

BOKLOK

LAND TO THE SOUTH OF LITTLEHAMPTON ACADEMY

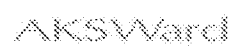
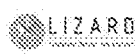
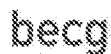
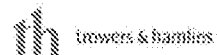
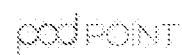
Air Quality Assessment

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1. INTRODUCTION

Hydrock have been commissioned by BoKlok Housing to prepare an Air Quality Assessment (AQA) for the proposed residential development of 112 dwellings, associated car parking and public open space accessed from Fitzalan Road. The application site is located at Land to the South of Littlehampton Academy, Littlehampton. This is within the authoritative boundary of Arun District council (ADC). The grid reference for the centre of the site is 503315, 102615. The location of the site is shown below in Figure 1:

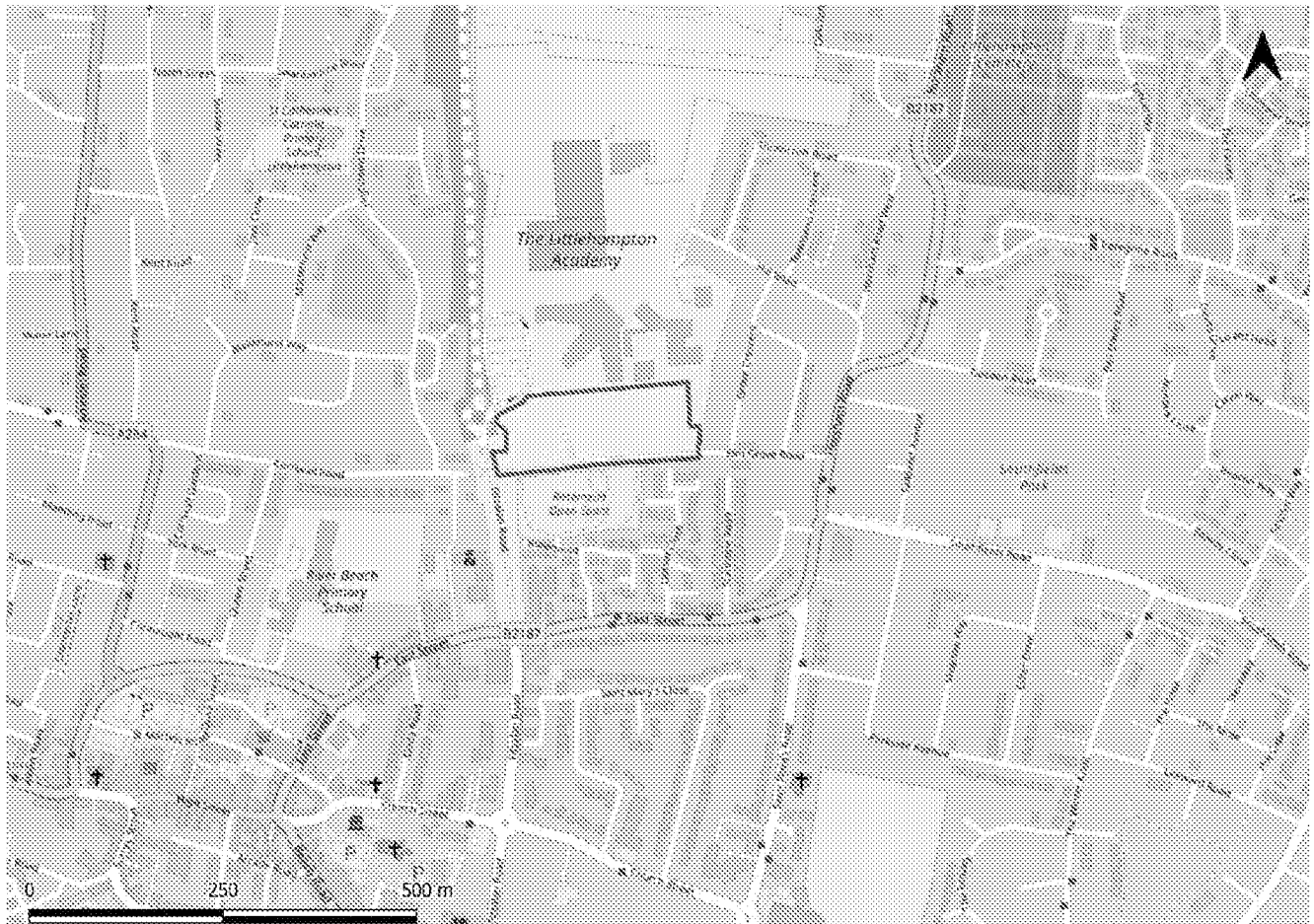


Figure 1 - Site Location (red line)

The local area has an urban / suburban character. There is a large secondary school and college (Littlehampton Academy) to the north. Residential properties are located to the east and west, of varying density and character. There is a relatively large area of public open space (including play space) to the south (Rosemead Park).

Tailpipe emissions from vehicles travelling along the Fitzalan Road are considered to be the main pollution source in the study area. There are no significant point sources in close proximity to the area, according to data from the National Atmospheric Emissions Inventory (NAEI).

1.1 Proposed development

The proposal is for the erection of 112 dwellings, associated car parking and public open space accessed from Fitzalan Road. An illustrative site plan is shown in Figure 2:

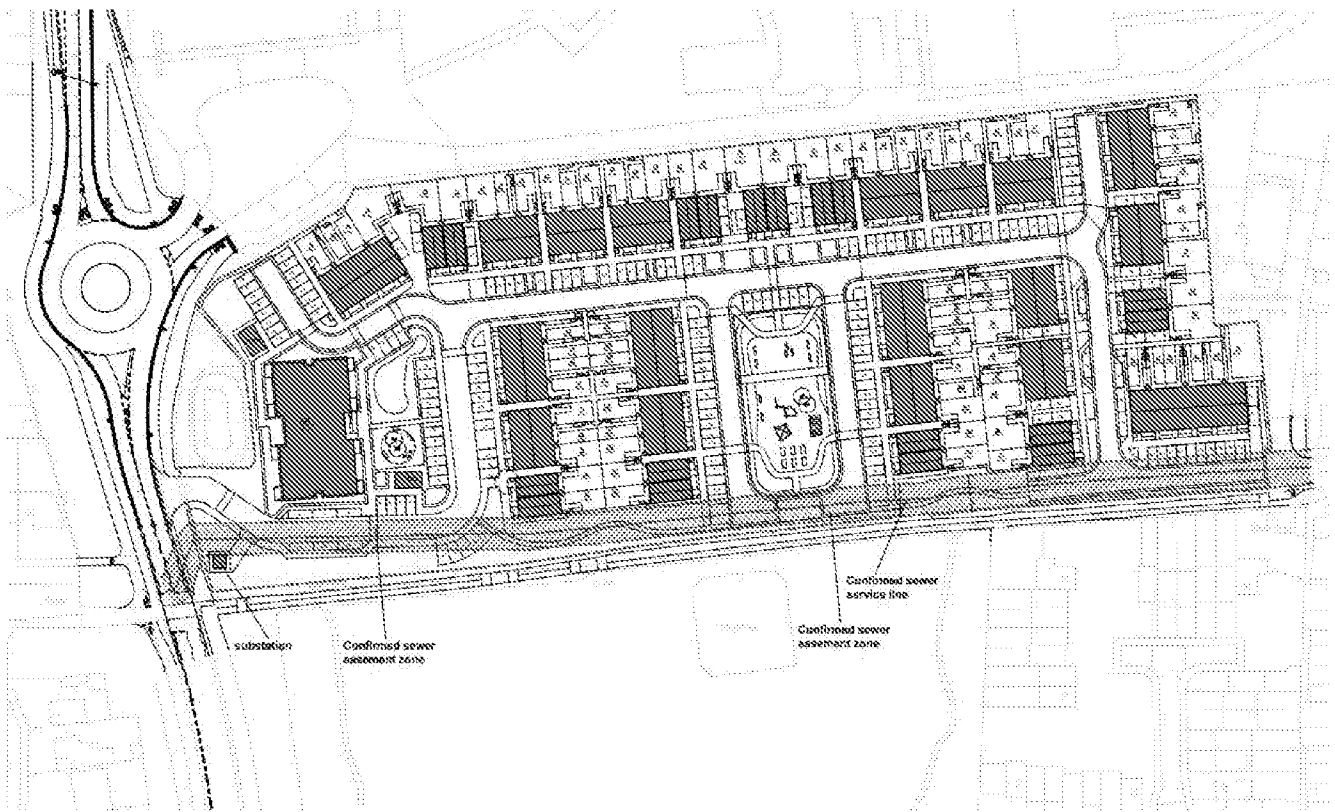


Figure 2- Extract from illustrative Site Plan

1.2 Purpose of Air Quality Assessment

This report provides a review of baseline air quality in the study area to assess the risk of exceedance of National Air Quality Objectives (NAQOs) at the site and surrounding area, in order to consider its suitability for residential and commercial use, in air quality terms.

The potential impact of construction dust is also addressed to conclude on the requirements for mitigation to reduce the significance of impacts to negligible during this phase.

In line with the Air Quality and Emissions Mitigation Guidance for Sussex (2020)¹, a damage cost and emissions mitigation statement is provided. This monetises the value of air quality mitigation required to reduce the polluting impact of the development, based on the net increase in vehicle trips.

¹ Sussex Air, "Air Quality and Emissions Mitigation Guidance for Sussex (2020)," January 2020, <http://www.sussex-air.net/Reports/SussexAQGuidanceV.12020.pdf>.

2. RELEVANT LEGISLATION

2.1 EU

The governing European Union Directive on ambient air quality and cleaner air for Europe (2008/50/EC)² came into force in 2008, and provides statutory guidance on air quality. This presents statutory requirements for the protection of human health and ecosystems through long and short-term limit values for: oxides of nitrogen (NO_x), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), particulate matter with a diameter of less than 10 microns (PM₁₀), particulate matter with a diameter of less than 2.5 microns (PM_{2.5}) carbon monoxide (CO), lead, benzene and ozone (O₃). The above legislation replaces the EU's previous three daughter directives.

The 2004/107/EC³ Daughter Directive also sets target values, where exposure is to be reduced to as low as reasonable possible, for arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons (PaH) within ambient air. In addition, the Committee on the Medical Effects of Air Pollution (COMEAP)⁴, the World Health Organisation (WHO)⁵ and the United Nations Economic Commission for Europe (UNECE)⁶ provide medical and scientific evidence of the health risks to the general public and recommended concentration limits.

2.2 UK

The targets and limit values set within the 2008/50/EC directive were transposed into UK law through the Air Quality Standards Regulations 2010⁷. These set out how the government has interpreted the EU directives noted above. One of the main additions the regulatory framework for PM_{2.5}.

The Air Quality Strategy 2007 Volume 1⁸ outlines the National Air Quality Standard (AQS) concentrations and NAQOs that should be achieved. A summary of the AQS concentrations and NAQOs of relevance to this assessment is provided below, in Table 1:

Table 1 – UK Air Quality Standards

Pollutant	Units	Averaging Period	Air Quality Standard (AQS)	National Air Quality Objectives (NAQO)
Nitrogen dioxide (NO ₂)	µg/m ³	1 Hour Mean	200 µg/m ³	Not to be exceeded more than 18 times in a year.
		Annual Mean	40 µg/m ³	
Particulate matter (PM ₁₀)	µg/m ³	24 Hour Mean	50 µg/m ³	Not to be exceeded more than 35 times in a year
		Annual Mean	40 µg/m ³	
Particulate matter (PM _{2.5})	µg/m ³	Annual Mean	25 µg/m ³	25 µg/m ³

² EC, "Directive 2008/50/EC of the European Parliament and of the Council," May 21, 2008, 44.

³ EC, "Directive 2004/107/EC of the European Parliament and of the Council," December 15, 2004, 107.

⁴ COMEAP, "The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom" (London: Committee on the Medical Effects of Air Pollutants (COMEAP), November 2010).

⁵ WHO, "WHO | Air Pollution," WHO, 2016, http://www.who.int/topics/air_pollution/en/.

⁶ UNECE, "Air Pollution - Air Pollution - Environmental Policy - UNECE," 2016, <http://www.unece.org/env/lrtap/welcome.html>.

⁷ Parliament, "The Air Quality Standards Regulations 2010," June 11, 2010, http://www.legislation.gov.uk/uksi/2010/1001/pdfs/ukxi_20101001_en.pdf.

⁸ Defra, "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Volume 1" (Department for Food, Environment and Rural Affairs (Defra), July 2007), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf.

Defra's Local Air Quality management Technical Guidance 2016 (LAQM.TG(16))⁹ provides guidance on where the above NAQOs should apply. This is summarised below, in Table 2:

Table 2 - Summary of where NAQOs should apply:

Averaging Period	Objectives should apply at:	Objectives should generally NOT apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual Mean and 24 and 8-hour mean objectives apply. Kerbside site (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railways stations etc. which are not fully enclosed, where members of the public might be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where member of the public might reasonably be exposed for a period of 15 minutes	

From the above, it can be concluded that the annual mean NAQOs apply at the residential properties within the study area when considering exposure of new receptors at the application site.

2.3 Local Air Quality Management

Obligations under the Environment Act 1995¹⁰ require local authorities to declare an Air Quality Management Area (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 NAQOs.

ADC do not have a declared AQMA. The closest AQMA is over 10km away in the administrative Boundary of Worthing Borough Council.

⁹ Defra, "LAQM Technical Guidance LAQM.TG16" (Department for Food, Environment and Rural Affairs (Defra), February 2018), <https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>.

¹⁰ Environment Agency, "Environment Act 1995" (The Environment Agency, 2002), <http://www.legislation.gov.uk/ukpga/1995/25/contents>.

Whilst ADC have not declared an AQMA, the Council has joined with other Local Authorities in West Sussex to create the new, joint Air Quality Action Plan 'Breathing Better'¹¹. This includes the issues faced in West Sussex in terms of air quality and includes measures to deliver improvements following the below themes:

- Low emission vehicles
- Traffic management
- Sustainable transport infrastructure
- Behaviour change
- Health and wellbeing
- Planning
- Travel planning
- Resourcing

2.4 National Planning Policy Framework

The National Planning Policy Framework (NPPF)¹² sets out the Government's planning policy for England. It requires planning decisions for any new development to prevent new and existing development from contributing to, or being put at risk from, unacceptable levels of air pollution (paragraph 170). It also states that planning decisions should sustain and contribute towards compliance with relevant limit values or national objectives for air pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones (paragraph 181), and the cumulative impacts from other sites (paragraph 180).

Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. Furthermore, planning decisions should ensure that any new development in AQMAs and Clean Air Zones (CAZs) is consistent with the local air quality action plan.

2.5 Planning Practice Guidance

Reference ID 32 (Air Quality) of the National Planning Practice Guidance (NPPG)¹³ 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.

2.6 Local planning policy

The Arun District Local Plan 2011-2031¹⁴ sets out the strategic vision and objectives that guide the districts development over the plan period. Within this air pollution is directly addressed in policy QE DM3:

¹¹ West Sussex Inter-Authority Air Quality Group, "Breathing Better: A Partnership Approach to Improving Air Quality in West Sussex," January 2020, https://www.westsussex.gov.uk/media/12062/air_quality_plan.pdf.

¹² Ministry of Housing, Communities and Local Government, "National Planning Policy Framework," February 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf.

¹³ Ministry of Housing, Communities & Local Government, "Reference ID (32) Air Quality" (Ministry of Housing, Communities & Local Government, 2019), <https://www.gov.uk/guidance/air-quality--3>.

¹⁴ Arun District Council, "Arun Local Plan 2011-2031," July 2018, <https://www.arun.gov.uk/download.cfm?doc=docm93jijm4n12844.pdf&ver=12984>.

Policy QE DM3

Air pollution

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

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

Industrial development which is regulated by environmental permits (that creates or results in dust, smell, fumes, smoke, heat, radiation, gases, steam or other forms of pollution) must be located in such a position which ensures that the health, safety and amenity of users of the site or surrounding land is not put at risk and the quality of the environment would not be damaged or put at risk. Developments shall also be consistent with all other Local Plan policies.¹⁵

Also of relevance to this air quality assessment is policy 18 within the Littlehampton Neighbourhood Plan¹⁵. Policy 18: Fitzalan Link Road, has implications for the potential exposure on receptors at the new development whereby the completed link road may increase the traffic on the section of Fitzalan Road adjacent to the proposed development at Land South of Littlehampton. This is considered accordingly within the assessment.

¹⁵ Littlehampton Town Council, "Littlehampton Neighbourhood Development Plan (Submission Plan)," November 2014, <https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n4038.pdf&ver=3710>.

3. METHODOLOGY

3.1 Consultation

Full details of the air quality assessment approach were sent via email to ADC's Air Quality Officers in December, 2020 with a request for further comment / guidance.

The following response was received:

Please ensure that your assessment includes the new link road which will run adjacent to the west side of the proposed site. Traffic on this new road and its impact on air quality for future residents at the proposed site will need to be taken into consideration for an acceptable assessment. Whilst the development itself and the associated increase in traffic may be small, this new link road may result in an increase in pollutants, thus making the site unsuitable for residential development or affect the site layout. This needs to be fully assessed."

Details of how the above issues would be addressed within the report were sent via email and agreed upon in January 2021. The agreed methodology is as shown below.

3.2 Guidance

Defra's LAQM.TG (16)⁹ and the EPUK & IAQM Land-use Planning & Development Control: Planning for Air Quality¹⁶ have been followed as guidance to produce this assessment. The IAQM's guidance on assessing impacts from construction¹⁷ has been followed for the construction assessment.

The Sussex-air partnership's Air quality and Emissions Mitigation Guidance for Sussex (2020)¹⁸ has also been followed as guidance to produce this assessment.

3.3 Baseline Air Quality

The baseline air quality conditions in the vicinity of the application site are established through the compilation and review of appropriately sourced background concentration predictions and local monitoring data. This is provided in section 4, and includes:

- Data from the National Atmospheric Emissions Inventory;
- Defra's 2018-2023 modelled background concentrations of AQS pollutants (UK-AIR). These estimates are produced using detailed modelling tools and are available as concentrations at central 1km² National Grid square locations across the UK, and
- ADC's latest available air quality monitoring data, derived from the latest Annual Status Report¹⁹. At the time of writing, these data were from 2019.

3.4 Exposure Assessment

This section will consider the suitability of the site in terms of air quality. The primary concern for the proposed development when considering the exposure of the new residents to poor air quality is Fitzalan Road to the

¹⁶ IAQM, "Land-Use Planning & Development Control: Planning for Air Quality" (Institute for Air Quality Management (IAQM), January 2017), <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>.

¹⁷ IAQM, "Guidance on the Assessment of Dust from Demolition and Construction" (Institute of Air Quality Management (IAQM)), February 2014), <http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf>.

¹⁸ Sussex Air, "Air Quality and Emissions Mitigation Guidance for Sussex (2020)."

¹⁹ Arun District Council, "2020 Air Quality Annual Status Report (ASR)," June 2020, <https://www.arun.gov.uk/download.cfm?doc=docm93jijm4n15545.pdf&ver=15975>.

West of the site. This section will include consideration of the existing section of Fitzalan Road and also the proposed Fitzalan Link Road which has been approved through a Reserved Matters planning application (LU/234/16/RES) to confirm the detailed design aspects for its construction. To do this the following will be used:

- Defra's AEA 'Diffusion Tube for Ambient NO₂ Monitoring: Practical Guidance'²⁰ to classify the site as urban background;
- Review of the Air Quality Assessment, prepared by WYG, that was submitted with the outline application [ref LU/63/11] for the proposed Fitzalan Link Road (not superseded at reserved matters stage);
- Defra's LAQM.TG(16) guidance, which provides screening criteria at Table 7.1 for the assessment of road traffic sources, including new roads such as the Fitzalan Link Road, and
- Review of existing traffic data and road characteristics for the study area.

3.5 Construction Dust Risk Assessment

A construction dust risk assessment is provided in section 5, which has been undertaken in line with IAQM guidance. This considers the risk of impacts during the construction phase in terms of nuisance dust, human health (PM₁₀ exposure) and ecological impacts.

With regard to ecological receptors, risk assessment should be taken where high-sensitivity receptors are located within 50m of a site boundary. The Multi Agency Geographic Information for the Countryside (MAGIC) website, which incorporates Natural England's interactive maps²¹, 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 for Large sites, 200m for Medium sites and 50m for Small sites. No such receptors were identified and no further assessment is required in relation to ecological receptors.

Within distances of 20m of the site boundary there is a high risk of dust impacts. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the prevailing wind direction in relation to the dust source. It is considered that for receptors more than 350m from the site boundary, the risk is negligible. Sensitive human receptors were identified within 350m of the site boundary. Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relation to both dust soiling and health effects of PM₁₀. Indicative examples of medium sensitivity receptors include places of work, such as offices.

The IAQM guidance states that the potential dust emission magnitude from Demolition, Earthworks, Construction and Trackout should all be assessed individually. In addition, the sensitivity of the area to adverse dust impacts should also be defined.

The overall significance of the risk of adverse impacts during the construction phase can then be defined using the 'risk of impacts matrix' for each stage of the construction phase described above.

²⁰ AEA Energy and Environment, "Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance," 2008, https://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf.

²¹ Natural England and MAGIC partnership organisations, "Multi Agency Geographic Information for the Countryside,," 2020, <https://magic.defra.gov.uk/MagicMap.aspx>.

3.6 Impact Assessment

The scope of assessment has been determined against the IAQM's checklist criteria. The purpose of the checklist criteria shown in Table 3 is to establish whether a detailed assessment of potential impacts is required.

Table 3 - IAQM detailed assessment criteria

Criteria	The development will:	Indicative criteria to proceed to a detailed AQIA
1	Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere
2	Cause a significant change in Heavy Duty (HDV) flows on local roads with relevant receptors (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
3	Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4	Introduce a new junction or remove an existing junction or change a bus station	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate e.g. traffic lights or roundabouts
5	Introduce or change a bus station	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
6	Have an underground car park with extraction system	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7	Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors NB. This includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	Typically, any combustion plant where the single or combined NO _x emission rate is less than 5mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent stack in a location and at a height that provides adequate dispersion In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situation where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emissions rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

With regard to screening criteria 1 and 2, the transport consultants for the proposed development are RGP who have provided clarity that the site is not expected to see an increase in road traffic that will exceed criteria 1 and 2 for non-AQMA areas.

As such, RGP have stated the following:

"that on average weekday of 453 two-way vehicle movements would be generated by the site, in terms of AADT, applying standard DfT conversion factors this would amount to a total AADT flow of 425 two-way vehicle movements."

With regard to screening criteria 3 - 6, these criteria are not triggered as a result of the proposed development.

With regard to screening criteria 7, if any gas fired boilers are proposed for heating / hot water, these should meet the ultra-low NO_x emission rating of <40mg/kWh, in accordance with EPUK/IAQM guidance.

Based on the above, detailed assessment of air quality impacts has not been undertaken, as it is reasonable to conclude that any potential impacts of this development would be insignificant, in air quality terms, in accordance with IAQM guidance.

3.7 Damage Costs and Emissions Mitigation Statement

Air Quality and Emission Mitigation Guidance for Sussex (2020)¹⁸ requires an emissions mitigation assessment to demonstrate how air quality impacts of a development will be mitigated to acceptable levels. It provides a detailed methodology, which has been followed.

The emissions mitigation assessment will provide the value of air quality mitigation required to reduce the polluting footprint of the development, based on the net increase in vehicle trips. Increases in pollutant emissions (NO_x and PM_{2.5}) caused by the development over a 5-year appraisal period are estimated using development traffic data and Defra's Emissions Factor Toolkit (EFT) (v.10.1)²². The latest version of Defra's Air Quality Appraisal: Damage Costs Toolkit²³ (last updated May 2020) is then used to apply the 'damage costs', which are a set of impact values, defined per tonne of emission by pollutant, to these development emissions. The result is an indicative value to be spent on mitigation measures to reduce incremental worsening in local ambient air quality from new development.

The base damage costs for 'Road Transport Urban Medium' are provided below in £/tonne:

- NO_x: £7,614
- PM_{2.5}: £66,797

The damage cost calculation applies inflationary uplift factors of 2% cumulatively per annum to the central damage cost from Defra's damage cost valuations (2017) and assumes a discount rate of 3.5%. The price base year for the damage cost calculation was set to 2021 (i.e. the year of appraisal), in accordance with Defra guidance.

²² Defra, "Emissions Factors Toolkit (EFT) V10.1," August 20, 2020, <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

²³ DEFRA, "Air Quality Damage Cost Appraisal Toolkit," May 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/887827/air-quality-damage-cost-appraisal-toolkit.xlsx.

4. BASELINE AIR QUALITY CONDITIONS

Baseline air quality conditions in the study area are established through compilation and review of appropriately sourced monitoring and modelling data.

4.1 UK-AIR background concentrations

Defra provides estimated background concentrations of AQ5 pollutants at the UK-AIR website. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km² 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.

Estimated background concentrations of the key AQ5 pollutants relevant to this assessment are presented in Table 4 for NO₂, NO_x, PM₁₀ and PM_{2.5}. The background concentrations are all below the NAQOs.

Table 4 - UK-AIR background concentrations and NAQOs

Pollutant		Period	National Air Quality Objectives (NAQO)	Annual mean 503500 102500					
Description	Units			2018	2019	2020	2021	2022	2023
Nitrogen dioxide (NO ₂)	µg/m ³	Annual mean	40	10.16	9.82	9.45	9.13	8.81	8.58
Particles (PM ₁₀)	µg/m ³	Annual mean	40	14.36	14.13	13.90	13.72	13.54	13.36
Particles (PM _{2.5})	µg/m ³	Annual mean	25	10.18	10.01	9.85	9.70	9.56	9.42
Oxides of nitrogen (NO _x)	µg/m ³	Annual mean	-	13.35	12.88	12.35	11.90	11.46	11.13

The data show that annual mean background concentrations of NO₂, PM₁₀ and PM_{2.5} at the grid square within which the application site is located are modelled by Defra to be well below the NAQOs in all years. In 2021, annual mean background concentrations of NO₂, PM₁₀ and PM_{2.5} were modelled to be below the annual mean NAQOs at the grid square 503500, 102500 by 77.2%, 65.7% and 61.2%, respectively.

Concentrations of all pollutants are predicted to decline incrementally each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles and strategies to reduce emissions across all sectors.

4.2 Arun Council Air Quality Monitoring Data

ADC monitor air quality at 17 non-automatic diffusion tube monitoring sites across the district. Of these, 4 are located in Littlehampton. These are sites 1, 2, 3 and 4 which are shown in Figure 3:

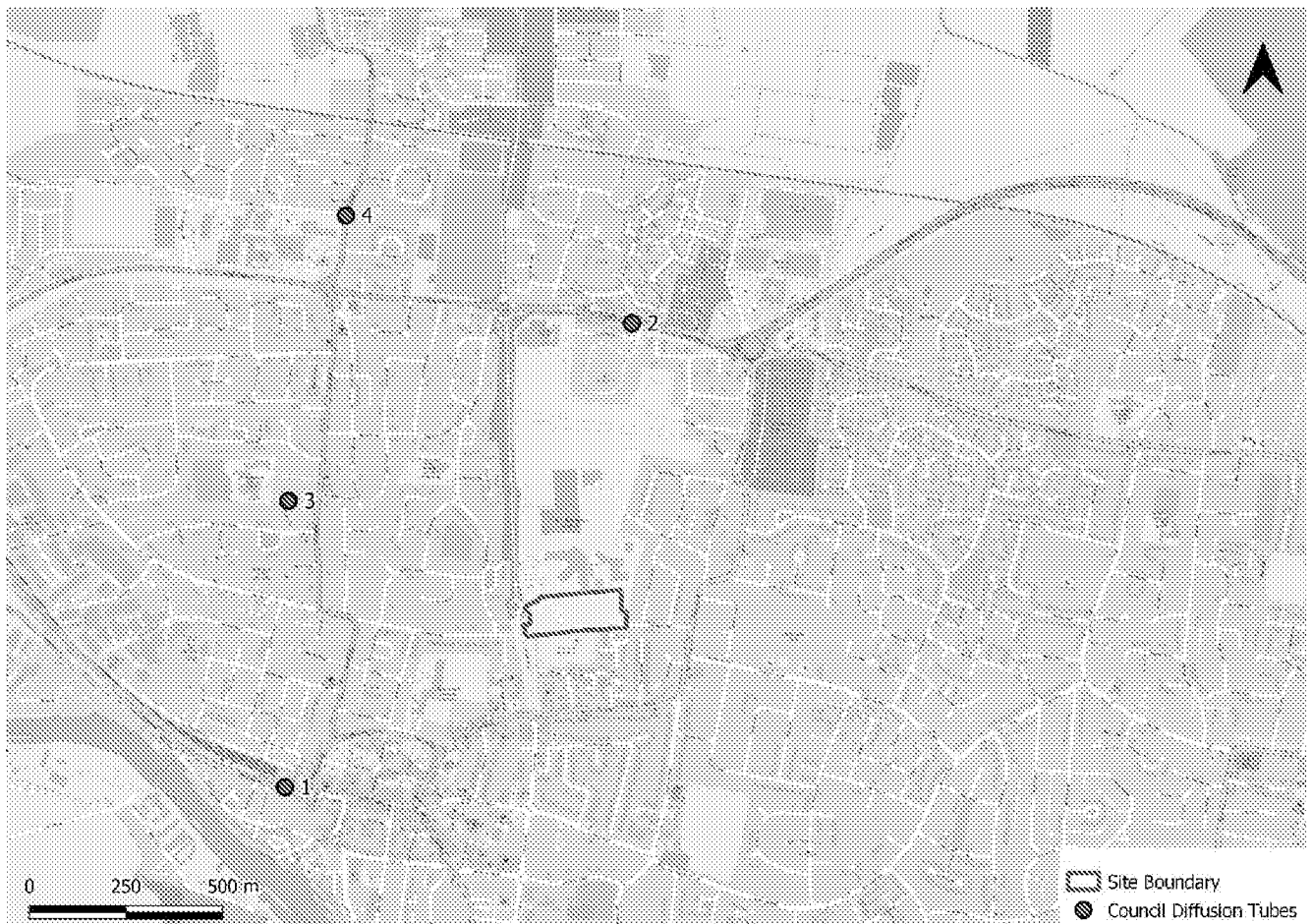


Figure 3 – Map of Arun Council automatic monitoring locations

The data for monitoring sites 1, 2, 3 and 4 are shown below, in Table 5:

Table 5 - Annual mean NO₂ concentrations (µg/m³)

Site ID	Site Name	Site Type	X(m)	Y(m)	In AQMA	Results (µg/m ³)				
						2015	2016	2017	2018	2019
1	Litt01	Roadside	502564	102149	NO	22.4	22.6	24.5	23	20
2	Litt02	Roadside	503439	103354	NO	25.8	24.4	25.3	23	20
3	Litt03	Urban Background	502559	102388	NO	12.9	12.9	-	-	-
4	Litt04	Roadside	502730	101225	NO	16.1	22.9	27.1	25	21

Notes: Bold values denote exceedance of the Annual Mean NAQO.

The data in Table 5 show that annual mean NO₂ concentrations were well below the NO₂ annual mean NAQO for recent years, with concentrations peaking in 2017. In 2019, sites 1, 2 were both below the NAQO by 50%, with site 4 47.5% below the NAQO. These data reflect the overall good air quality in the local area.

5. CONSTRUCTION DUST RISK ASSESSMENT

5.1 Overview

The construction phase of the proposed development will involve a number of activities that will produce polluting emissions to air. Predominantly, these will be emissions of dust. A such, a qualitative construction dust risk assessment has been carried out in accordance with IAQM Guidance¹⁷.

The risks of impact and the significance of each stage of the construction phase is classified as Negligible, Low, Medium or High, determined against a matrix which considers the distance from source, receptor sensitivity, background pollution concentrations and the potential dust emission magnitude of the works.

The IAQM's guidance states that, from experience of assessing exhaust emissions from site traffic, it is unlikely that any significant adverse impacts on local air quality would be caused and in the vast majority of cases, quantitative assessment is not needed. As such, short term effects of construction traffic emissions have not been assessed, as they are also likely to be well below the IAQM traffic criteria outlined in Table 3.

5.2 Demolition

There are no significant demolition works associated with this site, as it is unoccupied, and therefore no dust emissions are expected from this activity.

5.3 Earthworks

The total area of the site, is within the IAQM's Large criteria as it is over 10,000m². Based on this, the potential dust emission magnitude during this phase is defined as 'Large', with reference to IAQM guidance.

5.4 Construction

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the buildings / infrastructure, method of construction, construction materials, and duration of build.

An estimation of the total volume of the building usually forms the main criteria from which the potential dust emissions during the construction phase are judged. However, for the proposed development buildings are to be prefabricated off-site, this significantly reduces the expected emissions of dust during the construction phase.

However, as roads, other infrastructure and foundations still being constructed onsite, it is considered reasonable to define the potential dust emission magnitude during this phase as 'Medium'.

5.5 Trackout

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

It is expected that there would be 10 – 50 HDVs accessing the site each day. No unpaved surfaces over 50m would be utilised as site traffic would be routed along the existing road network. Accordingly, the potential dust emission magnitude during Trackout is considered to be 'Medium'.

5.6 Sensitivity of Area

The prevailing wind direction for the closest regionally representative meteorological measurement station to the application site, at Brighton City Airport (Shoreham), is shown below in Figure 4. The wind rose shows that

the prevailing winds are from the south-west. As such, receptors downwind (i.e. north-east) of the site are more sensitive to dust impacts than those located upwind.

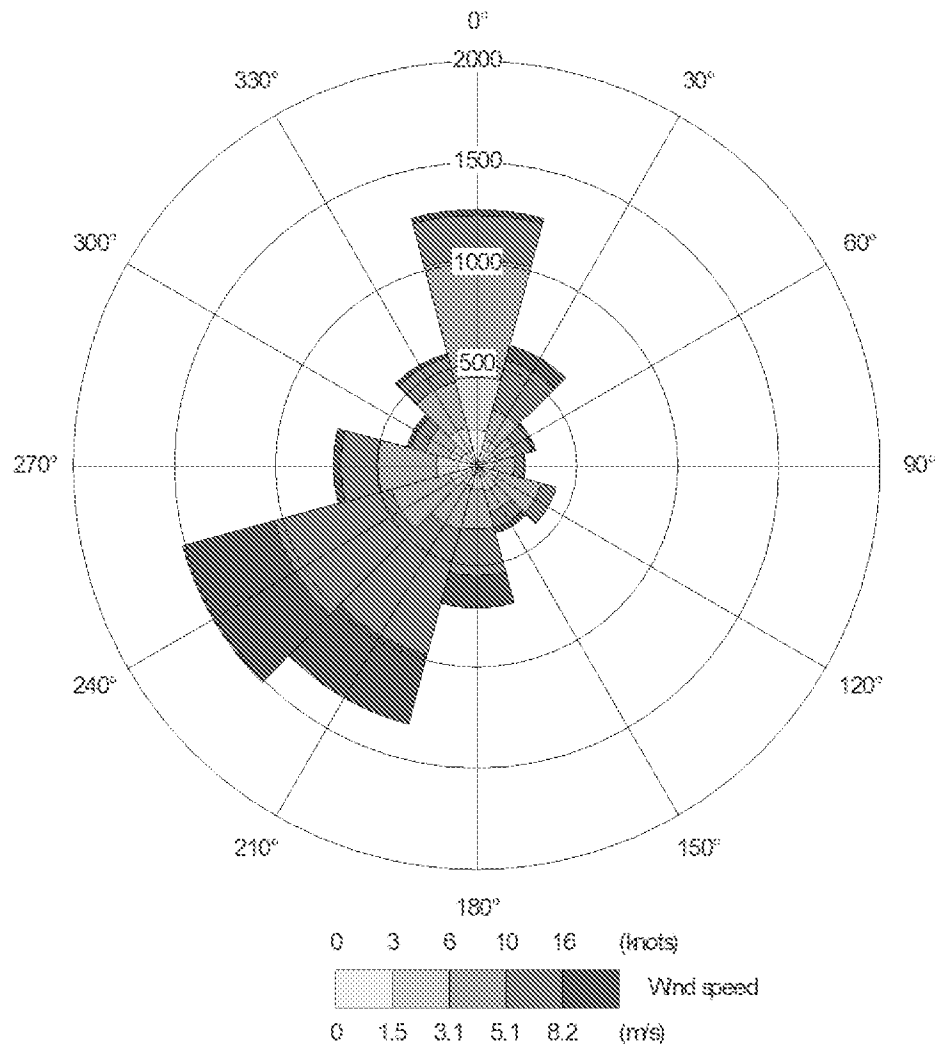


Figure 4 – 2019 wind Rose for Brighton City Airport Meteorological Station

There are sensitive human receptors in all directions from the site, at varying distances. Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relation to both dust soiling and health effects of PM₁₀. Indicative examples of medium sensitivity receptors include places of work, and commercial / industrial properties.

High-sensitivity ecological receptors are defined as designated sites, such as Sites of Special Scientific Interest (SSSI) and Special Protection Areas (SPA) with features sensitive to air pollution impacts. No ecological receptors were identified within 50m of the site boundary or within 50m of any routes likely to be used by construction vehicles on the public highway, up to 500m from the site entrance, following a review using Defra's MAGIC mapping service²⁴.

²⁴ Natural England and MAGIC partnership organisations., "Multi Agency Geographic Information for the Countryside."

As there are not more than 10 high sensitivity receptors within 20m of the site boundary, the overall sensitivity of the surrounding area to nuisance dust soiling effects during Earthworks and Construction, according to IAQM guidance, is defined as 'Medium'.

With regard to Trackout, the sensitivity for Large size sites is assessed where receptors are located within 50m from Trackout routes up to 500m from the site. As there are more than 10 high-sensitivity receptors within 20m of the Trackout route from the site, the sensitivity to dust soiling impacts from Trackout is defined as 'High'.

UK-AIR predictions show that annual mean concentrations of PM₁₀ are well below 32 µg/m³ in the vicinity of the site (the concentration at which exceedance of the 24-hour NAQO is likely), and are not likely to exceed 24 µg/m³. According to IAQM guidance, where PM₁₀ concentrations are <24 µg/m³ and there less than 100 high sensitivity receptors within 20m of the site boundary, the overall sensitivity of the surrounding area to human health impacts is defined as 'Low' for Earthworks and Construction. Similarly, there are less than 100 high sensitivity receptors within 20m of the Trackout route, so the overall sensitivity of the area to human health impacts is defined as 'Low' for Trackout.

The sensitivity of the surrounding area for the potential impacts discussed above are shown in Table 6 below. The sensitivity of the study area to demolition activities does not apply as no demolition activities will occur at the site. Similarly, no ecological receptors were identified so the ecological sensitivity of the study area is also not applicable.

Table 6 - Sensitivity of Local Area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	Medium	Medium	High
Human Health	n/a	Low	Low	Low
Ecological	n/a	n/a	n/a	n/a

5.7 Risk of Impacts

Using the methodology prescribed in the IAQM guidance, the overall risk of impacts can be defined by combining the sensitivity of the area with the potential dust emission magnitude of each stage of the construction phase as described above.

Table 7 provides a summary of the construction dust risk assessment. Overall, the development is considered to be Medium Risk for nuisance dust soiling effects and have a Low Risk for PM₁₀ health effects, in the absence of mitigation. Risks associated with ecological receptors and demolition activity do not apply to this site.

Table 7 - Risk of adverse impacts during construction phase

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	Medium Risk	Medium Risk	Medium Risk
Human Health	n/a	Low Risk	Low Risk	Low Risk
Ecological	n/a	n/a	n/a	n/a

6. EXPOSURE ASSESSMENT

Compilation and review of existing modelled and monitored air quality data for the study area has shown that background levels of pollutants and monitored roadside concentrations of NO₂ are well below the NAQOs. This suggests that the proposed development would not be introducing new receptors to an area of poor air quality. However, to increase confidence in site suitability, and to fully assess the potential impact of the operational Fitzalan Link Road on air quality at the site, further analysis is performed below to evaluate air quality local to the proposed development and consider the need for mitigation.

6.1 Review of Fitzalan Link Road Outline Application AQA

An AQA (Fitzalan Link Road Planning Application Air Quality Assessment, February 2011), prepared by WYG, was submitted as part of the outline application [ref LU/63/11] for the Link Road (not superseded at reserved matters stage). A review of this AQA shows that the assessment concluded that the impacts of the operational phase of the link road range from 'slight adverse' to 'moderate beneficial' in significance. In addition, no exceedances of the NAQOs were modelled. This assessment was based on a conservative opening year of 2016.

A review of the modelled receptor locations shows one receptor, REC 23, was modelled at a location that is on the boundary of the current application. Several other receptors were also modelled at locations near to the current application site. The locations of these modelled receptors are shown in Figure 5 below:

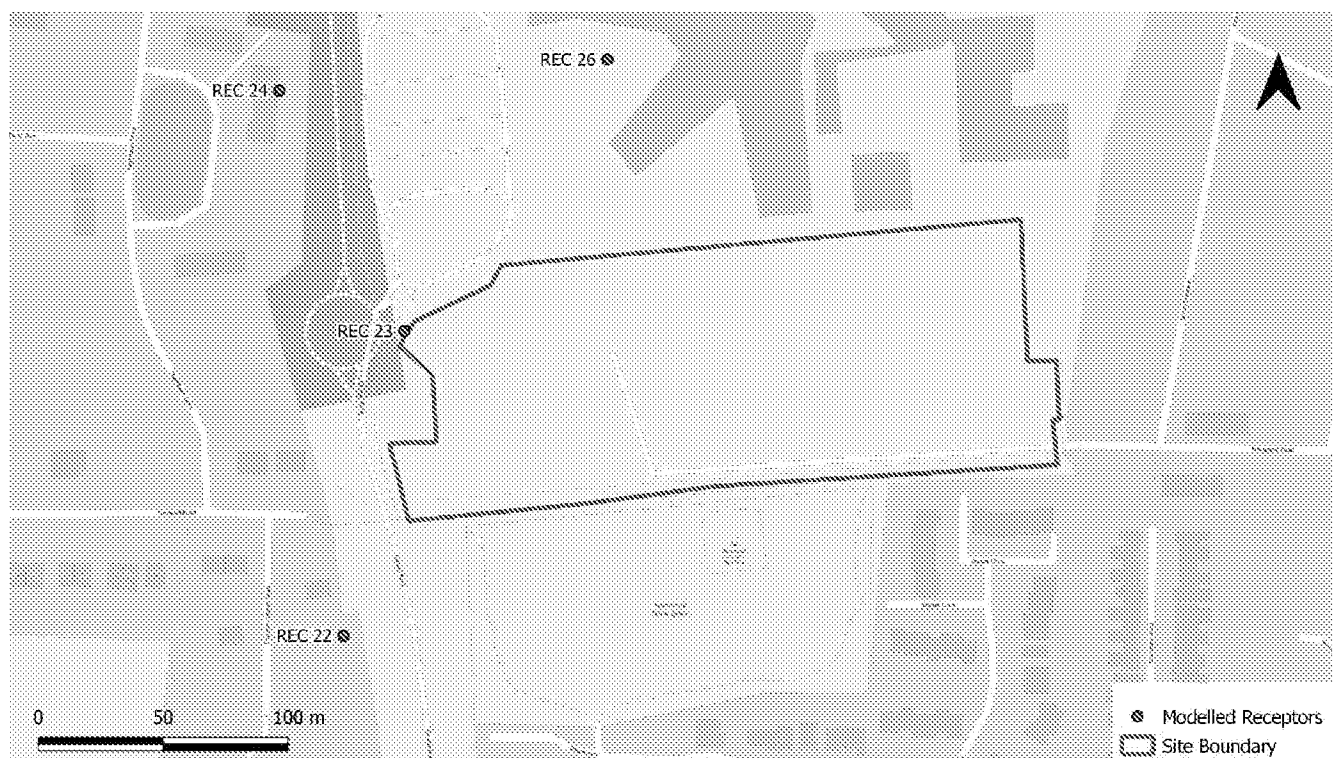


Figure 5 - Modelled Receptors

The results of the modelling at the above receptor locations, for the modelling of the operational link road, are shown below in Table 8.

Table 8 - Predicted concentrations of air pollutants at receptor locations

Site ID	Site Address*	X (m)	Y (m)	2016 Modelled NO ₂ (µg/m ³)	2016 Modelled PM ₁₀ (µg/m ³)
REC 22	5 Paterson Wilson Road	503156	102504	17.3	15.67
REC 23	Elm Grove Infant School	503178	102626	21.2	15.87
REC 24	34 Highdown Drive	503126	102721	19	15.74
REC 26	New School Receptor*	503257	102736	17.2	15.65
Notes: Bold values denote exceedance of the Annual Mean NAQO (*Site addresses as stated in 2011 AQIA)					

As can be seen from the above results, the highest modelled NO₂ concentration in the area was at REC 23, which was 47% below the NAQO. The concentration of NO₂ at the other receptors was lower than this, so also well below the NAQO. The modelled concentrations of PM₁₀ were also well below the NAQOs for these receptors.

Based on the fact that no exceedances of the NAQOs were modelled at REC 23, or other local receptors, and the assessment was performed with a conservative opening year of 2016, the operational link road is unlikely to cause exceedances of the NAQOs at the location of the proposed residential receptors for the current application.

6.2 Defra's LAQM TG (16)

Defra's LAQM.TG (16)⁹ guidance provides screening criteria at Table 7.1 which provides details of the methodology to follow to screen a range of road traffic sources for further assessment, including new roads such as the Fitzalan Link Road. For new road sources, the following assessment criteria are provided:

- Review existing air quality assessment which formed planning application for new road, where available (as detailed above), and / or;
- Compare traffic flows with distance to receptors. In this instance, the following distances apply: exposure within 20m of new roads with >10,000 AADT.

It is our understanding that the Fitzalan Link road will have an operational two-way traffic flow of circa 8050 AADT, as stated in the RGP pre-application transport note. The current site plans show the closest residential receptors to be over 20m set back from the kerb of the Fitzalan Link road. Accordingly, further detailed assessment of the Link Road can be scoped out against LAQM.TG (16) screening criteria and a conclusion reasonably be drawn qualitatively based on existing data sources.

6.3 Defra's AEA Diffusion Tube Guidance for NO₂ Monitoring

In addition to the LAQM.TG (16) screening criteria, Defra's AEA Diffusion Tubes for Ambient NO₂ Monitoring Practical Guidance²⁰ can be used to classify the majority of the site as an urban background location, whereby at distances of >20 m from a busy road (10,000 – 30,000 vehicles per day) the location is considered to be at urban background and NO₂ levels will be diluted to background levels.

Based on this the residential receptors are likely to experience urban background concentrations of NO₂ as are shown to be greater than 20m back from the kerb of Fitzalan Road by the Illustrative Site Plan (Figure 2). Therefore, these receptors are unlikely to experience concentrations of NO₂ over the NAQO.

6.4 Review of Existing Traffic Data

A review of existing traffic data and air quality monitoring is performed below. Comparison of roads, where both DfT traffic counts and air quality monitoring data is available, to the new link road is performed to assess if the traffic levels predicted on the operational link road will cause exceedances of NAQOs. Traffic data and air quality monitoring on Lymminster Road (DfT ID 78245) and Worthing Road (DfT ID 78244) is compared to the forecast traffic flows on the operational Fitzalan Link Road, circa 8050 AADT as stated in the RGP pre-application transport note. The location of these traffic count points are shown in Figure 6 below:

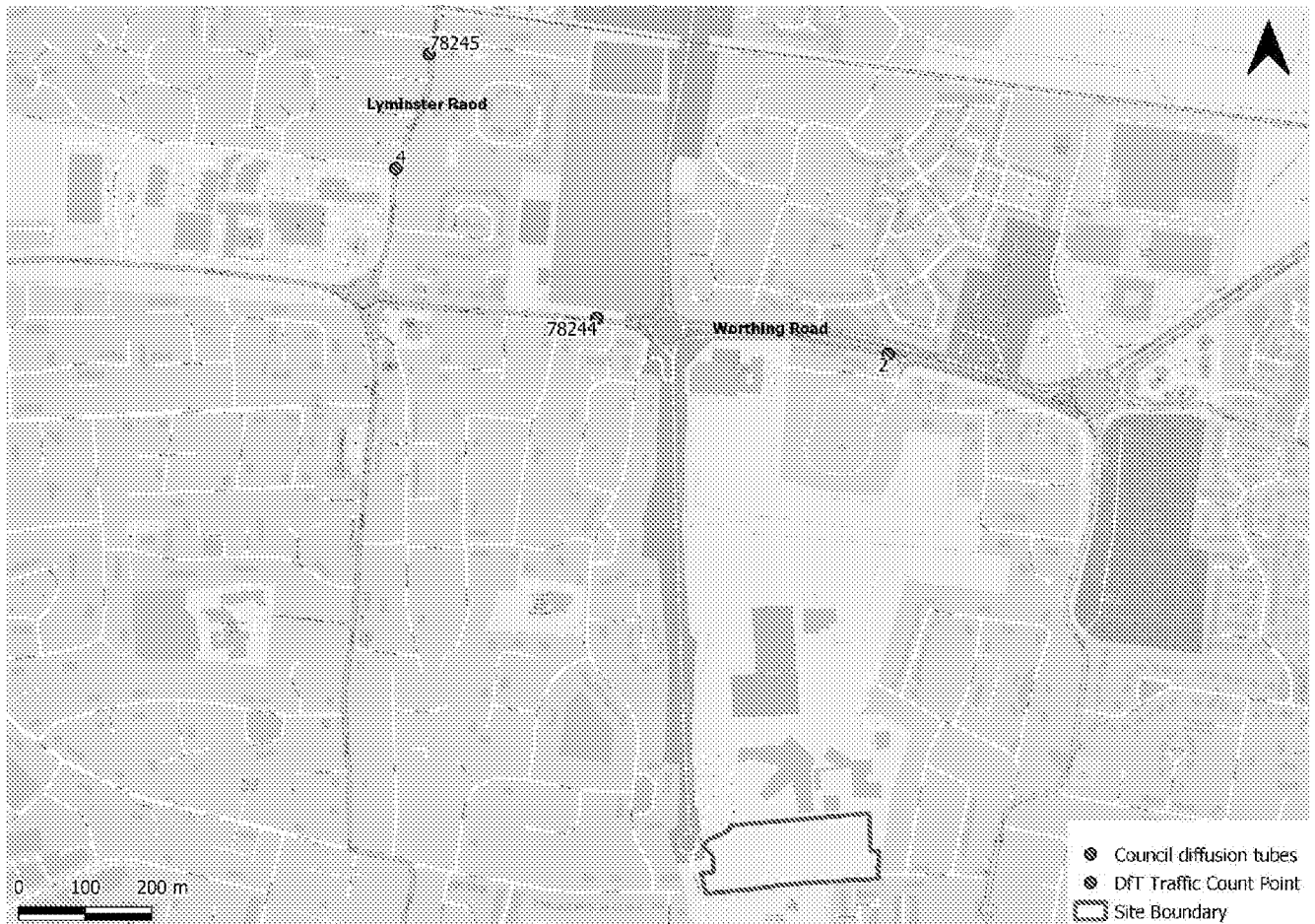


Figure 6 – Location of DfT traffic count points

The results of this, using traffic data from 2019, are shown below in Table 9:

Table 9 - Review of Traffic Data for 2019

Road name	DfT ID	Traffic Flow of 1 major vehicle (AADT)	Number Council Diffusion Tubes	2019 Estimated AQI (UE10)
Worthing Road	78244	24757	2	20
Lymminster Road	78245	13248	4	21

From Table 9 it can be seen that Lyminster Road and Worthing Road experience higher traffic flows than the Fitzalan Link Road is predicted to experience once operational (8050 AADT). The air quality monitoring data available on these roads show that Lyminster Road and Worthing Road do not exceed the NO₂ annual mean NAQO.

As these roads experience higher traffic flows and therefore higher emissions of air pollutants from motor vehicles than the operational Fitzalan Link Road is predicted to experience, it is likely that the air quality at the operational Fitzalan Link Road will also comply with NAQOs.

6.5 Suitability of Site

Several lines of evidence are used above to demonstrate that the air quality at the proposed site is likely to comply with NAQOs. The proposed location of the development is not in an AQMA and the area has low concentrations of background air pollutants. Due to distance of the residential receptors from the kerb of Fitzalan Road, the air quality at these receptor locations is likely to be at urban background levels. Guidance from Defra's LAQM TG(16) is used to show there is not a need for further assessment of the proposed Fitzalan Link Road. However, a review of traffic data shows the levels of predicted traffic on the Fitzalan Link Road is unlikely to lead to exceedances of the NAQO based on traffic flows on other roads in the area. This is supported by the modelling that was done as part of a AQA at the Outline Application stage of the Fitzalan Link Road, which found no predicted exceedances of NAQOs from the modelled levels of traffic emissions on the operational road.

From the above evidence it can be concluded that the site is, in terms of air quality, likely suitable for the proposed development and the risk of exposing new receptors to poor air quality is low.

7. DAMAGE COSTS

The calculation used in this assessment followed the below general formula, in accordance with Air Quality and Emission Mitigation Guidance for Sussex, where the latest Defra EFT (version 10.1) was used:

$$\text{EFT output} \times \text{Damage costs} \times 5 \text{ years} = 5\text{-year exposure cost value (in £)}$$

It is noted that emissions were calculated by assuming a reduction in emissions, in line with the EFT, for each year in the appraisal. This included the percentage of the total developmental traffic flow that is expected to be Electric Vehicles (EVs) for each year. This was accounted for as an input into Defra's EFT. Table 10, below, shows the inputs used for the damage cost calculation:

Table 10 – Damage Cost Inputs

Input	Value	Unit	Source / Explanation
Trip Length	10	km	Air Quality and Emission Mitigation Guidance for Sussex
Traffic Flow	425 (0% HDV)	AADT	Scheme generated traffic, provided by RGP. The % HDV of the traffic flow is likely to be negligible as provided by RGP, so had been set to 0% accordingly.
Percentage Electric Vehicle (EV)	See Table 11	-	Provided by RGP
EFT Road Type	Urban (Not London)	-	-
Appraisal Years	2022 - 2026 (5 years)	-	Reductions in line with EFT
Average Speed	50	kph	EUUK / IAQM guidance

It is understood that the development proposals include Electric Vehicles Charging Points (EVCs). Therefore, it is considered appropriate to allow for the expected percentage of electric vehicles in the development generated traffic in the EFT calculation. The inputs used, provided by RGP, are shown below for each year in Table 11.

Table 11 - Percentage EVs (provided by RGP)

	% of total Development Traffic				
	2022	2023	2024	2025	2026
Electric Vehicles	5.5	6.7	7.9	9.3	10.8

Using the above inputs, the emissions caused by the development traffic are calculated for the years 2022 to 2026, which are the five years following the opening of the development. These emissions per annum are shown below in Table 12.

Table 12 – Increase in Emissions (tonnes)

Pollutant	Developer's Emissions (tonnes/year)				
	2022	2023	2024	2025	2026
NO _x	0.26995	0.25231	0.23517	0.21819	0.20215
PM _{2.5}	0.02610	0.02583	0.02563	0.02547	0.02535

These emissions are then converted to the cost of damage to human health using the Air Quality Appraisal Damage Costs Toolkit²³. For this the price base year of 2021 was used. The pollutant sector used was 'Road Transport Urban Medium'. The results of this are shown below in Table 13:

Table 13 – Calculated Damage Cost Outputs

Pollutant	Low Development Present Value	Central Present Value	High Development Present Value
NO _x	£9,914	£10,397	£10,880
PM _{2.5}	£9,923	£9,923	£9,923
TOTAL	£19,837	£20,320	£20,803

Based on the outputs in Table 13, the total emissions 'damage costs' (sum of NO_x and PM_{2.5}) = **£20,320**, which is the indicative value of a package of air quality mitigation measures to offset the real-world impact of emissions from the proposed development.

8. MITIGATION MEASURES

8.1 Construction Phase

The qualitative construction dust risk assessment shows that the site is Medium Risk for adverse impacts during construction, as a worst-case, in the absence of mitigation.

To effectively reduce the risk of impacts to negligible, appropriate mitigation measures should be adopted. The Greater London Authority provides guidance²⁵ for mitigation measures which is considered to be best-practice for the UK. Appropriate measures that could be included in the 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;
- any excess material should be reused or recycled on-site;
- 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.

In addition to the above, the IAQM's highly recommended mitigation measures for Medium risk sites is provided at Appendix A of this report.

Implementing these measures should effectively reduce the risks of construction phase impacts on the local area to negligible.

8.2 Operational Phase

From the above evidence in this report, it has been concluded that the site is, in terms of air quality, likely suitable for the proposed development and the risk of exposing new receptors to poor air quality is low and receptors will experience pollutant concentrations below the relevant NAQOs.

²⁵ Greater London Authority (GLA), "The Control of Dust and Emissions During Construction and Demolition.," 2014, <https://www.london.gov.uk/file/18750/download?token=zV3ZKTpP>.

If any gas fired boilers are proposed for heating / hot water, these should meet the ultra-low NO_x emission rating of <40mg/kWh, in accordance with EPUK/IAQM guidance.

The operational phase of the development is not likely to have significant effects on the local air quality, as the traffic flows are below the IAQM threshold for detailed assessment. However, in line with Air quality and Emissions Mitigation Guidance for Sussex (2020)¹⁸, the damage costs of £20,320 have been calculated. This is the indicative value of a package of air quality mitigation measures to offset the real-world impact of emissions from the proposed development.

A possible measure to mitigate the air quality impacts of the development could be the provision of Flexible Travel Vouchers to residents. This voucher would be exchangeable for a range of sustainable travel options / incentives, such as, a season ticket for a local bus service; a rail season ticket; a contribution towards the purchase of a new bicycle and/ or equipment; or bike ability training. This would provide incentives for sustainable travel options with the aim of reducing the number of polluting trips from the development and therefore would have a positive impact, in terms of air quality.

9. DISCUSSION AND CONCLUSION

Hydrock have been commissioned to prepare an Air Quality Assessment (AQA) for the proposed residential development at Land to the South of Littlehampton Academy, Littlehampton.

A qualitative construction dust risk assessment has been undertaken in line with Institute of Air Quality Management guidance. It has been shown that the construction phases of the proposed development could give rise to emissions that a 'Medium' Risk for dust soiling effects on adjacent use, and a 'Low' Risk for human health impacts. However, by adopting appropriate mitigation measures to reduce emissions and their potential impact, such as those recommended in this report, there should be no significant residual effects, complying with the requirements of the National Planning Policy Framework and National Planning Practice Guidance.

By following screening criteria provided in EPUK and IAQM guidance, the need for detailed dispersion modelling to assess the significance of potential impacts has been scoped out of this assessment, as it is likely that any potential effects of the development on air quality would be not significant.

UK-AIR background concentrations and local air quality monitoring have been used to establish baseline air quality in Littlehampton. This review shows that both modelled and monitored concentrations of air pollutants in the area are well below the NAOQs.

It was agreed with ADC that the potential exposure of future occupants on the site would be assessed taking into consideration the future Fitzalan Link Road that is set to be adjacent to the proposed site. A qualitative assessment using several lines of evidence has been performed to show the risk of new occupants being exposed to air quality above the NAOQs is low. This included a review of the previous AQA submitted as part of the outline application for the Link Road and considerations of screening criteria of road traffic sources from Defra's LAQM.TG(16). Therefore, it is concluded the site is suitable, in terms of air quality, for the proposed use.

As a requirement of the Sussex-Air Partnership's Air Quality and Emission Mitigation Guidance for Sussex (2020), an emissions mitigation assessment has been provided. The damage costs of the development have been calculated, as based on the development generated traffic, and are £20,320. This is the indicative value of a package of air quality mitigation measures to be provided to offset the impact of emissions from the proposed development. Possible mitigation measures could include the provision of Flexible Travel Vouchers to residents.

From the evidence presented, and by following the guidance provided herein, the proposed development will comply with all relevant air quality policy. As such, air quality should not pose any significant obstacles to the planning process.

Appendix A - Construction Dust Mitigation for Medium Risk sites

In order to mitigate the worst-case dust impacts the following general mitigation measures are highly recommended by the IAQM for Medium Risk construction sites. Highly recommended mitigation measures applicable specifically to demolition, earthworks, construction and trackout are provided based on the respective risk of adverse impacts for each stage.

Highly Recommended

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 document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ 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 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.

Monitoring:

- 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 a large site, before work on a phase commences. Further guidance is provided by 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 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 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.
- 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 such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up.

Waste Management:

- Avoid bonfires and burning of waste materials.

Measures specific to Construction (Medium risk):

- 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.

Measures specific to Trackout (Medium risk):

- 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 bowzers 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.