Emission Rate/10km/vehicle type* × *Damage Costs*

7.3 The latest Defra Emissions Factor Toolkit[22] was used to determine the total transport related emissions that would be generated by the proposed development; the inputs used in the calculation are shown in Table 7.1.

Table 7.1: Calculation Inputs

Input	Value	Unit	Source/guidance
Trip Length	10	km	Sussex-Air AQEMGFS guidance
Net Traffic Flow LDV (HDV)	257 (2)	AADT	Transport Consultant
EFT Road Type	Urban (not London)	-	EFT
EFT Year	2022-2026	-	In line with EFT estimates
Average Speed	50	$km.hr^{-1}$	Sussex-Air AQEMGFS guidance
Appraisal period	5	years	Sussex-Air AQEMGFS guidance

7.4 The total emission 'damage' cost was calculated using Defra's appraisal toolkit and is presented in Tables 7.2 and 7.3.

7.5 The calculation accounts for an 'uplift factor' of 2% cumulatively per annum and a 'discount rate', in line with the latest 2021 guidance[24]. Central estimate damage costs for 'Road Transport' were based on Defra 2021 prices.

Table 7.2: Emission Cost Calculation for NO_x.

	2022	2023	2024	2025	2026
NO_X increase (tonnes)	0.218	0.198	0.179	0.162	0.145
Central Damage cost (NO_X)	10809	11025	11246	11471	11700
Adjusted Damage cost (NO_X)	2365	2114	1883	1672	1482
Total	**£9,515**				

Table 7.3: Emission Cost Calculation for $PM_{2.5}$.

	2022	2023	2024	2025	2026
$PM_{2.5}$ increase (tonnes)	0.017	0.017	0.017	0.017	0.017
Central Damage cost ($PM_{2.5}$)	97191	99314	101117	103139	105202
Adjusted Damage cost ($PM_{2.5}$)	1684	1640	1602	1567	1537
Total	**£8,030**				

7.6 The total damage costs are summarised as follows:

NO_X emission 'damage' (cost, £) = £9,515 +

$PM_{2.5}$ emission 'damage' (cost, £) = £8,030

TOTAL (cost, £) = £17,545

Mitigation

7.7 The resulting value of the 'emissions cost', as calculated above, is indicative of the value of an appropriate package of mitigation to offset any potential impacts from the proposed development. The mitigation package should at least equate to this 'emissions cost'.

7.8 For all residential developments considered as 'Major' under the AQEMGFS, the following mitigation measures should be included as a minimum:

- All gas-fired boilers are expected to meet a minimum standard of <40mgNO_x/kWh, with consideration given to renewable energy sources;
- Meet electric vehicle (EV) charging point guidance set out the West Sussex County Council's Parking Guidance.

7.9 The client has agreed to the above measures. Construction works are anticipated to commence in 2022. To meet WSCC's Parking Standards, 37% of spaces are therefore expected to include active EV charging infrastructure, with remaining spaces cable-ducted for future provision. The client has agreed to this, and additionally proposes an energy strategy based on air source heat pumps and photovoltaic arrays, with no NO_x emitters, for heating and hot water generation.

7.10 The client will be implementing further mitigation measures to contribute towards offsetting the £17,545 'emissions cost' calculated above. These measures include:

- Cycle storage facilities, to encourage active and sustainable travel; and
- The car showroom will include a green roof, and extensive planting of green infrastructure will be apparent across the site.

7.11 Should the above measures not equate to the above cost, a further non-exhaustive list of possible measures is provided below, which the client could give due consideration to:

- Implementing a Travel Plan, including mechanisms to discourage high emission vehicle use and encourage the uptake of low emission technologies;
- Public transport subsidies to all employees, to encourage the use of sustainable transport modes;
- Improving or connecting to the existing local cycle path network, to encourage active and sustainable travel; or
- Where possible, delivery and servicing vehicles should comply with the latest Euro Emission Standards.

8. Discussion

8.1 ADC and BHCC have both declared Air Quality Management Areas (AQMAs) within their administrative boundaries, due to exceedances in the long-term Air Quality Standards (AQSs) for NO_2. ADC's Southwick AQMA and BHCC's AQMA 1 are both located on the A270, either side of the proposed development.

8.2 Pollution concentrations within and surrounding these AQMAs can be high; however, data from the UK-AIR suggests background concentrations in the vicinity of the site are well below the key AQSs for NO_2, PM_{10} and $PM_{2.5}$.

8.3 An air quality assessment was principally required to assess the following:

- Potential impacts of the construction phase of the development; and
- Potential operational impacts of generated traffic on nearby sensitive receptors.

8.4 The construction phase of the development could give rise to emissions which could cause dust soiling effects on adjacent uses. However, by adopting appropriate mitigation measures to reduce emissions and their potential impact, there should be no significant residual effects, thus complying with the requirements of the NPPF.

8.5 A detailed dispersion model has been used to predict pollutant concentrations at sensitive locations along the A270 and A293, where contributing traffic generated by the development is anticipated to be highest. The assessment uses a conservative approach to assess air quality by:

- Assessing receptors at worst-case locations (i.e. closest to the roads);
- Assuming vehicular fleet emissions do not improve beyond 2019; and
- Assuming that there will be no improvement in pollutant background concentrations beyond 2019.

8.6 It has been shown that in 2022, predicted concentrations of NO_2, PM_{10}, and $PM_{2.5}$ are expected to increase as a result of development traffic. However, all increases are considered to be of negligible impact on sensitive receptors. As such, impacts from generated traffic are considered to be insignificant, in air quality terms.

8.7 Though the air quality impacts are not considered to be significant, Sussex-Air's air quality planning guidance requires 'Major' developments to carry out an emissions mitigation assessment, to help minimise incremental air quality impacts.

8.8 Current plans to offset potential air quality impacts include:

- Active EV charging points in line WSCC requirements;
- Energy strategy comprising ASHP and PV arrays;

- Cycle storage facilities to encourage active travel; and
- The use of green infrastructure.

8.9 Should the development require more mitigation measures to offset its emissions cost, recommendations are provided in Section 7 of this report.

9. Conclusions

9.1 Folkes Architects, on behalf of Tates Bros. commissioned Phlorum Ltd to undertake an Air Quality Assessment for the development at Brooklands Allotments and Mayberry Garden Centre. The proposal is to extend the existing Mayberry Garden Centre, construct a new car showroom (B1/B8 land use class) and car parking facility under the existing overhead power lines.

9.2 Current background pollutant concentrations and local air quality monitoring results from the wider area suggest that whilst air quality within the surrounding Air Quality Management Area is often poor, background pollution concentrations across the site are likely to be below the relevant UK Air Quality Strategy standard concentrations.

9.3 During construction, adopting appropriate mitigation measures should prevent any significant air quality effects on the surrounding area.

9.4 The proposed development is not expected to introduce new receptors into an area of existing poor air quality, nor is it anticipated to significantly impact local air quality.

9.5 To mitigate for future emissions and offset potential 'emissions costs', the development will include several mitigation measures, including electric vehicle charging points, green infrastructure and cycle storage facilities. Should more be required to offset the 'emissions cost' calculated within this report, recommendations are listed in Section 7.

9.6 The proposed development is expected to comply with all relevant local and national air quality policy. As such, air quality should not pose any significant obstacles to the planning process.

Figures and Appendices

Figure 1: Site Location Plan

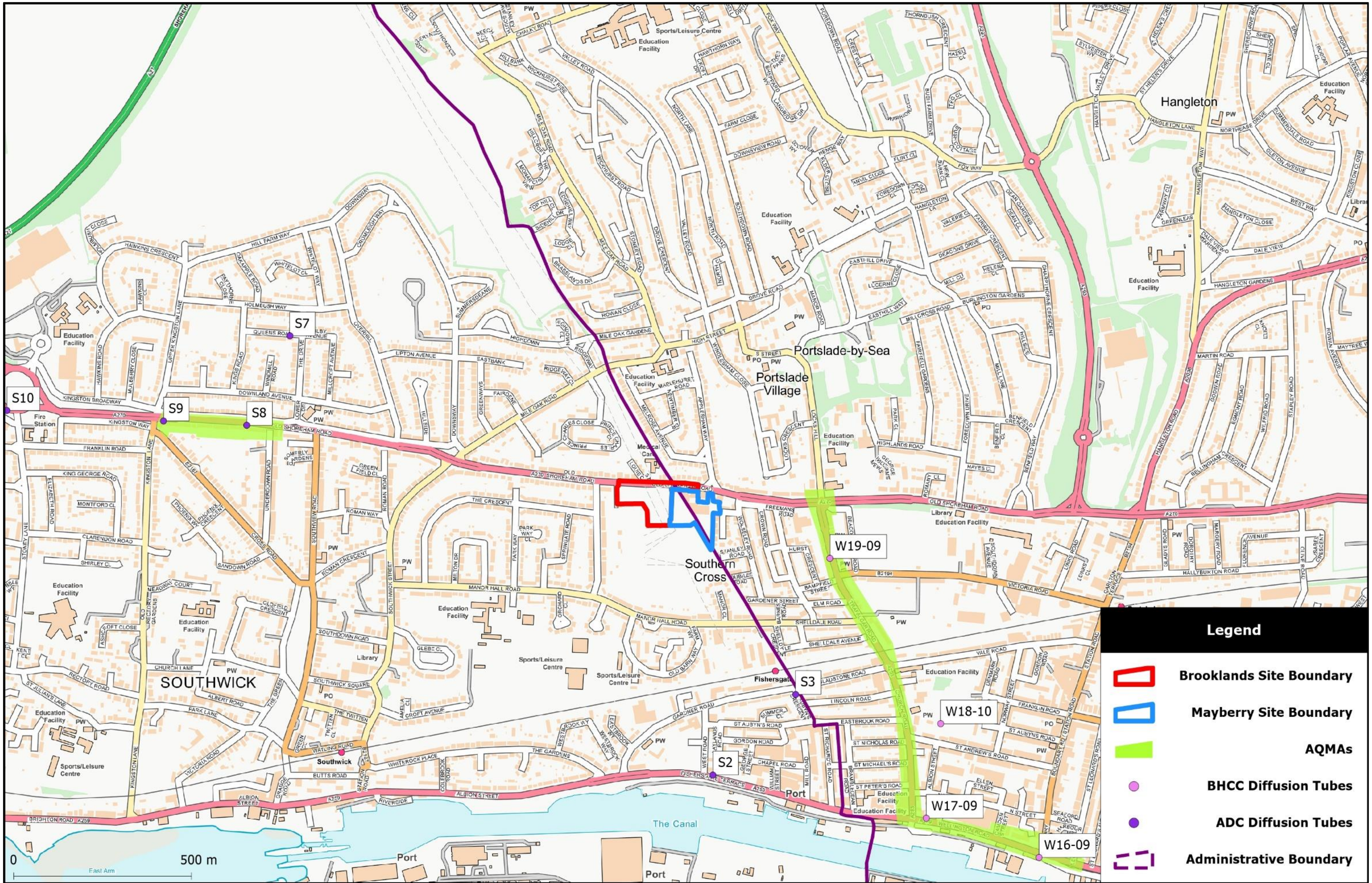


Figure 1: Site Location Plan

Job No: 10224.S
Drawn by: RB
Printed at: 19/11/2020
www.phlorum.com

Figure 2: Construction Phase Receptors

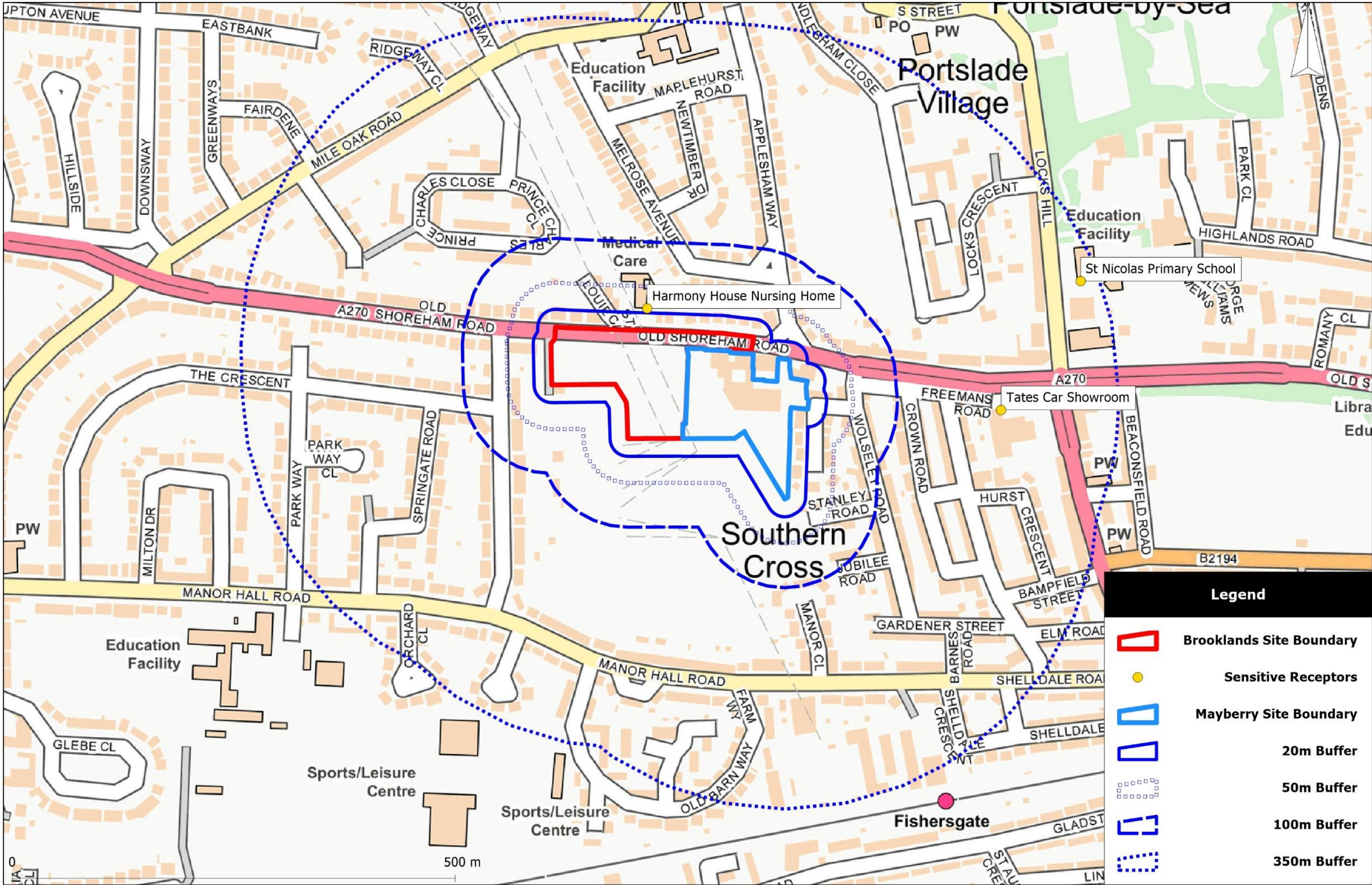


Figure 2: Construction Phase Receptors

Job No: 10224.S
Drawn by: RB
Printed at: 16/11/2020
www.phlorum.com

Figure 3: Operational Phase Receptors

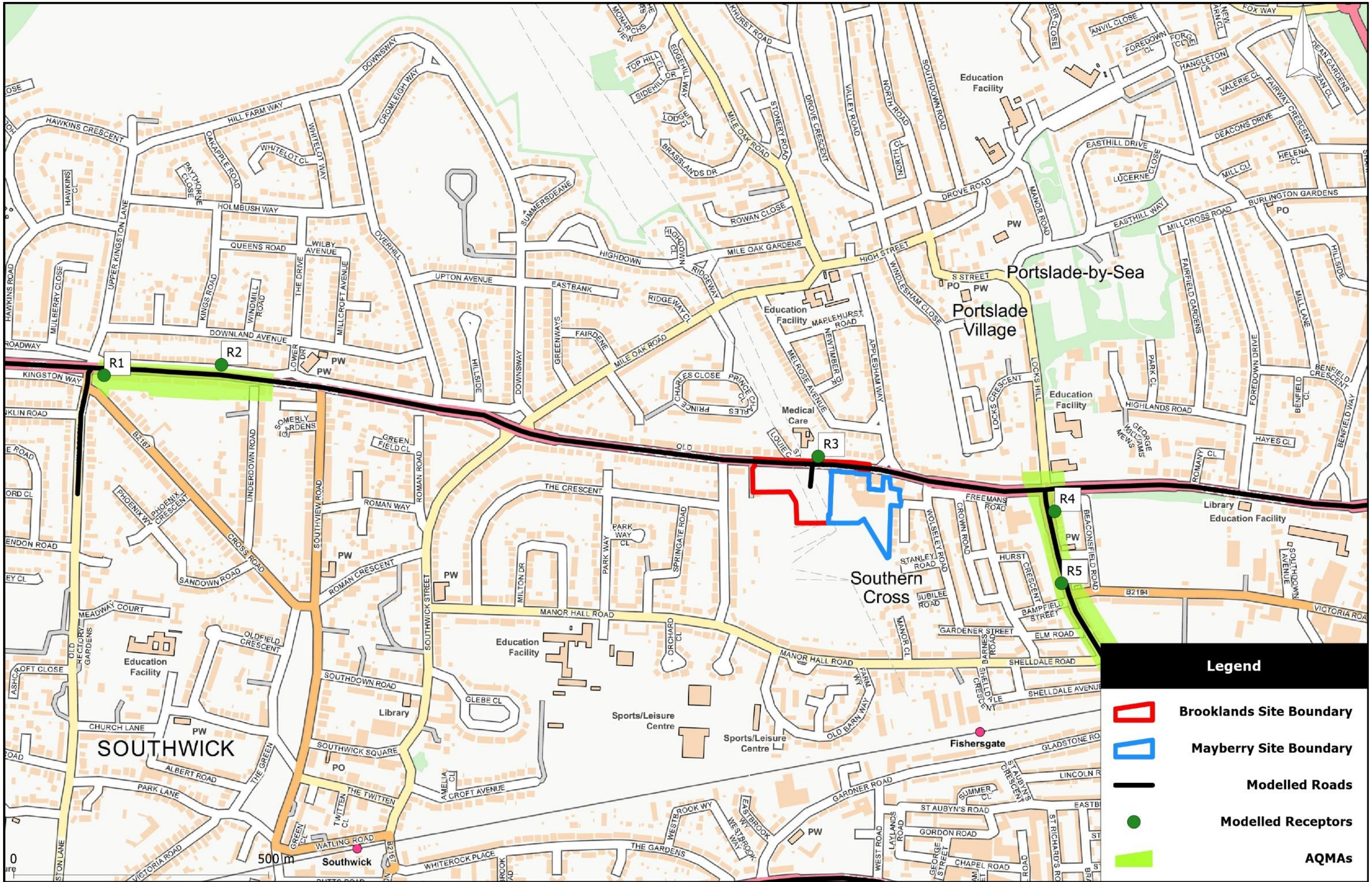
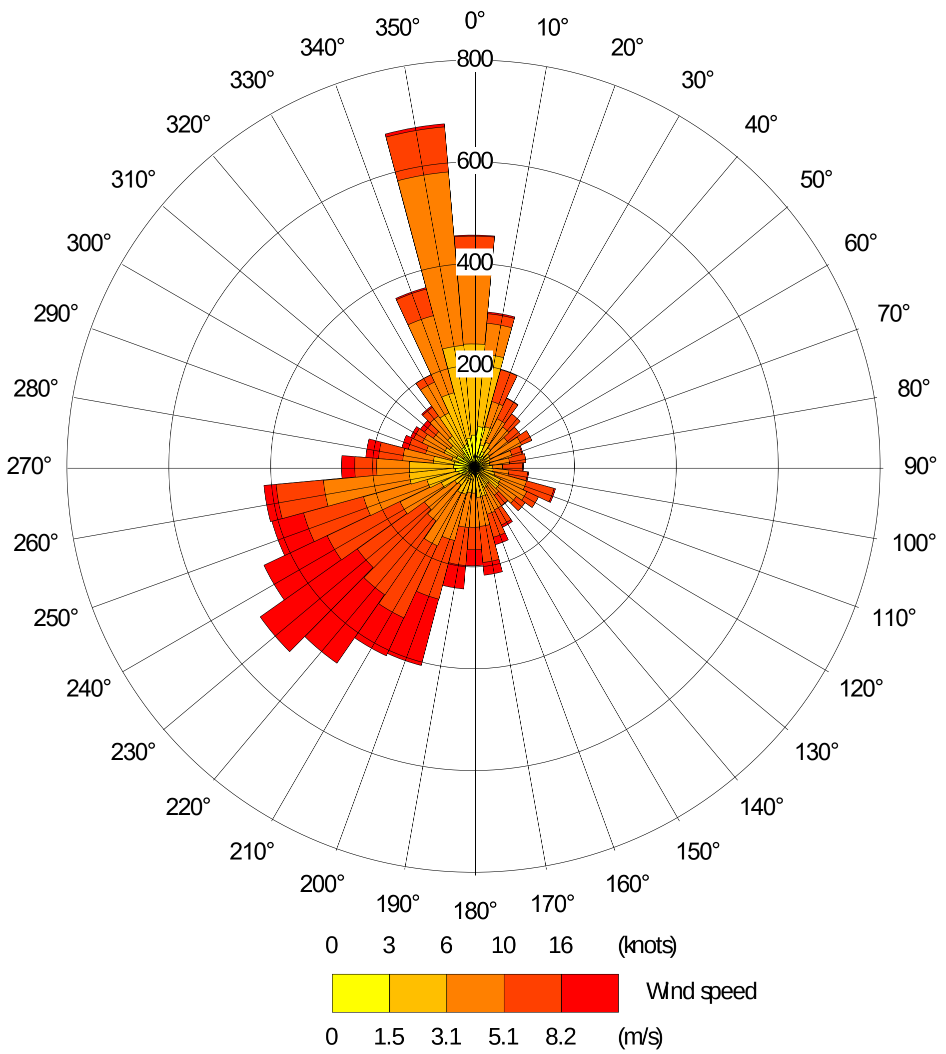


Figure 3: Operational Phase Receptors

Job No: 10224.S
Drawn by: RB
Printed at: 19/11/2020
www.phlorum.com

Figure 4: Wind Rose for Shoreham, 2019


0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
800
600
400
200
0 3 6 10 16 (knots)
Wind speed
0 1.5 3.1 5.1 8.2 (m/s)

Appendix A: EPUK & IAQM Significance Criteria

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. 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)'.
2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. .less than 0.5% will be described as Negligible..
3. The Table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

Appendix B: Model Input Data

Traffic Data

The AADT data used in the ADMS-Roads assessment are included in the table below and were provided by Motion, unless otherwise stated. Committed developments were accounted for using TEMPro Growth Factors.

Table B.1: Traffic inputs for the ADMS-Roads Assessment

Link ID	Road	2019 Baseline		2022 Without		2022 With	
		LDV/hr	HDV/hr	LDV/hr	HDV/hr	LDV/hr	HDV/hr
A	A270 West of Site	944	36	1140	43	1146	43
B	A270 East of Site	944	36	1140	43	1146	43
C	Trafalgar Road	516	26	624	31	627	31
D	A270 East of Trafalgar Road	1168	30	1412	36	1413	36

Model Inputs

Model inputs are provided below in Tables B.2 and B.3. These data relate to ADMS Roads inputs for model verification and the assessment modelling.

Table B.2: Verification inputs

Inputs	
Dataset	UK EFT v10.1 (2VC)
Emission Year	2019
Road Type	England Urban

Table B.3: Operational inputs

Inputs	
Dataset	UK EFT v10.1 (2VC)
Emission Year	2019
Road Type	England Urban
Traffic Data	Provided by Motion

Appendix C: Model Verification Study

Model Verification

Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to monitored concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in LAQM.TG(16).

According to LAQM.TG(16), no adjustment factor is necessary where the results of the model all lie within 25% of the monitored concentrations.

Model verification can only be undertaken where there is sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. LAQM.TG(16) recommends that a combination of automatic and diffusion tube monitoring data is used; although this may be limited by data availability. Six nearby monitoring locations, three in ADC and three in BHCC, with appropriate traffic data collated by Motion Transport or obtained from the Department for Transport, were selected for this study.

Table C.1 compares monitored and modelled NO_2 concentrations at the six monitoring locations.

Table C.1: Monitored and Modelled Road Contributions of NO_2 Concentrations at Roadside Monitoring Sites

Monitor ID	Type	Concentrations ($\mu g.m^{-3}$)		
		Monitored	Modelled	% Difference
S9	DT	31.1	29.1	-6.4%
S8	DT	27.5	25.0	-9.1%
S2	DT	23.6	20.1	-14.9%
W19-09	DT	39.9	30.3	-24.0%
W17-09	DT	39.2	28.2	-28.2%
W16-09	DT	33.5	28.4	-15.2%

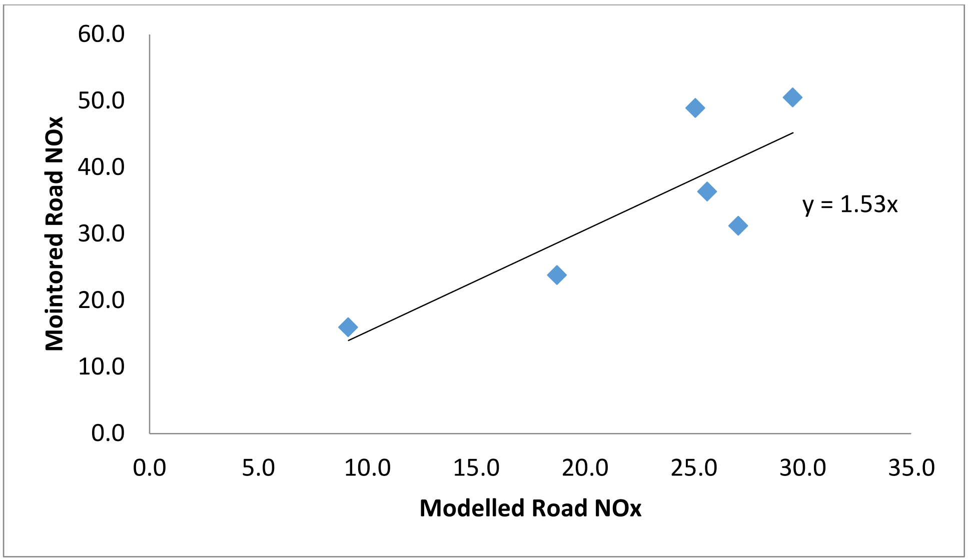
Note: DT = Diffusion Tube

The data in Table C.1 shows that the model is under-predicting concentrations at all locations to a varying degree. This is a pattern frequently seen in model verification studies, and is likely to be the result of local dispersion characteristics. It was decided to proceed with adjustment as the model was systematically under predicting NO_2 concentrations. This was done in order to ensure conservative results.

As it is primary NO_x, rather than secondary NO_2, emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x.

Plots of modelled versus monitored NO_x concentrations for the study area on a graph shows a positive correlation. These graphs are included in Figure C.1 below.

Figure C.1 Monitored vs Modelled Road NO_x



By plotting a trend line through the points on the graph, a factor of **1.53** was derived.

Table C.2 shows total monitored versus modelled NO_2 following the adjustment of the road contribution of NO_x by this factor. It shows that, following this adjustment, all modelled concentrations of NO_2 are within 25% of monitored concentrations at these locations. As a result, the adjustment factors were considered appropriate for the adjustment of modelled road contributions of NO_x for the Proposed Development.

Table C.2: Monitored and Adjusted Modelled Total NO_2 Concentrations

Monitor ID	Type	Concentrations ($\mu g.m^{-3}$)		
		Monitored	Modelled	% Difference
S9	DT	31.1	35.8	15.2%
S8	DT	27.5	29.9	8.7%
S2	DT	23.6	22.6	-4.3%
W19-09	DT	39.9	37.6	-5.8%
W17-09	DT	39.2	34.5	-12.1%
W16-09	DT	33.5	34.8	4.0%

Note: DT = Diffusion Tube; A = Automatic Monitor

As there is no suitable PM_{10} or $PM_{2.5}$ monitoring data in the study area, it was not possible to perform model verification for these pollutants. As such, the NO_x adjustment factor has also been applied to PM_{10} and $PM_{2.5}$ model results, in accordance with LAQM.TG(16).

Root Mean Square Error

Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(16), the RMSE should ideally be within 10% of the relevant air quality standard, but is acceptable where it is within 25% of the AQS.

The model verification process calculated a post-adjusted RMSE of $3.1\mu g.m^{-3}$, which equates to 7.8% of the annual mean AQS for NO_2, and is therefore considered to be acceptable.

Appendix D: IAQM Highly Recommended Mitigation Measures for High Risk Sites

Appendix D: IAQM Highly Recommended Mitigation Measures for sites with a High Risk of Dust Impacts

Please refer to the IAQM's Construction Dust Guidance (*Guidance on the assessment of dust from demolition and construction (2014))*[12] and *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018)*[15] for further, "desirable", mitigation measures.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences 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 environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this Appendix. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

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 exception 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 500m 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 inspection, 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 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of 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 PM_{10} 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 the IAQM on *monitoring during demolition, earthworks and construction*.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as 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 on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicles switch off 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 15mph on surfaced and 10mph on unsurfaced 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.

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 and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on 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.

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.

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 in small areas during work and not all at once.

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.

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 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.

- Access gates to be located at least 10m from receptors where possible.

Phlorum Limited

Head Office & Registered Office:
Unit 12
Hunns Mere Way
Woodingdean
Brighton
East Sussex
BN2 6AH
T: 01273 307 167

Northern Office:
Ground Floor
Adamson House
Towers Business Park
Wilmslow Road
Didsbury
Manchester
M20 2YY
T: 0161 955 4250

Western Office:
One Caspian Point
Pierhead Street
Cardiff Bay
Cardiff
CF10 4DQ
T: 029 2092 0820

info@phlorum.com
www.phlorum.com

Registered in England & Wales. Reg No. 4967256