



# Land at Woodgate Centre Air Quality Assessment

*For J.A Pye (Oxford) Ltd*

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## 1. INTRODUCTION

Hydrock have been commissioned by J.A. Pye (Oxford) Ltd to prepare an Air Quality Assessment (AQA) for the proposed residential development ("the Proposed Development") at Woodgate Centre, Westergate, in the administrative boundary of Arun District Council (ADC). The location of the site ("the Site") is shown below in Figure 1:

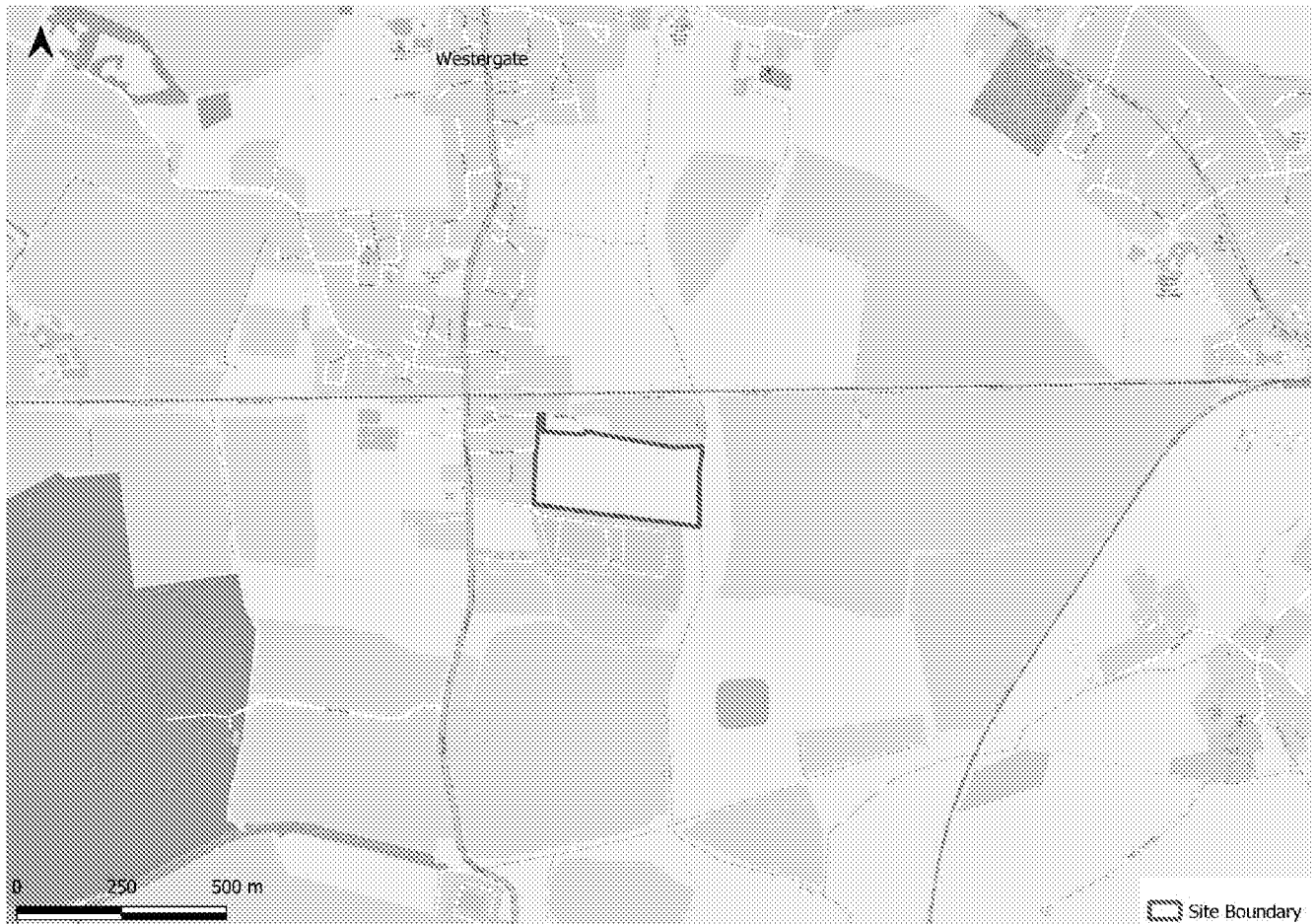


Figure 1 - Site Location Plan

The West Coastway Railway line lies approximately 45m north of the Site. Lidsey Road is approximately 170m to the west of the Site. Willows Caravan Park is located immediately to the south of the Site. Currently, to the east of the Site is agricultural land, however it is understood that a strategic bypass road (the A29 realignment project) will be constructed to the east of the Site.

The Site is currently occupied by a mix of uses collectively called the Woodgate Centre. This comprises a number of small businesses based in poor quality buildings and a horse stables with a number of paddocks around the site.

Emissions from road vehicles travelling along the A29 Lidsey Road, approximately 170m west of the Site are considered to be the main pollution source in the study area. There are no significant point sources in the area, according to data from the National Atmospheric Emissions Inventory (NAEI).

## 1.1 Proposed Development

The application seeks planning permission for:

*"Demolition of the Woodgate Centre buildings including residential properties and the construction of 180 residential dwellings, with the creation of new vehicular access with footways and cycleways and ancillary road infrastructure and emergency access arrangements, associated parking, public open space, including children's play space, landscape planting, surface water attenuation and drainage and other associated infrastructure."*

## 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, in order to consider its suitability for residential land-use, in air quality terms. The potential impact of construction dust and operational phase traffic emissions are also addressed to conclude on the requirements for mitigation to reduce the significance of impacts to negligible during these phases.

## 2. RELEVANT LEGISLATION

### 2.1 EU

The governing European Union Directive on ambient air quality and cleaner air for Europe (2008/50/EC)<sup>1</sup> 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<sub>x</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), particulate matter with a diameter of less than 10 microns (PM<sub>10</sub>), particulate matter with a diameter of less than 2.5 microns (PM<sub>2.5</sub>), carbon monoxide (CO), lead, benzene and ozone (O<sub>3</sub>). The above legislation replaces the EU's previous three daughter directives.

### 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 2010, as amended. These set out how the government has interpreted the EU directives noted above. One of the main additions is the regulatory framework for PM<sub>2.5</sub>.

The Air Quality Strategy 2007 Volume 1<sup>2</sup> outlines the National Air Quality Standard (AQS) concentrations and National Air Quality Objectives (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 <sub>2</sub> )     | µg/m <sup>3</sup> | 1 Hour Mean      | 200 µg/m <sup>3</sup>      | Not to be exceeded more than 18 times in a year. |
|                                         |                   | Annual Mean      | 40 µg/m <sup>3</sup>       |                                                  |
| Particulate matter (PM <sub>10</sub> )  | µg/m <sup>3</sup> | 24 Hour Mean     | 50 µg/m <sup>3</sup>       | Not to be exceeded more than 35 times in a year. |
|                                         |                   | Annual Mean      | 40 µg/m <sup>3</sup>       |                                                  |
| Particulate matter (PM <sub>2.5</sub> ) | µg/m <sup>3</sup> | Annual Mean      | 25 µg/m <sup>3</sup>       | 25 µg/m <sup>3</sup>                             |

Defra's Local Air Quality management Technical Guidance 2016 (LAQM.TG(16))<sup>3</sup> provides guidance on where the above NAQO's should apply. This is summarised below, in Table 2:

<sup>1</sup> EC, "Directive 2008/50/EC of the European Parliament and of the Council," May 21, 2008, 44.

<sup>2</sup> 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](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf).

<sup>3</sup> Defra, "LAQM Technical Guidance LAQM.TG16", April 2021, <https://laqm.defra.gov.uk/technical-guidance/>.

Table 2 – Summary of where NAQOs should apply:

| Averaging Period             | Objectives should apply at:                                                                                                                                                                                                                                                                                             | Objectives should generally <i>not</i> 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. | Kerbside sites where the public would not be expected to have regular access.                                                                                                                                                                                                                                                                                 |
| 15-min mean                  | Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.<br><br>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 both the short term and annual mean NAQOs apply at the application site when considering the exposure of future occupiers of the Proposed Development to poor air quality. These NAQOs also apply at the existing high sensitivity receptors in the local area.

### 2.3 Local Air Quality Management

Obligations under the Environment Act 1995<sup>4</sup> require local authorities to declare an AQMA at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below NAQOs.

ADC have not declared any AQMAs within their district. ADC have joined with other local authorities in West Sussex to create a joint AQAP<sup>5</sup> which covers the following themes:

- Low emission vehicles;

<sup>4</sup> Environment Agency, "Environment Act 1995" (The Environment Agency, 2002), <http://www.legislation.gov.uk/ukpga/1995/25/contents>.

<sup>5</sup> 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](https://www.westsussex.gov.uk/media/12062/air_quality_plan.pdf).

- Traffic management;
- Sustainable transport infrastructure;
- Behaviour change;
- Health and wellbeing;
- Planning;
- Travel planning, and
- Resourcing.

## 2.4 National Planning Policy Framework

The National Planning Policy Framework (NPPF)<sup>6</sup> 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 174). 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 AQMAs and Clean Air Zones (CAZ)s (paragraph 186), and the cumulative impacts from other sites (paragraph 185).

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 CAZs is consistent with the local air quality action plan.

Also, to help reduce congestion and emissions, to improve air quality and public health, significant development should be focused on locations which are / can be made sustainable through limiting the need to travel (paragraph 105).

## 2.5 Planning Practice Guidance

Reference ID 32 (Air Quality) of the National Planning Practice Guidance (NPPG)<sup>7</sup> 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 NPPG 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 2011-2031<sup>8</sup> sets out the strategic vision and objectives that guide development in the district over the plan period. Within this, air pollution is addressed in policy QE DM3 and also policy QE SP1, as summarised below:

<sup>6</sup> Ministry of Housing, Communities and Local Government, "National Planning Policy Framework," July 2021, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1004408/NPPF\\_JULY\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf).

<sup>7</sup> 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>.

<sup>8</sup> Arun District Council, "Arun Local Plan 2011-2031," July 2018, <https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n12844.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."*

## ***"Policy QE SP1***

### ***Quality of the environment***

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

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

### 3. METHODOLOGY

#### 3.1 Consultation

The proposed scope of assessment was sent to ADC's air quality officer in December 2020 with a request for comment / guidance. The following response was received:

*"You will need to ensure that you follow the Sussex Guidance for such assessments which can be found here <https://sussex-air.net/ImprovingAQ/GuidancePlanning.aspx> and that emissions mitigation calculations are carried out as required.*

*You may also like to know that the Council is currently monitoring NO<sub>2</sub> at the Woodgate level crossing which is very close to the proposed development. This is a new site for 2020 so we don't have any results yet but if they would be of use to you, please email me in the New Year and I can let you have the raw data once we have received it from the lab.*

*You should also be aware of the proposed A29 realignment scheme which is proposed to divert traffic away from the level crossing which causes congestion onto a new road which will pass to the East of the site you are looking at. More detail can be found here [A29 realignment scheme - West Sussex County Council](#) and this should be considered in your assessment as this will affect air quality in both Woodgate to the West of your site and around the proposed route to the East of your site"*

Further consultation with the council was undertaken in June 2021 to confirm the proposed approach to the impact assessment was satisfactory. The following response was received:

*"Thank you for the email, I am happy with your proposed impact assessment which seems logical"*

The agreed methodology is outlined below.

#### 3.2 Guidance

Defra's LAQM.TG (16)<sup>9</sup> and the EPUK & IAQM Land-use Planning & Development Control: Planning for Air Quality<sup>9</sup> have been followed as guidance to produce this assessment. The IAQM's guidance on assessing impacts from construction<sup>10</sup> has also been followed.

The Sussex-air partnership's Air quality and Emissions Mitigation Guidance for Sussex (2020)<sup>11</sup> 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 have been established through the compilation and review of appropriately sourced background concentration predictions and local monitoring data. This is provided in section 4, and includes:

<sup>9</sup> 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>.

<sup>10</sup> 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>.

<sup>11</sup> Sussex Air, "Air Quality and Emissions Mitigation Guidance for Sussex (2020)," January 2020, <http://www.sussex-air.net/Reports/SussexAQGuidanceV.12020.pdf>.

- Data from the National Atmospheric Emissions Inventory<sup>12</sup>;
- Defra's modelled background concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. These estimates are produced using detailed modelling tools and are available as concentrations at central 1km<sup>2</sup> National Grid square locations across the UK<sup>13</sup>;
- ADC's latest available air quality monitoring data, derived from the latest Annual Status Report<sup>14</sup>. At the time of writing, these data were from 2019; and,
- ADC's air quality officer has provided the raw unadjusted 2020 data for a diffusion tube monitoring point at the Woodgate level crossing.

### 3.4 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 (PM<sub>10</sub> 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 maps<sup>15</sup>, 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. No such receptors were identified and no further assessment is required.

With regard to human 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. Based on the IAQM guidance residential dwellings are considered as high sensitivity receptors in relation to both dust soiling and health effects of PM<sub>10</sub>. 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.

<sup>12</sup> Defra and BEIS, "Emissions from Point Sources as Calculated for the 2018 NAEI Maps," 2018, [https://naei.beis.gov.uk/mapping/mapping\\_2018/NAEIPointsSources\\_2018.xlsx](https://naei.beis.gov.uk/mapping/mapping_2018/NAEIPointsSources_2018.xlsx).

<sup>13</sup> UK-AIR, "Background Mapping Data for Local Authorities - 2018," n.d., <https://uk-air.defra.gov.uk/data/iaqm-background-maps?year=2018>.

<sup>14</sup> Arun District Council, "2020 Air Quality Annual Status Report (ASR)," June 2020, <https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n15545.pdf&ver=15975>.

<sup>15</sup> Natural England and MAGIC partnership organisations., "Multi Agency Geographic Information for the Countryside.," 2020, <https://magic.defra.gov.uk/MagicMap.aspx>.

## 3.5 Operational Phase Assessment

### 3.5.1 Site suitability

Due to the sensitive nature of the Proposed Development, the suitability of the site for the proposed use, in air quality terms, has been assessed. This draws on the findings of the review of the baseline air quality conditions and also considers the potential impact of the proposed A29 realignment scheme. The following qualitative tools will be used:

- Defra's LAQM.TG(16) to scope the risk of the exposure to railway emissions at Site; and,
- Defra's AEA 'Diffusion Tube for Ambient NO<sub>2</sub> Monitoring: Practical Guidance'<sup>16</sup>.

### 3.5.2 Impact Assessment

The scope of assessment has been determined against the criteria within the Sussex-air partnership's Air quality and Emissions Mitigation Guidance for Sussex (2020)<sup>11</sup> and the EPUK & IAQM Planning for Air Quality guidance.

The Proposed Development meets the classification of a MAJOR development, as defined by Town and Country Planning (Development Management Procedure) Order (England) 2015<sup>17</sup>, as it proposes more than 10 residential dwellings. As such, an AQA with an emissions mitigation assessment (damage cost calculation) are required for planning purposes.

The Sussex-air guidance then requires the AQA to be prepared in line with EPUK & IAQM<sup>9</sup> guidance. The scope of the AQA has therefore been determined from the checklist criteria contained therein. The IAQM guidance includes several criteria which are not directly relevant to the Proposed Development, such as those related to the realignment of roads within an AQMA, introduction of a new bus station, new road junctions and underground car parks. These have been excluded from this assessment and only relevant screening criteria have been included. The relevant checklist criteria shown in Table 3 below.

<sup>16</sup> AEA Energy and Environment, "Diffusion Tubes for Ambient NO<sub>2</sub> Monitoring: Practical Guidance," 2008, [https://laqm.defra.gov.uk/documents/0802141004\\_NO2\\_WG\\_PracticalGuidance\\_Issue1a.pdf](https://laqm.defra.gov.uk/documents/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf).

<sup>17</sup> UK Government, "The Town and Country Planning (Development Management Procedure) (England) Order 2015", 2015.

Table 3 – IAQM detailed assessment criteria

| Criteria | The development will                                                                                                                                                                                                                                                  | Indicative criteria to proceed to a detailed AQA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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:<br>- more than 100 AADT within or adjacent to an AQMA<br>- 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:<br>- more than 25 AADT within or adjacent to an AQMA<br>- more than 100 AADT elsewhere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3        | Have one of more substantial combustion processes, where there is a risk of impacts at relevant receptors.<br><br>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 <sub>x</sub> 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.<br><br>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.<br><br>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 Charles and Associates who have provided confirmation that the development will cause an increase in LDV flows on roads surrounding the Site. The predicted traffic generation is shown below in Table 4:

Table 4 – Development Traffic Flows

| Road Name             | Total 2-way AADT |
|-----------------------|------------------|
| Woodgate Rd           | 992              |
| Lidsey Rd (S of site) | 315              |
| Lidsey Rd (N of site) | 675              |
| Westergate St         | 168              |
| Hook Lane             | 520              |
| Oving Road N          | 271              |
| Oving Road S          | 249              |

As seen from Table 4, the traffic flows on Woodgate Road (the Site access), Linsey Road (North bound) and Hook Lane are predicted to exceed IAQM indicative threshold criteria for further assessment of traffic emissions. However, as noted in IAQM guidance, **exceeding a screening criterion in Table 3 does not automatically lead to the requirement for a Detailed Assessment:**

*"The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence."*

A detailed assessment of the air quality impacts from development generated traffic has not been undertaken. As agreed in advance with ADC's air quality officer prior to undertaking the assessment, a qualitative impact assessment has been undertaken in Section 6.2 for the roads which exceed the threshold criteria. The air quality impact along other roads (i.e., those with traffic flow changes below the IAQM screening criteria) is considered to be Negligible and on this basis, no further assessment of these roads has been undertaken.

With regard to screening criteria 3, the preferred heating / hot water strategy is for gas boilers. These should meet the emission criteria set out in IAQM guidance of a NO<sub>x</sub> emission rate is less than 5mg/sec. This equates to a gas boiler with an ultra-low NO<sub>x</sub> emission rating of <40mg/kWh, in accordance with EPUK/IAQM guidance.

### 3.6 Emissions Mitigation Assessment (Damage Costs)

Air Quality and Emission Mitigation Guidance for Sussex (2020)<sup>11</sup> requires an emissions mitigation assessment to demonstrate how air quality impacts from new development will be appropriately mitigated. This is provided at Section 7. The Sussex-air guidance provides a detailed methodology, which has been followed.

## 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 Defra 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 1km<sup>2</sup> National Grid square locations across the UK. At the time of writing, the most recent background maps were from August 2020 and were verified against monitoring data from 2018.

Estimated background concentrations of the key AQ5 pollutants relevant to this assessment are presented in Table 5 for NO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. The background concentrations are all below the National Air Quality Objectives (NAQOs). Note that the Site is located within multiple grid squares, these concentrations from these are reported below.

Table 5 - UK-AIR background concentrations and NAQOs

| Grid Square    | Pollutant                           | Period      | NAQO (µg/m <sup>3</sup> ) | Annual Mean (µg/m <sup>3</sup> ) |      |      |      |      |      |
|----------------|-------------------------------------|-------------|---------------------------|----------------------------------|------|------|------|------|------|
|                |                                     |             |                           | 2018                             | 2019 | 2020 | 2021 | 2022 | 2023 |
| 493500, 104500 | Nitrogen Dioxide (NO <sub>2</sub> ) | Annual mean | 40                        | 9.6                              | 9.3  | 9.0  | 8.7  | 8.4  | 8.2  |
|                | Particulates (PM <sub>10</sub> )    | Annual mean | 40                        | 14.4                             | 14.2 | 14.0 | 13.8 | 13.6 | 13.5 |
|                | Particulates (PM <sub>2.5</sub> )   | Annual mean | 25                        | 9.5                              | 9.3  | 9.1  | 9.0  | 8.9  | 8.7  |
| 494500, 104500 | Nitrogen Dioxide (NO <sub>2</sub> ) | Annual mean | 40                        | 8.9                              | 8.6  | 8.3  | 8.1  | 7.8  | 7.6  |
|                | Particulates (PM <sub>10</sub> )    | Annual mean | 40                        | 14.7                             | 14.5 | 14.3 | 14.1 | 13.9 | 13.7 |
|                | Particulates (PM <sub>2.5</sub> )   | Annual mean | 25                        | 9.3                              | 9.1  | 9.0  | 8.8  | 8.7  | 8.5  |

The data show that annual mean background concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at the grid squares within which the application site is located are modelled by Defra to be well below the NAQOs in all years.

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 Local Authority Monitoring Data

ADC do not monitor air quality at automatic (continuous) monitoring sites. ADC monitored air quality at 17 passive diffusion tube monitoring sites across the district in 2019. Of these, the closest, and therefore considered to be most representative of the study area, are reported in this AQA. In addition, raw, unadjusted data from 2020 at diffusion tube 26 has been provided by ADC's air quality officer to support the assessment. The diffusion tube locations are shown in Figure 2:



Figure 2 – Council diffusion tubes

The monitoring data from these diffusion tubes is shown below in Table 6:

Table 6 - Annual mean NO<sub>2</sub> concentrations (µg/m<sup>3</sup>)

| Tube ID | Tube Name               | X      | Y      | Tube Type | 2016 | 2017 | 2018 | 2019 | 2020   |
|---------|-------------------------|--------|--------|-----------|------|------|------|------|--------|
| 19      | Yap19                   | 497607 | 103312 | Roadside  | -    | 16.9 | 17   | 15   | -      |
| 20      | Barn20                  | 495975 | 104395 | Roadside  | -    | 20.7 | 20   | 18   | -      |
| 26*     | Woodgate level Crossing | 493801 | 104307 | -         | -    | -    | -    | -    | 20.5** |

\*As provided by ADC's air quality officer  
 \*\*Annual average from raw monthly results as provided. No bias adjustment undertaken

The data in Table 6 shows that the monitored annual mean NO<sub>2</sub> concentrations at all three diffusion tubes were below the annual mean NAQO for years with available data. In 2019 tubes 19 and 20 were 62.5% and 55% below the annual mean NAQO respectively.

Diffusion tube 26 shows the highest annual mean, occurring in 2020. However, it is understood that this data is the raw data only. No post processing (e.g., bias adjustment) has been undertaken and therefore the results are indicative only and should be treated with caution.

In addition, monitoring at Diffusion tube 26 during 2020 would reasonably have been affected by changes in traffic flows due to COVID-19 lockdowns. It was widely reported that NO<sub>2</sub> concentrations declined rapidly during the first lockdown (enforced on 23/03/2020)<sup>18</sup> and this could have an effect on the annual mean concentration. Therefore, the data are treated as indicative only.

Overall, whilst there is uncertainty in the result from tube 26, it does suggest that concentrations of NO<sub>2</sub> on Lidsey road at roadside location, are not likely at risk of exceeding the NAQO.

When considering the above, the available monitoring data suggest that there have not been exceedances of the annual mean NAQO at roadside monitoring sites, and that the concentrations are well below the NAQO.

### 4.3 Proposed A29 Realignment

A review of the A29 realignment application (planning reference: WSCC/052/20) has been undertaken to supplement the above baseline air quality data. This application was subject to an Environmental Impact Assessment (EIA). The air quality assessment of this proposed scheme is at chapter 6 of the associated revised Environmental Statement<sup>19</sup> (hereafter referred to as the “A29 ES”).

As part of the A29 ES, WSP undertook a NO<sub>2</sub> diffusion tube survey between 04/10/2019 and 04/03/2020 in Woodgate. Therefore, the results of the WSP survey are unaffected by the COVID-19 pandemic. WSP also prepared a detailed dispersion model to predict pollution concentrations at sensitive receptors in Woodgate and Westergate for a future year baseline assessment of 2023. The location of these monitoring sites and modelled receptors are shown below in Figure 3:

<sup>18</sup> Wyche et al., “Changes in ambient air quality and atmospheric composition and reactivity in the South East of the UK as a result of the COVID-19 lockdown”, September 2020, <https://doi.org/10.1016/j.scitotenv.2020.142526>

<sup>19</sup> WSP, “A29 REALIGNMENT PHASE 1 Environmental Statement - Chapter 6”, May 2021, <https://westsussex.planning-register.co.uk/Document/Download?module=PLA&recordNumber=1705&planid=60333&imageid=242&isPlan=False&fileName=Chapter%206%20-%20Air%20Quality.pdf>



Figure 3 - WSP baseline data

The data from the above diffusion tube monitoring sites, as reported in the A29 ES, are shown below:

Table 7 - WSP baseline monitoring ( $\mu\text{g}/\text{m}^3$ )

| Site ID | Site Name                                                    | X      | Y      | 2019 |
|---------|--------------------------------------------------------------|--------|--------|------|
| A29x3   | A29 Lidsey Road, near Wood Gate Road, Woodgate               | 493805 | 104172 | 23.5 |
| A29x4   | A29 Westergate Street, near Orchard Gardens, Woodgate        | 493786 | 104491 | 29.4 |
| A29x5   | A29 Westergate Street, near Old Manor House B&B, Westergate, | 493851 | 105105 | 23.3 |

The reported annual mean concentrations from the monitoring survey in Woodgate and Westergate are all well below the annual mean NAQO for  $\text{NO}_2$ . The highest concentration of  $29.4 \mu\text{g}/\text{m}^3$  was recorded at A29x4, which was more than 25% below the NAQO.

The results of the modelling assessment for the future baseline scenario of 2023 (without the A29 realignment scheme) are shown below for the modelled receptors in Woodgate and Westergate:

Table 8 – WSP future baseline 2023 ( $\mu\text{g}/\text{m}^3$ )

| Site ID | Site Name                                                                                | X      | Y      | $\text{NO}_2$ | $\text{PM}_{10}$ | $\text{PM}_{2.5}$ |
|---------|------------------------------------------------------------------------------------------|--------|--------|---------------|------------------|-------------------|
| E05     | A29 Lidsey Road between Woodgate Road and Oak Tree Lane, Woodgate (residential property) | 493813 | 104136 | 17.5          | 16.1             | 10.2              |
| E06     | A29 Westergate Street opposite Orchard Gardens, Westergate (residential property)        | 493781 | 104517 | 15.8          | 15.4             | 9.8               |
| E07     | A29 Westergate Street at corner of Oaks Close, Westergate (residential property)         | 493866 | 104981 | 16.5          | 15.8             | 10                |

The future modelled concentrations, as reported in the A29 ES, are all well below the relevant NAQOs and are all lower than the existing baseline concentrations at receptors.

## 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. As such, a qualitative construction dust risk assessment has been carried out in accordance with IAQM Guidance<sup>10</sup>.

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.

### 5.2 Dust Emission Magnitude

#### 5.2.1 Demolition

The building currently occupying the Site is to be demolished. The volume of buildings to be demolished are estimated to be within the IAQM's criteria of <20,000m<sup>3</sup>.

In addition, the majority of this demolition is expected to take place <10m height, although some minor works will take place at heights of between 10 – 20m.

When considering the above, it is considered that the potential dust emission magnitude for the demolition activities will be 'Small'.

#### 5.2.2 Earthworks

The total area of the Site is within the IAQM's Large criteria as it is over 10,000m<sup>2</sup>. The soils characteristics for the Site are Loamy soils with naturally high groundwater levels. Therefore, it is not considered that the underlying soils inherently present a high potential for dust release<sup>20</sup>.

However, based on the Site size, the total material to be moved has the potential to be >100,000 tonnes with >10 heavy earth moving vehicles active at any one time, according to IAQM guidance.

When considering the above, the potential dust emission magnitude during this phase is defined as 'Large', with reference to IAQM guidance, which provides a conservative estimate.

#### 5.2.3 Construction

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

<sup>20</sup> Cranfield University, "Cranfield Soil and Agrifood Institute," n.d., <http://www.landis.org.uk/soilscapes/>.

An estimation of the total volume of the buildings usually forms one criterion from which the potential dust emissions during the construction phase can be estimated. The total volume of the proposed buildings is within the IAQM's Medium criteria of 20,000m<sup>3</sup> – 100,000m<sup>3</sup>.

However, the duration of the building works is estimated to be approximately 3 to 4 years.

When considering the above, due to the duration of the works, it is considered appropriate to define the potential dust emission magnitude during this phase as 'Large' to ensure a conservative approach.

#### 5.2.4 Trackout

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

It is estimated that there would be a maximum of 10 – 50 HDVs outward movements from the Site in any day during the construction period. Currently site access is via the existing road network. No unpaved road surfaces will be used for trackout. Accordingly, the potential dust emission magnitude during Trackout is considered to be 'Medium'.

#### 5.2.5 Summary

Table 9 below shows a summary of the potential dust emission magnitudes from each activity:

Table 9 – Potential Dust Emission Magnitude

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

### 5.3 Sensitivity of Area

The prevailing wind direction for the closest regionally representative meteorological measurement station to the application site, at Thorney Island, for the years 2016 to 2020, 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/north-east) of the site are more sensitive to dust impacts than those located upwind.

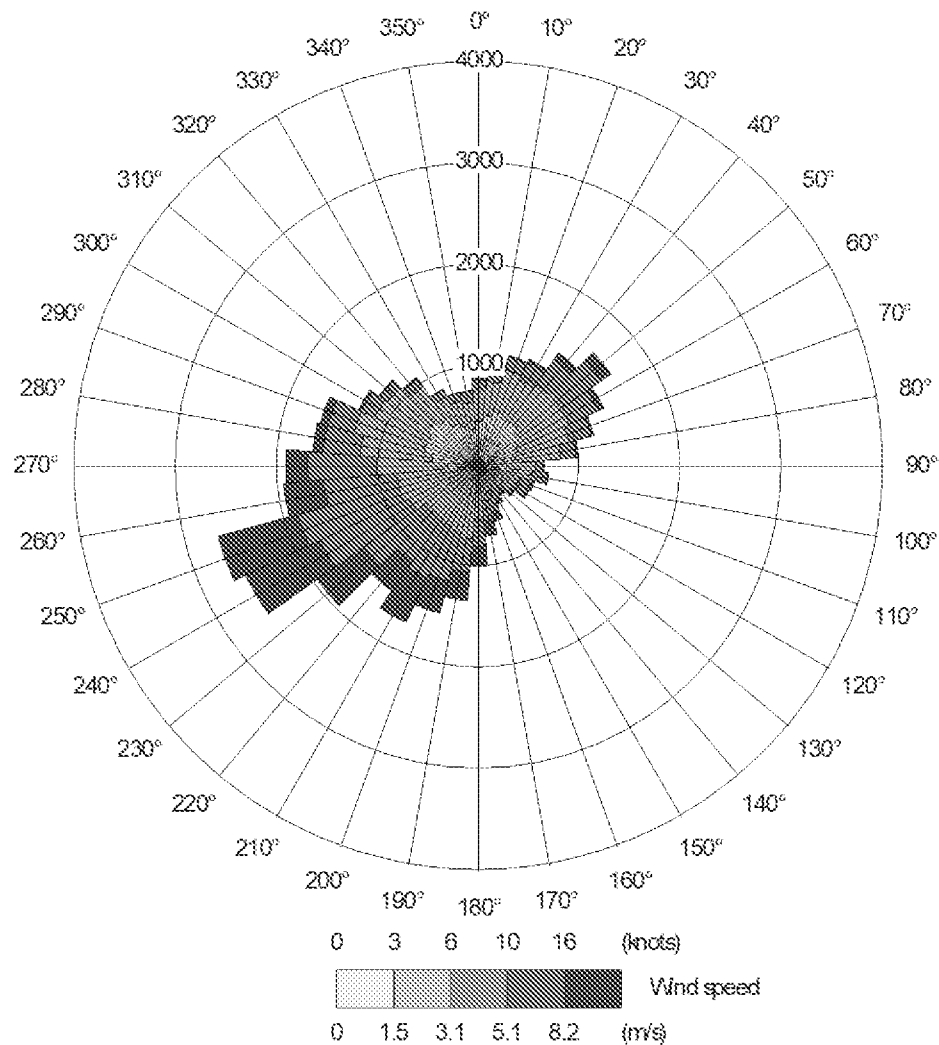


Figure 4 – 2016-2020 wind Rose for Thorney Island Meteorological Station

There are sensitive receptors adjacent to the site to the north, west and south. There are currently no receptors directly downwind of the prevailing wind direction (to the north east). The holiday caravan park to the south of the Site has been classified as a high sensitivity receptor as it is considered that users would reasonably expect a high level of residential amenity when using this site. Figure 5 shows the sensitive human receptors that have been identified within 350m of the site boundary.

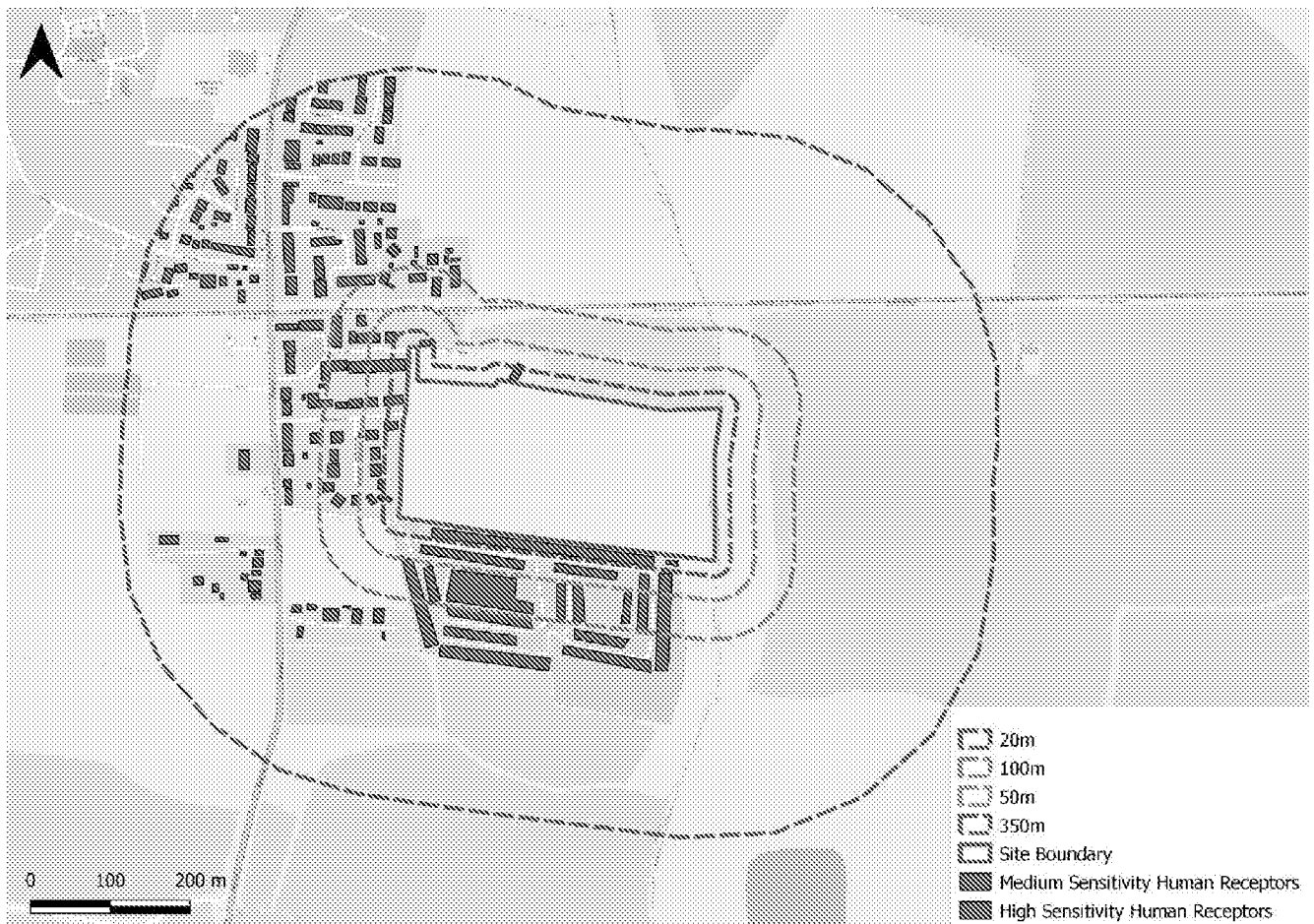


Figure 5 – Construction Phase Receptors

There are over 10 high-sensitivity receptors within 20m of the site boundary. In addition to these existing receptors, internal Site receptors have been considered as it is understood first occupation of the Proposed Development will occur before site construction works conclude. Considering the above, the overall sensitivity of the surrounding area to nuisance dust soiling effects during Demolition, Earthworks and Construction is defined as 'High'.

With regard to Trackout, the sensitivity 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, the sensitivity to dust soiling impacts from Trackout is defined as 'High'.

UK-AIR predictions show that annual mean concentrations of  $PM_{10}$  are well below  $32 \mu g/m^3$  in the vicinity of the site (the concentration at which exceedance of the 24-hour NAQO is likely), and are not likely to exceed  $24 \mu g/m^3$ . According to IAQM guidance, where  $PM_{10}$  concentrations are  $<24 \mu g/m^3$  and there are fewer 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 all stages.

The sensitivity of the surrounding area to potential impacts during the construction phase is summarised in Table 10 below.

Table 10 – Sensitivity of Local Area

| Potential Impact | Sensitivity of the Surrounding Area |            |              |          |
|------------------|-------------------------------------|------------|--------------|----------|
|                  | Demolition                          | Earthworks | Construction | Trackout |
| Dust Soiling     | Low                                 | Low        | Low          | Low      |
| Human Health     | Low                                 | Low        | Low          | Low      |

## 5.4 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 11 provides a summary of the construction dust risk assessment. Overall, the development is considered to be ‘High’ Risk for nuisance dust soiling effects and a ‘Low’ Risk for PM<sub>10</sub> human health effects, in the absence of mitigation. Risks associated with ecological impacts do not apply.

Table 11 – Risk of adverse impacts during construction phase

| Potential Impact | Risk of Impact  |            |              |             |
|------------------|-----------------|------------|--------------|-------------|
|                  | Demolition      | Earthworks | Construction | Trackout    |
| Dust Soiling     | Medium Risk     | High Risk  | High Risk    | Medium Risk |
| Human Health     | Negligible Risk | Low Risk   | Low Risk     | Low Risk    |

Appendix A provides site specific mitigation measures to be adopted to reduce dust emissions during construction. The IAQM guidance<sup>10</sup> states that implementing these measures should effectively reduce the risk of impacts to *Negligible* during this phase. On this basis, the residual construction phase effects are considered to be ‘not significant’.

Note as the first occupation of the site will occur before the completion of construction works, it is considered that there is also a risk of impact to future receptors within the Site boundary, therefore it is recommended all mitigation measures should be implemented across all phases of construction.

## 6. OPERATIONAL PHASE ASSESSMENT

### 6.1 Exposure Assessment

#### 6.1.1 Site Classification

Defra's AEA 'Diffusion Tube for Ambient NO<sub>2</sub> Monitoring: Practical Guidance'<sup>16</sup> provides detailed definitions which help to classify urban/rural background sites. Specifically, section 3.2.2 states that, where a site meets the following criteria, they can be reasonably defined being in an urban/rural background location, away from adverse impacts associated with emissions from road sources:

- 50m from any major source of NO<sub>2</sub> (e.g. multi-storey car parks);
- 30m from any 'very busy' road (>30,000 vehicles per day);
- 20m from a 'busy' road (10,000 – 30,000 vehicles per day);
- 10m from any 'main' road; and
- 5m from locations where vehicles may stop with their engines idling.

Department for Transport traffic data for the A29 (Lidsey Road) (count point ID 87002), shows that traffic flows are in the region of 10,000 – 30,000 vehicles per day<sup>21</sup>. Using the above criteria, the A29 is classified as a 'busy' road, and at distances of >20m from the kerb, pollution concentrations would be expected to decline to background levels.

The closest point of the Site to Lidsey Road is approximately 160m away. As such, emissions from the A29 are unlikely to directly affect the Site beyond background contributions.

#### 6.1.2 Rail emissions

LAQM.TG (16) provides guidance on the assessment of emissions from railway locomotives. Sources can be screening based on particular 'lines of concern' and the pathway distance between source and receptor. As the railway line in question (the West Coastway line) is not one of the lines of concern that experiences heavy traffic of diesel passenger trains and is further than 30m from the Site, further assessment of railway emissions has not been undertaken as no adverse impact would be expected.

#### 6.1.3 Proposed A29 realignment scheme

The proposed A29 realignment scheme will deliver a new 4.34km road to the east of Eastergate, Westergate and Woodgate village. The location of this realignment in relation to the Site is shown in Figure 6 below:

<sup>21</sup> DfT, "Traffic count point 87002", <https://roadtraffic.dft.gov.uk/manualcountpoints/87002>

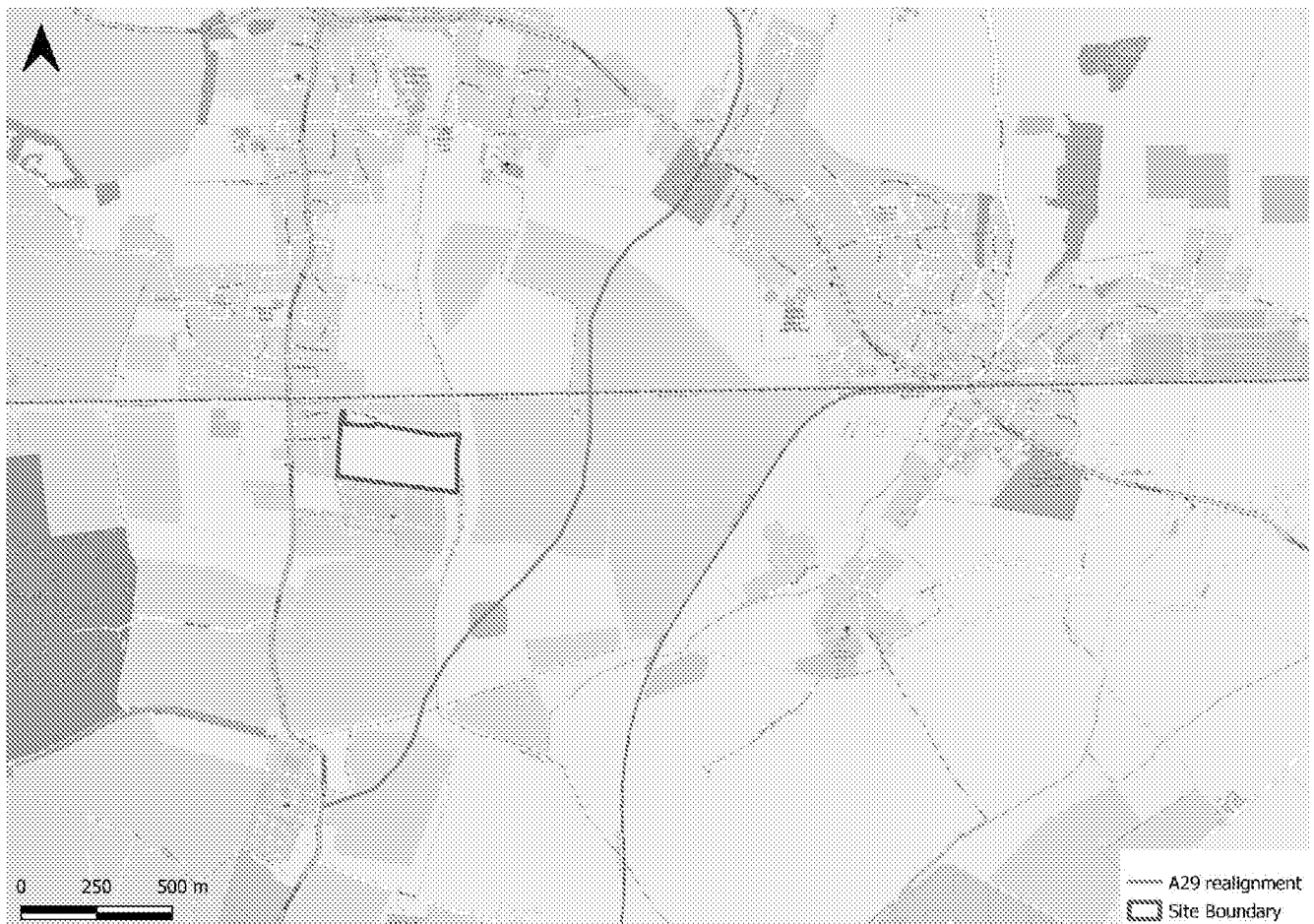


Figure 6 - A29 Realignment

The location of the A29 realignment once operational will be over 300m from the Proposed Development (closest point). Therefore, based on this distance it would be expected that any emissions from the operational road will have dispersed to background contributions only at the Site. This is in line with the Design Manual for Roads and Bridges (DMRB) LA 105 guidance<sup>22</sup> on the assessment of air quality for strategic roads which states sensitive receptors are required to be assessed where they are within 200m of the 'affected road network'. As shown above, the Site is more than 200m from the proposed location of the A29 realignment.

Additionally, the traffic impact of the A29 realignment through Woodgate and Westergate on Lidsey Road was predicted to be a decrease of >1000 AADT by the A29 ES. Based on this, the Proposed A29 realignment will not cause a worsening of air quality on Lidsey Road to the west of the Proposed Development.

#### 6.1.4 Summary of Site Suitability

Based on the above, exposure to poor air quality at the Site is not considered to be significant and annual mean concentrations are likely to be comparable to UK-AIR background predictions for the Site. Therefore, air quality is not considered to be a constraint to the proposed residential use.

<sup>22</sup> Highways England, "Design Manual for Roads and Bridges LA 105: Air Quality," 2019, <https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90>.

## 6.2 Impact assessment

As agreed with ADC's air quality officer, a qualitative assessment of the impact of traffic generated by the Proposed Development has been undertaken, in air quality terms. A commonly accepted threshold, which is referenced by the latest Highway's England DMRB (2019) guidance<sup>22</sup>, the IAQM<sup>23</sup> and Natural England<sup>24</sup>, is that an increase in vehicle movements of 1,000 AADT is roughly equivalent to a 1% increase in concentrations relative to the assessment level. Whilst this threshold is most commonly used to assess strategic road schemes or impacts on ecological receptors, it is considered appropriate to use in this context.

The scheme generated traffic flows of 992 AADT on Woodgate Road (site access only) will dissipate as the traffic distributes onto the local highway. This means only Lidsey Road and Hook Lane are predicted to experience an increase in traffic above the IAQM indicative threshold criteria, but well below the 1,000 AADT increase. These roads are shown below in Figure 7:

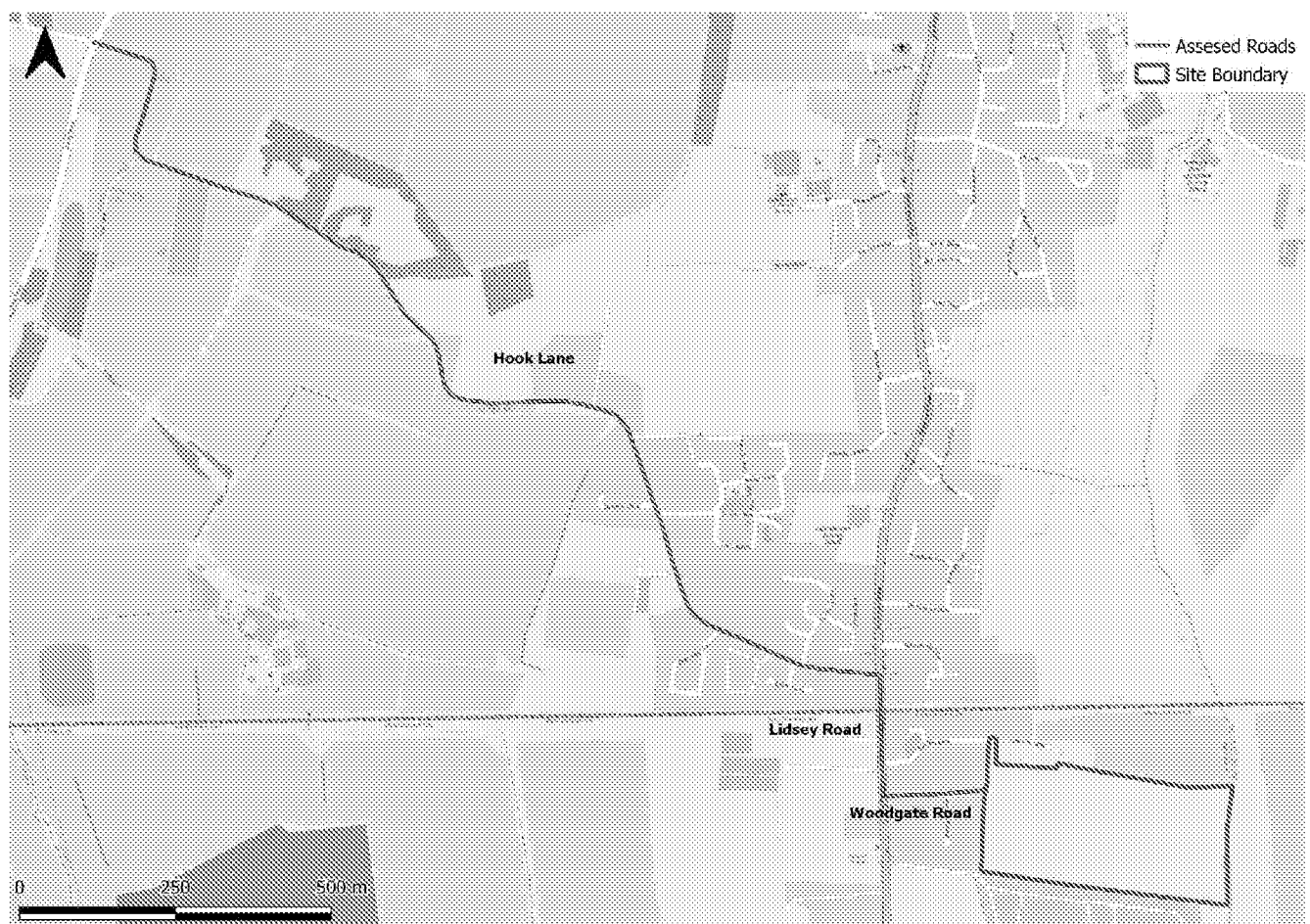


Figure 7 - Impact assessment road network

<sup>23</sup> IAQM, "A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites" (Institute for Air Quality Management (IAQM), June 2019), <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2019.pdf>.

<sup>24</sup> Natural England, "Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations," June 2018, <http://publications.naturalengland.org.uk/file/5431868963160064>.

### 6.2.1 Potential Impacts

As the annual mean assessment level for NO<sub>2</sub> is 40µg/m<sup>3</sup> (the annual mean NAQO), a 1% increase equates to an increase of 0.4 µg/m<sup>3</sup> as an approximate guide.

As discussed in section 4, Defra's UK-AIR predicted background concentrations of NO<sub>2</sub>, roadside council monitored NO<sub>2</sub> and the results of the WSP NO<sub>2</sub> diffusion tube survey indicate annual mean baseline NO<sub>2</sub> concentrations in the area are under 75% of the NAQO. For a change against this baseline to be described as Moderately Adverse (with reference to the IAQM's impact descriptors shown below in Table 12), an increase of 4 µg/m<sup>3</sup> (or 10% of the AQAL) is required. As the estimated impact from the Proposed Development (based on comparison between scheme generated traffic and screening criteria) is estimated to be no greater than approximately 0.4 µg/m<sup>3</sup>, it is considered unlikely that the Proposed Development will have a significant impact on local air quality. Furthermore, an increase in the order of 10 µg/m<sup>3</sup> against the baseline would be required for there to be a local risk of exceedance of the annual mean NAQO for NO<sub>2</sub>.

Table 12 - IAQM Impact Descriptors for Individual Receptors

| Long term annual mean concentration at receptor in assessment year | % Change in concentration relative to Air Quality Assessment Level (AQAL) |            |          |          |
|--------------------------------------------------------------------|---------------------------------------------------------------------------|------------|----------|----------|
|                                                                    | 0-25                                                                      | 25-50      | 50-75    | 75       |
| 75% or less of AQAL                                                | Negligible                                                                | Negligible | Slight   | Moderate |
| 76 - 94% of AQAL                                                   | Negligible                                                                | Slight     | Moderate | Moderate |
| 95 - 102% of AQAL                                                  | Slight                                                                    | Moderate   | Moderate | Moderate |
| 103 - 109% of AQAL                                                 | Moderate                                                                  | Moderate   | Moderate | Moderate |
| 110% or more of AQAL                                               | Moderate                                                                  | Moderate   | Moderate | Moderate |

In addition to considering the impact of the Proposed Development in terms of NO<sub>2</sub>, the DMRB threshold can also be used to consider the impact of the Proposed Development in terms of PM<sub>10</sub> and PM<sub>2.5</sub>. As the annual mean assessment levels for PM<sub>10</sub> and PM<sub>2.5</sub> are 40 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> respectively (the annual mean NAQOs), a 1% increase equates to an increase of 0.4 µg/m<sup>3</sup> and 0.25 µg/m<sup>3</sup> for PM<sub>10</sub> and PM<sub>2.5</sub> respectively as an approximate guide. Given the low prevailing background concentrations of these pollutants, as shown by Defra's UK-Air predicted concentrations, it is considered unlikely that the above increases in PM<sub>10</sub> and PM<sub>2.5</sub> will lead to significant impacts.

While no detailed assessment of specific impacts at individual receptors has been undertaken, the following Emissions Mitigation Assessment provides details of the mitigation measures to be incorporated within the scheme to ensure potential impacts are minimised.

## 7. EMISSIONS MITIGATION ASSESSMENT

Increases in pollutant emissions (NO<sub>x</sub> and PM<sub>2.5</sub>) caused by the development over a 5-year appraisal period are estimated, in accordance with Air Quality and Emission Mitigation Guidance for Sussex, using development traffic data and Defra's Emissions Factor Toolkit (EFT) (v.10.1)<sup>25</sup>.

The latest version of Defra's Air Quality Appraisal: Damage Costs Toolkit<sup>26</sup> (last updated March 2021) 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 central base damage costs for 'Road Transport Rural' are provided below in £/tonne:

- NO<sub>x</sub>: £3,166
- PM<sub>2.5</sub>: £30,697

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 calculation used in this assessment is summarised in the below general formula:

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

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 was accounted for as an input into Defra's EFT. Table 13, below, shows the inputs used for the damage cost calculation:

Table 13 – Damage Cost Inputs

| Input           | Value                 | Unit | Source / Explanation                                                                                                    |
|-----------------|-----------------------|------|-------------------------------------------------------------------------------------------------------------------------|
| Trip Length     | 10                    | km   | As in Sussex guidance and National Travel Survey UK Average                                                             |
| Traffic Flow    | 992 (0% HDV)          | AADT | Scheme generated traffic, provided by Charles and Associates. HGV generation from the Site considered to be negligible. |
| EFT Road Type   | Rural (Not London)    | -    |                                                                                                                         |
| Appraisal Years | 2022 – 2026 (5 years) | -    | Reductions in line with EFT as forecast by Defra from the five years following first occupation of the Site             |
| Average Speed   | 50                    | kph  | As in Sussex AQ guidance and EPUK / IAQM guidance.                                                                      |

<sup>25</sup> Defra, "Emissions Factors Toolkit (EFT) V10.1," August 20, 2020, <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

<sup>26</sup> DEFRA, "Air Quality Damage Cost Appraisal Toolkit," March 2021, <https://www.gov.uk/government/publications/assess-the-impact-of-air-quality>.

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 anticipated opening of the Proposed Development (i.e., first occupation). These emissions per annum are shown below in Table 14.

Table 14 – Increase in Emissions (tonnes)

| Pollutants       | Development Emissions (tonnes/year) |       |       |       |       |
|------------------|-------------------------------------|-------|-------|-------|-------|
|                  | 2022                                | 2023  | 2024  | 2025  | 2026  |
| NO <sub>x</sub>  | 0.876                               | 0.754 | 0.718 | 0.646 | 0.580 |
| PM <sub>10</sub> | 0.050                               | 0.049 | 0.049 | 0.048 | 0.048 |

These emissions are then converted to the cost of ‘damage’ to human health using the Air Quality Appraisal Damage Costs Toolkit. For this the price base year of 2021 (i.e., the year of appraisal) was used. The pollutant sector used was ‘Road Transport Rural’. The results of this are shown below in Table 15:

Table 15 – Calculated Damage Cost Outputs

| Pollutant        | Low traffic scenario present value | Central Present Value | High traffic scenario present value |
|------------------|------------------------------------|-----------------------|-------------------------------------|
| NO <sub>x</sub>  | £1,526                             | £13,292               | £16,211                             |
| PM <sub>10</sub> | £2,257                             | £8,709                | £27,647                             |
| TOTAL            | £3,783                             | £22,001               | £43,858                             |

Based on the outputs in Table 15, the total emissions ‘damage costs’ (sum of NO<sub>x</sub> and PM<sub>10</sub>) = **£22,001**, 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.

These damage costs do not take account of the effects of the Travel Plan prepared by Charles and Associates. The Travel Plan measures will have air quality benefits where they promote and encourage the use of sustainable transport and lead to a reduction in the number of polluting trips that the development generates.

The total indicative cost to the developer of the core Travel Plan measures is £73,800. Further to this, assuming a 50% uptake of the optional Travel Plan measures, an additional indicative cost of £13,500 will be spent on sustainable travel measures. Further details are provided in Section 8 of this report.

## 8. MITIGATION MEASURES

### 8.1 Construction Phase

The qualitative construction dust risk assessment shows that the site is High Risk for adverse impacts during construction, in the absence of mitigation.

To effectively reduce the risk of impacts to negligible, appropriate mitigation measures should be adopted. The IAQM's highly recommended mitigation measures for High Risk sites is provided at Appendix A of this report. Implementing these measures should effectively reduce the risk of impacts to Negligible during the construction phase.

### 8.2 Operational Phase

From the above evidence in this report, the Site is considered to be suitable for residential use and the Proposed Development is unlikely to have a significant impact on local air quality. However, mitigation measures will be incorporated within the scheme to ensure potential impacts are minimised.

In accordance with the locally adopted Air quality and Emissions Mitigation Guidance for Sussex (2020)<sup>11</sup>, a damage cost of £22,001 has 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.

These damage costs do not take account of the effects of the Travel Plan prepared by Charles and Associates. The Travel Plan measures include those aimed at reducing car travel, promoting cycling, promoting walking and promoting public transport. Some of the measures, are summarised in Table 16 below.

Table 16 - Travel Plan Measures (from Charles and Associates Travel Plan)

| Hard Measures                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Car parking provision including EV charging points in accordance with appropriate planning guidance.                                                                                                                         |
| Travel noticeboards at key locations across the development to provide up to date information on sustainable travel                                                                                                          |
| Shared surface areas to improve the environment for pedestrians/cyclists by constraining vehicles speeds.                                                                                                                    |
| Secure cycle storage in accordance with adopted standards.                                                                                                                                                                   |
| Improvements to existing bus stops.                                                                                                                                                                                          |
| Proposed new offsite shared footway/cycleway leading to local facilities.                                                                                                                                                    |
| Potential walking and cycling links between the sites in the allocation is maintained.                                                                                                                                       |
| Soft Measures                                                                                                                                                                                                                |
| Appointment of a Travel Plan Coordinator to implement and monitor the Travel Plan.                                                                                                                                           |
| Promotion of West Sussex County Council Car sharing Scheme.                                                                                                                                                                  |
| Sustainable travel information within sales literature to inform potential residents about accessibility to local facilities and sustainable travel modes available to them.                                                 |
| Resident Travel Information Packs to provide information about the TP and TPC. This document will provide details of pedestrian network, cycle networks and public transport as well as important links and contact details. |
| Construction of a travel plan website to provide all travel related information and provide a forum for residents to exchange travel information.                                                                            |
| TPC to establish a close liaison with local bus operators and cycle shops to discuss initiatives which would benefit residents e.g. discounts and promotions                                                                 |

Finally, any gas fired boilers should meet the emission criteria set out in IAQM guidance of a NO<sub>x</sub> emission rate is less than 5mg/sec. This equates to a gas boiler with an ultra-low NO<sub>x</sub> emission rating of <40mg/kWh, in accordance with EPUK/IAQM guidance.

## 9. DISCUSSION AND CONCLUSIONS

Hydrock have been commissioned by J.A (Pye) Oxford Ltd to prepare an Air Quality Assessment (AQA) for the proposed residential development at Land at Woodgate Centre of 180 residential dwellings.

UK-AIR background concentrations, local air quality monitoring data and the A29 realignment application Environmental Statement have been reviewed to establish baseline air quality in the area. This review shows that no exceedances of the annual mean National Air Quality Objective for Nitrogen dioxide were observed in 2019 in the area and background concentrations of pollutants are low.

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 are considered to be 'High' Risk for nuisance dust soiling effects and a 'Low' Risk for PM<sub>10</sub> human health effects, in the absence of mitigation. 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.

As agreed in advance with the ADC's air quality officer, a qualitative assessment of the impact of the traffic generated by the Proposed Development has been undertaken, which shows that the Site is considered to be suitable for residential use and the Proposed Development is unlikely to have a significant impact on local air quality.

However, mitigation measures will be incorporated within the scheme to ensure potential impacts are minimised. To this end, a damage cost of £22,001 has been calculated, which represents the indicative value of a package of air quality mitigation measures to offset the real-world impact of emissions from the Proposed Development. However, these damage costs do not take account of the sustainable travel measures within the Charles and Associated Travel Plan. The indicative costs of the Travel Plan to the developer are £73,800 for the core travel plan measures and a further £13,500 for the optional Travel Plan measures, assuming a 50% uptake.

From the evidence presented, the Proposed Development is expected to comply with all relevant air quality policy including local plan policy QE DM3 and QE SP1. As such, air quality should not pose any significant obstacles to the planning process.

## *Appendix A - Construction Dust Mitigation for High-Risk sites*

In order to mitigate the worst-case dust impacts the following general mitigation measures are highly recommended by the IAQM for High Risk construction sites. Highly recommended mitigation measures applicable specifically to earthworks, construction and trackout are provided based on the respective risk of adverse impact 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.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.

#### **Monitoring:**

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

- Agree dust deposition, dust flux, or real-time PM<sub>10</sub> 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.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

## **Operations:**

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes 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 Demolition (Medium Risk)**

- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

#### **Measures specific to Earthworks (High Risk)**

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

#### **Measures specific to Construction (High risk)**

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

#### **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 bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.

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