

## 7. Air Quality and Dust

### Introduction

- 7.1 This chapter of the EIA has been produced by Air and Acoustic Consultants Ltd (AAC) to assess the Proposed Development in relation to the effects it would have upon air quality.
- 7.2 During site clearance and construction activities, temporary impacts may arise from the emission of air pollutants and dust. During both the construction and occupation phase(s), vehicular traffic and emissions from stationary plant associated with the Proposed Development has the potential to lead to changes in the total air quality concentrations at human receptors.
- 7.3 This ES Chapter will focus on air pollutants that are likely to arise from the construction and occupation of the Proposed Development. These pollutants are oxides of nitrogen (NO<sub>x</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and dust for human receptors. No considerations on impacts on ecological receptors have been undertaken due to lack of statutory sites located near to the Site.
- 7.4 This Chapter is supported by the following figures and appendices:
- Figure 7.1 – Manchester Meteorological Site Wind Rose
  - Figure 7.2 – Diurnal Profile
  - Figure 7.3 – Modelled Road Network
  - Figure 7.4 – Existing and Committed Receptors
  - Figure 7.5 – Future Receptors
  - Figure 7.6 – Local Authority Air Quality Monitoring Locations
  - Figure 7.7 – Demolition Dust Risk Buffers
  - Figure 7.8 – Earthworks and Construction Dust Risk Buffers
  - Figure 7.9 – Trackout Dust Risk Buffers
  - Appendix 7.1 – Construction Dust Assessment Methodology
  - Appendix 7.2 – EPUK & IAQM Planning for Air Quality Guidance
  - Appendix 7.3 – General Demolition and Construction Dust Mitigation Measures
  - Appendix 7.4 – Traffic Flows
  - Appendix 7.5 – Verification

## Planning Policy Context

### European Legislation

- 7.5 The following text is taken from the [legislation.gov.uk](https://www.legislation.gov.uk)<sup>1</sup> website and sets out how European Union (EU) Legislation will be retained in the United Kingdom after the Brexit transition:

*"The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on [legislation.gov.uk](https://www.legislation.gov.uk).*

[...]

*EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16)."*

- 7.6 European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality standards for fine particulates. The consolidated Directives include the three (now repealed) below:

- Directive 1999/30/EC – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO<sub>2</sub> and oxides of nitrogen, sulphur dioxide, lead and PM<sub>10</sub>;
- Directive 2000/69/EC – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- Directive 2002/3/EC – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold, and an information threshold for concentrations of ozone in ambient air.

- 7.7 The fourth daughter Directive was not included within the consolidation and is described as:

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<sup>1</sup> EU legislation and UK law. Accessible at: <https://www.legislation.gov.uk/eu-legislation-and-uk-law>

- Directive 2004/107/EC – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

7.8 The updated Directive, The Air Quality Standards (Amendment) Regulations 2016, came into force on 31st December 2016<sup>2</sup>.

## **National Legislation, Planning Policy and Strategy**

### **UK Air Quality Regulations**

7.9 The Air Quality Standards (Amendments) Regulations 2016, seeks to simplify the air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives, but also the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. Statutory Instrument SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995)<sup>3</sup>, for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

### **UK Air Quality Strategy<sup>4</sup>**

7.10 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS)<sup>5</sup> for England, Scotland, Wales and Northern Ireland. The AQS provides a framework for reducing air pollution in the UK. The Air Quality Strategy has since been updated<sup>6</sup> and includes a range of actions, for both local authorities and the UK government, to improve air quality across the UK.

7.11 The AQS sets out national health-based standards and objectives for nine key air pollutants to protect human health and ecosystems. These pollutants are benzene, 1-3 butadiene, carbon

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<sup>2</sup> Statutory Instrument, 2016. The Air Quality Standards Regulations, No. 1184.

<sup>3</sup> Parliament of the United Kingdom, 1995. Environmental Act 1995, Chapter 25

<sup>4</sup> Department for Environment, Food and Rural Affairs (July 2007) Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 & 2)

<sup>5</sup> Department for Environment Food and Rural Affairs, 1997. The United Kingdom National Air Quality Strategy, Cm 3587.

<sup>6</sup> Department for Environment Food and Rural Affairs, 2023. Air quality strategy: framework for local authority delivery.

monoxide, lead, nitrogen dioxide, ozone, particulate matter, sulphur dioxide and polycyclic aromatic hydrocarbons.

- 7.12 The pollutant standards relate to ambient pollutant concentrations in air, based on medical and scientific evidence regarding how each pollutant affects human health. Pollutant standards are the future dates by which each standard is to be achieved, considering economic considerations, practical and technical feasibility.
- 7.13 The air quality standards are managed through the Local Air Quality Management, (LAQM) regime, which is defined within the Air Quality (England) Regulations 2000, (SI 928) and The Air Quality (England) (Amendment) Regulations 2002, (SI 3043). **Table 7.1** below shows the national air quality standards as set out in the Air Quality Standards (Amendment) Regulations 2016. To note, the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 came into force in England on 30<sup>th</sup> January 2023<sup>7</sup> and set out two fine particulate matter targets to be achieved by 2040, which have been included in **Table 7.1**, as well as the 2028 interim targets which were released as part of the Environmental Improvement Plan (2023)<sup>8</sup>.

Table 7.1: Air Quality Standards (England)

| Pollutants                                | Air Quality Standards                                                                                                                                              |                                                             |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|                                           | Concentration                                                                                                                                                      | Measured as                                                 |
| Nitrogen Dioxide<br>(NO <sub>2</sub> )    | 200 µg/m <sup>3</sup>                                                                                                                                              | 1-hour mean not to be exceeded more than 18 times per year  |
|                                           | 40 µg/m <sup>3</sup> <sup>A</sup>                                                                                                                                  | Annual mean                                                 |
| Particulate Matter<br>(PM <sub>10</sub> ) | 50 µg/m <sup>3</sup>                                                                                                                                               | 24-hour mean not to be exceeded more than 35 times per year |
|                                           | 40 µg/m <sup>3</sup>                                                                                                                                               | Annual mean                                                 |
| PM <sub>2.5</sub>                         | 25 µg/m <sup>3</sup> - Stage 1 limit value pre 2020<br>20 µg/m <sup>3</sup> - Indicative Stage 2 limit value post 2020. 15% reduction in background to be achieved | Annual mean                                                 |

<sup>7</sup> Statutory Instrument, 2023. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. No. 96.

<sup>8</sup> Department for Environment, Food and Rural Affairs, 2023. A Green Future: Our 25 Year Plan to Improve the Environment.

| Pollutants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Air Quality Standards                                                                                                         |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Concentration                                                                                                                 | Measured as |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | between 2010 & 2020 at Urban Background sites. <sup>B</sup>                                                                   |             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 12 µg/m <sup>3</sup> - Target to be achieved by 2028 and 22% reduction in exposure achieved between 2018 & 2028. <sup>C</sup> | Annual mean |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10 µg/m <sup>3</sup> - Target to be achieved by 2040 and 35% reduction in exposure achieved between 2018 & 2040. <sup>D</sup> | Annual Mean |
| <p>Notes:</p> <p>A Annual mean value of 60 µg/m<sup>3</sup> used to assess whether the NO<sub>2</sub> 1-hour mean objective will be exceeded. A study carried out on behalf of DEFRA and the Devolved Administrations identified that exceedances of the NO<sub>2</sub> 1-hour mean are unlikely to occur where the annual mean is below this concentration.</p> <p>B Current UK limit value.</p> <p>C As set out in the Environmental Improvement Plan (2023). These targets will help drive reductions in the worst PM<sub>2.5</sub> hotspots across the country, whilst ensuring nationwide action to improve air quality for everyone.</p> <p>D In line with Statutory Instrument, 2023. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. No.96.</p> |                                                                                                                               |             |

- 7.14 To note, the PM<sub>2.5</sub> targets are central government targets primarily focus on tackling emissions, rather than requiring local authorities to assess concentrations against these new PM<sub>2.5</sub> targets. In March 2023, the Department for Levelling-Up, Housing and Communities (DLUHC) wrote to all Chief Planning Officers in England advising on how these new targets are to be integrated into the planning system. However, until such guidance is published, it is requested that local authorities should continue to assess local air quality impacts in accordance with existing standards. It is, thus, not appropriate to consider these new targets until such guidance has been published, which at the time of writing it is understood this guidance has not been released.

### Environment Act(s)

- 7.15 Part IV of the Environment Act 1995 requires local authorities to review and assess the air quality within their boundaries. As a result, the Air Quality Strategy was adopted in 1997, with national health-based standards and objectives set out for the, then, nine key air pollutants.

- 7.16 Part IV of the Environment Act 2021<sup>9</sup> amends both the Environment Act 1995 and the Clean Air Act 1993<sup>10</sup>. It builds on the foundations provided by Part IV of the Environment Act 1995 and strengthens the local air quality management framework. The act allows the Secretary of State to make provisions for, about or connect with the recall of relevant products that do not meet relevant environmental standards.
- 7.17 The government has resisted calls for the adoption of the recently updated World Health Organisation (WHO) air quality guidelines, specifically targeting particulate matter pollution. The act does introduce a duty on the government to bring forward at least two air quality targets by October 2022 for consultation that will be set in secondary legislation, which has now been introduced in secondary legislation. The first aim of the legislation is to reduce the annual average level of fine particulate matter (PM<sub>2.5</sub>) in ambient air. The second aim is to set a long-term target (set a minimum of 15 years in the future), which the government says, *“will encourage long-term investment and provide certainty for businesses and other stakeholders.”*

## World Health Organisation Guidelines

- 7.18 The WHO guidelines were updated in September 2021<sup>11</sup>, and are a set of evidence-based recommendations of limit values for specific air pollutants developed to help countries achieve air quality that protects public health. They are significantly lower than the current levels legislated within the Air Quality Standards (as set out in **Table 7.1**). The WHO guideline levels are set out in **Table 7.2**.

Table 7.2: WHO Air Quality Guidelines

| Pollutants                                | Air Quality Guidelines |                                |
|-------------------------------------------|------------------------|--------------------------------|
|                                           | Concentration          | Measured as                    |
| Nitrogen Dioxide<br>(NO <sub>2</sub> )    | 25 µg/m <sup>3</sup>   | 24-hour mean (99th percentile) |
|                                           | 10 µg/m <sup>3</sup>   | Annual mean                    |
| Particulate Matter<br>(PM <sub>10</sub> ) | 45 µg/m <sup>3</sup>   | 24-hour mean (99th percentile) |
|                                           | 15 µg/m <sup>3</sup>   | Annual mean                    |
| PM <sub>2.5</sub>                         | 15 µg/m <sup>3</sup>   | 24-hour mean (99th percentile) |
|                                           | 5 µg/m <sup>3</sup>    | Annual mean                    |

<sup>9</sup> UK Public General Acts, 2021. Environmental Act 2021, Chapter 30

<sup>10</sup> UK Public General Acts, 1993. Clean Air Act 1993, Chapter 11.

<sup>11</sup> World Health Organization, 2021. WHO global air quality guidelines.

- 7.19 The Committee on the Medical Effects of Air Pollutants (COMEAP)<sup>12</sup> has concluded the following:

*"The WHO's revised AQGs for pollutants in outdoor air are suitable as long-term targets to inform policy development. We stress that the AQG values should not be regarded as thresholds below which there are no impacts on health - the current evidence has not identified thresholds for effect at the population level, meaning that even low concentrations of pollutants are likely to be associated with adverse effects on health. Therefore, continued reductions, even where concentrations are below the AQGs, are also likely to be beneficial to health."*

- 7.20 However, this ES Chapter has considered the current legislation, and therefore the objectives set out in **Table 7.1** have been used to inform and assess the impact of the development at the modelled receptors locations. As a result, any aforementioned potential updates to the PM<sub>2.5</sub> targets have not been considered further in this assessment.

### **National Planning Policy Framework**

- 7.21 The National Planning Policy Framework (NPPF)<sup>13</sup> (2023) sets out the planning policy for England, to help achieve sustainable development within the planning sector. The planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

*"To protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy"*

- 7.22 Paragraph 109 states:

*"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*

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<sup>12</sup> Committee on the Medical Effects of Air Pollutants (COMEAP), 2022. COMEAP statement: response to publication of the World Health Organization Air quality guidelines 2021

<sup>13</sup> Department for Levelling Up, Housing, & Communities, 2023. National Planning Policy Framework.

## 7.23 Paragraph 180 states:

*"Planning policies and decisions should contribute to and enhance the natural and local environment by:*

*[..]*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*

*[...]"*

## 7.24 Paragraph 191 states:

*"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

## 7.25 Paragraph 192 states:

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

## 7.26 Paragraph 194 states:

*“The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”*

- 7.27 The NPPF also sets out the national planning policy on biodiversity and conservation. This emphasises that the planning system should seek to minimise effects on and provide net gains in biodiversity, wherever possible, as part of the Government’s commitment to halting decline and establishing coherent and resilient ecological networks.

## **Planning Practice Guidance**

- 7.28 The NPPF is supported by Planning Practice Guidance (PPG)<sup>14</sup> (DCLG, 2021), which sets out the principles on how planning can take account of the impacts of new developments on air quality.

- 7.29 Paragraph 001 Reference ID: 32-001-20191101 states:

*“The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>).*

*The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:*

- *fine particulate matter (PM<sub>2.5</sub>)*
- *ammonia (NH<sub>3</sub>)*
- *nitrogen oxides (NO<sub>x</sub>)*
- *sulphur dioxide (SO<sub>2</sub>)*
- *non-methane volatile organic compounds (NMVOCs)*

*As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent*

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<sup>14</sup> Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. Planning Practice Guidance. Accessible at: <http://planningguidance.planningportal.gov.uk/>

*greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."*

7.30 Paragraph 005 Reference ID: 32-005-20191101 states:

*"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.*

*Where air quality is a relevant consideration the local planning authority may need to establish:*

- *The 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
- *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."*

## **Any Other Relevant National Planning or Development Strategies**

### **Environmental Improvement Plan**

7.31 The Environmental Improvement Plan 2023 (as previously referenced with relation to **Table 7.1**) is the first revision of the 25 year Environment Plan<sup>15</sup>, and sets out how the 25 Year Environmental Plan goals, Environment Act targets, and other commitments that have been made domestically and internationally will combine to drive specific improvements in the natural environment. This is to be reviewed every five years, with the next review due in 2028.

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<sup>15</sup> Department for Environment, Food and Rural Affairs, 2018. A Green Future: Our 25 Year Plan to Improve the Environment.

- 7.32 Goal 2 – Clean Air sets out what the government has achieved since 2018, which includes publishing the Clean Air Strategy<sup>16</sup> in 2019, reducing pollution from domestic burning and publishing the Transport Decarbonisation Plan<sup>17</sup>, all of which aim to improve air quality.
- 7.33 The Environmental Improvement Plan sets out the following targets and commitments to be implemented in order to tackle poor air pollution. In addition to the PM<sub>2.5</sub> long-term and interim targets, the following legal emission reduction targets for five damaging pollutants also apply (to be achieved by 2030 relative to 2005 levels):
- Reduce emissions of nitrogen oxides by 73%.
  - Reduce emissions of sulphur dioxide by 88%.
  - Reduce emission of PM<sub>2.5</sub> by 46%.
  - Reduce emissions of ammonia by 16%.
  - Reduce emissions of non-methane volatile organic compounds by 39%.
- 7.34 These measures will be monitored through the Annual Progress Report and the Outcome Indicator Framework.

### **Clean Air Strategy**

- 7.35 The Clean Air Strategy (CAS)<sup>18</sup> was published in January 2019 and sets out how the government will improve air quality nationally. The document aims to tackle the issue of air quality across all parts of government and society to protect public health and the environment, and identifies what needs to be done to achieve this. The document complements the Industrial Strategy (archived), the Clean Growth Strategy<sup>19</sup> and the 25 Year Environment Plan<sup>20</sup> and is a key part of delivering the government's 25 Year Environmental Plan.
- 7.36 The document has adopted international targets to reduce emissions of fine particulate matter, ammonia, nitrogen oxides, sulphur dioxide and non-methane volatile organic compounds by 2020 and 2030. The document proposes tougher goals to cut public exposure to particulate matter pollution, as recommended by the World Health Organisation (WHO).

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<sup>16</sup> Department for Environment, Food and Rural Affairs, 2019. Clean Air Strategy 2019.

<sup>17</sup> Department for Transport, 2021. Decarbonising Transport. A Better, Greener Britain.

<sup>18</sup> Department for Environment, Food and Rural Affairs, 2019. Clean Air Strategy 2019.

<sup>19</sup> Department for Business, Energy and Industrial Strategy, 2017. The Clean Growth Strategy.

<sup>20</sup> Department for Environment, Food and Rural Affairs, 2018. A Green Future: Our 25 Year Plan to Improve the Environment.

- 7.37 The strategy not only targets the reduction of emissions, but also a reduction in exposure.

### **Reducing Emissions from Road Transport: Road to Zero Strategy**

- 7.38 The Reducing emissions from road transport: Road to Zero Strategy<sup>21</sup> (2018) document produced by the Office for Low Emission Vehicles (OLEV), Office for Zero Emission Vehicles (OZEV) and the Department for Transport (DfT) sets out how the government aims to end the sale of new conventional petrol and diesel cars and vans by 2040, with almost every car and van having zero emissions by 2050. Furthermore, the aim of the government is to see at least 50%, and as many as 70%, of new car sales being ultra-low emission by 2030 (and up to 40% of new van sales).
- 7.39 A number of measures have been set out in the document which outline how the government will support this gradual transition, some of which are consumer incentives, research and development and innovation support based.
- 7.40 Since this document was released, the then Prime Minister has announced that, as part of the Ten Point Plan for a Green Industrial Revolution (2020)<sup>22</sup>, the government will end the sale of new petrol and diesel cars and vans from 2030, 10 years earlier than set out in the document above. This has since been pushed back, with the end of the sale of new petrol and diesel cars and vans due to be achieved by 2035.
- 7.41 This plan will see road traffic-related NO<sub>x</sub> emissions to reduce significantly over the coming decades, and likely beyond the scale of reductions forecast in the air quality tools used to assess air quality impacts.

### **Local Planning Policy**

- 7.42 The Knowsley Local Plan Core Strategy<sup>23</sup> was published in January 2016 and sets out the vision, objectives and policies which will guide development within Knowsley up to the year 2028. The Core Strategy contains the following policies which are related to air quality:

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<sup>21</sup> Department for Transport, Office for Low Emission vehicles and Office for Zero Emission Vehicles, 2018. Reducing emissions from road transport: Road to Zero Strategy

<sup>22</sup> Department for Transport and Office for Zero Emission Vehicles, 2020. The Ten Point Plan for a Green Industrial Revolution

<sup>23</sup> Knowsley Council (2016). Core Strategy

7.43 Policy CS2, *Development Principles* states:

- 1) *"New development in Knowsley and the preparation of subsequent stages of the Local Plan will be expected to support the following development principles:*

*[...]*

*Principle 4: Recognise environmental limits, protect and enhance environmental assets, enhance local character and promote quality of place by:*

*[...]*

- e) Mitigating potential negative impacts of traffic growth and road traffic on highway safety, air quality, noise and health;*

*[...]*

- j) minimising negative impact upon flood risk, air quality, water quality, land quality, soil quality, and noise or vibration levels and ensuring any negative impacts are appropriately mitigated.*

*Development that will have an unacceptable impact upon any of the above will only be permitted where the benefits of the proposal clearly outweigh the harm*

*[...]"*

7.44 Policy CS8, *Green Infrastructure*, states:

*"Maintenance and Enhancement of Knowsley's Existing Green Infrastructure*

- 1) Knowsley's existing Green Infrastructure and its beneficial functions will be protected, managed and/or enhanced, primarily to:*

*[...]*

- e) Mitigate air, water and noise pollution"*

*[...]"*

7.45 Policy CS23, *Renewable and Low Carbon Infrastructure* states:

- 1) *“The Council will support proposals that will produce and distribute decentralised, low carbon and renewable energy, provided that they do not cause significant harm (in terms of their number, scale, siting or cumulative impacts) to:*

*a) Natural resources, biodiversity, geodiversity, water and air quality and, landscape quality;*

*[...]”*

## **Site Specific Policies**

- 7.46 It is noted within the Local Plan Policies Map<sup>24</sup>, that the proposed development will be situated on “Urban Greenspace/Education land”, which is covered by Policy CS21, *Greenspaces and Trees*, within the Core Strategy. To note, air quality is not considered within this policy.

## **Other Relevant Policy, Standards and Guidance**

### **Local Air Quality Management Technical Guidance (TG(22))<sup>25</sup>**

- 7.47 The Department for Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their review and assessment work. This guidance, referred to in this document as TG(22), has been used where appropriate.

### **Guidance on the Assessment of Dust from Demolition and Construction (2024)<sup>26</sup>**

- 7.48 The Institute of Air Quality Management (IAQM) have published this guidance. The guidance provides a methodology to undertake a qualitative assessment of the potential dust / emission risks during the construction phase of a proposed development. The assessment consists of a five step process to assess the potential level of risks, (Large, Medium, Small or Negligible), regarding the four main phases of development, (demolition, earthworks, construction, and trackout). The assessment includes consideration of pre-mitigation, and post-mitigation impacts,

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<sup>24</sup> Knowsley Council, 2015. Local Plan Policies Map

<sup>25</sup> Department for Environment, Food & Rural Affairs, 2022. Local Air Quality Management. Technical Guidance (TG22).

<sup>26</sup> Institute of Air Quality Management, 2024. Guidance on the Assessment of Dust from Demolition and Construction.

based upon the scale and nature of the development. The screening criteria is set out in

**Appendix 7.1.**

**Land-Use Planning & Development Control: Planning for Air Quality (2017)<sup>27</sup>**

- 7.49 The Environmental Protection UK (EPUK) and IAQM have published guidance that offers comprehensive advice on when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and the possible mitigation measures that may be implemented to minimise these impacts. The methodology is set out in **Appendix 7.2.**

## **Assessment Methodology and Significance Criteria**

### **Baseline Data Collection**

- 7.50 The existing baseline NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>, concentrations, on and in the vicinity of the Proposed Development have been assessed using the monitoring data within the Knowsley Metropolitan Borough Council (KMBC) air quality review and assessment reports.
- 7.51 The DEFRA background mapping website<sup>28</sup> has also been utilised to provide background NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations. The website has mapped background concentrations at a resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030.
- 7.52 To identify any sensitive ecological designated sites, a review of the DEFRA Magic Map website<sup>29</sup> and the UK Air Pollution Information System<sup>30</sup>, (APIS) website has been undertaken.

### **Construction Phase**

- 7.53 To assess the potential impacts associated with dust and PM<sub>10</sub> release during the construction phase of the Proposed Development and determine required mitigation to feed into the

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<sup>27</sup> Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), 2017. Land-use Planning & Development Control: Planning for Air Quality

<sup>28</sup> Department for Environmental Food and Rural Affairs. Accessible at: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

<sup>29</sup> Natural England. MAGIC. Accessible at: <https://magic.defra.gov.uk/>

<sup>30</sup> Centre for Ecology and Hydrology. Air Pollution Information Systems. Accessible at: <http://www.apis.ac.uk/>

inherent mitigation measures in the 'Additional Mitigation / Enhancement Measures' of this ES Chapter. The dust risk assessment is based upon the IAQM (2024) guidance.

7.54 The criteria developed by the IAQM divides the activities on construction sites into the four main activity types to assess their different level of impacts upon receptors. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout

7.55 The risk of dust effects (Low, Medium or High) is determined by the scale (magnitude) and nature of the works being undertaken, along with the distance to the receptor.

7.56 The full methodology is set out in **Appendix 7.1**, and the full assessment of the Proposed Development dust risk assessment in isolation of any ongoing works or committed developments has been undertaken in the 'Assessment of Likely Significant Effects' section of this ES Chapter, with no allowance for inherent mitigation set out in the 'Additional Mitigation / Enhancement Measures' section and General Mitigation set out in **Appendix 7.3**.

## **Construction and Operational Phase Vehicular Impact Methodology for Human Receptors**

7.57 The number of daily vehicular movements associated with the construction phase of the Proposed Development will vary on a daily basis, depending upon the construction activity being undertaken at the time. Therefore, reasonable estimates have been provided by mode transport planning, the project transport consultant.

7.58 The peak construction and operational phase(s) for the Proposed Development is anticipated to be 2025 and 2028 respectively.

7.59 The traffic predictions provided by mode transport planning, as set out in **Appendix 7.5**, have been compared to the EPUK & IAQM (2017) criterion thresholds for impacts on human receptors, set out in **Appendix 7.2**, with the assessment of the Proposed Development construction and operational traffic set out in the 'Assessment of Likely Significant Effects' section to determine if a full impact assessment of the potential impacts on human receptors is required.

## Modelling Parameters

### *Air Quality Model*

- 7.60 Air quality at specified receptor locations have been predicted using the industry recognised ADMS-Roads (v5.0.1.3) dispersion model. The model is recognised and validated for this type of assessment. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions of air pollutant concentrations. It can predict long-term and short-term concentrations, including percentile concentrations.
- 7.61 The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, where applicable), and meteorological data. To note, the meteorological data used within the model has been taken from Manchester Airport Meteorological Site for 2022, as the closest two meteorological sites (Crosby and Liverpool) will be influenced by coastal conditions, which are not representative of the Site location. This was agreed with the KMBC Environmental Protection Officer on the 24/11/2022. The windrose is illustrated in **Figure 7.1**.
- 7.62 A standard diurnal profile from the DfT website<sup>31</sup> has been utilised as part of the modelling process for an average 7-day week. The 2022 diurnal profile is illustrated in **Figure 7.2**.
- 7.63 The model has been utilised to predict concentrations of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>, based upon vehicle flow, composition and speed data.

### *Modelling Scenarios*

- 7.64 The following scenarios have been modelled / assessed:
- Scenario 1 – 2022 Baseline (Verification);
  - Scenario 2 – 2025 Construction Year (incl. Committed Developments);
  - Scenario 3 – 2025 Construction Year (incl. Committed Developments) + Proposed Development Construction Traffic;
  - Scenario 4 – 2028 Future Baseline (incl. Committed Developments); and

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<sup>31</sup> Department for Transport. Road Traffic Statistics (TRA). Accessible at <https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra>.

- Scenario 5 – 2028 Future Baseline (incl. Committed Developments) + Proposed Development.

7.65 To note, the following committed developments have been included within Scenarios 2 to 5:

- 20/00193/FUL – Residential development comprising 266no. dwellings;
- 20/00124/FUL – Erection of B8 warehousing/distribution centre, c.79,187 sqm; and
- 19/00337/OUT – Erection of a c.97,000 sqm mixed-use development.

### **Emission Factors**

7.66 There are numerous sources of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> which include, for example, industry and domestic origins. However, the main source is usually road transport. For the purpose of this impact assessment and due to the absence of other sources in the area, only road traffic emissions have been modelled.

7.67 The potential impacts have been modelled using the ADMS-Roads model atmospheric dispersion model, with Emission Factor Toolkit v12.0 (the most recently available emission factor toolkit) which is built into the ADMS-Roads model.

7.68 The most recently available emission factor tool kit (EFT) (Version 12.0), released by DEFRA in November 2023, have been used to predict the traffic related emissions in 2022, 2025, and 2028.

7.69 It has been widely known for some time that NO<sub>x</sub>/NO<sub>2</sub> levels are not reducing as quickly as anticipated and this was identified by DEFRA in 2011. This was reiterated in an IAQM Interim Position Statement (v1.1)<sup>32</sup> released in July 2018 recognising that emissions from diesel vehicles have not declined as expected by DEFRA. This document has since been formally withdrawn, stating:

*“There is a growing body of evidence to suggest that the latest COPERT vehicle emission factors, which feed into the EFT (v9 and onwards), reflect the real-world NO<sub>x</sub> emissions more accurately.*

*It is judged that an exclusively vehicle emissions-based sensitivity test is no longer necessary.*

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<sup>32</sup> Institute of Air Quality Management, 2018. Dealing with Uncertainty in Vehicle NO<sub>x</sub> Emissions within Air Quality Assessments.

*On this basis, the EFT may be used for future year modelling with greater confidence when considering the per vehicle emission, provided that the assessment is verified against measurements made in the year 2016 or later."*

- 7.70 On this basis it is anticipated the most up to date (EFT) v12.0 could be relied upon to provide a good representation of the air quality concentrations and impacts, and no sensitivity test has therefore been undertaken.
- 7.71 Vehicles emit NO<sub>x</sub> with different proportions of NO<sub>2</sub>. Following release into the atmosphere, chemical reactions take place between nitric oxide (NO), NO<sub>2</sub> and Ozone (O<sub>3</sub>). In this assessment, the screening of NO<sub>x</sub> emissions has taken place and the resulting NO<sub>2</sub> concentration has been calculated post modelling using the DEFRA NO<sub>x</sub> to NO<sub>2</sub> Calculator (v8.1)<sup>33</sup>, which derives NO<sub>2</sub> from the modelled NO<sub>x</sub> concentrations.

### ***Modelled Road Network***

- 7.72 The modelled road network is consistent with the traffic data provided by mode transport planning, as set out in **Appendix 7.4**. Roads Junctions have been modelled in line with TG(22), which states:

*"For junctions, common sense, driving experience and local knowledge are helpful to estimate speeds. For example, for a section of road leading up to traffic lights, the aim should be to estimate average speeds over a 50 m section of road:*

- *Traffic pulling away from the lights, e.g. 40-50 kph;*
- *Traffic approaching the lights when green, e.g. 20-50 kph; and*
- *Traffic on the carriageway approaching the lights when red, e.g. 5-20 kph, depending on the time of day and how congested the junction is.*

*It is considered that the combined effect of these three conditions is likely in most instances to be a two-way average speed for all vehicles of 20 to 40 kph. Speeds in similar ranges would also apply at roundabouts, although on sections of large roundabouts, speeds may well average between 40-50 kph."*

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<sup>33</sup> Department for Environment, Food and Rural Affairs. NO<sub>x</sub> to NO<sub>2</sub> Calculator. Accessible at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/>

- 7.73 The modelled road network for the 2022, 2025 and 2028 assessment year scenarios, including the modelled speeds, are illustrated in **Figure 7.3**.

### ***Sensitive Receptors***

- 7.74 The concentrations of NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> have been considered as part of this assessment. While selecting the receptor locations, careful consideration was made to receptors located near key road junctions, where congestion may occur, or where a number of highway links merge.
- 7.75 The sensitive locations at which the standards apply are places where the population is expected to be exposed to the various pollutants over the particular averaging period. Thus, for those standards to which an annual mean standard applies, the most common sensitive receptor locations used to measure concentrations against the set standards are areas of residential housing, since it is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.
- 7.76 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean standards due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time, such as on public footways or residential amenity areas.
- 7.77 TG(22) states:

*"Dispersion models cannot predict short-term concentrations as reliably as annual mean concentrations"*

*[...]*

*Previous research carried out on behalf of Defra and the Devolved Administrations identified that exceedances of the NO<sub>2</sub> 1-hour mean are unlikely to occur where the annual mean is below 60 µg/m<sup>3</sup>. This assumption is still considered valid; therefore local authorities should refer to it."*

7.78 The modelling receptor locations are set out in **Table 7.3** and illustrated in **Figure 7.4** for existing and committed receptors (associated with Planning Application 20/00193/FUL), and in **Figure 7.5** for the future receptors.

Table 7.3: Receptor Locations

| Receptor | Type        | Coordinates (m) |        |     |
|----------|-------------|-----------------|--------|-----|
|          |             | X               | Y      | Z   |
| Existing |             |                 |        |     |
| R.1      | Residential | 341376          | 398529 | 1.5 |
| R.2      | Residential | 341382          | 398544 | 1.5 |
| R.3      | Residential | 341572          | 398651 | 1.5 |
| R.4      | Residential | 341330          | 398013 | 1.5 |
| R.5      | Residential | 341297          | 398001 | 1.5 |
| R.6      | Residential | 340873          | 398072 | 1.5 |
| R.7      | Residential | 341428          | 398944 | 1.5 |
| R.8      | Residential | 341317          | 399009 | 1.5 |
| R.9      | Residential | 341445          | 398996 | 1.5 |
| R.10     | Residential | 342420          | 397764 | 1.5 |
| R.11     | Residential | 342103          | 397178 | 1.5 |
| R.12     | Residential | 341410          | 398174 | 1.5 |
| R.13     | Residential | 340937          | 398104 | 1.5 |
| R.14     | Residential | 339077          | 397366 | 1.5 |
| R.15     | Residential | 339055          | 397418 | 1.5 |
| R.16     | Residential | 339989          | 397714 | 1.5 |
| R.17     | Residential | 340681          | 398286 | 1.5 |
| R.18     | Residential | 339799          | 398505 | 1.5 |
| R.19     | Residential | 340220          | 398013 | 1.5 |
| R.20     | Residential | 341561          | 397437 | 1.5 |
| R.21     | Residential | 342026          | 398372 | 1.5 |
| R.22     | Residential | 340495          | 397760 | 1.5 |
| R.23     | Residential | 340953          | 397259 | 1.5 |
| R.24     | Residential | 340373          | 397797 | 1.5 |
| R.25     | Residential | 340217          | 397703 | 1.5 |

| Receptor                 | Type           | Coordinates (m) |        |     |
|--------------------------|----------------|-----------------|--------|-----|
|                          |                | X               | Y      | Z   |
| S.1                      | School         | 341009          | 398092 | 1.0 |
| S.2                      | School         | 341548          | 398994 | 1.0 |
| S.3                      | School         | 338725          | 397389 | 1.0 |
| S.4                      | School         | 342409          | 398031 | 1.0 |
| H.1                      | Medical Centre | 341187          | 398055 | 1.0 |
| CH.1                     | Care Home      | 340681          | 398696 | 1.0 |
| Committed (20/00193/FUL) |                |                 |        |     |
| CR.1                     | Residential    | 340428          | 397908 | 1.5 |
| CR.2                     | Residential    | 340575          | 398075 | 1.5 |
| Future                   |                |                 |        |     |
| FR.1                     | Residential    | 340800          | 398626 | 1.5 |
| FR.2                     | Residential    | 340874          | 398743 | 1.5 |
| FR.3                     | Residential    | 340946          | 398717 | 1.5 |
| FR.4                     | Residential    | 341344          | 398529 | 1.5 |
| FR.5                     | Residential    | 341369          | 398144 | 1.5 |
| FR.6                     | Residential    | 341308          | 398031 | 1.5 |
| FR.7                     | Residential    | 340885          | 398099 | 1.5 |

## Dust Impacts – Assessment of Significance

- 7.79 The IAQM (2024) guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, (as set out in the Additional Mitigation / Enhancement Measures' section and in **Appendix 7.3**) the IAQM (2024) guidance is clear that the residual effect will normally be 'not significant.'

## Traffic Emissions – Impact Descriptors and Assessment of Significance

- 7.80 Currently there is no official guidance in the UK on how to describe the nature of air quality impacts, nor how to assess their significance. The approach developed by EPUK & IAQM (2017) has therefore been used. This approach involves a two-stage process:

- A quantitative description of the impacts on local air quality arising from a proposed development; and
- A judgement on the overall significance of the effects of any impact.

### ***Impact Descriptors for Human Receptor Impacts***

- 7.81 The guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 7.4**.

Table 7.4: Construction and Operational Vehicular Impact Descriptors

| Long Term Average Concentration at Receptor in Assessment Year                                                                                                                                                                                                                                                                                                                                                                                            | % Change in concentration relative to Air Quality Action Level (AQAL) |            |             |             |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------|-------------|-------------|-------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <0.5                                                                  | 1          | 2 – 5       | 6 – 10      | >10         |
| 75% or less of AQAL                                                                                                                                                                                                                                                                                                                                                                                                                                       | Negligible                                                            | Negligible | Negligible  | Slight      | Moderate    |
| 76-94% of AQAL                                                                                                                                                                                                                                                                                                                                                                                                                                            | Negligible                                                            | Negligible | Slight      | Moderate    | Moderate    |
| 95-102% of AQAL                                                                                                                                                                                                                                                                                                                                                                                                                                           | Negligible                                                            | Slight     | Moderate    | Moderate    | Substantial |
| 103-109% of AQAL                                                                                                                                                                                                                                                                                                                                                                                                                                          | Negligible                                                            | Moderate   | Moderate    | Substantial | Substantial |
| 110% or more of AQAL                                                                                                                                                                                                                                                                                                                                                                                                                                      | Negligible                                                            | Moderate   | Substantial | Substantial | Substantial |
| Notes:<br>Values are rounded to the nearest whole number.<br>When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme,' concentration for an increase.<br>AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL).'<br> |                                                                       |            |             |             |             |

- 7.82 The EPUK & IAQM (2017) advice provides guidance on the severity of an impact as a descriptor. However, although the impacts might be considered 'Slight,' 'Moderate' or 'Substantial' at one or more receptor location, the overall effects of a proposed development may not always be judged as being 'significant.' Consideration of the overall effect on air quality needs to incorporate consideration of impacts as a whole including the extent to which receptors represent sensitive locations and whether this wider impact is significant or not.
- 7.83 The EPUK & IAQM (2017) guidance goes on to state:

*“Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means.”*

- 7.84 To note, when considering this, careful considerations has been made of the WHO guidelines. The current air quality standards were set based on NO<sub>2</sub> in particular being a “threshold” pollutant – i.e. that there is a “safe” level of NO<sub>2</sub> in the ambient air that will not damage the health of an average person. In recent years this has been called into question, and the WHO Guidelines, while not statutory, are considerably lower (10 µg/m<sup>3</sup> compared to 40 µg/m<sup>3</sup> for NO<sub>2</sub>). While using the current standards is not technically incorrect, there is an argument to be made that any worsening of air quality, particularly within an Air Quality Management Area (AQMA) and/or CAZ, should not be allowed to occur as the potential to damage health is clear.
- 7.85 Air Quality is now the leading environmental risk factor globally, and the issue is rising in prominence all the time. As such worsening the air quality within an existing AQMA / CAZ, even by a small amount should be carefully considered.
- 7.86 The guidance believes that the assessment of significance should be based on professional judgement, with the overall air quality impact of the scheme / proposed development described as either significant or not significant. In drawing this conclusion, the following factors should be taken into account:
- The number of receptors affected by different levels of impacts;
  - The magnitude of any changes and descriptors;
  - Whether a new exceedance of an air quality standard is predicted to arise or an existing exceedance is removed, or an existing exceedance is substantially increased or reduced;
  - The level of uncertainty, including the extent to which worst case assumptions have been made; and
  - The extent of any exceedance of an air quality standard.
- 7.87 The judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Chapter 2: Approach.

### ***Introduction of Residential Receptors***

- 7.88 The significance of emissions for the introduction of residential receptors will be determined by comparing the predicted results to the Air Pollution Exposure Criteria (APEC) detailed in the Air Quality and Planning Guidance<sup>34</sup> written by the London Air Pollution Planning and the Local Environment (APPLE) working group. The Air Pollution Exposure Criteria is a recognised approach to describe the significance of the impacts predicted, together with an indication as to the level of mitigation required in order for a development to be approved. The APEC table is replicated in **Table 7.5** below.

Table 7.5: Air Pollution Exposure Criteria (APEC)

| APEC | NO <sub>2</sub>                                          | PM <sub>10</sub>                                                                                                     | Recommendations                                                                                                                                                                              |
|------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A    | >5% below national annual mean objective                 | >5% below national annual mean objective<br>>1-day less than national 24-hour objective                              | No air quality grounds for refusal; however, mitigation of any emissions should be considered.                                                                                               |
| B    | Between 5% below or above national annual mean objective | Between 5% above or below national annual mean objective<br>Between 1-day above or below national 24- hour objective | May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered.                                                                                    |
| C    | >5% above national annual mean objective                 | >5% above national annual mean objective<br>>1-day more than national 24-hour objective                              | Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated |

### **Assumptions/Limitations**

<sup>34</sup> The London Air Pollution Planning and the Local Environment (APPLE) working group, 2007. Air Quality and Planning Guidance.

- 7.89 There are many uncertainties when considering both measured and predicted pollution concentrations. The model is dependent upon the traffic data provided for the project, and should this be subject to change, so may the resulting pollution concentrations.
- 7.90 The background air quality concentrations have been taken from the DEFRA background mapping. The DEFRA website<sup>35</sup> includes estimated background air pollution data for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for each 1km by 1km OS grid square. Background pollutant concentrations are modelled from the base year of 2018 and based on ambient monitoring and meteorological data from 2018. The 2018 mapping includes projections for future years, up to currently 2030. Furthermore, the concentrations are modelled at a standard 'living height,' which has been averaged across the grid square.
- 7.91 There is discrepancy between the concentrations mapped by DEFRA and those recorded at local background sites. NO<sub>2</sub> concentrations have been calibrated using the local monitoring data. In the absence of background monitoring data for PM<sub>10</sub> and PM<sub>2.5</sub>, background concentrations for these pollutants have been adjusted using the NO<sub>2</sub> calibration factor. This is supported by TG(22), which states:

*"Where a model has been used to predict background concentrations (for example based on an emissions inventory), the modelled background concentrations should also be verified and where necessary adjusted.*

*If national background maps are used, these should first be compared against any local monitoring to check they are representative of the area. In most cases there is good agreement with local monitoring, but some locations may not agree. Local authorities are not expected to verify and adjust the national background maps. Where these estimates do not agree with local monitoring, either local monitoring may be used, or local authorities may consider adjusting the background maps."*

- 7.92 The verification process has used 2022 monitoring data as the most recent representative year after the COVID-19 pandemic, where no national or local 'lockdowns' were enforced. To note, at the time of writing, 2023 monitoring is not available.

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<sup>35</sup> Department for Environmental Food and Rural Affairs. Accessible at: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

- 7.93 In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in TG(22) and is set out in **Appendix 7.5**. To note, due to no data being published for the automatic monitoring in 2022, it was not possible to complete a verification at this monitoring location.

## Consultation

- 7.94 Prior to submission the following consultation was undertaken with KMBC.

Table 7.6: Consultation

| Consultee                                 | Date and Time                   | Comments                            | Actions                                               |
|-------------------------------------------|---------------------------------|-------------------------------------|-------------------------------------------------------|
| Knowsley Environmental Protection Officer | 12 <sup>th</sup> September 2022 | Air quality scope accepted          | -                                                     |
| Knowsley Environmental Protection Officer | 16 <sup>th</sup> November 2022  | Query on use of Meteorological Site | Updated models to use Manchester Meteorological site. |

## Baseline Conditions

### Local Air Quality Management

- 7.95 Under the Air Quality Strategy there is a duty on all Local Authorities to consider the air quality within their boundaries and to report annually to DEFRA. LAQM in the Kirkby area has been assessed by KMBC, through the national Review and Assessment process and, in fulfilment of Part IV of the Environment Act 1995.
- 7.96 Although KMBC have not declared any AQMAs, they have a number of automatic and non-automatic monitoring locations across Knowsley, including within Kirkby. The nearest AQMA is approximately 900 m southwest of the Site and is the Liverpool City AQMA, declared by Liverpool City Council for exceedances of the NO<sub>2</sub> annual mean objective.
- 7.97 The latest annual air quality results were published by KMBC in 2022. KMBC undertook automatic monitoring at three sites for the period 2018 – 2021, measuring concentrations of

NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>, although the latest Annual Status Report did not publish results from these monitors in 2022. NO<sub>2</sub> diffusion tube monitoring was also carried out at various locations across the jurisdiction during the period 2018 - 2022, including some in close proximity to the Site. The local monitored data is set out in **Table(s) 7.7 to 7.10** and illustrated in **Figure 7.6**.

Table 7.7: Monitored Annual Mean NO<sub>2</sub> Concentrations

| ID                                                                                                                                                                                                                                          | Type     | Annual Mean (µg/m³) |      |      |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------|------|------|------|
|                                                                                                                                                                                                                                             |          | 2019                | 2020 | 2021 | 2022 |
| Automatic Monitoring                                                                                                                                                                                                                        |          |                     |      |      |      |
| Kirkby                                                                                                                                                                                                                                      | Roadside | 24.8                | 25.8 | 30.8 |      |
| Diffusion Tubes                                                                                                                                                                                                                             |          |                     |      |      |      |
| K1a, K1b                                                                                                                                                                                                                                    | Roadside | <b>45.4</b>         | 38.0 | 33.3 | 34.0 |
| K2a, K2b                                                                                                                                                                                                                                    | Roadside | 26.9                | 22.1 | 20.1 | 19.6 |
| K3a, K3b                                                                                                                                                                                                                                    | Roadside | 25.3                | 22.5 | 19.8 | 20.1 |
| K4a, K4b                                                                                                                                                                                                                                    | Roadside | 32.5                | 26.9 | 26.3 | 23.6 |
| K5a, K5b                                                                                                                                                                                                                                    | Roadside | 35.1                | 30.9 | 28.1 | 28.9 |
| K6a, K6b                                                                                                                                                                                                                                    | Roadside | 35.3                | 28.1 | 26.6 | 28.7 |
| K7a, K7b                                                                                                                                                                                                                                    | Roadside | 29.6                | 24.1 | 21.7 | 20.0 |
| K8a, K8b                                                                                                                                                                                                                                    | Roadside | 32.4                | 28.7 | 25.8 | 24.7 |
| K9a, K9b                                                                                                                                                                                                                                    | Roadside | 35.3                | 27.7 | 27.1 | 28.6 |
| K10, K10b                                                                                                                                                                                                                                   | Roadside | 29.4                | 24.1 | 22.9 | 20.6 |
| Notes:                                                                                                                                                                                                                                      |          |                     |      |      |      |
| <b>Bold</b> indicates exceedances of the NO <sub>2</sub> annual mean objective. <b><u>Bold and underlined</u></b> indicates exceedances of 60 µg/m <sup>3</sup> (which is an indication the hourly mean objective could be being breached). |          |                     |      |      |      |

Table 7.8: Monitored NO<sub>2</sub> 1-Hour Mean Exceedances

| ID                                                                                                                                                         | Type     | NO <sub>2</sub> 1-hour mean > 200 µg/m <sup>3</sup> |      |      |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------------------------------------|------|------|------|
|                                                                                                                                                            |          | 2019                                                | 2020 | 2021 | 2022 |
| Automatic Monitoring                                                                                                                                       |          |                                                     |      |      |      |
| Kirkby (new)                                                                                                                                               | Roadside | 0                                                   | 0    | 0    |      |
| Notes:<br><b>Bold</b> indicates exceedances of the NO <sub>2</sub> 1-hour mean objective (200µg/m <sup>3</sup> not to be exceeded more than 18 times/year) |          |                                                     |      |      |      |

Table 7.9: Monitored Annual Mean PM<sub>10</sub> Concentration

| ID | Type | Annual Mean (µg/m <sup>3</sup> ) |
|----|------|----------------------------------|
|----|------|----------------------------------|

|                                                                                                                                                                                                                                                |          | 2019 | 2020 | 2021 | 2022 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|------|------|------|
| Automatic Monitoring                                                                                                                                                                                                                           |          |      |      |      |      |
| Kirkby (new)                                                                                                                                                                                                                                   | Roadside | 37.6 | 33.3 | 32.2 |      |
| Notes:<br><b>Bold</b> indicates exceedances of the NO <sub>2</sub> annual mean objective. <b>Bold and underlined</b> indicates exceedances of 60 µg/m <sup>3</sup> (which is an indication the hourly mean objective could be being breached). |          |      |      |      |      |

Table 7.10: Monitored PM<sub>10</sub> 24-Hour Mean Exceedances

| ID                                                                                                                                                          | Type     | PM <sub>10</sub> 24-hour mean > 50 µg/m <sup>3</sup> |      |      |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------|------|------|------|
|                                                                                                                                                             |          | 2019                                                 | 2020 | 2021 | 2022 |
| Automatic Monitoring                                                                                                                                        |          |                                                      |      |      |      |
| Kirkby (new)                                                                                                                                                | Roadside | 9                                                    | 35   | 18   |      |
| Notes:<br><b>Bold</b> indicates exceedances of the PM <sub>10</sub> 24-hour mean objective (50µg/m <sup>3</sup> not to be exceeded more than 35 times/year) |          |                                                      |      |      |      |

- 7.98 The air quality monitoring carried out closest to the Site shows a compliance of the NO<sub>2</sub> annual mean objective in 2022, the latest representative year. The closest automatic monitor to the Site was compliant with the NO<sub>2</sub> annual mean and 1-hour mean objectives and the PM<sub>10</sub> annual mean and 24-hour mean objectives in 2019, the latest representative year for this monitor.

## Background Concentrations

### Mapped Background Concentrations

- 7.99 As set out in the 'Assumptions/Limitations' section, the DEFRA background concentrations have been calibrated against local background monitoring data.
- 7.100 The background calibration factor for NO<sub>2</sub>, is set out in **Table 7.11**. The adjusted projected pollutant concentrations for 2022, 2025 and 2028 are set out in **Table 7.12**.

Table 7.11: NO<sub>2</sub> Background Calibration Factor

| NO <sub>2</sub>                             | Monitoring Sites |      |
|---------------------------------------------|------------------|------|
|                                             | H10              | H11  |
| Measured Concentration (µg/m <sup>3</sup> ) | 18.5             | 21.6 |
| Mapped Concentration (µg/m <sup>3</sup> )   | 16.9             | 20.3 |
| Calibration Factor                          | 1.1              | 1.1  |
| Average Calibration Factor                  | 1.1              |      |

Table 7.12: Estimated Annual Mean Background Pollutant Concentrations (µg/m<sup>3</sup>)

| Pollutant                                                                                      | 2022        | 2025        | 2028        |
|------------------------------------------------------------------------------------------------|-------------|-------------|-------------|
| NO <sub>2</sub>                                                                                | 13.2 – 17.0 | 11.9 – 15.7 | 11.1 – 15.0 |
| PM <sub>10</sub>                                                                               | 12.6 – 15.4 | 12.3 – 15.0 | 12.2 – 15.0 |
| PM <sub>2.5</sub>                                                                              | 8.8 – 10.9  | 8.5 – 10.6  | 8.5 – 10.5  |
| Notes: Data presented are derived from the ordnance survey grid reference set out in Table 7.3 |             |             |             |

## Existing and Future Baseline Conditions

- 7.101 Baseline concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have been modelled at each of the previously identified receptor locations, including the ecological receptors. The results, which cover the baseline years of Scenario 1 (2022), Scenario 2 - 3 (2025) and Scenario 4 - 5 (2028), are set out in **Table(s) 7.13 to 7.15**.

Table 7.13: Predicted 2022 Baseline Annual Mean Concentrations (µg/m<sup>3</sup>)

| Receptor | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|----------|-----------------|------------------|-------------------|
| R.1      | 22.2            | 14.7             | 9.9               |

| Receptor | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|----------|-----------------|------------------|-------------------|
| R.2      | 20.2            | 14.3             | 9.7               |
| R.3      | 19.6            | 14.3             | 9.7               |
| R.4      | 21.5            | 14.8             | 10.0              |
| R.5      | 17.4            | 13.7             | 9.4               |
| R.6      | 19.5            | 14.4             | 9.8               |
| R.7      | 27.0            | 15.5             | 10.4              |
| R.8      | 21.7            | 15.3             | 9.8               |
| R.9      | 21.4            | 14.4             | 9.8               |
| R.10     | 22.8            | 16.7             | 11.6              |
| R.11     | 23.3            | 16.6             | 11.5              |
| R.12     | 17.0            | 13.7             | 9.4               |
| R.13     | 21.5            | 14.9             | 10.1              |
| R.14     | 20.5            | 14.3             | 9.8               |
| R.15     | 25.0            | 15.4             | 10.4              |
| R.16     | 21.8            | 14.6             | 9.9               |
| R.17     | 22.2            | 14.9             | 10.1              |
| R.18     | 29.5            | 15.3             | 10.1              |
| R.19     | 23.2            | 14.6             | 10.0              |
| R.20     | 20.4            | 15.4             | 10.4              |
| R.21     | 19.2            | 14.5             | 9.6               |
| R.22     | 23.2            | 15.4             | 10.1              |
| R.23     | 22.5            | 15.2             | 10.0              |
| R.24     | 29.3            | 16.8             | 10.9              |
| R.25     | 23.9            | 15.9             | 10.4              |
| S.1      | 19.4            | 14.2             | 9.7               |

| Receptor                                                                                                                                                                                                                                                    | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|-------------------|
| S.2                                                                                                                                                                                                                                                         | 30.3            | 16.1             | 10.7              |
| S.3                                                                                                                                                                                                                                                         | 30.8            | 16.0             | 10.7              |
| S.4                                                                                                                                                                                                                                                         | 17.0            | 14.1             | 9.3               |
| H.1                                                                                                                                                                                                                                                         | 17.2            | 13.7             | 9.4               |
| CH.1                                                                                                                                                                                                                                                        | 17.7            | 13.9             | 9.6               |
| CR.1                                                                                                                                                                                                                                                        | 28.0            | 16.7             | 10.9              |
| CR.2                                                                                                                                                                                                                                                        | 26.3            | 15.6             | 10.5              |
| Annual Mean<br>Objective/Limit                                                                                                                                                                                                                              | 40              | 40               | 20                |
| Notes:<br><b>Bold</b> indicates an exceedance of the annual mean objective. <b><u>Bold and underlined</u></b> indicates exceedances of 60 µg/m <sup>3</sup> for NO <sub>2</sub> (which is an indication the hourly mean objective could be being breached). |                 |                  |                   |

Table 7.14: Predicted 2025 Baseline Annual Mean Concentrations (µg/m<sup>3</sup>)

| Receptor | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|----------|-----------------|------------------|-------------------|
| R.1      | 18.5            | 14.3             | 9.6               |
| R.2      | 17.1            | 13.9             | 9.4               |
| R.3      | 17.0            | 14.1             | 9.5               |
| R.4      | 17.9            | 14.4             | 9.7               |
| R.5      | 15.0            | 13.4             | 9.1               |
| R.6      | 16.7            | 14.0             | 9.5               |
| R.7      | 23.1            | 15.5             | 10.2              |
| R.8      | 18.1            | 14.9             | 9.5               |
| R.9      | 18.3            | 14.2             | 9.5               |
| R.10     | 19.5            | 16.3             | 11.3              |
| R.11     | 19.8            | 16.2             | 11.2              |
| R.12     | 14.8            | 13.3             | 9.1               |
| R.13     | 18.1            | 14.5             | 9.8               |

| Receptor                                                                                                                                                                                                                                                    | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|-------------------|
| R.14                                                                                                                                                                                                                                                        | 17.4            | 13.9             | 9.5               |
| R.15                                                                                                                                                                                                                                                        | 20.6            | 15.0             | 10.1              |
| R.16                                                                                                                                                                                                                                                        | 18.4            | 14.2             | 9.6               |
| R.17                                                                                                                                                                                                                                                        | 18.6            | 14.5             | 9.8               |
| R.18                                                                                                                                                                                                                                                        | 23.9            | 14.8             | 9.8               |
| R.19                                                                                                                                                                                                                                                        | 19.3            | 14.2             | 9.7               |
| R.20                                                                                                                                                                                                                                                        | 17.2            | 15.0             | 10.1              |
| R.21                                                                                                                                                                                                                                                        | 17.1            | 14.3             | 9.3               |
| R.22                                                                                                                                                                                                                                                        | 19.3            | 15.0             | 9.8               |
| R.23                                                                                                                                                                                                                                                        | 18.9            | 14.8             | 9.7               |
| R.24                                                                                                                                                                                                                                                        | 23.7            | 16.4             | 10.6              |
| R.25                                                                                                                                                                                                                                                        | 19.8            | 15.5             | 10.1              |
| S.1                                                                                                                                                                                                                                                         | 16.5            | 13.9             | 9.4               |
| S.2                                                                                                                                                                                                                                                         | 24.5            | 15.7             | 10.4              |
| S.3                                                                                                                                                                                                                                                         | 25.6            | 15.6             | 10.4              |
| S.4                                                                                                                                                                                                                                                         | 15.0            | 13.7             | 9.1               |
| H.1                                                                                                                                                                                                                                                         | 14.9            | 13.3             | 9.1               |
| CH.1                                                                                                                                                                                                                                                        | 15.3            | 13.6             | 9.3               |
| CR.1                                                                                                                                                                                                                                                        | 22.8            | 16.3             | 10.6              |
| CR.2                                                                                                                                                                                                                                                        | 21.5            | 15.2             | 10.2              |
| Annual Mean<br>Objective/Limit                                                                                                                                                                                                                              | 40              | 40               | 20                |
| Notes:<br><b>Bold</b> indicates an exceedance of the annual mean objective. <b><u>Bold and underlined</u></b> indicates exceedances of 60 µg/m <sup>3</sup> for NO <sub>2</sub> (which is an indication the hourly mean objective could be being breached). |                 |                  |                   |

Table 7.15: Predicted 2028 Baseline Annual Mean Concentrations ( $\mu\text{g}/\text{m}^3$ )

| Receptor | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|----------|-----------------|------------------|-------------------|
| R.1      | 15.8            | 14.3             | 9.6               |
| R.2      | 14.9            | 13.9             | 9.4               |
| R.3      | 14.8            | 14.0             | 9.4               |
| R.4      | 15.4            | 14.4             | 9.6               |
| R.5      | 13.4            | 13.3             | 9.1               |
| R.6      | 14.6            | 14.0             | 9.5               |
| R.7      | 19.0            | 15.4             | 10.2              |
| R.8      | 15.3            | 14.9             | 9.5               |
| R.9      | 15.6            | 14.1             | 9.5               |
| R.10     | 17.2            | 16.2             | 11.2              |
| R.11     | 17.4            | 16.1             | 11.1              |
| R.12     | 13.2            | 13.3             | 9.1               |
| R.13     | 15.6            | 14.5             | 9.7               |
| R.14     | 15.2            | 13.9             | 9.4               |
| R.15     | 17.4            | 15.0             | 10.0              |
| R.16     | 15.9            | 14.2             | 9.6               |
| R.17     | 15.9            | 14.5             | 9.7               |
| R.18     | 19.7            | 14.8             | 9.7               |
| R.19     | 16.4            | 14.2             | 9.6               |
| R.20     | 14.9            | 14.9             | 10.1              |
| R.21     | 15.1            | 14.2             | 9.3               |
| R.22     | 16.5            | 15.0             | 9.8               |
| R.23     | 16.2            | 14.8             | 9.7               |
| R.24     | 19.6            | 16.4             | 10.5              |

| Receptor                                                                                                                                                                                                                                                    | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|-------------------|
| R.25                                                                                                                                                                                                                                                        | 16.8            | 15.5             | 10.0              |
| S.1                                                                                                                                                                                                                                                         | 14.5            | 13.8             | 9.3               |
| S.2                                                                                                                                                                                                                                                         | 20.1            | 15.7             | 10.3              |
| S.3                                                                                                                                                                                                                                                         | 21.8            | 15.6             | 10.3              |
| S.4                                                                                                                                                                                                                                                         | 13.3            | 13.2             | 9.0               |
| H.1                                                                                                                                                                                                                                                         | 13.8            | 13.6             | 9.3               |
| CH.1                                                                                                                                                                                                                                                        | 13.6            | 13.6             | 9.0               |
| CR.1                                                                                                                                                                                                                                                        | 17.9            | 15.3             | 10.2              |
| CR.2                                                                                                                                                                                                                                                        | 17.5            | 14.8             | 9.9               |
| Annual Mean<br>Objective/Limit                                                                                                                                                                                                                              | 40              | 40               | 20                |
| Notes:<br><b>Bold</b> indicates an exceedance of the annual mean objective. <b><u>Bold and underlined</u></b> indicates exceedances of 60 µg/m <sup>3</sup> for NO <sub>2</sub> (which is an indication the hourly mean objective could be being breached). |                 |                  |                   |

7.102 The predicted annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are all below their respective annual mean objectives/limit in 2022, 2025 and 2028 at all modelled receptor locations.

7.103 These annual mean NO<sub>2</sub> concentrations are all below 60 µg/m<sup>3</sup>, which is regarded to be an indicator that the hourly mean objective will also not be breached.

7.104 The annual mean PM<sub>10</sub> concentrations are below 32 µg/m<sup>3</sup>, which is an indication of potential exceedances of the 24-hour mean PM<sub>10</sub> objective and it is, therefore, unlikely that the 24-hour mean PM<sub>10</sub> objective will be exceeded.

## Embedded Mitigation

7.105 This section describes the measures which have been 'embedded' into the development.

## Construction

7.106 No embedded mitigation is anticipated to be in place for the construction phase.

## The Completed and Operational Development

7.107 A variety of inherent operational mitigation measures have been proposed within **Chapter 6: Traffic and Access** which will aid in reducing vehicular trips, and therefore emissions. These include (but are not potentially limited to):

- Cycle parking to be provided in line with locally adopted standards;
- Network of pedestrian and cycle routes throughout the Proposed Development;
- Provision of electric vehicle (EV) charging; and,
- Framework Travel Plan to promote and stimulate modal shift.

## Assessment of Likely Significant Effects

### Construction

#### Proposed Development Construction Traffic

7.108 A review of the predicted traffic numbers associated with the construction phase have been screened against the EPUK & IAQM (2017) thresholds set out in **Appendix 7.2**. The predicted traffic impacts indicate a potential breach of the EPUK & IAQM (2017) thresholds. Therefore, a full impact assessment has been undertaken.

7.109 The predicted impacts of the proposed development construction traffic upon the annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> during the peak year of 2025 for the previously specified receptors are set out in **Table(s) 7.16 to 7.18**. These also describe the impacts at each receptor using the impact descriptors given in **Table 7.4**.

Table 7.16: Predicted Impacts in 2025 on Baseline Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.1      | 18.5          | 18.5                                 | 0%                    | Negligible        |
| R.2      | 17.1          | 17.1                                 | 0%                    | Negligible        |
| R.3      | 17.0          | 17.0                                 | 0%                    | Negligible        |

| Receptor | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.4      | 17.9          | 17.9                                 | 0%                    | Negligible        |
| R.5      | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.6      | 16.7          | 16.7                                 | 0%                    | Negligible        |
| R.7      | 23.1          | 23.1                                 | 0%                    | Negligible        |
| R.8      | 18.1          | 18.1                                 | 0%                    | Negligible        |
| R.9      | 18.3          | 18.3                                 | 0%                    | Negligible        |
| R.10     | 19.5          | 19.5                                 | 0%                    | Negligible        |
| R.11     | 19.8          | 19.8                                 | 0%                    | Negligible        |
| R.12     | 14.8          | 14.8                                 | 0%                    | Negligible        |
| R.13     | 18.1          | 18.1                                 | 0%                    | Negligible        |
| R.14     | 17.4          | 17.4                                 | 0%                    | Negligible        |
| R.15     | 20.6          | 20.6                                 | 0%                    | Negligible        |
| R.16     | 18.4          | 18.4                                 | 0%                    | Negligible        |
| R.17     | 18.6          | 18.6                                 | 0%                    | Negligible        |
| R.18     | 23.9          | 24.0                                 | 0%                    | Negligible        |
| R.19     | 19.3          | 19.3                                 | 0%                    | Negligible        |
| R.20     | 17.2          | 17.2                                 | 0%                    | Negligible        |
| R.21     | 17.1          | 17.1                                 | 0%                    | Negligible        |
| R.22     | 19.3          | 19.3                                 | 0%                    | Negligible        |
| R.23     | 18.9          | 18.9                                 | 0%                    | Negligible        |
| R.24     | 23.7          | 23.8                                 | 0%                    | Negligible        |
| R.25     | 19.8          | 19.9                                 | 0%                    | Negligible        |
| S.1      | 16.5          | 16.5                                 | 0%                    | Negligible        |
| S.2      | 24.5          | 24.5                                 | 0%                    | Negligible        |

| Receptor                                                                                                                                                                                                                                             | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Objective | Impact Descriptor |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------|-----------------------|-------------------|
| S.3                                                                                                                                                                                                                                                  | 25.6          | 25.6                                 | 0%                    | Negligible        |
| S.4                                                                                                                                                                                                                                                  | 15.0          | 15.0                                 | 0%                    | Negligible        |
| H.1                                                                                                                                                                                                                                                  | 14.9          | 14.9                                 | 0%                    | Negligible        |
| CH.1                                                                                                                                                                                                                                                 | 15.3          | 15.3                                 | 0%                    | Negligible        |
| CR.1                                                                                                                                                                                                                                                 | 22.8          | 22.8                                 | 0%                    | Negligible        |
| CR.2                                                                                                                                                                                                                                                 | 21.5          | 21.6                                 | 0%                    | Negligible        |
| Annual Mean Objective                                                                                                                                                                                                                                |               | 40                                   |                       |                   |
| Notes:<br><b>Bold</b> indicates an exceedance of the annual mean objective. <b>Bold and underlined</b> indicates exceedances of 60 µg/m <sup>3</sup> for NO <sub>2</sub> (which is an indication the hourly mean objective could be being breached). |               |                                      |                       |                   |

Table 7.17: Predicted Impacts in 2025 on Baseline Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.1      | 14.3          | 14.3                                 | 0%                    | Negligible        |
| R.2      | 13.9          | 13.9                                 | 0%                    | Negligible        |
| R.3      | 14.1          | 14.1                                 | 0%                    | Negligible        |
| R.4      | 14.4          | 14.4                                 | 0%                    | Negligible        |
| R.5      | 13.4          | 13.4                                 | 0%                    | Negligible        |
| R.6      | 14.0          | 14.0                                 | 0%                    | Negligible        |
| R.7      | 15.5          | 15.5                                 | 0%                    | Negligible        |
| R.8      | 14.9          | 14.9                                 | 0%                    | Negligible        |
| R.9      | 14.2          | 14.2                                 | 0%                    | Negligible        |
| R.10     | 16.3          | 16.3                                 | 0%                    | Negligible        |
| R.11     | 16.2          | 16.2                                 | 0%                    | Negligible        |
| R.12     | 13.3          | 13.3                                 | 0%                    | Negligible        |

| Receptor                                                                     | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Objective | Impact Descriptor |
|------------------------------------------------------------------------------|---------------|--------------------------------------|-----------------------|-------------------|
| R.13                                                                         | 14.5          | 14.5                                 | 0%                    | Negligible        |
| R.14                                                                         | 13.9          | 13.9                                 | 0%                    | Negligible        |
| R.15                                                                         | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.16                                                                         | 14.2          | 14.2                                 | 0%                    | Negligible        |
| R.17                                                                         | 14.5          | 14.5                                 | 0%                    | Negligible        |
| R.18                                                                         | 14.8          | 14.8                                 | 0%                    | Negligible        |
| R.19                                                                         | 14.2          | 14.2                                 | 0%                    | Negligible        |
| R.20                                                                         | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.21                                                                         | 14.3          | 14.3                                 | 0%                    | Negligible        |
| R.22                                                                         | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.23                                                                         | 14.8          | 14.8                                 | 0%                    | Negligible        |
| R.24                                                                         | 16.4          | 16.4                                 | 0%                    | Negligible        |
| R.25                                                                         | 15.5          | 15.5                                 | 0%                    | Negligible        |
| S.1                                                                          | 13.9          | 13.9                                 | 0%                    | Negligible        |
| S.2                                                                          | 15.7          | 15.7                                 | 0%                    | Negligible        |
| S.3                                                                          | 15.6          | 15.6                                 | 0%                    | Negligible        |
| H.1                                                                          | 13.7          | 13.7                                 | 0%                    | Negligible        |
| CH.1                                                                         | 13.3          | 13.3                                 | 0%                    | Negligible        |
| S.4                                                                          | 13.6          | 13.6                                 | 0%                    | Negligible        |
| CR.1                                                                         | 16.3          | 16.4                                 | 0%                    | Negligible        |
| CR.2                                                                         | 15.2          | 15.2                                 | 0%                    | Negligible        |
| Annual Mean Objective                                                        |               | 40                                   |                       |                   |
| Notes:<br><b>Bold</b> indicates an exceedances of the annual mean objective. |               |                                      |                       |                   |

Table 7.18: Predicted Impacts in 2025 on Baseline Annual Mean PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Limit | Impact Descriptor |
|----------|---------------|--------------------------------------|-------------------|-------------------|
| R.1      | 9.6           | 9.6                                  | 0%                | Negligible        |
| R.2      | 9.4           | 9.4                                  | 0%                | Negligible        |
| R.3      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.4      | 9.7           | 9.7                                  | 0%                | Negligible        |
| R.5      | 9.1           | 9.1                                  | 0%                | Negligible        |
| R.6      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.7      | 10.2          | 10.2                                 | 0%                | Negligible        |
| R.8      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.9      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.10     | 11.3          | 11.3                                 | 0%                | Negligible        |
| R.11     | 11.2          | 11.2                                 | 0%                | Negligible        |
| R.12     | 9.1           | 9.1                                  | 0%                | Negligible        |
| R.13     | 9.8           | 9.8                                  | 0%                | Negligible        |
| R.14     | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.15     | 10.1          | 10.1                                 | 0%                | Negligible        |
| R.16     | 9.6           | 9.6                                  | 0%                | Negligible        |
| R.17     | 9.8           | 9.8                                  | 0%                | Negligible        |
| R.18     | 9.8           | 9.8                                  | 0%                | Negligible        |
| R.19     | 9.7           | 9.7                                  | 0%                | Negligible        |
| R.20     | 10.1          | 10.1                                 | 0%                | Negligible        |
| R.21     | 9.3           | 9.3                                  | 0%                | Negligible        |
| R.22     | 9.8           | 9.8                                  | 0%                | Negligible        |
| R.23     | 9.7           | 9.7                                  | 0%                | Negligible        |

| Receptor                                                                     | 2025 Baseline | 2025 Baseline + Construction Traffic | % Change of Limit | Impact Descriptor |
|------------------------------------------------------------------------------|---------------|--------------------------------------|-------------------|-------------------|
| R.24                                                                         | 10.6          | 10.6                                 | 0%                | Negligible        |
| R.25                                                                         | 10.1          | 10.1                                 | 0%                | Negligible        |
| S.1                                                                          | 9.4           | 9.4                                  | 0%                | Negligible        |
| S.2                                                                          | 10.4          | 10.4                                 | 0%                | Negligible        |
| S.3                                                                          | 10.4          | 10.4                                 | 0%                | Negligible        |
| H.1                                                                          | 9.1           | 9.1                                  | 0%                | Negligible        |
| CH.1                                                                         | 9.1           | 9.1                                  | 0%                | Negligible        |
| S.4                                                                          | 9.3           | 9.3                                  | 0%                | Negligible        |
| CR.1                                                                         | 10.6          | 10.6                                 | 0%                | Negligible        |
| CR.2                                                                         | 10.2          | 10.2                                 | 0%                | Negligible        |
| Annual Mean Limit                                                            |               | 20                                   |                   |                   |
| Notes:<br><b>Bold</b> indicates an exceedances of the annual mean objective. |               |                                      |                   |                   |

7.110 The modelled NO<sub>2</sub> concentrations in **Table 7.16** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations.

7.111 Using the matrix in **Table 7.4**, it can be seen that the impacts associated with the proposed development are anticipated to be temporary **negligible (adverse)** at all modelled receptors.

7.112 Based on the annual average mean concentration at all receptors being below 60 µg/m<sup>3</sup>, it is unlikely that any modelled receptor identified would experience an exceedance of the 1-hour mean objective.

7.113 The modelled PM<sub>10</sub> concentrations in **Table 7.17** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations. Using the matrix in **Table 7.4**, it can be seen that the impacts are anticipated to be temporary **negligible (adverse)** at all modelled receptors.

- 7.114 For PM<sub>10</sub>, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m<sup>3</sup>) is likely to be exceeded:

$$\text{Num. 24-hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left( \frac{206}{\text{annual mean}} \right)$$

- 7.115 There are limitations to this calculation, and this is set out in TG(22), which states:

*"The relationship does have limitations in so far that it should not be applied when the annual mean PM<sub>10</sub> concentration is lower than 14.8 µg/m<sup>3</sup>".*

- 7.116 The highest concentration, predicted at Receptor CR1, is 16.4 µg/m<sup>3</sup>; therefore, the formula can be used to predict the number of 24-hour mean exceedances predicted. Based on the formula above, this predicts 0.4 exceedance days at this receptor, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM<sub>10</sub>.
- 7.117 The modelled PM<sub>2.5</sub> concentrations in **Table 7.18** do not predict any exceedances of the Stage 2 Post 2020 annual mean limit (20 µg/m<sup>3</sup>) at any of the specified receptor locations. Using the matrix in **Table 7.4**, it can be seen that the impacts are anticipated to be temporary **negligible (adverse)** at all modelled receptors.
- 7.118 As set out above, the impacts on the receptors associated with the proposed development are anticipated to be **negligible (adverse)** for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations. The concentrations do not exceed the relevant national standards as set out in **Table 7.1**. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the temporary impacts can be considered '**not significant.**'

#### **Proposed Development Construction Dust Risk Assessment**

- 7.119 The main air quality impacts associated with construction activities relate to the potential release of particulate matter of both PM<sub>10</sub> size fractions. There is also the potential for the evolution of other air quality pollutants (known as secondary pollutants). The sources of potential construction impacts specifically associated with the Proposed Development are set out below:

- Potential for generation of airborne dusts from exposure and movement of soils and construction materials;
- Generation of fumes on-site by construction plant and tools throughout the construction phase;
- Increase in vehicle emissions (smoke/fumes) from vehicles (and potentially as a result of slow-moving traffic, should local congestion ensue); and
- Re-suspension of dust as a result of vehicle tyres travelling over dusty surfaces.

7.120 A construction dust assessment has been undertaken in line with the IAQM (2024) guidance methodology as set out in **Appendix 7.1** and a summary of the process is provided below.

### **Screening for a Full Assessment**

7.121 Having reviewed the Site location, it is evident that there are a number of human receptors within 250 m of the Site, therefore a detailed dust impact assessment is required.

7.122 A review of the DEFRA Magic website<sup>36</sup> indicates that no ecological site is present within the immediate surrounding area. The closest ecological site is Acornfield Plantation Local Nature Reserve (LNR), which sits approximately 2 km east of the Site. As per box 1 of the IAQM (2024) guidance, it is not within 50 m of the boundary of the Site or construction vehicular routes (up to 250 m from the Site), therefore, an assessment of the impact of the construction phase on this receptor has been scoped out.

### **Potential Dust Emission Magnitude**

#### ***Demolition***

7.123 A review of the Site indicates that while the majority of the Site is vacant and undeveloped, the Knowsley Community College as well as some smaller buildings in the North West of the Site will need to be demolished. The volume of these buildings is unknown; however it is anticipated that the volume of these buildings is < 12,000 m<sup>3</sup>, but is potentially made of dusty construction material. Therefore, in line **Table 7.1.1** as set out in **Appendix 7.1**, and professional judgment, the magnitude of potential dust release from demolition activities is classified as **Medium**.

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<sup>36</sup> Natural England. MAGIC. Accessible at: <https://magic.defra.gov.uk/>

### **Earthworks**

- 7.124 The total area where earthworks will occur is greater than 110,000 m<sup>2</sup>. It is anticipated that the soil existing in the ground has a 'Sandy and Loamy'<sup>37</sup> texture. Therefore, in line with **Table 7.1.1** as set out in **Appendix 7.1**, and professional judgment, the magnitude of potential dust release from earthworks activities is classified as **Large**.

### **Construction**

- 7.125 The total building volume to be constructed is unknown, based on the number of residential dwellings set to be constructed, it is expected to be > 75,000 m<sup>2</sup>. Furthermore, the material used is anticipated to be of high dust potential. Therefore, in line with **Table 7.1.1** as set out in **Appendix 7.1**, and professional judgement, the magnitude of potential dust release from construction activities is classified as **Large**.

### **Trackout**

- 7.126 During the construction year (2025) there is expected to be 47 two-way (AADT) HDV movements on the local highway network, and thus, as a reasonable worst case assumption, it is predicted that 24 one-way movements (AADT) are created. Therefore, in line with **Table 7.1.1** as set out in **Appendix 7.1** and professional judgment, the magnitude of potential dust release from trackout activities is classified as **Medium**.

### **Summary**

- 7.127 **Table 7.19** summarises the dust emission magnitude for the proposed development.

Table 7.19 Summary of Dust Emission Magnitude

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

<sup>37</sup> Cranfield Soil and Agrifood Institute. Soilscales. Accessible at: <http://www.landis.org.uk/soilscales/>

### Sensitivity of Area

- 7.128 Having established the emission magnitude for dust above, the sensitivity of the area is considered to establish the significance of effects. The effect of the dust (i.e. the result of the change in dust levels) depends on the sensitivity of the receptor to change. High sensitivity human receptors include residential dwellings, schools and hospitals.
- 7.129 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20 m of the Site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100 m from the construction site there may still be a high risk, particularly if the receptor is downwind of the dust source.
- 7.130 With the exponential decline in dust with distance from dust generating activities, it is considered that for receptors more than 250 m from the Site boundary, the risk is negligible (this is supported by the older IAQM (2016)<sup>38</sup> guidance). Furthermore, the risks at over 100 m are only likely to be significant in certain weather conditions, e.g. downwind of the source during dry periods.
- 7.131 The approximate number of high sensitivity human receptors in the vicinity of the Site boundary is detailed in **Table 7.20** below and are highlighted in **Figure(s) 7.7 to 7.9** for demolition, earthworks and construction and for trackout. The main existing receptors within the Assessment Area are existing commercial, educational, health care and residential buildings along:
- A506 Valley Road;
  - Cherryfield Drive;
  - Whinberry Drive;
  - Pondwater Drive;
  - Bewley Drive;
  - Bracknell Avenue;
  - Tennyson Way;
  - Shakespeare Avenue; and

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<sup>38</sup> Institute of Air Quality Management, 2016. Guidance on the Assessment of Dust from Demolition and Construction.

- The Barn Lane

Table 7.20 High Sensitivity Human Receptors

| Distance to Site (m) | No. of High Sensitivity Receptors | Details                                                                                                                                                                                                     |
|----------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <20                  | 10 - 100                          | -Residential dwellings located off the residential estate bordering the central area of the southern boundary.<br>Residential dwellings located to the north and east of the Proposed Development boundary. |
| 20 – 100             | > 100                             | Residential dwellings along the highways highlighted above.<br>St Joseph The Worker RC School south of the Site.                                                                                            |

7.132 The prevailing wind is from the south-west, as indicated by the Manchester wind rose in **Figure 7.1**. The Site boundary is surrounded with sensitive receptors to the east, south and south-west of the Site. Some areas are potentially upwind of the prevailing south-westerly wind. Due to the number of high sensitive receptors in such close proximity to the Site, the risk of dust soiling effects in line with IAQM (2024) are considered '**Medium**' for demolition and '**High**' for earthworks, construction and trackout.

7.133 The background annual mean concentration of PM<sub>10</sub> is well below 24 µg/m<sup>3</sup>. Based upon this and the number of receptors within 20 m being between 10 – 100 the potential health impacts in line with IAQM (2024) are considered as '**Low**' for all activities.

### Risk and Significance

7.134 Having established the likely dust emission magnitude and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM (2024) guidance; these are summarised in **Table 7.21**.

Table 7.21: Summary of Dust Risk to Define Site-Specific Mitigation

| Activity     | Demolition | Earthworks | Construction | Trackout    |
|--------------|------------|------------|--------------|-------------|
| Dust Soiling | Low Risk   | High Risk  | High Risk    | Medium Risk |
| Human Health | Low Risk   | Low Risk   | Low Risk     | Low Risk    |

## The Completed and Operational Development

### Proposed Development Operational Traffic

- 7.135 A review of the predicted traffic numbers associated with the operational phase have been screened against the EPUK & IAQM (2017) thresholds set out in **Appendix 7.2**. The predicted traffic impacts indicate a potential breach of the EPUK & IAQM (2017) thresholds. Therefore, a full impact assessment has been undertaken.
- 7.136 The predicted impacts of the proposed development operational traffic upon the annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> during the operational year of 2028 for the previously specified receptors are set out in **Table(s) 7.22 to 7.24**. These also describe the impacts at each receptor using the impact descriptors given in **Table 7.4**.

Table 7.22: Predicted Impacts in 2028 on Baseline Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.1      | 15.8          | 16.0                                 | 0%                    | Negligible        |
| R.2      | 14.9          | 15.0                                 | 0%                    | Negligible        |
| R.3      | 14.8          | 14.9                                 | 0%                    | Negligible        |
| R.4      | 15.4          | 15.5                                 | 0%                    | Negligible        |
| R.5      | 13.4          | 13.5                                 | 0%                    | Negligible        |
| R.6      | 14.6          | 14.7                                 | 0%                    | Negligible        |
| R.7      | 19.0          | 19.1                                 | 0%                    | Negligible        |
| R.8      | 15.3          | 15.4                                 | 0%                    | Negligible        |
| R.9      | 15.6          | 15.7                                 | 0%                    | Negligible        |

| Receptor | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.10     | 17.2          | 17.3                                 | 0%                    | Negligible        |
| R.11     | 17.4          | 17.5                                 | 0%                    | Negligible        |
| R.12     | 13.2          | 13.4                                 | 0%                    | Negligible        |
| R.13     | 15.6          | 15.7                                 | 0%                    | Negligible        |
| R.14     | 15.2          | 15.3                                 | 0%                    | Negligible        |
| R.15     | 17.4          | 17.5                                 | 0%                    | Negligible        |
| R.16     | 15.9          | 16.0                                 | 0%                    | Negligible        |
| R.17     | 15.9          | 16.1                                 | 0%                    | Negligible        |
| R.18     | 19.7          | 19.7                                 | 0%                    | Negligible        |
| R.19     | 16.4          | 16.5                                 | 0%                    | Negligible        |
| R.20     | 14.9          | 15.0                                 | 0%                    | Negligible        |
| R.21     | 15.1          | 15.2                                 | 0%                    | Negligible        |
| R.22     | 16.5          | 16.6                                 | 0%                    | Negligible        |
| R.23     | 16.2          | 16.2                                 | 0%                    | Negligible        |
| R.24     | 19.6          | 19.7                                 | 0%                    | Negligible        |
| R.25     | 16.8          | 17.0                                 | 0%                    | Negligible        |
| S.1      | 14.5          | 14.5                                 | 0%                    | Negligible        |
| S.2      | 20.1          | 20.2                                 | 0%                    | Negligible        |
| S.3      | 21.8          | 21.9                                 | 0%                    | Negligible        |
| H.1      | 13.3          | 13.3                                 | 0%                    | Negligible        |
| CH.1     | 13.8          | 13.8                                 | 0%                    | Negligible        |
| S.4      | 13.6          | 13.6                                 | 0%                    | Negligible        |
| CR.1     | 17.9          | 18.2                                 | 1%                    | Negligible        |
| CR.2     | 17.5          | 17.8                                 | 1%                    | Negligible        |

| Receptor                                                                                                                                                                                                                             | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Objective | Impact Descriptor |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------|-----------------------|-------------------|
| Annual Mean Objective                                                                                                                                                                                                                |               |                                      | 40                    |                   |
| Notes:<br><b>Bold</b> indicates an exceedances of the annual mean objective. <b><u>Bold and underlined</u></b> indicates exceedances of 60 µg/m³ for NO₂ (which is an indication the hourly mean objective could be being breached). |               |                                      |                       |                   |

Table 7.23: Predicted Impacts in 2028 on Baseline Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Objective | Impact Descriptor |
|----------|---------------|--------------------------------------|-----------------------|-------------------|
| R.1      | 14.3          | 14.3                                 | 0%                    | Negligible        |
| R.2      | 13.9          | 13.9                                 | 0%                    | Negligible        |
| R.3      | 14.0          | 14.1                                 | 0%                    | Negligible        |
| R.4      | 14.4          | 14.4                                 | 0%                    | Negligible        |
| R.5      | 13.3          | 13.4                                 | 0%                    | Negligible        |
| R.6      | 14.0          | 14.0                                 | 0%                    | Negligible        |
| R.7      | 15.4          | 15.4                                 | 0%                    | Negligible        |
| R.8      | 14.9          | 14.9                                 | 0%                    | Negligible        |
| R.9      | 14.1          | 14.1                                 | 0%                    | Negligible        |
| R.10     | 16.2          | 16.2                                 | 0%                    | Negligible        |
| R.11     | 16.1          | 16.1                                 | 0%                    | Negligible        |
| R.12     | 13.3          | 13.4                                 | 0%                    | Negligible        |
| R.13     | 14.5          | 14.5                                 | 0%                    | Negligible        |
| R.14     | 13.9          | 13.9                                 | 0%                    | Negligible        |
| R.15     | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.16     | 14.2          | 14.2                                 | 0%                    | Negligible        |
| R.17     | 14.5          | 14.5                                 | 0%                    | Negligible        |
| R.18     | 14.8          | 14.8                                 | 0%                    | Negligible        |
| R.19     | 14.2          | 14.2                                 | 0%                    | Negligible        |

| Receptor                                                                     | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Objective | Impact Descriptor |
|------------------------------------------------------------------------------|---------------|--------------------------------------|-----------------------|-------------------|
| R.20                                                                         | 14.9          | 15.0                                 | 0%                    | Negligible        |
| R.21                                                                         | 14.2          | 14.2                                 | 0%                    | Negligible        |
| R.22                                                                         | 15.0          | 15.0                                 | 0%                    | Negligible        |
| R.23                                                                         | 14.8          | 14.8                                 | 0%                    | Negligible        |
| R.24                                                                         | 16.4          | 16.4                                 | 0%                    | Negligible        |
| R.25                                                                         | 15.5          | 15.5                                 | 0%                    | Negligible        |
| S.1                                                                          | 13.8          | 13.8                                 | 0%                    | Negligible        |
| S.2                                                                          | 15.7          | 15.7                                 | 0%                    | Negligible        |
| S.3                                                                          | 15.6          | 15.7                                 | 0%                    | Negligible        |
| H.1                                                                          | 13.2          | 13.3                                 | 0%                    | Negligible        |
| CH.1                                                                         | 13.6          | 13.7                                 | 0%                    | Negligible        |
| S.4                                                                          | 13.6          | 13.6                                 | 0%                    | Negligible        |
| CR.1                                                                         | 15.3          | 15.4                                 | 0%                    | Negligible        |
| CR.2                                                                         | 14.8          | 14.9                                 | 0%                    | Negligible        |
| Annual Mean Objective                                                        |               | 40                                   |                       |                   |
| Notes:<br><b>Bold</b> indicates an exceedances of the annual mean objective. |               |                                      |                       |                   |

Table 7.24: Predicted Impacts in 2028 on Baseline Annual Mean PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>)

| Receptor | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Limit | Impact Descriptor |
|----------|---------------|--------------------------------------|-------------------|-------------------|
| R.1      | 9.6           | 9.6                                  | 0%                | Negligible        |
| R.2      | 9.4           | 9.4                                  | 0%                | Negligible        |
| R.3      | 9.4           | 9.5                                  | 0%                | Negligible        |
| R.4      | 9.6           | 9.7                                  | 0%                | Negligible        |
| R.5      | 9.1           | 9.1                                  | 0%                | Negligible        |

| Receptor | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Limit | Impact Descriptor |
|----------|---------------|--------------------------------------|-------------------|-------------------|
| R.6      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.7      | 10.2          | 10.2                                 | 0%                | Negligible        |
| R.8      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.9      | 9.5           | 9.5                                  | 0%                | Negligible        |
| R.10     | 11.2          | 11.2                                 | 0%                | Negligible        |
| R.11     | 11.1          | 11.1                                 | 0%                | Negligible        |
| R.12     | 9.1           | 9.1                                  | 0%                | Negligible        |
| R.13     | 9.7           | 9.8                                  | 0%                | Negligible        |
| R.14     | 9.4           | 9.4                                  | 0%                | Negligible        |
| R.15     | 10.0          | 10.1                                 | 0%                | Negligible        |
| R.16     | 9.6           | 9.6                                  | 0%                | Negligible        |
| R.17     | 9.7           | 9.8                                  | 0%                | Negligible        |
| R.18     | 9.7           | 9.7                                  | 0%                | Negligible        |
| R.19     | 9.6           | 9.6                                  | 0%                | Negligible        |
| R.20     | 10.1          | 10.1                                 | 0%                | Negligible        |
| R.21     | 9.3           | 9.3                                  | 0%                | Negligible        |
| R.22     | 9.8           | 9.8                                  | 0%                | Negligible        |
| R.23     | 9.7           | 9.7                                  | 0%                | Negligible        |
| R.24     | 10.5          | 10.6                                 | 0%                | Negligible        |
| R.25     | 10.0          | 10.1                                 | 0%                | Negligible        |
| S.1      | 9.3           | 9.4                                  | 0%                | Negligible        |
| S.2      | 10.3          | 10.3                                 | 0%                | Negligible        |
| S.3      | 10.3          | 10.4                                 | 0%                | Negligible        |
| H.1      | 9.0           | 9.1                                  | 0%                | Negligible        |

| Receptor                                                                     | 2028 Baseline | 2028 Baseline + Proposed Development | % Change of Limit | Impact Descriptor |
|------------------------------------------------------------------------------|---------------|--------------------------------------|-------------------|-------------------|
| CH.1                                                                         | 9.3           | 9.3                                  | 0%                | Negligible        |
| S.4                                                                          | 9.0           | 9.0                                  | 0%                | Negligible        |
| CR.1                                                                         | 10.2          | 10.3                                 | 0%                | Negligible        |
| CR.2                                                                         | 9.9           | 9.9                                  | 0%                | Negligible        |
| Annual Mean Limit                                                            |               | 20                                   |                   |                   |
| Notes:<br><b>Bold</b> indicates an exceedances of the annual mean objective. |               |                                      |                   |                   |

7.137 The modelled NO<sub>2</sub> concentrations in **Table 7.22** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations.

7.138 Using the matrix in **Table 7.4**, it can be seen that the impacts associated with the proposed development are anticipated to be **negligible (adverse)** at all modelled receptors.

7.139 Based on the annual average mean concentration at all receptors being below 60 µg/m<sup>3</sup>, it is unlikely that any modelled receptor identified would experience an exceedance of the 1-hour mean objective.

7.140 The modelled PM<sub>10</sub> concentrations in **Table 7.23** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations. Using the matrix in **Table 7.4**, it can be seen that the impacts are anticipated to be **negligible (adverse)** at all modelled receptors.

7.141 For PM<sub>10</sub>, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m<sup>3</sup>) is likely to be exceeded:

$$\text{Num. 24-hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left( \frac{206}{\text{annual mean}} \right)$$

7.142 There are limitations to this calculation, and this is set out in TG(22), which states:

*“The relationship does have limitations in so far that it should not be applied when the annual mean  $PM_{10}$  concentration is lower than  $14.8 \mu\text{g}/\text{m}^3$ ”.*

- 7.143 The highest concentration, predicted at Receptor R.24 is  $16.4 \mu\text{g}/\text{m}^3$ ; therefore, the formula can be used to predict the number of 24-hour mean exceedances predicted. Based on the formula above, this predicts 0.4 exceedance days at this receptor, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of  $PM_{10}$ .
- 7.144 The modelled  $PM_{2.5}$  concentrations in **Table 7.24** do not predict any exceedances of the Stage 2 Post 2020 annual mean limit ( $20 \mu\text{g}/\text{m}^3$ ) at any of the specified receptor locations. Using the matrix in **Table 7.4**, it can be seen that the impacts are anticipated to be **negligible (adverse)** at all modelled receptors.
- 7.145 As set out above, the impacts on the receptors associated with the proposed development are anticipated to be **negligible (adverse)** for  $NO_2$ ,  $PM_{10}$  and  $PM_{2.5}$  concentrations. The concentrations do not exceed the relevant national standards as set out in **Table 7.1**. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the temporary impacts can be considered **‘not significant.’**
- 7.146 The predicted overall  $NO_2$ ,  $PM_{10}$  and  $PM_{2.5}$  annual mean concentrations at the worst case specified future receptor locations are set out in **Table(s) 7.25 to 7.27**. The tables also set out the percentage above or below the respective annual mean objective/target at each receptor location.

Table 7.25: Predicted 2028  $NO_2$  Concentrations at Future Receptors

| Receptor | Predicted Concentration | % of Objective |
|----------|-------------------------|----------------|
| FR.1     | 18.4                    | 46             |
| FR.2     | 17.1                    | 43             |
| FR.3     | 17.5                    | 44             |
| FR.4     | 17.7                    | 44             |
| FR.5     | 16.5                    | 41             |
| FR.6     | 19.0                    | 47             |

| Receptor | Predicted Concentration | % of Objective |
|----------|-------------------------|----------------|
| FR.7     | 18.6                    | 46             |

Table 7.26: Predicted 2028 PM<sub>10</sub> Concentrations at Future Receptors

| Receptor | Predicted Concentration | % of Objective |
|----------|-------------------------|----------------|
| FR.1     | 14.8                    | 37             |
| FR.2     | 14.1                    | 35             |
| FR.3     | 14.3                    | 36             |
| FR.4     | 14.4                    | 36             |
| FR.5     | 14.1                    | 35             |
| FR.6     | 15.2                    | 38             |
| FR.7     | 14.9                    | 37             |

Table 7.27: Predicted 2028 PM<sub>2.5</sub> Concentrations at Future Receptors

| Receptor | Predicted Concentration | % of Limit |
|----------|-------------------------|------------|
| FR.1     | 10.0                    | 50         |
| FR.2     | 9.6                     | 48         |
| FR.3     | 9.7                     | 48         |
| FR.4     | 9.8                     | 49         |
| FR.5     | 9.6                     | 48         |
| FR.6     | 10.2                    | 51         |
| FR.7     | 10.1                    | 50         |

7.147 The modelled NO<sub>2</sub> concentrations in **Table 7.25** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations.

7.148 Based on the annual average mean concentration at all receptors being below 60 µg/m<sup>3</sup>, it is unlikely that any modelled receptor identified would experience an exceedance of the 1-hour mean objective.

7.149 The modelled PM<sub>10</sub> concentrations in **Table 7.26** do not predict any exceedances of the annual mean objective (40 µg/m<sup>3</sup>) at any of the specified receptor locations.

7.150 For PM<sub>10</sub>, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m<sup>3</sup>) is likely to be exceeded:

$$\text{Num. 24-hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left( \frac{206}{\text{annual mean}} \right)$$

7.151 There are limitations to this calculation, and this is set out in LAQM.TG(22), which states:

*"The relationship does have limitations in so far that it should not be applied when the annual mean PM<sub>10</sub> concentration is lower than 14.8 µg/m<sup>3</sup>".*

7.152 On the basis none of the concentrations exceed 14.8 µg/m<sup>3</sup>, it is not deemed appropriate to apply the above calculation, and it is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM<sub>10</sub>.

7.153 The modelled PM<sub>2.5</sub> concentrations in **Table 7.27** do not predict any exceedances of the Stage 2 Post 2020 annual mean limit (20 µg/m<sup>3</sup>) at any of the specified receptor locations.

7.154 The concentrations do not exceed the relevant national objectives as set out in **Table 7.1**. Using the APPLE working group Air Pollution Exposure Criteria, as set out in **Table 7.5**, the modelled air quality concentrations of NO<sub>2</sub> and PM<sub>10</sub> for these receptors in 2028 fall within APEC A, which states:

*"No air quality grounds for refusal; however, mitigation of any emissions should be considered."*

## Additional Mitigation / Enhancement Measures

### Construction

7.155 A construction dust assessment has been undertaken for the Proposed Development and is presented in 'Assessment of Likely Significant Effects' section of this ES Chapter. The assessment has been used to identify the need for standard and best practice mitigation measures to be

implemented during the construction phase of the Proposed Development. These measures will be controlled and implemented through a Construction Environmental Management Plan (CEMP), which is anticipated to be secured via a suitably worded planning condition.

7.156 A range of measures are suggested and summarised below, which would typically be utilised during the construction phases, further detail is provided in **Appendix 7.4**.

7.157 The following potential mitigation measures are anticipated (but are not limited to):

- Cutting, grinding and sawing will not be conducted on-site and pre-fabricated material and modules will be brought in where possible;
- Where cutting, grinding and sawing takes place, water suppression will be used to reduce the amount of dust generated;
- Skips, chutes and conveyors will be completely covered and, if necessary enclosed to ensure that dust does not escape;
- No burning of any materials will be permitted on site;
- Any excess material will be reused or recycled on-site where practicable in accordance with appropriate legislation;
- The Principal Contractor will produce a waste or recycling plan;
- Following earthworks, exposed areas and soil stockpiles will be re-vegetated to stabilise surfaces, or otherwise covered with hessian or mulches;
- Stockpiles will be stored in enclosed or bunded containers or silos and kept damp where necessary;
- Hard surfaces will be used for haul routes where possible;
- Haul routes will be swept/washed regularly;
- Vehicle wheels will be washed on leaving the Site;
- All vehicles carrying dusty materials will be securely covered; and
- Delivery areas, stockpiles and particularly dusty items of construction plant will be kept as far away from neighbouring properties as possible.

7.158 Mitigation measures specific to the demolition and construction phases of the Proposed Development (Demolition, Earthworks, Construction and Trackout) can be found in **Appendix 13.3. Table 13.33** at the end of this document sets out how these demolition and construction related inherent mitigation measures are proposed.

## The Completed and Operational Development

7.159 In addition to the mitigation measures set out in 'Embedded Mitigation' section, the EPUK & IAQM (2017) recommends a number of further mitigation measures that could be considered for the Proposed Development. These include (in addition to a number of further examples):

- Set back dwelling as far as possible from the main highway network to reduce exposure for new receptors;
- Locating habitable rooms away from busy roads, or directing combustion generated pollutants through well sited vents or chimney stacks;
- All gas-fired boilers to meet a minimum standard of <40mgNO<sub>x</sub>/kWh; and
- All gas-fired CHP plant to meet a minimum emissions standard of 250 mgNO<sub>x</sub>/Nm<sup>3</sup> for spark ignition engines.

## Residual Effects

7.160 The overall residual effects are summarised below and set out **Table 7.28**.

### Construction

7.161 With the CEMP in place the residual air quality effects are '**not significant**' for all receptors.

### Operational

7.162 The residual impacts remain unchanged as the effect without mitigation, which are **negligible** and '**not significant**' for all receptors.

Table 7.28: Residual Effects Summary

| Description of Effect | Embedded Mitigation                           | Potential Effect (inc. Significance) | Further Mitigation                                                                                                                                                                    | Residual Effect (inc. Significance) |
|-----------------------|-----------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>Construction</b>   |                                               |                                      |                                                                                                                                                                                       |                                     |
| Dust Soiling          | N/A                                           | Not Significant                      | CEMP                                                                                                                                                                                  | Not Significant                     |
| Human Health          | N/A                                           | Not Significant                      | CEMP                                                                                                                                                                                  | Not Significant                     |
| Traffic               | N/A                                           | Not Significant                      | CEMP / Construction Logistics Plan                                                                                                                                                    | Not Significant                     |
| <b>Operation</b>      |                                               |                                      |                                                                                                                                                                                       |                                     |
| Traffic               | Travel Planning / Sustainable Transport Links | Not Significant                      | Network of pedestrian and cycle routes throughout the Proposed Development;<br>Provision of electric vehicle charging;<br>Framework Travel Plan to promote and stimulate modal shift. | Not Significant                     |

## Conclusions

- 7.163 This ES Chapter has assessed the impacts of both the construction and operational phase of the Proposed Development in isolation against the appropriate baseline conditions.
- 7.164 A construction dust assessment has been undertaken for the construction phase associated with the Proposed Development and in accordance with IAQM (2024) guidance. Following the successful implementation of the suggested inherent mitigation measures, the impacts of the Proposed Development construction dust and emissions from construction activities upon the local area and sensitive receptors although adverse, the impacts will be temporary, and **'not significant'**.
- 7.165 The change in predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at existing and future receptors in 2025 during peak construction of the Proposed Development are anticipated to be temporary, **negligible** and **'not significant'**.
- 7.166 The change in predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at existing and future receptors in 2028 during the operational year of the Proposed Development are anticipated to be **negligible** and **'not significant'**.

## Assessment of Cumulative Effects

- 7.167 As previously set in this ES Chapter, AAC have been advised that certain committed developments have been factored into the baseline traffic scenarios and cannot be separated out and compared in isolation to the Proposed Development traffic. These are set out in paragraph 7.65 of this ES Chapter

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