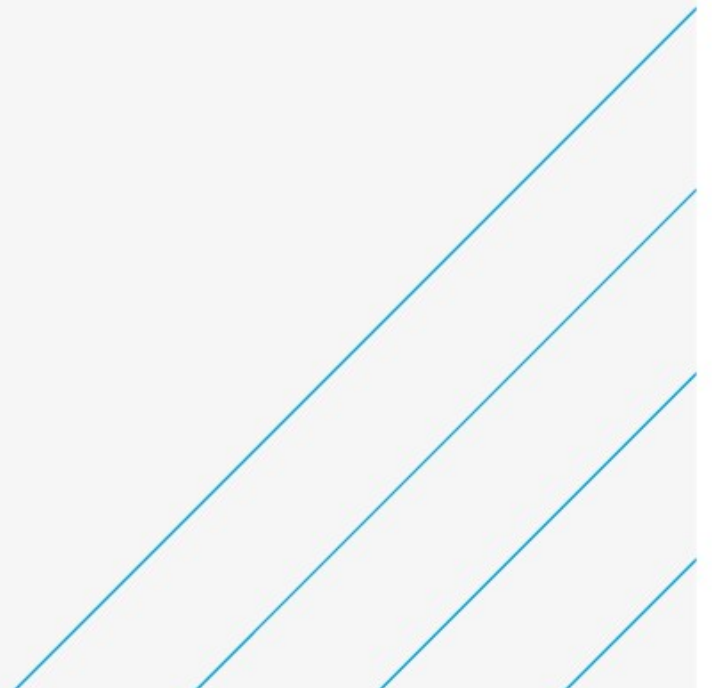


Orchard Hill Primary School

Air Quality Screening Assessment

Laing O'Rourke

10 June 2019



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1. Introduction

Atkins Ltd has been commissioned to undertake an air quality screening assessment as part of the planning application for the proposed Orchard Hill School in West Drayton, hereon referred to as 'the Proposed Development'. The proposed development site currently houses an existing school (Chantry School), with associated soft and hard landscaped areas. The intention is to establish the Proposed Development in the northern part of the site prior to the demolition of the existing school buildings in southern parts of the site.

The Proposed Development site is located off Falling Lane, in the London Borough of Hillingdon (LBH). The Proposed Development site is located within the LBH's Air Quality Management Area (AQMA), which encompasses the majority of the council's area and is designated due to exceedances of the annual mean nitrogen dioxide (NO₂) annual mean Air Quality Strategy (AQS) objective.

This report presents a review of baseline air quality conditions in the vicinity of the Proposed Development site and provides a qualitative screening assessment of potential development generated impacts. This includes considering the impact of existing air quality upon future users of the Proposed Development and any development generated impacts on local air quality during the construction and operational phases.

1.1. Assessment Scope

This air quality assessment includes:

- A desk-based review of baseline air quality conditions in the vicinity of the development using publicly available data;
- A qualitative site suitability assessment which considers the potential impact of existing air quality on future users of the Proposed Development;
- The identification of sensitive receptors near to the Proposed Development, including residential properties, schools, hospitals and any designated ecological sites;
- A qualitative assessment of the impacts on dust and particulate matter concentrations at sensitive receptors in the study area during the construction phase;
- A qualitative assessment of local air quality impacts associated with changes in traffic flows on the local road network during the operational and construction phases of the Proposed Development;
- An air quality neutral assessment, as required by the Greater London Authority; and
- Recommendations for mitigation to prevent or reasonably minimise any potentially significant effects.

2. Legislation, Policy and Guidance

2.1. Air Pollutants

In most urban areas in the UK, the main local source of air pollutants is road traffic. Emissions from vehicle exhausts contain a complex mixture of pollutants including oxides of nitrogen (a mixture of nitrogen dioxide and nitric oxide), particulate matter (PM), carbon monoxide, and hydrocarbons (including benzene and 1,3-butadiene). The quantities of each pollutant emitted depend upon the vehicle type, quantity and type of fuel used, engine size, speed of the vehicle and abatement equipment fitted. In recent years, the local air pollutants of greatest concern have been nitrogen dioxide and particulate matter, as these pollutants are most likely to be present in ambient air at concentrations close to or above air quality criteria near roads. In addition to these air pollutants, dust may be generated during the construction phase. Further information is provided below.

2.1.1. Nitrogen Dioxide

Nitrogen dioxide (NO₂) is generally produced by the oxidation of nitric oxide (NO) in ambient air (i.e. it is not formed directly and as such is known as a secondary pollutant). NO and NO₂ are collectively termed oxides of nitrogen (NO_x). Almost a third of UK NO_x emissions are from road transport¹. The majority of NO_x emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone (O₃) to form NO₂. Sources of nitrogen dioxide emissions can arise from the operation of on-site plant associated with construction activities. In high concentrations NO₂ can affect the respiratory system and can also enhance the response to allergens in sensitive individuals. Additionally, there is increasing awareness of an association between long-term average concentrations (chronic exposure) of NO₂ and mortality. NO does not have any observable effect on human health at the range of concentrations found in ambient air. Elevated concentrations of NO_x can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from NO_x emissions contribute to acidification and/ or eutrophication of sensitive habitats.

2.1.2. Particulate Matter

Particulate matter in vehicle exhaust gases consists of carbon nuclei onto which a wide range of compounds are absorbed. These particles have an effective aerodynamic diameter of less than 10 micrometres (µm). Particles in this size range are referred to as PM₁₀. Road transport produces 12% of primary PM₁₀ emissions in the UK, of which the majority are from diesel engines². Particulate matter is associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. Exposure to a finer fraction of particles (PM_{2.5}, which typically make up around two thirds of PM₁₀ emissions and concentrations) give a stronger association with the observed ill health effects³.

2.1.3. Dust

Dust is defined within the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction'⁴ (IAQM Construction Dust Guidance) as solid particles that are suspended in air or have settled out onto a surface after having been suspended in air. It includes particles that give rise to soiling (deposited dust) and to human health and ecological effects.

The IAQM Construction Dust Guidance states that there is evidence that major construction sites can lead to an increase in annual PM₁₀ concentrations and the number of exceedances of the short term 24-hour objective for PM₁₀. In addition, demolition and construction activities have the potential to cause higher than normal levels of dust deposition in the surrounding area. Dust emissions from a construction site may be mechanically generated due to land preparation (e.g. demolition, land clearing and earth moving) or as a result of release from site plant and movement of road vehicles on temporary roads, and open ground and haul routes.

¹ http://naei.defra.gov.uk/overview/pollutants?pollutant_id=6

² http://naei.defra.gov.uk/overview/pollutants?pollutant_id=PM24

³ Committee on the Medical Effects of Air Pollutants (COMEAP) (2010). The Mortality Effects of Long Term Exposure to Particulate Air Pollution in the United Kingdom. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304641/COMEAP_mortality_effects_of_long_term_exposure.pdf.

⁴ IAQM (2014) *Guidance on the assessment of dust from demolition and construction v1.1*. Available at: <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

2.2. Air Quality Legislation

There are two types of air quality regulations that apply in England:

- Regulations implementing mandatory European Union Directive limit values: The Air Quality Standards Regulations 2010 (Statutory Instrument (SI) 2010 No. 1001)⁵; and
- Regulations implementing national air quality objectives: Air Quality (England) Regulations 2000 (SI 2000 No. 928) and Air Quality (England) (Amendment) Regulations 2002 (SI 2002 No. 3043)^{6,7}.

2.2.1. EU Limit Values

The first European Community (EC) air pollution limit values were introduced in the 1980s. The directives contained mandatory limit values that must be attained and more stringent, but non-obligatory, guide values. In April 2008, the European Commission adopted a directive on ambient air quality and cleaner air for Europe (2008/50/EC). This directive merged the previous Air Quality Framework Directive and the first three daughter directives and introduced new objectives for PM_{2.5}. UK regulations Air Quality Standards Regulations 2010 (SI 2010 No. 1001) implement the EU Directive.

2.2.2. National Air Quality Strategy

The 2007 Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland⁸ (UK AQS) sets out the national air quality standards and objectives for a number of local air pollutants. The standards are set by expert organisations with regard to scientific and medical evidence on the effects of the particular pollutant on health and define the level of pollution below which health effects are expected to be minimum or low risk even for the most sensitive members of the population. The objectives are targets for air pollution levels to be achieved by a specified timescale, which take account of the costs and benefits of achieving the standard, either without exception or, for certain short-term averaging period standards, with a permitted number of exceedances. Local authorities have a responsibility (under Part IV of the Environment Act 1995, see below) to review and assess local pollution levels against these objectives. These criteria are defined in Regulations SI 2000 No. 928 and SI 2002 No. 3043.

It should be noted that the UK AQS objectives only apply in locations likely to have 'relevant exposure' i.e. where members of the public are exposed for periods equal to or exceeding the averaging periods set for the standards. For this assessment, locations of relevant exposure include building façades of residential premises, schools, public buildings and medical facilities; places of work (other than certain community facilities) are excluded.

In January 2019, the UK Government published its Clean Air Strategy⁹, which sets out actions proposed by the Government to improve air quality by reducing pollution from a wide range of sources. Within the strategy, the Government sets an ambitious target to reduce the population exposed to concentrations of PM_{2.5} above 10 µg/m³ by 50% by 2025.

2.2.3. Local Air Quality Management

Under Part IV of the Environment Act 1995 all local authorities are responsible for Local Air Quality Management (LAQM), the mechanism by which the Government's AQS objectives are to be achieved. As part of this LAQM role, local authorities are required to periodically review air quality in their area and to assess present and likely future air quality against the objectives defined in Regulations. Where a local authority anticipates an objective is expected to be breached within their area, they must designate an Air Quality Management Area (AQMA) and develop an action plan to improve pollution levels and work towards achieving the AQS objectives. Under the current LAQM regime, a local authority is responsible for regular review and assessment of local air quality, reports on which are published following public consultation and review by the Department for Environment, Food and Rural Affairs (Defra).

Statutory responsibility for achieving EU limit values rests with the Secretary of State and local authorities have no responsibility for achieving the national air quality criteria, although they should contribute to this through local action plans designed to reduce pollution levels in AQMAs.

⁵ The Air Quality Standards Regulations 2010. Available at: <http://www.legislation.gov.uk/uksi/2010/1001/contents/made>

⁶ The Air Quality (England) Regulations 2000. Available at: <http://www.legislation.gov.uk/uksi/2000/928/contents/made>

⁷ The Air Quality (England) (Amendment) Regulations 2002. Available at: <http://www.legislation.gov.uk/uksi/2002/3043/contents/made>

⁸ Department for Environment, Food and Rural Affairs (Defra), 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Available at: <http://archive.Defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf>

⁹ Defra, 2019. Clean Air Strategy 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

The relevant statutory air quality criteria for the protection of human health are outlined in Table 2-1.

Table 2-1 - Statutory Air Quality Criteria

Pollutant	Objective
NO ₂	Hourly mean concentration should not exceed 200 µg/m ³ more than 18 times a year Annual mean concentration should not exceed 40 µg/m ³
PM ₁₀	24-hour mean concentration should not exceed 50 µg/m ³ more than 35 times a year Annual mean concentration should not exceed 40 µg/m ³
PM _{2.5}	UK (Except Scotland) annual mean concentration should not exceed 25 µg/m ³ † Exposure reduction [^] (UK urban areas): target of 15% reduction in concentrations at urban background between 2010 and 2020*

† UK AQS objective is 25 µg/m³ to be met by 2020. EU limit value is 25 µg/m³ to be met by 2015, with a requirement in urban areas to bring exposure down to below 20 µg/m³ by 2020.

[^] EU limit value exposure reduction target of 20% reduction between 2010 and 2020.

* 25 µg/m³ is a cap to be seen in conjunction with 15% reduction.

2.2.4. Dust

There are no national standards or guidelines for dust deposition currently set for the UK, nor by the European Union (EU) or any international organisation. This is due mainly to the difficulty in setting a standard that would need to relate to dust being a perceptual problem rather than specifically being related to health effects.

Typically, dust monitoring is undertaken with regard to Site Action Levels (i.e. the level above which mitigation may be required to reduce the likelihood of adverse impacts). In residential areas, the IAQM recommends Site Action Levels of a PM₁₀ concentrations of 190 µg/m³, measured as a 1-hour mean, or a dust deposition rate (as measured using a passive 'Frisbee-type' dust deposition gauge) of 200 mg/m²/day or greater¹⁰.

2.3. Planning Policy

2.3.1. National Planning Policy

2.3.1.1. National Planning Policy Framework

The Government's planning guidance of general relevance to air quality is found within the National Planning Policy Framework (NPPF)¹¹. It assists local authorities to incorporate air quality considerations into planning decisions and attempts to protect the environment and to promote sustainable growth. It states that:

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

2.3.1.2. Planning Practice Guidance

Planning Practice Guidance (PPG)¹² is intended to support the NPPF and provide further detail to its policies. PPG indicates at paragraph 006 that information relating to air quality could be important to decision makers, and when there are concerns about air quality, the local planning authority may want to know about:

- "the 'baseline' local air quality;

¹⁰ IAQM (2018) *Guidance on Monitoring in the Vicinity of Demolition and Construction Sites*. Available at: https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

¹¹ Ministry of Housing, Communities & Local Government, National Planning Policy Framework (NPPF), February 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

¹² National Planning Portal. Available at <http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/>

- *whether the Proposed Development could significantly change air quality during the construction and operational phases; and/or*
- *whether there is likely to be a significant increase in the number of people exposed to a problem with air quality, such as when new residential properties are proposed in an area known to experience poor air quality.”*

PPG also advocates, at paragraph 006, early engagement with the local planning and environmental health departments to establish the scope of any assessment. Guidance is also given on the level of detail required in an air quality assessment, and measures which could be employed to mitigate adverse effects.

2.3.2. Regional Planning Policy

2.3.2.1. The London Plan

The London Plan¹³ is the overall strategic plan for London, which sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031 and forms part of the development plan for Greater London. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Improvement of air quality is one of the key policy objectives of the London Plan, as confirmed by Policy 7.14 'Improving air quality', which states:

“Development proposals should:

- a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);*
- b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'; and*
- c) be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs)).*
- d) ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches”.*

2.3.2.2. London Air Quality Strategy

The Mayor of London's Air Quality Strategy¹⁴ seeks to set out a detailed air quality strategy for London in order to deliver the required reductions in particulate matter less than 10 microns in diameter (PM₁₀) and nitrogen dioxide (NO₂) concentrations in London to work towards achieving the national air quality objectives. The London strategy primarily concerns commercial and residential development. Policies that may be considered relevant to the Proposed Development include:

- Policy 6 – Reducing emissions from construction and demolition sites;
- Policy 7 – Using the planning process to improve air quality; and
- Policy 10 – Improved air quality in the public realm.

Policy 6 relates to the collaboration between the Mayor, London boroughs, the Greater London Authority (GLA) Groups and the construction industry to encourage the implementation of the Best Practice Guidance for construction and demolition sites across London.

The key relevant principle of Policy 7 is to ensure measures to improve air quality are embedded in the planning process. An example of this is that the Policy states that all new developments in London shall be at least 'air quality neutral'. Emission benchmarks were defined for buildings' operation and transport across

¹³ Mayor of London (2016). The London Plan. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf.

¹⁴ Mayor of London (2010). Clearing the air. The Mayor's Air Quality Strategy. Available at: https://www.london.gov.uk/sites/default/files/Air_Quality_Strategy_v3.pdf.

London based on the latest technology. Developments that do not exceed these benchmarks will be considered as Air Quality Neutral as they will not cause an increase in NO_x and PM emissions across London as a whole.

2.3.2.3. London Environment Strategy

The London Environment Strategy (LES)¹⁵ sets out an ambitious vision for improving London's environment for the benefit of all Londoners and includes a number of policies considered relevant to the proposed Development including:

- Policy 4.2.1 - Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport;
- Policy 4.2.3 - Reduce emissions from non-transport sources, including by phasing out fossil fuels;
- Policy 4.3.3 - Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality; and
- Policy 4.3.4 - Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces.

Under Policy 4.3.3, it is proposed that the London Plan includes policies so that all new large scale developments in London are 'Air Quality Positive', and maintain Air Quality Neutral requirements for all other developments (Proposal 4.3.3.a). As described above, all major developments are required to be Air Quality Neutral, however the LES suggests that larger developments have the potential to go further and boost local air quality by effective design and integration into the surrounding area. For instance, by the provision of low or zero emission heating and energy, green infrastructure, or improvements to public transport, walking and cycling infrastructure, 'Air Quality Positive' developments will make sure that emissions and exposure to pollution are reduced. As of yet however, guidance has not been published on the most effective approach to take to ensure a development is Air Quality Positive.

2.3.2.4. Supplementary Planning Guidance

The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance (Construction and Demolition SPG)¹⁶ sets out how impacts on air quality can be minimised during the construction phase of development and advises on necessary mitigation measures.

The Sustainable Design and Construction SPG¹⁷ describes how the principles detailed in the London Plan and the Mayor's Air Quality Strategy are to be incorporated into the design and construction of development. It provides guidance on the following key areas:

- assessment requirements;
- construction and demolition;
- design and occupation; and
- air quality neutral policy for buildings and transport; and emissions standards for combustion plants.

The Air Quality Neutral Planning Support Update: GLA¹⁸ was published in April 2014 to accompany the Sustainable Design and Construction SPG. It provides methodology to undertake an Air Quality Neutral assessment, as well as emission benchmarks for buildings and transport, against which the predicted values for the Proposed Development will be compared.

2.3.3. Local Planning Policy

LBH's Local Plan Part 1 – Strategic Policies¹⁹ sets out a range of development proposals and planning policies until 2026. The plan, adopted on 8th November 2012 but currently under review, includes the following policies relating to air quality and dust:

¹⁵ Greater London Authority (2018), London Environment Strategy, May 2018. Available at: https://www.london.gov.uk/sites/default/files/london_environment_strategy.pdf.

¹⁶ Greater London Authority (2014), The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, July 2014. Available at: <https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/planning-guidance-and-practice-notes/control-dust-and->

¹⁷ Sustainable Design and Construction Supplementary Planning Guidance, April 2014. Available at: https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

¹⁸ Air Quality Neutral Planning Support Update: GLA, April 2014. Available at: https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

¹⁹ <https://www.hillingdon.gov.uk/article/24461/Local-Plan-Part-1---Strategic-policies>

“Policy E2: ...The Council will promote development in highly accessible locations that delivers sustainable travel patterns and contributes to the improvement of existing networks to reduce emissions and impacts on air quality.”

“Policy EM8: Land, Water, Air and Noise: ... All development should not cause deterioration in the local air quality levels and should ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The Council seeks to reduce the levels of pollutants referred to in the Government’s National Air Quality Strategy and will have regard to the Mayor’s Air Quality Strategy.

London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Actions plans, in particular where Air Quality Management Areas have been designated.

The Council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements.”

The Air Quality Action Plan for LBH²⁰ sets out measures “to pursue the air quality objectives laid down in the National Air Quality Strategy, whilst ...improving the quality of life and health of the residents and workers in Hillingdon, ...acting in a cost-effective manner, through careful selection of options, ...integrating this work with other Council Strategies and the activities of Council Departments, regional bodies, outside Agencies and other interested parties, ...taking account of the needs and views of local people, ...and acting, where possible, to stimulate local employment and the local economy.”

²⁰ http://www.hillingdon-air.info/pdf/Hillingdon_AQAP.pdf

3. Assessment Methodology

3.1. Baseline Conditions

Information on existing baseline air quality conditions within the study area was obtained from the following sources:

- LBH's air quality review and assessment reports²¹;
- Air quality background concentrations from DEFRA's UK Air Quality Information Resource (UK-AIR)²²;
- Outputs from Defra's Pollution Climate Mapping (PCM) model²³; and
- Modelled pollutant concentration data from the London Atmospheric Emissions Inventory (LAEI)²⁴.

This information has been used to assess whether AQS objectives have the potential to be exceeded at the location of the Proposed Development.

3.2. Construction Dust

The IAQM Construction Dust Guidance⁴ presents a framework for undertaking risk assessment of construction dust emissions. It considers activities with dust raising potential to comprise demolition, earthworks, construction and trackout²⁵. This method is deliberately conservative and further assessment is necessary for most schemes. There are four key steps in the assessment process, as follows:

- **Step 1** (screening) – identification of the number of receptors within 350 metres of the boundary of the Site and / or within 50 metres of the route(s) used by construction vehicles on the public highway up to 500 metres from the Site entrance. Ecological receptors should also be identified within 50 metres of the Site and / or of the route(s) used by construction vehicles on the public highway up to 500 metres from the Site entrance. No further assessment is required if there are no receptors.
- **Step 2** – Assessment of the risk of dust effects by considering the area around the Site in the context of potential dust impacts and distances to nearby receptors in relation to proposed activities in terms of demolition, earthworks, construction and trackout.
- **Step 2A** - Dust emission magnitude classes of 'large', 'medium' and 'small' are used to define the level of risk arising from each activity depending on the nature and scale of the operation.
- **Step 2B** - The sensitivity of the surrounding area is defined as 'high', 'medium' and 'low' for dust soiling effects, human health impacts, and ecological impacts separately, taking into account the sensitivity of the receptors, distance and number of receptors from dust generating activities, and other site-specific factors (defined in the IAQM's Construction Dust Guidance). In addition, for the effect on human health, background PM₁₀ concentrations are taken into account. The definitions are provided in Tables 2, 3 and 4 of the IAQM Construction Dust Guidance.
- **Step 3** – Determination of the site-specific mitigation in terms of the identified risks including the reduction of emissions for non-road mobile machinery (NRMM) where applicable.
- **Step 4** – Assessment of the significance of the dust effects, after the application for the site-specific mitigation. Once mitigation has been applied, there should not be any significant adverse effects.

Table 3-1 to Table 3-3 show the definitions of the risk of impact based on the dust emission magnitude and sensitivity of the area, in line with the IAQM Guidance⁴.

²¹ <http://www.hillingdon-air.info/laqm.php>

²² <https://uk-air.defra.gov.uk/>

²³ <https://uk-air.defra.gov.uk/library/no2ten/2019-no2-pm-projections-from-2017-data>

²⁴ <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016>

²⁵ The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when HDVs leave the construction/demolition site with dust materials, which may spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

Table 3-1 - Risk of Dust Impacts - Demolition

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 3-2 - Risk of Dust Impacts - Earthworks and Construction

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 3-3 - Risk of Dust Impacts - Trackout

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

3.3. Road Traffic Emissions

The need for an assessment of operational and/or construction phase road traffic emissions impacts associated with the Proposed Development has been determined based on the screening criteria given in IAQM Guidance²⁶. These screening criteria indicate an air quality assessment is required if the development comprises:

- 10 or more residential units or a site area of more than 0.5 ha; or
- More than 1,000 m² of floor space for all other uses or a site area greater than 1 ha; and either:
 - More than 10 parking spaces; or
 - A centralised energy facility or other centralised combustion process.

Given that the Proposed Development is expected to comprise of more than 1,000 m² of floor space and have more than 10 parking spaces, further screening was undertaken using the indicative traffic change criteria in the EPUK/IAQM Guidance. The relevant traffic change criteria are:

- a change of light duty vehicles (LDV) of more than 500 Annual Average Daily Traffic (AADT) movements (or more than 100 AADT within or adjacent to an AQMA); or
- a change of HDV of more than 100 AADT (or more than 25 AADT within or adjacent to an AQMA).

3.4. Air Quality Neutral

The proposed development falls under the air quality neutral policy highlighted in the London Plan and the 'Sustainable Design and Construction' SPG. As such, an Air Quality Neutral Assessment has been carried out, in line with guidance provided in the SPG on Sustainable Design and Construction, and the accompanying Air Quality Neutral Planning Support Update report¹⁸.

The approach used in the Air Quality Neutral Assessment is to compare the expected emissions from the building heating and energy use and the car transport use associated with the new development, against defined emissions benchmarks for building and transport in London. These benchmarks are referred to as the "Building Emissions Benchmarks" (BEBs) and the "Transport Emission Benchmarks" (TEBs). To achieve compliance with the air quality neutral policy, the development must demonstrate that the building and transport emissions would achieve the benchmark.

²⁶ Environmental Protection UK and Institute of Air Quality Management, 'Land-Use Planning & Development Control: Planning for Air Quality', January 2017.

4. Baseline Conditions

4.1. Local Air Quality Management

The Proposed Development is located within the area administered by LBH. The London Borough of Hillingdon AQMA was declared in 2001 in relation to elevated annual mean concentrations of NO₂ and was extended in 2003 to its current area. The designated AQMA encompasses the entire southern portion of LBH and follows the Chiltern-Marylebone Railway line along its northern extent. As shown in Figure 4-1, the Proposed Development is located within LBH's AQMA.

4.2. Air Quality Monitoring

Air quality monitoring is undertaken by national and local authorities and is a key component of local air quality management. Measurements of pollutant concentrations include those made by analytical instruments that measure continuously, and simpler passive sampling devices such as diffusion tubes.

4.2.1. Continuous Monitoring Data

LBH currently operate 11 continuous monitoring station (CMS), mainly located in the south of the borough. The nearest CMS, HIL, is approximately 2.6 kilometres to the south-west of the Proposed Development site at grid reference 506951, 178605. HIL began operation in 2011 and measured an annual mean NO₂ concentration of 47.2 µg/m³ in 2017, which is above the relevant UK AQS objective for NO₂. Annual mean NO₂ concentrations measured at the HIL CMS for the period 2013-2017 are presented in Table 4-1.

Table 4-1 - Continuous Monitoring Site Annual Mean NO₂ Concentrations (µg/m³)

Pollutant	Monitoring Site	Site Type	X	Y	2013	2014	2015	2016	2017
NO ₂	London Hillingdon - HIL	Urban Background	506951	178605	52.8	57.5	51.9	51.2	47.2

Exceedances of annual mean AQS objective (40 µg/m³) shown in **bold** type

Source: Data for LBH sites are from the 2018 Annual Status Report²⁷.

LBH does not conduct measurements of either PM₁₀ or PM_{2.5} in the vicinity of the Proposed development, with the closest monitoring station located more than 3 km from the Proposed Development in the vicinity of London Heathrow airport. Concentrations measured at this location are therefore not considered representative of the study area.

4.2.2. Passive Monitoring Data

LBH maintains a network of passive diffusion tubes to measure annual mean concentrations of NO₂. Of the 39 sites operated by LBH, three are located in the vicinity of the Proposed Development. Annual mean concentrations measured at these diffusion tube sites are presented below in Table 4-2, the locations of which are shown in Figure 4-1.

Table 4-2 - LBH Diffusion Tube Annual Mean NO₂ Concentrations (µg/m³)

Monitoring Site	Site Type	X	Y	2013	2014	2015	2016	2017
HD204	Background	506108	180493	38.3	39.7	40.9	32.0	37.0
HD67	Roadside	505731	180288	29.8	30.7	28.7	25.8	26.9
HD51	Roadside	506335	180263	34.3	36.7	33.3	29.3	32.9

Exceedances of annual mean AQS objective (40 µg/m³) shown in **bold** type

Source: Data for LBH sites are from the 2018 Annual Status Report.

²⁷ http://www.hillingdon-air.info/pdf/Hillingdon_AQ_Progress_Report_2018_FINAL.pdf.

The monitoring results indicate that annual mean NO₂ concentrations are generally below the AQS objective (40 µg/m³) however a slight exceedance was recorded at site HD204 in 2015. Whilst this site is classed as a background site, this diffusion tube is located in relatively close proximity to a busy road (Yiewsley High Street), which likely contributes to the NO₂ concentrations observed at this location. These monitoring locations are considered representative of receptors with the potential to be affected by traffic generated by the Proposed Development.

DEFRA's Technical Guidance LAQM.TG(16) suggests that where annual mean NO₂ concentrations are below 60 µg/m³, it is unlikely that hourly mean concentrations would exceed the hourly mean NO₂ AQS objective. Given that the highest monitored annual mean NO₂ concentration within the study area is 40.9 µg/m³, concentrations of NO₂ are unlikely to exceed the short-term objective value.

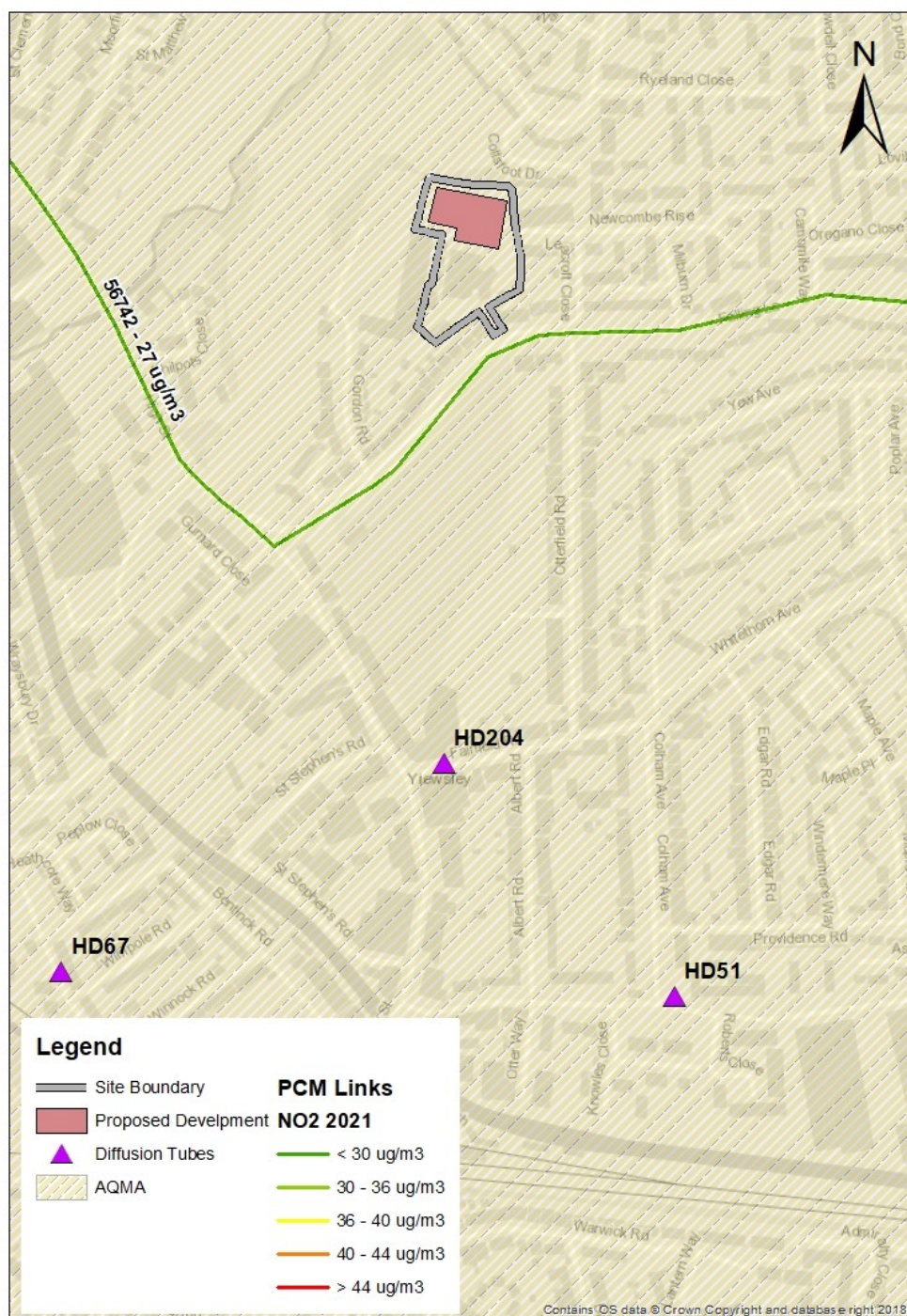


Figure 4-1 - Monitoring sites, PCM Links and AQMA

4.3. Pollution Climate Mapping (PCM) Model

DEFRA's PCM model provides estimates of roadside concentrations of annual mean NO₂ and PM₁₀, which are used in reporting to the EU regarding compliance with EU limit values. The model provides projected roadside concentrations of pollutants, for the years 2017-2030 inclusive, based on a 2017 base year.

The PCM model includes the majority of main roads in the study area including Falling Lane (A408). Roadside annual mean NO₂ concentrations on all PCM links in the vicinity of the Proposed Development are projected to be well below the EU limit value in the Proposed Development opening year (2021), with a concentration of 27.0 µg/m³ projected for Yiewsley High Street and Falling Lane.

4.4. Mapped Background Concentrations

Estimates of current and future year background pollutant concentrations in the UK are available on the DEFRA UK-AIR website²⁸. These background estimates, which are a combination of measured and modelled data, are available for each one km grid square throughout the UK for a base year of 2017, which is the basis for future year estimates up to 2030. These background estimates include contributions from all source sectors, e.g. road transport, industry and domestic and commercial heating systems.

Estimated annual mean background concentrations for the one km grid squares that cover the study area for the baseline year (2018) and the Proposed Development opening year (2021) are presented below in Table 4-3 for the pollutants NO₂, PM₁₀ and PM_{2.5}. These data indicate that background concentrations affecting the Proposed Development site are likely to be well below relevant AQS objectives.

Table 4-3 - DEFRA Background Concentrations, 2018 and 2021 (µg/m³)

Grid Square (x, y)	2018			2021		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
506500,181500	22.6	15.9	11.1	20.0	15.3	10.6
506500,180500	27.1	16.5	11.4	23.9	15.7	10.8

4.5. London Atmospheric Emissions Inventory

The London Atmospheric Emissions Inventory (LAEI) includes information on the amount of eight key pollutants and three subsidiary pollutants, including nitrogen dioxide, released from road traffic and other modes of transport, major industrial sources, and smaller sources throughout the Greater London Area and parts of 19 districts in the counties of Kent, Surrey, Berkshire, Buckinghamshire, Hertfordshire and Essex. The LAEI covers a total area of 2,466 km² with a population of 7.31 million people, including the Proposed Development site.

The LAEI 2016²⁹ is the latest version. Emissions estimates of key pollutants (NO_x, PM₁₀, PM_{2.5} and CO₂) by source type are included for the base year 2016, using the latest data sources (emission factors, activity data etc.) and methodology. Modelled 2016 ground level concentrations of annual mean NO_x, NO₂, PM₁₀ and PM_{2.5} are also provided at 20m grid resolution. Figure 4-2 illustrates estimated annual mean NO₂ concentrations across the Proposed Development site and surrounding area in the LAEI base year 2016. These data suggest that NO₂ concentrations across the Proposed Development were well below the NO₂ AQS.

²⁸ <https://uk-air.defra.gov.uk/>

²⁹ <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016>



Figure 4-2 – Modelled LAEI 2016 Annual Mean NO₂ Concentrations

4.6. Summary of Existing Conditions

Whilst the Proposed Development site is located within London Borough of Hillingdon's AQMA, local diffusion tube monitoring, PCM model projections, mapped background concentrations and modelled concentrations from the LAEI 2016 indicate that AQS objectives for NO₂, PM₁₀ and PM_{2.5} are unlikely to be exceeded at the Proposed Development site.

5. Assessments of Impacts

5.1. Site Suitability Assessment.

The Proposed Development will be used regularly by members of the public who are sensitive to air pollution and as such is considered to be of high sensitivity. The development does not however introduce new exposure into this area, as the existing school on the site provides a similar level of public use.

Evaluation of baseline information indicates that air pollutant concentrations are generally below AQS objectives, however annual mean NO₂ concentrations can approach and exceed the level of the objective at busy roadside locations in the study area. The Proposed Development site can however be considered to be in an urban background location and is well set back from the nearest road.

As all sensitive areas of the Proposed Development are located in excess of 30m from the roadside, it is unlikely that pollutant concentrations in excess of the AQS objectives will affect the Proposed Development. In addition, the new school buildings, which are located to the north of the development site, are located further from Falling Lane (A498) than the existing school building, which is located in the south of the development site. The existing school buildings are to be replaced with car parking areas and a 3G sports pitch and as such the Proposed Development will result in a general movement away from the most significant nearby pollution source (i.e. vehicles using the A498).

The site is considered suitable for its proposed use and replaces, and potentially reduces, the level of public exposure to air pollution compared to the existing site.

5.2. Construction Phase

5.2.1. Construction Dust

In accordance with IAQM Construction Dust Guidance⁴, an initial screening assessment was carried out using Ordnance Survey³⁰ base mapping and DEFRA's mapping website "Magic"³¹ to determine the location and number of sensitive receptors within relevant distances of the Proposed Development. Approximately 100 human health receptors are located within a buffer of 350 metres around the site, while no ecological sites were identified within 50 metres of the site boundary (or within 50 metres of the routes likely to be used by construction vehicles). The nearest ecological site, South West London Waterbodies SPA, is over six kilometres to the northeast of the Proposed Development (vehicles associated with the development will not use nearby roads).

Table 5-1 shows the assumed dust emission magnitude for each construction activity. Demolition activities will involve a total building volume of less than 20,000 m³, however, as some permanent concrete buildings will be demolished to prepare the site, a "medium" dust emission magnitude is assigned. Earthworks were classed as "medium", considering the area of the Proposed Development is around 4,500 m². Construction activities are categorised as "medium" due a total building volume which will be less than 25,000 m³. Estimates of vehicle movements for the construction of the Proposed Development are not available at this stage, therefore an assumption of <10 HGV outward movements per day has been applied due to the scale of the Proposed Development so that a "small" emission magnitude for trackout is provided.

Table 5-1 - Dust Emission Magnitude

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

The Proposed Development is close to residential properties, which are of high sensitivity to dust and particulate matter. There are approximately three high sensitivity receptors within 20 metres of the Proposed

³⁰ <https://www.ordnancesurvey.co.uk/opendatadownload/products.html>

³¹ <https://magic.defra.gov.uk/>

Development site, and consequently the sensitivity of the surrounding area to dust soiling is medium. As annual mean PM₁₀ concentrations are below 24 µg/m³ in the area (see Table 4-3) and there are fewer than 100 high sensitivity receptors within 20 metres of the Proposed Development site, the sensitivity of the surrounding area to human health impacts is low.

The sensitivity of the surrounding area and potential risk from dust soiling and human health impacts, given the dust emissions magnitudes described above, is summarised in Table 5-2.

Table 5-2 - Summary of Sensitivity of the Surrounding Area and Expected Dust Risk

Sensitivity of Surrounding Area		Summary of Dust Risk			
		Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	Medium	Medium	Medium	Low
Human Health	Low	Low	Low	Low	Low

5.2.2. Construction Phase Non-Road Mobile Machinery Emissions

Given the small size of the Proposed Development and the short duration and temporary nature of activities, any effect on air quality is not considered to be significant. Therefore, detailed assessment of plant emissions has been scoped out of this assessment.

Additionally, the magnitude of any impacts will be reduced by adherence to London Low Emission Zone (LEZ) non-road mobile machinery (NRMM) emission standards. The equipment used during the construction phase will therefore be, as a minimum, compliant with the minimum emission standards for constant speed (Stage V by January 2020) and variable speed (Stage IIIB by September 2020) machinery.

5.2.3. Construction Phase Road Vehicle Emissions

At the time of writing, the number of daily HDV movements during construction is not known. However, given the small scale of the development and short construction duration, it is anticipated that the number of daily HDV movements generated would not exceed assessment screening criteria published by the IAQM (see Section 3.3). Where expected vehicle movements are below the assessment screening criteria (25 daily HDV movements), impacts can be considered to be insignificant and detailed impact assessment is not required. Construction traffic emissions are therefore not considered further within this assessment.

5.3. Operational Phase Road Traffic Emissions

As the Proposed Development replaces an existing school and is well served by public transport, it is considered unlikely to result in a net increase in excess of 100 AADT on local roads. As the IAQM screening criteria (see Section 3.3) are therefore unlikely to be exceeded, impacts can be considered likely to be not significant and detailed assessment is not required.

The net change in road traffic movements as a result of the Proposed Development will be confirmed in a subsequent Transport Statement. Further assessment may be required if the Transport Statement demonstrates that the IAQM criteria would be exceeded.

5.4. Air Quality Neutral Assessment

An air quality neutral assessment was conducted for building emissions in accordance with GLA guidance¹⁸. Orchard Hill School is classed as Class D1 (c-h) use, typically representing schools, libraries and other educational buildings. The building benchmarks for Class D1 (c-h) are 31.0 g/m² for NO_x and 1.78 g/m² for PM₁₀. The Proposed Development includes two gas fired boilers and three gas fired water heaters. Since BEBs are defined on the basis of gas and oil combustion data, it is not necessary for a developer to demonstrate compliance with the PM₁₀ benchmark where gas is the only fuel used on site. If the benchmark is exceeded, then action is required, either locally or by way of off-setting.

In order to calculate the BEB for the Proposed Development, the following data was used:

- Gross Floor Area (GFA) (m²) of development;
- On-site emissions of NO_x associated with building use (kg/annum) calculated from energy use (kWh/annum); and
- Site specific emissions factors (kgNO_x/kWh).

The given inputs and the calculation of the total BEB for the Proposed Development is presented in Table 5-3.

Table 5-3 Calculation of BEB for the Proposed Development

GFA (m ²)	EFBoiler (kgNO _x / kWh)	EFGas Heater (kgNO _x / kWh)	Total Power Input Boiler (kW)	Total Power Input Gas Heater (kW)	Assumed Working Hours per Year (h)	Total NO _x emission (g/m ²)	BEB for Class D1 (c-h) (g/m ²)
4,972	<0.00003	<0.00003	363 ^a	185	8,760 ^b	28.9	31.0

^a 500kW capacity at 91% efficiency and 66% load.

^b Assuming constant operation, which is substantially worst case.

The total building NO_x emissions are calculated (assuming continuous operation) to be 28.9 g/m², which is less than the development benchmark of 31.0 g/m² for NO_x. The Proposed Development may thus be considered air quality neutral and comply with the Mayors Sustainable Design and Construction SPG.

6. Mitigation

6.1. Construction Phase

Construction works associated with the Proposed Development have the potential to generate dust emissions, which will require effective control/minimisation for the duration of the construction project through a Construction Environmental Management Plan (CEMP) or similar.

Selected mitigation measures given in the IAQM Dust Guidance⁴ and in the Mayors Construction and Demolition SPG¹⁶, which are applicable to “medium” risk construction sites include:

- 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;
- Keep site fencing, barriers and scaffolding clean using wet methods
- 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 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas;
- 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 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;
- Use water-assisted dust sweepers on the access and local roads, to remove any material tracked out of the site;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); and
- Access gates to be located at least 10 m from receptors where possible.

With appropriate mitigation measures in place, any adverse effects resulting from the construction works would be minimised such that there would not be any significant residual effect on the nearby receptors.

7. Conclusions

This report presents a review of baseline air quality conditions in the vicinity of the Proposed Development site and provides a qualitative screening assessment of potential development generated impacts. This includes considering the impact of existing air quality upon future users of the Proposed Development and any development generated impacts on local air quality during the construction and operational phases.

7.1. Site Suitability

A review of existing air quality conditions indicates that pollutant concentrations affecting the Proposed Development site are likely to be below relevant AQS objectives. It is there considered that the site is suitable for its proposed use and will not result in a significant increase in exposure to local air pollution.

7.2. Construction Phase Impacts

The results of the construction phase dust assessment indicate that, with appropriate mitigation measures in place and secured through a CEMP, the construction phase of the Proposed Development will not result in significant human health or dust soiling impacts on local receptors.

Emissions from NRMM and construction related road traffic are also considered unlikely to have a significant effect on air quality.

7.3. Operational Road Traffic

As the Proposed Development replaces an existing school and is well served by public transport, it is considered unlikely to result in a sizeable change in road traffic movements along local roads and is therefore considered unlikely to have a significant effect on air quality.

The net change in road traffic movements as a result of the Proposed Development will be confirmed in a subsequent Transport Statement. Further assessment however may be required if the Transport Statement demonstrates that relevant traffic change criteria would be exceeded.

7.4. Air Quality Neutral

The results of the assessment indicate that emissions from the Proposed Development are below the defined Building Emissions Benchmark and as such the development can be considered to be Air Quality Neutral.

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