OMEGA ZONE 8, ST HELENS

Omega St Helens Ltd / T. J. Morris Limited

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6. AIR QUALITY

6.1. INTRODUCTION

6.1.1. This chapter reports the outcome of the assessment of likely significant effects arising from the Proposed Development upon local air quality.

6.1.2. The assessment of air quality has established that appropriate mitigation measures are required during the construction phase of the Proposed Development. These measures are recommended with reference to the Institute of Air Quality Management (IAQM) '*Guidance on the assessment of dust from demolition and construction*' document (Ref. 6.1).

6.1.3. The following residual effects have been identified in relation to the construction phase only:

- There is likely to be a direct, temporary, short-term negligible adverse residual effect on nearby sensitive receptors within 350 m of the application site boundary and within 50 m of construction routes, up to 500 m from the application site boundary (not significant).

6.1.4. No monitoring requirements have been identified:

6.1.5. The following enhancement opportunities have been identified:

- The provision of at least one Electric Vehicle (EV) 'fast charge' point per 1,000 m^2 of commercial floorspace;
- Support for and promotion of car clubs for employees;
- Improvements to cycling and walking infrastructure; and,
- Inclusion of EV points for freight vehicles, where available.

6.1.6. The remainder of this chapter describes the assessment methodology and the baseline conditions relevant to the assessment, which have enabled the assessment of likely significant effects on local air quality. Where appropriate, the outcomes of the assessment have informed the need for additional mitigation measures required to avoid, prevent, reduce or, if possible, offset any likely significant adverse effects, and the likely residual effects. Where applicable, opportunities for enhancement are also discussed.

6.1.7. This chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to **Chapter 12: Transport** and **Chapter 17: Cumulative Effects**.

6.1.8. A glossary of terms is provided in **Appendix 6.1**.

6.1.9. The Proposed Development is illustrated in **Figure 3-1**.

6.2. CONSULTATION, SCOPE, METHODOLOGY AND SIGNIFICANCE CRITERIA

CONSULTATION UNDERTAKEN TO DATE

6.2.1. **Table 6-1** provides a summary of the consultation activities undertaken in support of the preparation of this assessment.

Table 6-1 - Summary of consultation undertaken

Body / organisation	Individual / stat body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
St. Helens Council	Lucy Northey Scientific Officer, Environmental Protection Department	E-mail correspondence on 24 October 2019 to request the latest Local Air Quality Management (LAQM) report and monitoring data held by St. Helens Council & consultation on the assessment methodology and scope.	LAQM Monitoring Data for 2018 and 2019 Annual Status Report received 15 November 2019

SCOPE OF THE ASSESSMENT

6.2.2. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5: Approach to EIA**.

6.2.3. This section provides the scope of the assessment and confirms, as appropriate, the evidence base for insignificant effects following further iterative assessment.

Elements scoped out of the assessment

6.2.4. The elements shown in **Table 6-2** are not considered to give rise to likely significant effects as a result of the Proposed Development and have therefore not been considered within this assessment.

Table 6-2 - Elements scoped out of the assessment

Element scoped out	Justification
Potential impacts on local air quality regarding changes in concentrations of nitrogen dioxide (NO_2), particulate matter (PM) that have a diameter of less than 10 micrometers (PM_{10}) and less than 2.5 micrometers ($PM_{2.5}$) at existing receptors because of exhaust emissions arising from construction plant and non-road mobile machinery.	The number of non-road mobile machinery and their location within the application site are likely to be variable over the construction phase and will be determined by the Contractor.
Road vehicle exhaust emissions generated during the construction phase.	Construction traffic will be temporary and for the duration of the construction phase only, with additional construction vehicle movements generated during the construction phase considered likely to be low within the context of existing traffic flows on the local road network.
Potential impacts at ecological designations regarding dust nuisance and changes in concentrations of NO_2, PM_{10} and $PM_{2.5}$ due to exhaust emissions arising from construction and operational related activities.	A review of information available regarding the presence of any ecological receptors from Defra MAGIC website indicated that there are no ecological receptors (i.e. designated ecological sites) within 50 m of the application site or within 50 m of roads to be used by construction vehicles, up to 500 m from the application site access.
Potential impacts regarding dust nuisance in regard to demolition activities during the construction phase.	There are no demolition activities envisaged to be carried out as the application site is currently vacant.

Elements scoped into the assessment

Construction Phase

6.2.5. The following elements are considered to have the potential to give rise to likely significant effects during construction of the Proposed Development and have therefore been considered within this assessment:

- Dust and particulate matter generated by on-site construction activities. Dust is described by the IAQM as "…*solid particles that are suspended in air or have settled out onto a surface after having been suspended in air*" (Ref. 6.1) and can cause impact at sensitive receptor locations in the locality of construction sites.

Operational Phase

6.2.6. The following elements are considered to have the potential to give rise to likely significant effects during operation of the Proposed Development and have therefore been considered within this assessment:

- The subsequent changes in vehicle flow, composition, and speed associated with the Proposed Development in regard to road vehicle exhaust emissions, which may result in changes to local concentrations of NO_2, PM_{10} and less than $PM_{2.5}$ at sensitive receptors within proximity to the application site.

EXTENT OF THE STUDY AREA

Construction Phase

6.2.7. The assessment of fugitive dust generated during the construction phase has been completed with reference to the IAQM guidance on the assessment of dust from construction (Ref. 6.1). This states that, for human receptors, the extent of the study area is up to 350 m from the application site boundary and within 50 m of the routes used by construction vehicles up to 500 m from the application site entrance(s).

Operational Phase

6.2.8. To assess the impact of emissions resulting from development-generated road traffic, traffic data were provided for the surrounding network by the project transport consultant. The road network considered includes those roads which fall within the criteria detailed in Table 6.2 of the joint Environmental Protection UK (EPUK) and IAQM planning guidance (Ref. 6.2).

METHOD OF BASELINE DATA COLLATION

Desk Study

6.2.9. To inform the assessment and obtain appropriate baseline information for the area of the Proposed Development, a desk-based review of available air quality information was completed. This included the following:

- Collation and review of the most recent local monitoring data and Local Air Quality Management (LAQM) Review and Assessment reports available for St. Helens Council and Warrington Borough Council;
- Review of additional air quality data for the area surrounding the Proposed Development, including data available from Defra's LAQM support pages; and,

- A review of local mapping data available for the study area to identify existing receptors that may be sensitive to changes in local air quality during both the construction and operation of the Proposed Development.

Site Visit

6.2.10. For the purpose of this assessment, no site visit was carried out.

ASSESSMENT METHODOLOGY

Construction Phase

6.2.11. Construction activities have the potential to generate dust, which may have an adverse effect on nearby receptors. Dust emissions from construction sites potentially arise from a range of diffuse sources and are named 'fugitive emission'. Fugitive dust emissions can lead to a localised increase in dust deposition rates that may potentially cause soiling of amenities and infrastructure. Over time, dust deposition may become perceptible and cause concern and/or nuisance.

6.2.12. An assessment of the likely significance of impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken with reference to:

- IAQM Construction Dust guidance (Ref. 6.1);
- Available information for the Proposed Development; and,
- Professional judgement.

6.2.13. The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following activities: earthworks; general construction activities and track-out. It considers the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk.

6.2.14. Risks are described in terms of there being a *low*, *medium*, or *high* risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in **Appendix 6.2**.

Operational Phase

6.2.15. The local air quality assessment has focussed on the predicted changes in concentrations of specific air pollutants at identified sensitive receptors, which are associated with changes in vehicle emissions attributed to the operation of the Proposed Development. The assessed vehicle pollutants comprise NO_2, PM_{10} and $PM_{2.5}$.

Assessment Scenarios

6.2.16. The operational phase assessment has focussed on the following scenarios, for which traffic data were provided to facilitate atmospheric dispersion modelling of vehicle emissions using CERC's ADMS-Roads v4.1.1 model:

- Base year of 2018 to facilitate model verification using local authority monitoring data;
- Opening year (2021) Do Minimum (*without* the Proposed Development);
- Opening year (2021) Do Something (*with* the Proposed Development);
- Design year (2036) Do Minimum; and,
- Design year (2036) Do Something.

6.2.17. The base year (2018) was assessed to enable verification of the model results as there is local air quality monitoring available from Warrington Borough Council. This base year also aligns with the representative meteorological data and traffic data year (2018) obtained for the assessment.

6.2.18. The respective traffic data provided by the project transport consultant for each of the above scenarios includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (km/h) and the percentage of Heavy-Duty Vehicles (HDVs) applicable to the local road network in all assessment years.

6.2.19. Traffic and emissions data used in the assessment can be found in **Appendix 6.3**. This includes details of AADT, vehicle speeds and the percentage of HDVs for the considered local road network in all assessment years. The traffic data provided includes flows from the committed developments as identified in **Chapter 12: Transport**. A diurnal profile has been derived from Automatic Traffic Counter (ATC) data provided by the project transport consultant and applied within the dispersion modelling exercise and is presented in **Appendix 6.3**.

6.2.20. The traffic flows for the baseline (2018), Do Minimum (2021) and Do Minimum (2036) scenarios do not include any contribution to road traffic from the Proposed Development itself. The traffic flows for the Do Something (2021) and Do Something (2036) scenarios account for the baseline flows in addition to the change in vehicle flows arising from the operation of the Proposed Development.

Meteorological Data

6.2.21. Meteorological data, such as wind speed and direction, are used by the model to determine pollutant dispersion and levels of dilution in the lower atmosphere. Meteorological data used in the model were obtained from the Met Office observing station at Rostherne (with missing cloud cover data supplemented from Manchester and RAF Leeming) for 2018. This station is located approximately 20 km to the east of the application site and hence it is considered to provide representative data for the assessment.

6.2.22. A wind rose plot of the Rostherne meteorological site for 2018 is provided in **Appendix 6.3**.

Complex Terrain

6.2.23. Complex terrain data were obtained from the Ordnance Survey OS Terrain 50 website (Ref. 6.3). The data are available for 10 km by 10 km tiles, with a 50 m resolution. The data were manipulated for input into the ADMS-Roads model as per CERC Guidance on setting up terrain data for input into CERC Models.

Derivation of Vehicle Emission Factors

6.2.24. Vehicle emission factors used in the assessment have been obtained using the Emission Factor Toolkit (EFT) version 9.0 (published in May 2019), published by Defra (Ref. 6.4). The EFT allows for the calculation of emission factors arising from road traffic for all years between 2017 and 2030.

6.2.25. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time. However, there is currently some uncertainty over future predictions, in-particular the ability of Euro 6 (VI) type approval emission standards, which were introduced in 2014 in relation to all new vehicles, to deliver substantial reductions in NO_x emissions.

6.2.26. To address this uncertainty, a vehicle emissions sensitivity test has been included, whereby there is assumed to be no improvement in vehicle emission factors for NO_x, PM_{10}, and $PM_{2.5}$ between 2018 (the baseline year) and both future years of assessment; 2021 (the anticipated opening year) and 2036 (the anticipated design year).

6.2.27. A second sensitivity test has also been considered by replacing the Defra EFT NO_x emissions factors for 2021 and 2036 with Air Quality Consultants (AQC) Ltd.'s '*Calculator Using Realistic Emissions for Diesels (CURED) V3A*' (Ref. 6.5). The CURED tool has been developed to address the uncertainties associated with future vehicle emissions of NO_x from diesel vehicles.

6.2.28. The results for dispersion modelling based on emissions factors derived in both sensitivity tests have been calculated and provided in Section 6.6.

Conversion of NO_x to NO_2

6.2.29. Road contributions of NO_x (road-NO_x) have been predicted using the ADMS-Roads model. The proportion of road-NO_x predicted to be converted to NO_2 at the identified receptor locations has been derived using the NO_x to NO_2 calculator version 7.1 (Ref. 6.6), as provided by Defra.

Background Pollutant Concentrations

6.2.30. Background pollutant concentration data for NO_x, NO_2, PM_{10} and $PM_{2.5}$ have been obtained from the Defra UK-Air website (Ref. 6.7).

6.2.31. Estimated background concentrations are available for all years between 2017 and 2030. The maps assume that background concentrations will improve (reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources.

6.2.32. Due to the uncertainty discussed above, and in line with the findings of many local authorities that measured concentrations have not reduced as anticipated, a sensitivity analysis in regard to holding background concentrations for 2018 have been provided within the assessment for the respective modelling scenarios. This is combined with holding the vehicle exhaust emissions (see paragraph 6.2.26) to 2018 factors.

6.2.33. It should be noted that for NO_x, PM_{10} and $PM_{2.5}$, the background maps present both the 'total' estimated concentrations and the individual contributions from a range of emission sources such as motorways, industry, and rail, in addition to particulates from vehicle braking, tyre and road abrasion.

6.2.34. When detailed dispersion modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. However, for this assessment the total background concentrations have been applied to provide a conservative approach.

6.2.35. With regard to model verification, contributions relating to the 'in sources' for road transport sectors were removed from the mapped national background NO_x concentrations encompassing the monitoring locations used in the model adjustment process. The NO_2 adjustment for NO_X Sector Removal Tool (Ref. 6.8) was used to derive the revised NO_2 background concentrations for use in the model verification exercise (see **Appendix 6.3**).

Model Verification

6.2.36. The ADMS-Roads dispersion model has been widely validated for this type of assessment and is fit for purpose. Model validation undertaken by the software developer will not have included validation near the application site.

6.2.37. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the results and was carried out in accordance with the methodology specified in Defra's Local Air Quality Management Technical Guidance document LAQM.TG16 (Ref. 6.9).

6.2.38. Details of the verification factor calculations and application are presented in **Appendix 6.3**.

Treatment of Predicted Concentrations

6.2.39. To enable comparison with the relevant annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$ (see **Appendix 6.4**), it is necessary to combine the model output data with the annual mean background concentrations.

6.2.40. To consider compliance with the hourly mean air quality objective for NO_2, LAQM.TG16 (Ref. 6.9) states that in locations where the annual mean NO_2 concentration exceeds 60 µg/m^3 then the hourly mean objective may be exceeded. Where annual mean concentrations are less than 60 µg/m^3, then exceedance of the hourly mean air quality objective can be treated as being unlikely.

6.2.41. To consider compliance with the 24-hour mean air quality objective for PM_{10}, LAQM.TG16 (Ref. 6.9) gives the following equation that relates the annual mean concentration to the number of exceedances of the 24-hour mean concentration of 50 µg/m^3, where up to 35 exceedances are allowed:

- *No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean^3 + (206/annual mean)*

SIGNIFICANCE CRITERIA

Construction Phase

6.2.42. The significance of effects associated with dust and particulate generated from on-site construction activities has been determined through professional judgement and the application of the IAQM assessment methodology, which is summarised in **Appendix 6.2**.

6.2.43. The IAQM guidance (Ref. 6.1) regarding determination of the significance of effect has been followed, where:

"IAQM recommends that significance is only assigned to the effect after considering the construction activity with mitigation. It is, therefore, important that the mitigation measures are defined in a form suitable for implementation by way of a planning condition or legal obligation within a section 106 agreement and are included in a DMP or a more general Code of Construction Practice or Construction Environmental Management Plan (CEMP)."

"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'."

Operational Phase

6.2.44. The approach provided in the joint EPUK / IAQM guidance (Ref. 6.2) has been used within this assessment to assist in describing the air quality effects generated by the Proposed Development once operational.

6.2.45. This 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 6-3**.

Table 6-3 – EPUK / IAQM Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration relative to AQAL			
	1	2 - 5	6 - 10	More than 10
75 % or less than AQAL	Negligible	Negligible	Slight	Moderate
76-94 % AQAL	Negligible	Slight	Moderate	Moderate
95-102% AQAL	Slight	Moderate	Moderate	Substantial
103-109% AQAL	Moderate	Moderate	Substantial	Substantial
More than 110% of AQAL	Moderate	Substantial	Substantial	Substantial

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives. Where the % change in concentrations is less than 0.5%, the change is described as 'negligible' regardless of concentration. When defining the concentration as a percentage of the AQAL, 'without Proposed Development' concentration should be used where there is a decrease in pollutant concentration and the 'with Proposed Development' concentration where there is an increase

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

6.2.46. The joint EPUK / IAQM guidance (Ref. 6.2) notes that the criteria in **Table 6-3** should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for.

6.2.47. The joint EPUK / IAQM guidance (Ref. 6.2) states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

6.2.48. The joint EPUK / IAQM guidance (Ref. 6.2) states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO_2 concentrations or daily mean PM_{10} concentrations. The significance of effects of hourly mean NO_2 and daily mean PM_{10} concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.

6.2.49. The joint EPUK / IAQM guidance (Ref. 6.2) outlines the judgement of significance below:

"One of the relevant factors in the judgement of the overall significance of effect may relate to the potential for cumulative impacts and, in such circumstances, several impacts that are described as 'slight' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health."

EFFECT SIGNIFICANCE

6.2.50. The following terms have been used to define the significance of the effects identified and apply to both beneficial and adverse effects.

Construction Phase

6.2.51. The following terms have been defined, based on the level of risk determined as part of the IAQM Construction Dust guidance (Ref. 6.1) to describe the significance of effect.

- **Major effect:** where the Proposed Development could be expected to have a very significant effect (either beneficial or adverse) on receptors (e.g. a high risk of human impacts or dust soiling);
- **Moderate effect:** where the Proposed Development could be expected to have a noticeable effect (either beneficial or adverse on receptors (e.g. a medium risk of human impacts or dust soiling);
- **Minor effect:** where the Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) on receptors (e.g. a low risk of human impacts or dust soiling); and,
- **Negligible:** where no discernible effect is expected because of the Proposed Development on receptors (e.g. a negligible risk of human health impacts or dust soiling).

Operational Phase

6.2.52. The following terms have been defined, based on the magnitudes of impact descriptors (see **Table 6-3**) provided in the joint EPUK / IAQM guidance (Ref. 6.2) to describe the significance of effect.

- **Substantial effect**: where the Proposed Development could be expected to cause a substantial magnitude of change (either beneficial or adverse) to annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at existing sensitive locations (such as residential dwellings or schools);
- **Moderate effect:** where the Proposed Development could be expected to cause a moderate magnitude of change (either beneficial or adverse) to annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at existing sensitive locations;
- **Minor effect:** where the Proposed Development could be expected to cause a slight magnitude of change (either beneficial or adverse) to annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at existing sensitive locations; and,
- **Negligible:** where no discernible effect is expected because of the Proposed Development on receptors (e.g., a negligible magnitude of change to annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing sensitive locations).

6.2.53. As set out in **Chapter 5: Approach to EIA**, effects that are classified as **moderate or above** are considered to be **significant**. Effects classified as below **moderate** are considered to be **not significant**.

6.3. BASELINE CONDITIONS

6.3.1. This section presents a summary of baseline conditions, presented for each of the respective two local authorities which the study area spans; St. Helens Council and Warrington Borough Council.

ST. HELENS COUNCIL

Local Air Quality Management

6.3.2. A review of the latest LAQM review and assessment report published by St. Helens Council (Ref. 6.10) confirmed that four Air Quality Management Areas (AQMAs) have been declared within their administrative area. However, the application site is not situated within an AQMA.

6.3.3. The following narrative is presented from the 2019 Annual Status Report (Ref. 6.10):

- No new exceedances of national air quality objectives have been identified within the Borough;
- The monitored data for 2018 shows air quality to be improving at most locations, which remains in line with the trend reported over the past five years; and,
- Levels of particulate matter (PM_{10}) has increased slightly during 2018 from 16 µg/m^3 to 18 µg/m^3.

6.3.4. St. Helens Council published an Air Quality Action Plan in 2013 (Ref. 6.11). This document proposes a series of measures to reduce NO_2 concentrations specific to the individual AQMAs, where appropriate.

6.3.5. The objectives of the Air Quality Action Plan (Ref. 6.11) are outlined below:

- To reduce the levels of NO_2 and improve the local air quality in pursuit of the UK annual objective for nitrogen dioxide which is currently exceeded in the AQMAs;
- Contribute to the health and wellbeing of the local community by reducing air pollution in St. Helens;
- Engage the community and raise more awareness of air quality issues and the impact that the local community can have during their everyday activities; and,
- Enable and encourage the public to utilise a more sustainable transport mean whenever possible.

6.3.6. A number of direct measures are identified within the 2019 Annual Status Report (Ref. 6.10) that are intended to improve local air quality and compliment the Air Quality Action Plan (Ref. 6.11). These measures include:

- Green council fleet;
- Travel awareness campaign for businesses within the borough;
- Implementation of the SCOOT system to optimise flow on key routes;
- Increasing number of electric vehicle charging points; and,
- New planning policy in place for air quality encouraging developers to make air quality a priority and consider offsetting measures within developments.

Air Quality Monitoring in St. Helens

6.3.7. According to the 2019 Annual Status Report (Ref. 6.10), St. Helens Council carried out automatic (continuous) monitoring at four sites and non-automatic (passive) monitoring at 33 sites during 2018.

6.3.8. The 2019 Annual Status Report (Ref. 6.10) states that, *"The national objective is being met at all locations apart from one located on the façade of a terraced house on Borough Road. There are no exceedances of the 60 µg/m^3 which indicates that the 1-hour mean objective is not being exceeded at any locations within the Borough."*

Continuous Monitoring

6.3.9. There are no continuous monitoring stations situated within 3 km of the application site.

Passive Monitoring

6.3.10. Annual mean concentrations of NO_2 for 2017 and 2018 from passive diffusion tube monitoring sites that are situated within 3 km of the application site boundary are provided in **Table 6-4** and presented in **Figure 6-1**.

Table 6-4 – St. Helens Council NO_2 Annual Mean Diffusion Tube Data – 2017 & 2018

Site ID	Location	Site Type	Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)	
			X	Y	2017	2018
T13	22 Union Bank Lane	Roadside	352391	390301	24.6	24.4
T30	4 Union Bank Lane	Roadside	352262	390226	22.8	20.7

Source: St. Helens Council 2019 Annual Status Report (Ref. 6.10)

6.3.11. The results presented in **Table 6-4** indicate that the annual mean NO_2 objective was not exceeded at both identified locations within 3 km of the application site boundary. Both locations are situated adjacent to residential properties along Union Bank Lane, in proximity to the M62. Both monitoring sites are positioned approximately 50 m (T13) and 95 m (T30) to the south of the hard shoulder of the M62.

WARRINGTON BOROUGH COUNCIL

Local Air Quality Management

6.3.12. A review of the latest LAQM review and assessment report published by Warrington Borough Council (Ref. 6.12) confirmed that two AQMAs have been declared within their administrative area. The north east corner of the application site is bounded to the 'Motorway AQMA' which is described as:

- *A 50 m continuous strip on both sides of the M6, M62 and M56 corridors, due to the potential exceedances of the annual mean NO_2 objective.*

6.3.13. The following narrative is presented from the 2019 Annual Status Report (Ref. 6.12):

- Air quality levels in 2018 for NO_2 have marginally improved when compared to the levels observed in 2017. The majority of Warrington has good air quality and meets the national objectives; and,
- Concentrations have further reduced at some locations within AQMAs to below the national standards. There remain some areas though, close to major roads, where NO_2 levels are still high and exceed the limits.

6.3.14. The Warrington Air Quality Action Plan (Ref. 6.13) was formally adopted in April 2018. The main priority is to try to tackle the exceedances of NO_2 and to improve air quality generally, within the AQMAs and across the wider borough.

6.3.15. Warrington Borough Council has developed 17 initial actions that can be considered under three key delivery topics: policy; infrastructure; and additional measures such as sustainable travel use, school and workplace travel advice and active travel plans within their Air Quality Action Plan (Ref. 6.13).

Air Quality Monitoring in Warrington

6.3.16. According to the 2019 Annual Status Report (Ref. 6.12) Warrington Borough Council carried out automatic (continuous) monitoring at three sites and non-automatic (passive) monitoring at 42 sites during 2018.

6.3.17. The 2019 Annual Status Report (Ref. 6.12) states that, "*Air quality levels in 2018 have marginally improved compared to those observed in 2017 for NO_2, PM_{10} and for $PM_{2.5}$. Whilst some locations within AQMAs have reduced to below the objective level in 2018, it is important to consider the longer-term trend to take into account annual fluctuations due to meteorological conditions. While levels have reduced there remain some locations areas within current AQMAs that still exceed the national objectives for NO_2.*"

Continuous Monitoring

6.3.18. There are no continuous monitoring stations situated within 3 km of the application site.

Passive Monitoring

6.3.19. Annual mean concentrations of NO_2 for 2017 and 2018 from passive diffusion tube monitoring sites that are situated within 3 km of the application site boundary are provided in **Table 6-5** and presented in **Figure 6-1**.

Table 6-5 – Warrington Borough Council NO_2 Annual Mean Diffusion Tube Data – 2017 & 2018

Site ID	Location	Site Type	Grid Reference		Annual Mean NO_2 (µg/m^3)	
			X	Y	2017	2018
DT16	WA86 – Old Liverpool Road 5	Roadside	357765	387908	34.9	27.2

Source: Warrington Borough Council 2019 Annual Status Report (Ref. 6.12)

6.3.20. The results presented in **Table 6-5** indicate that the annual mean NO_2 objective was not exceeded at the DT16 / WA86 monitoring location.

6.3.21. The monitoring location is situated at a residential area in the Sankey Bridges area of Warrington and is positioned approximately 3 km to the south east of the application site boundary. The monitoring site is situated approximately 1.6 km to the west of the 'Warrington AQMA'.

LOCAL EMISSION SOURCES

6.3.22. The application site is in an area where ambient NO_2, PM_{10} and $PM_{2.5}$ concentrations are mainly influenced by local road transport emissions from vehicles using the local road network, such as Burtonwood Road, Whittle Avenue and the M62.

BACKGROUND POLLUTANT CONCENTRATIONS

6.3.23. Defra provides mapped estimates of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ across the UK at a grid resolution of 1 km x 1 km, covering each year from 2017 to 2030 (Ref. 6.7).

6.3.24. Future year projections have been developed on a base year for the background maps, which is currently 2017. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2017 UK monitoring and meteorological data.

6.3.25. The background NO_x, NO_2, PM_{10} and $PM_{2.5}$ annual mean concentrations for the 1 km x 1 km grid squares encompassing the Proposed Development and surrounding area are provided in **Appendix 6.5**. The data are provided in for the assessment base year (2018), the future operational year (2021), and the latest available year of 2030 (in lieu of the design year of 2036).

6.3.26. The reported background pollutant concentrations are observed to be below the respective annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$ in all years assessed.

PREDICTED BASELINE ASSESSMENT

6.3.27. A baseline modelling exercise has been carried out for the Proposed Development, accounting for the identified sensitive receptor locations included in the operational phase assessment (see Section 6.4). The modelling has been carried out for a base year (2018), for which local authority data were available to facilitate model verification.

6.3.28. A summary of the assessment results is provided below. The results of the baseline modelling assessment are presented in **Appendix 6.6**.

Annual and Hourly Mean NO_2 Concentrations

6.3.29. In the 2018 baseline model scenario, two considered receptors (R9, Union Bridge Farm, Finger House Lane and R12, Travelodge, Apollo Park, Westbrook) are predicted to be in exceedance of the annual mean NO_2 objective, with respective concentrations of 41.7 µg/m^3 and 40.5 µg/m^3.

6.3.30. All other predicted concentrations for the modelled existing receptor locations are below the annual mean air quality objective of 40 µg/m^3, ranging between 16.2 µg/m^3 and 39.5 µg/m^3.

6.3.31. All modelled receptors are predicted to experience an annual mean NO_2 concentration of less than 60 µg/m^3. Therefore, with reference to LAQM.TG16 (Ref. 6.9), exceedances of the hourly mean NO_2 objective are unlikely to occur in the 2018 baseline modelling scenario.

Annual and Daily Mean PM_{10} Concentrations

6.3.32. Predicted annual mean concentrations of PM_{10} range between 11.1 µg/m^3 and 16.2 µg/m^3 in the 2018 baseline scenario.

6.3.33. The modelling indicates that the maximum number of days of exceedance is less than three days for all modelled receptors in 2018, which is below the daily mean objective.

Annual Mean $PM_{2.5}$ Concentrations

6.3.34. In the 2018 modelled baseline scenario, annual mean $PM_{2.5}$ concentrations are below the air quality objective of 25 µg/m^3 at all modelled receptors, ranging between 7.5 µg/m^3 to 10.2 µg/m^3.

FUTURE BASELINE

6.3.35. Pollutant concentrations will vary in the future when compared to the baseline scenario, because of projected improvements in vehicle emissions and variations in traffic distribution across the road network, both because of the implementation of new policies and strategies, potential new road schemes for the area, changing attitudes towards driving, and improvements in fuel and vehicle technology.

6.3.36. As part of the operational phase assessment, the future air quality without the Proposed Development (described as the Do Minimum scenario) in both the opening year (2021) and design year (2036) has been considered.

6.3.37. A summary of the assessment results for the future baseline scenario is provided below. The results are presented in **Appendix 6.6**.

Annual and Hourly Mean NO_2 Concentrations

6.3.38. In the 2021 Do Minimum model scenario, annual mean NO_2 concentrations meet the air quality objective at all modelled existing receptor locations, ranging between 14.2 µg/m^3 and 35.9 µg/m^3.

6.3.39. In the 2036 Do Minimum model scenario, all receptors are below the annual mean NO_2 objective, which range between 10.6 µg/m^3 and 21.7 µg/m^3.

6.3.40. All modelled receptors are predicted to experience an annual mean NO_2 concentration of less than 60 µg/m^3. Therefore, with reference to LAQM.TG16 (Ref. 6.9), exceedances of the hourly mean NO_2 objective are unlikely to occur in both the 2021 Do Minimum and 2036 Do Minimum modelling scenarios.

Annual and Daily Mean PM_{10} Concentrations

6.3.41. Predicted annual mean concentrations of PM_{10} range between 10.9 µg/m^3 and 15.8 µg/m^3.

6.3.42. In the 2036 Do Minimum scenario, predicted annual mean concentrations of PM_{10} range between 10.5 µg/m^3 and 15.4 µg/m^3.

6.3.43. All predicted concentrations are below the annual mean objective for both the 2021 Do Minimum and 2036 Do Minimum model scenarios.

6.3.44. The modelling indicates that the maximum number of days of exceedance is up to three for all considered receptors in 2021 and 2036, which is below the daily mean objective.

Annual Mean $PM_{2.5}$ Concentrations

6.3.45. In both the 2021 Do Minimum and 2036 model scenarios, annual mean $PM_{2.5}$ concentrations are below the air quality objective at all modelled receptors. The modelled concentrations range from 7.3 µg/m^3 to 9.7 µg/m^3 for the 2021 Do Minimum scenario and between 7.0 µg/m^3 and 9.3 µg/m^3 in the 2036 Do Minimum scenario.

6.4. SENSITIVE RECEPTORS

6.4.1. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and PM_{10} exposure because of on-site construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development.

CONSTRUCTION PHASE

6.4.2. The IAQM construction phase air quality assessment focusses on the following sensitive locations:

- ‘human receptors’ within 350 m of the application site boundary, or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the application site entrance(s).

6.4.3. It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

6.4.4. Details of the approximate number of respective sensitive receptors that have the potential to experience fugitive dust nuisance within 350 m of the Proposed Development extent is presented in **Table 6-6**.

Table 6-6 – IAQM Construction Dust Assessment – Distance of receptors from the Application Site

Distance to Application Site Boundary	Approximate Number of Receptors	Type of Receptors
Up to 20 m	None	-
Between 20 m – 50 m	Less than 10	Workplace, Nursery
Between 50 m – 100 m	Less than 10	Workplace, Nursery
Between 100 m – 200 m	Between 10 – 100	Workplace, Nursery,
Up to 350 m	Between 10 – 100	Workplace, Nursery, Residential

6.4.5. **Figure 6-2** presents the sensitive receptor locations within 350 m of the application site boundary and **Figure 6-3** presents the sensitive receptor locations within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the application site entrance(s).

OPERATIONAL PHASE

6.4.6. In terms of locations that are sensitive to pollutants emitted from road vehicle exhausts, these will include places where members of the public are likely to be regularly present over the period prescribed in the Air Quality Strategy (Ref. 6.14).

6.4.7. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15-minute mean or hourly mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) may be more appropriate.

6.4.8. Box 1.1 of LAQM.TG16 (Ref. 6.9) provides examples of the locations where the air quality objectives should/should not apply. All identified sensitive receptors are treated with the same level of sensitivity.

6.4.9. The receptor locations considered representative of potential exposure for the local air quality assessment are shown below in **Table 6-7** and illustrated in **Figure 6-4**, based upon relevant exposure locations outlined within Box 1.1 of LAQM.TG16 (Ref. 6.9).

6.4.10. Receptors were identified by using Ordnance Survey Open Data Mapping sources within a Geographical Information System (GIS) platform.

Table 6-7 – Considered Sensitive Receptors – Operational Phase Assessment

Receptor	Location	OS X Grid Ref (m)	OS Y Grid Ref (m)
R1	37 Partisan Green, Westbrook, Warrington WA5 7AA	357222.6	390965.4
R2	60 Coppice Green, Westbrook, Warrington WA5 7WA	357303.7	390305.5
R3	19 Heralds Green, Westbrook, Warrington WA5 7WT	357257.4	390674.1
R4	6 Calf Hey, Great Sankey, Warrington WA5 3XT	356052.6	390008.4

Receptor	Location	OS X Grid Ref (m)	OS Y Grid Ref (m)
R5	20 Trentham Gardens, Great Sankey, Warrington, WA 3XW	356130.9	389915.7
R6	65 Tourney Green, Westbrook, Warrington WA5 7XL	357257.4	390707.2
R7	29 Swinfen Lake, Great Sankey, Warrington, WA5 3YN	356174.1	389779.8
R8	5 Bushells Farm, Joy Lane, Widnes WA8 3TR	353155.8	390659.4
R9	Union Bridge Farm, Finger House Lane, Bold Heath WA8 3XF	352699.5	390404.5
R10	24 Union Bank Lane, Widnes, WA8 5XB	352404.8	390308.5
R11	1 Union Bank Lane, Widnes, WA8 5XB	352247.9	390218.0
R12	Travelodge, Apollo Park, Westbrook, Warrington, WA5 7YA	357606.4	391216.3

6.4.11. The sensitive receptors identified in **Table 6-7** represent conservative locations situated adjacent to the traffic network considered for this assessment. In addition to highly sensitive receptors (e.g. residential dwellings), the model also includes a receptor at a hotel property. This receptor (R12) has been selected as the receptor is located in close proximity to an existing AQMA (see **Section 6.3**) and is an area where short term exposure will be more prevalent (Ref. 6.9).

6.4.12. Receptors have been modelled at a height of 1.5 m to be representative of human exposure.

6.5. LEGISLATIVE FRAMEWORK, POLICY AND GUIDANCE

LEGISLATIVE FRAMEWORK

6.5.1. Details of the relevant legislation, policy and guidance notes used for the air quality assessment are provided in **Appendix 6.7**. The applicable legislative framework is summarised as follows:

- The Air Quality Strategy for England; Scotland, Wales and Northern Ireland, 2007 (Ref. 6.14);
- Directive 2008/50/EC of the European Parliament on Ambient Air Quality, 2008 (Ref. 6.15);
- Part IV of the Environment Act, 1995 (Ref. 6.16);
- Environmental Protection Act, 1990 (Ref. 6.17);
- The Air Quality (England) Regulations 2000. 2000 SI 2000/928 (Ref. 6.18);
- The Air Quality (England) (Amendment) Regulations 2002. 2002 SI 2002/3043 (Ref. 6.19); and,
- The Air Quality Standards (Amendment) Regulations 2010, as amended 2016. 2016 SI 2016/1184 (Ref. 6.20).

NATIONAL POLICY

- Clean Air Strategy, 2019 (Ref. 6.21); and,
- National Planning Policy Framework (NPPF), 2019 (Ref. 6.22);

LOCAL POLICY

- St. Helens Local Plan Core Strategy, 2012 (Ref. 6.23);
- St. Helens Borough Local Plan Submission Draft, 2019 (Ref. 6.24);
- Warrington Local Plan Core Strategy, 2014 (Ref. 6.25); and,
- Warrington Proposed Submission Version Local Plan 2017 – 2037 (Ref. 6.26).

GUIDANCE

- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control: Planning for Air Quality, 2017 (Ref. 6.2);
- IAQM Guidance on the assessment of dust from demolition and construction, 2016 (Ref. 6.1);
- Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG16), 2016 (Ref. 6.9); and,
- Air Quality Consultants Ltd (AQC) Calculator Using Realistic Emissions for Diesel (CURED) methodology (Ref. 6.5).

6.6. ASSESSMENT OF POTENTIAL EFFECTS, MITIGATION AND RESIDUAL EFFECTS

CONSTRUCTION PHASE

Dust and Particulate Matter arising from On-Site Activities

6.6.1. Construction activities that have the potential to generate and/or re-suspend dust and particulate matter include:

- Site clearance and preparation;
- Preparation of temporary access/egress to the application site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic to, from and within the application site confines (including excavators and dumper trucks);
- Construction of the Proposed Development and additional road surface and car parking to facilitate the Proposed Development;
- Internal and external finishing; and,
- Site landscaping after completion.

6.6.2. The main potential air quality impacts that may arise from those activities are:

- Dust deposition, resulting in the soiling of surfaces; and,
- Dust plumes, affecting visibility and amenity.

6.6.3. Many of the releases are likely to occur during the 'working week'. However, for some potential release sources (for example, exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

6.6.4. **Appendix 6.2** contains the potential dust emission magnitudes, the sensitivity of the study area and the subsequent summary dusk risk table used to determine site specific mitigation, pertinent to the Proposed Development.

Potential Dust Emission Magnitude

6.6.5. The IAQM assessment methodology (Ref. 6.1, see **Appendix 6.2**) has been used to determine the potential dust emission magnitude for the following different dust and PM_{10} sources: earthworks, construction and trackout. The findings of the assessment are presented below.

6.6.6. Earthworks undertaken prior to construction would mainly involve the excavation of topsoil and subsoil from excavation and working zones. The soil would be removed and then stored separately

within designated stockpile areas. The total area covered within the application site boundary is more than 10,000 m^2, which falls within the IAQM range for 'large' sites (Ref. 6.1). Not all of the application site is to be excavated or levelled and it is assumed that appropriate landscaping work will be undertaken post-construction.

6.6.7. The total mass of material that will be moved is estimated to be more than 100,000 tonnes given the overall size of the application site. It is also estimated that between 5 and 10 heavy earth moving vehicles will be active at any one time. To be conservative, the potential dust emission magnitude is defined as 'large' for earthwork activities.

6.6.8. The construction of the Proposed Development is likely to exceed a total building volume of 100,000 m^3. The material used to construct the Proposed Development is anticipated to contain metal cladding, timbers and other sources of material with low potential for dust release. New road surfaces are to be in place around the Proposed Development, comprising asphalt or bitumen-bound mineral aggregate. The dust emission magnitude is therefore defined as 'large' for construction activities.

6.6.9. No detailed construction traffic information has been provided to date and so the potential dust emission magnitude for trackout is based on professional judgement. Construction traffic is anticipated to access the application site via A3280 Skyline Drive, with the number of maximum HDV movements conservatively assumed to be more than 50 per day, for the duration of the construction phase.

6.6.10. There is less than 50 m of unpaved road given the proximity of the Proposed Development to the existing road network, and its nature. To be conservative, the potential dust emission magnitude is therefore defined as 'large' for trackout activities.

Sensitivity of Study Area

6.6.11. A wind rose generated using the 2018 meteorological data from Rostherne is presented in **Appendix 6.3**. This shows that the prevailing wind directions are from the south and north west. Therefore, receptors located to north and south east of the application site boundary are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

6.6.12. Under low wind speed conditions, it is likely that fugitive dust emissions would be predominantly deposited in the area immediately surrounding the source.

6.6.13. There are no sensitive receptor locations identified within 20 m of the application site boundary. There are less than 10 sensitive receptors identified up to 100 m of the application site boundary and between 10 to 100 receptors identified within 350 m. The majority of these are designated for office or business park use. Stepping Stones Day Nursery is situated within 50 m of the eastern boundary of the application site.

6.6.14. Overall, there are between 10 to 100 receptors situated within 350 m of the application site boundary. The vast majority of these receptors are classified at a medium sensitivity (Ref. 6.1) given their designations as 'places of work'. There is one highly sensitive receptor identified within 50 m (Stepping Stones Day Nursery).

6.6.15. The annual mean PM_{10} background concentration for the 1 km x 1 km grid squares encompassing the Proposed Development range between 10.2 µg/m^3 and 13.8 µg/m^3 in 2021 (see **Appendix 6.5**), which is well below the annual mean objective (40 µg/m^3).

6.6.16. Construction traffic is anticipated to access the application site from Skyline Drive and Omega Boulevard. Receptors situated in proximity to these road links are the most likely to be affected by trackout dust emission, given these will be part of the expected primary route for construction traffic.

6.6.17. The construction phase dust distance buffer zones with reference to the construction and earthworks phases are presented in **Figure 6-2** and regarding trackout is illustrated in **Figure 6-3**.

6.6.18. Taking the above into account and following IAQM assessment methodology (Ref. 6.1), for all activities, the sensitivity of the surrounding area is adjudged to be *'low'* with respect to dust soiling and human health effect.

Risk of Impacts

6.6.19. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. The risk category identified for each construction activity has been used to determine the level of mitigation required.

6.6.20. Based on the criteria detailed in the IAQM construction dust guidance (Ref. 6.1), the application site would be categorised overall as *Low Risk.*

6.6.21. Based on the criteria specified in paragraph 6.2.51, there is the potential for effects of **minor adverse** significance with regards to dust soiling and of human health effects. Therefore, in the absence of mitigation there is likely to be a direct, temporary, short-term adverse effect on nearby sensitive receptor locations of **minor** significance prior to the implementation of mitigation measures, which is considered to be **not significant**.

Mitigation

6.6.22. Recommended mitigation measures are described in **Appendix 6,2**. These measures would form part of the Construction Environmental Management Plan, which would be adopted by planning condition and implemented by the appointed Contractor.

Residual effects

6.6.23. The residual effects of dust and particulate matter (PM_{10} & $PM_{2.5}$) generated by construction activities will be direct, temporary and short-term and of **negligible** significance following the implementation of mitigation measures, which is considered to be **not significant**.

OPERATIONAL PHASE

Road Vehicle Exhaust Emissions - Assessment against 'Future Baseline'

With Defra Vehicle Emissions Factors (EFT V9.0)

Annual Mean NO_2 Concentrations

6.6.24. The air quality objective for annual mean NO_2 is 40 µg/m^3. The results of the assessment show that in the opening year (2021), predicted concentrations at all modelled receptors are below the air quality objective both without and with the Proposed Development in operation.

6.6.25. Receptor R9 (Union Bridge Farm, Finger House Lane) is predicted to experience the maximum annual mean NO_2 value of 36.1 µg/m^3 and is situated approximately 1.4 km from the application site boundary.

6.6.26. The greatest increase in annual mean NO_2 concentration between the Do Minimum and Do Something scenarios in 2021 is predicted at receptor R5 (20 Trentham Gardens, Great Sankey) with

a concentration change of 0.3 µg/m^3, from 15.9 µg/m^3 to 16.2 µg/m^3. This impact equates to a *negligible* magnitude of change.

6.6.27. In the design year (2036), predicted concentrations at all of the considered receptors are below the air quality objective both without and with the Proposed Development in operation. Receptor R9 (Union Bridge Farm, Finger House Lane) is predicted to experience the maximum annual mean NO_2 value of 21.7 µg/m^3.

6.6.28. The greatest increase in annual mean NO_2 concentration between the Do Minimum and Do Something scenarios in the design year is predicted at receptor R5 (20 Trentham Gardens, Great Sankey), with a concentration change of 0.1 µg/m^3, from 11.4 µg/m^3 to 11.5 µg/m^3. This impact equates to a *negligible* magnitude of change.

Hourly Mean NO_2 Concentrations

6.6.29. The annual mean NO_2 concentrations predicted by the model in the Do Minimum and Do Something scenarios for the opening year (2021) and design year (2036) were below 60 µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the respective air quality objective (Ref. 6.9).

Annual Mean PM_{10} Concentrations

6.6.30. The air quality objective for annual mean PM_{10} is 40 µg/m^3. The results of the assessment show that in the opening year (2021) and design year (2036), predicted concentrations at existing receptors are well below the air quality objective in both the Do Minimum and Do Something scenarios.

6.6.31. The maximum predicted PM_{10} annual mean concentration with the implementation of the Proposed Development in 2021 is 15.8 µg/m^3 at receptor R8 (5 Bushells Farm, Joy Lane).

6.6.32. The greatest increase in annual mean PM_{10} concentration between the Do Minimum and Do Something scenarios in 2021 is predicted at receptor R5 (20 Trentham Gardens, Great Sankey) with a concentration change of 0.1 µg/m^3, from 11.3 µg/m^3 to 11.4 µg/m^3. This impact equates to a *negligible* magnitude of change.

6.6.33. The maximum predicted PM_{10} annual mean concentration with Proposed Development in operation in 2036 is 15.4 µg/m^3 at receptor R8 (5 Bushells Farm, Joy Lane).

6.6.34. The greatest increase in annual mean NO_2 concentration between the Do Minimum and Do Something scenarios in the design year is predicted at receptor R12 (Travelodge, Apollo Park, Westbrook), with a concentration change of 0.1 µg/m^3, from 14.7 µg/m^3 to 14.8 µg/m^3. This impact equates to a *negligible* magnitude of change.

6.6.35. All other modelled receptors are predicted to experience a *negligible* magnitude of change with the Proposed Development in operation in both 2021 and 2036.

Daily Mean PM_{10} Concentrations

6.6.36. The air quality objective for daily mean PM_{10} concentrations is 50 µg/m^3, to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that several receptors will experience concentrations greater than 50 µg/m^3 up to three times a year in the opening year (2021) and the design year (2036).

6.6.37. The daily mean objective is not predicted to be exceeded in all considered scenarios.

Annual Mean $PM_{2.5}$ Concentrations

6.6.38. The air quality objective for annual mean $PM_{2.5}$ is 25 µg/m^3. The results of the assessment show that in the opening year (2021) and design year (2036), predicted concentrations at sensitive receptors are below the air quality objective.

6.6.39. Receptor R9 (Union Bridge Farm, Finger House Lane) is predicted to experience a maximum annual mean $PM_{2.5}$ concentration of 9.7 µg/m^3 in 2021 and 9.3 µg/m^3 in 2036. The receptor is predicted to experience a *negligible* impact.

6.6.40. All other modelled receptors are predicted to experience a *negligible* magnitude of change due to the operation of the Proposed Development in both 2021 and 2036, with changes of less than 0.1 µg/m^3 predicted in the opening and design years of assessment.

Significance

6.6.41. The relevant air quality objectives for NO_2, PM_{10} and $PM_{2.5}$ are predicted to be met at all receptor locations considered in the assessment for the opening year (2021) and design year (2036). Annual mean concentrations between the opening year and design year are predicted to decrease between years because the anticipated improvements in both vehicle emissions and background pollutant concentrations.

6.6.42. The impacts of the Proposed Development on nearby sensitive receptors are predicted to be *negligible* at all considered receptor locations in regard to annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations. The short-term air quality objectives are also predicted to be met.

6.6.43. Therefore, the predicted local air quality effect associated with the operation of the Proposed Development is **not significant**.

Sensitivity Testing

With Defra Vehicle Emissions Factors and Background Concentrations held for 2018

6.6.44. In holding the Defra emissions factors and background pollutant concentrations to base year (2018) levels, one receptor (R12, Travelodge, Apollo Park) is predicted to experience a *moderate adverse* impact in the opening year (2021) and design year (2036).

6.6.45. The same receptor is predicted to experience an increase of annual mean NO_2, from 42.3 µg/m^3 to 42.7 µg/m^3 in the opening year (2021) and from 43.5 µg/m^3 to 43.8 µg/m^3 in the design year (2036). As such, this receptor is predicted to remain in exceedance in both scenarios for the opening year (2021) and design year (2036), when the emissions and backgrounds are held at 2018 levels.

6.6.46. The receptor is situated approximately 2.2 km from the application site boundary and is contained within the Warrington 'Motorway AQMA' boundary. However, given the nature of the property (hotel), occupants are unlikely to be exposed over an annual averaging period.

6.6.47. All other modelled receptor locations are predicted to experience *negligible* impacts in regard to annual mean NO_2, PM_{10} and $PM_{2.5}$ as a consequence of holding emission rates and background concentrations to 2018 base year levels.

6.6.48. The respective short-term air quality objectives for NO_2 and PM_{10} are predicted to be met.

6.6.49. With respect to outcomes of this sensitivity test, the local air quality effect associated with the Proposed Development remains as **not significant**.

With CURED 3A emissions factors

6.6.50. With application of the emissions factors as per the CURED V3A methodology (Ref. 6.5), the sensitivity test indicated that all receptor locations considered within the assessment are predicted to experience an increase in total annual mean NO_2 concentrations in the opening year (2021) and design year (2036) scenarios, relative to the assessment concentrations predicted in the main assessment approach (i.e. Defra EFT factors and background levels corresponding to assessed year). However, all impacts are predicted to remain *negligible* in magnitude.

6.6.51. Annual mean NO_2 concentrations range between 14.5 µg/m^3 and 36.6 µg/m^3 in the opening year (2021), and between 11.3 µg/m^3 and 27.3 µg/m^3 in the design year (2036).

6.6.52. The annual mean NO_2 concentrations predicted by the model in the Do Minimum and Do Something scenarios for the opening year (2021) and design year (2036) were below 60 µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the respective air quality objective.

6.6.53. With respect to outcomes of this sensitivity test, the local air quality effect associated with the Proposed Development remains as **not significant**.

Mitigation

6.6.54. The outcomes of the operational phase assessment have demonstrated that with the Proposed Development in operation, the effect of increased road vehicle traffic on local air quality conditions at identified sensitive receptor locations is judged to be **not significant**.

6.6.55. Therefore, it is not considered necessary to specify any mitigation measures in order to reduce impacts on local air quality as a consequence of the operation of the Proposed Development.

Residual effects

6.6.56. Overall, the residual local air quality effect during operation will remain as direct, temporary, and long-term at identified sensitive receptor locations of **negligible** significance, which is considered to be **not significant**.

CUMULATIVE EFFECTS

Construction Phase

6.6.57. As discussed in Section 6.5, there is the potential for adverse impacts from dust and particulate emissions to occur intermittently during the construction phase at sensitive receptors located in proximity to the Proposed Development during construction works.

6.6.58. A Construction Environmental Management Plan will be prepared by the appointed Contractor and will include proposals for site specific mitigation (as presented in **Appendix 6.2**) to manage, mitigate and monitor the main environmental effects of the construction phase, including dust and particulate matter emission from construction activities.

6.6.59. It is envisaged that the construction phases associated with other committed developments in the locality would adhere to the same legislative requirements and best practice principles contained within and implemented through a site-specific Construction Environmental Management Plan.

6.6.60. The cumulative effects at existing locations would therefore be appropriately managed by the respective contractors to avoid the occurrence of significant adverse cumulative effects.

6.6.61. As such, the cumulative effects during the construction phase are therefore considered to be temporary, local and overall **not significant**.

Operational Phase

6.6.62. The assessment examines the impact of road vehicle exhaust emissions generated from additional vehicle movements associated with the Proposed Development.

6.6.63. The traffic data provided by the project transport consultant represents cumulative conditions, including consented development relating to the Omega Warrington area and wider committed developments as agreed with the St. Helens Council and Warrington Borough Council (see **Chapter 12: Transport** and **Chapter 17: Cumulative Effects**).

6.6.64. As such, the results of the air quality assessment completed for the operational phase can be considered to be representative of a cumulative effects assessment, the findings of which are judged to be **not significant**.

6.7. OPPORTUNITIES FOR ENHANCEMENT

6.7.1. Enhancement options selected for a development with regards to air quality should be relevant and appropriate to the type, size and activity of the development and the impacts of the development upon the local community. These may be based on through traffic and travel management or through green infrastructure provision and enhancement.

6.7.2. The joint EPUK and IAQM planning guidance (Ref. 6.2) advises the following good practice principles, relevant to the operation of the Proposed Development, should be considered:

- The provision of at least one Electric Vehicle (EV) 'fast charge' point per 1,000 m^2 of commercial floorspace.

6.7.3. Additional enhancement measures are quoted in the EPUK and IAQM planning guidance (Ref. 6.2), which may be considered relevant to the Proposed Development include:

- Support for and promotion of car clubs for employees; and,
- Improvements to cycling and walking infrastructure.

6.7.4. Other opportunities that may be considered include:

- Inclusion of EV points for freight vehicles, where available.

6.8. LIMITATIONS AND ASSUMPTIONS

CONSTRUCTION PHASE ASSESSMENT

6.8.1. Detailed information regarding the construction traffic movements and nature of construction materials was limited at the time of completing the assessment. Therefore, conservative assumptions have been made regarding the number of HDV movements, construction materials and the level of construction during this phase. These assumptions have been made using professional judgement and experience of developments of a similar size.

OPERATIONAL PHASE ASSESSMENT

6.8.2. There are uncertainties associated with both measured and predicted concentrations of air pollutants. The model (ADMS-Roads) used in this assessment relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself

simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not consider.

6.8.3. To reduce the uncertainty associated with predicted concentrations and provide an evaluation of model performance, a verification exercise has been carried out following guidance set out in LAQM.TG16 (Ref. 6.9) to provide confidence in the results and subsequent outcomes of the assessment. As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations within the measure of uncertainty derived, as reported in **Appendix 6.3**.

6.8.4. The average uncertainty (derived as the root mean square error) of the air quality model equates to 1.0 µg/m^3 for annual mean NO_2 (see **Appendix 6.3**). As such, the modelled receptors that are predicted to experience NO_2 concentrations between 39.0 µg/m^3 and 41.0 µg/m^3 are considered to be at potential risk of exceeding the annual mean objective of 40 µg/m^3. Of the 12 receptor locations included in the assessment, none are predicted to be within this range (see **Appendix 6.6**) with the application of the current Defra EFT and background pollutant concentration projections.

6.8.5. In regard to the sensitivity test with the emissions and background pollutant concentrations held for 2018, three of the 12 considered receptor locations are predicted to be above the annual mean NO_2 objective in both scenarios for the opening and design years of assessment. One receptor (R8, 5 Bushells' Farm, Joy Lane) is within 0.1 µg/m^3 of the upper level of average uncertainty in the opening year of development (2021) and may have the potential to experience NO_2 concentrations that may exceed the annual mean air quality objective within the range of uncertainty (see **Appendix 6.6**) in the opening year (2021).

6.8.6. The CURED sensitivity analysis indicates that none of the considered receptor locations would have the potential to experience NO_2 concentrations that may exceed the annual mean air quality objective within the range of uncertainty identified.

6.8.7. Within the context of model uncertainty, a maximum increase of 0.4 µg/m^3 is predicted with the operation of the Proposed Development through the assessment and two sensitivity tests, which equates to 1 % of the annual mean NO_2 objective. The predicted changes remain the same for each element regardless of the level of model uncertainty identified. As such, the outcomes of the air quality assessment remain valid, with the overall local air quality effect judged to be **not significant**.

6.8.8. Dispersion modelling has been carried out with the use of AADT and associated speed and composition traffic data provided by the project transport consultant. Where applicable, data has been incorporated from the Department for Transport to inform the model verification exercise, where the spatial coverage of the project traffic dataset does not cover.

6.8.9. The speed data contained within the traffic dataset has been adjusted for the approaches of junctions in consideration of the principles outlined in LAQM.TG16 (Ref. 6.9). Road links were split up into smaller sections which has allowed a more accurate definition of speed variance in proximity to those considered junctions.

6.8.10. The background pollutant mapping concentrations have been obtained from the national maps published by Defra (Ref. 6.7). These estimated concentrations are produced on a 1km by 1km grid basis for the whole of the UK and are available from 2017 until 2030. As the design year of assessment is quoted as 2036, background pollutant concentrations were held at 2030 levels.

6.8.11. Sensitive receptor locations have been determined using the Ordnance Survey Open Data mapping sources. There may, in some cases, be residential dwellings which are not yet present within the existing data source or not appropriately identified. Every attempt has been made to identify and consider any such properties for this assessment.

6.9. SUMMARY

6.9.1. An air quality assessment of the effect of the Proposed Development on local air quality has been undertaken with reference to relevant legislation, policy and guidance.

6.9.2. Information on existing air quality conditions has been reviewed and described for the study area. The Proposed Development is situated in an area where emissions to air are primarily related to road transport sources and is adjacent to the main arterial route between Liverpool and Manchester i.e. the M62.

6.9.3. A review of LAQM documentation infers that the Proposed Development is situated in proximity to an AQMA, designated by Warrington Borough Council for exceedances of the annual mean NO_2 objective.

6.9.4. Monitoring data observed in proximity to the Proposed Development indicated that those sites were not in exceedance of the annual mean NO_2 objective.

6.9.5. Background pollutant concentrations considered for use in the assessment are below the respective annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$.

CONSTRUCTION PHASE

6.9.6. A qualitative assessment of the potential impacts on air quality from construction activities has been carried out in accordance with the IAQM methodology (Ref. 6.1). This demonstrated that there is potential for a **minor adverse** effect with regards to dust soiling and human health effects, in the absence of mitigation.

6.9.7. However, the effects of dust and PM_{10} releases would be significantly reduced by the implementation of appropriate mitigation, which would be contained within a Construction Environmental Management Plan, such that the residual local air quality effects would be **not significant**.

OPERATIONAL PHASE

6.9.8. A quantitative assessment has been carried out to assess the air quality impacts during the operation of the Proposed Development at identified sensitive receptors, using an atmospheric dispersion model.

6.9.9. The dispersion model was verified against air quality monitoring data obtained from Warrington Borough Council. The model was used to predict pollutant concentrations associated with vehicle exhaust emissions generated in both the Do Minimum and Do Something scenarios for an opening year (2021) and design year (2036). The results of each scenario were then evaluated to establish the likely change in local air quality due to the operation of the Proposed Development.

6.9.10. In regard to annual mean NO_2, it is predicted that concentrations are below the objective at all existing receptors in 2021 or 2036, with and without the Proposed Development.

6.9.11. All modelled receptors are predicted to be below the respective PM_{10} and $PM_{2.5}$ air quality objectives. This conclusion is consistent with the outcomes of the review and assessment work

completed by St. Helens Council and Warrington Borough Council, which show that exceedances of the PM_{10} objective are unlikely.

6.9.12. On the basis of the operational phase assessment carried out for the Proposed Development, all receptors are predicted to experience negligible impacts, equating to an overall effect on local air quality that is **not significant**.

6.9.13. Two additional sensitivity tests were completed; one which considered the CURED V3A methodology (Ref. 6.5) and one which kept vehicle emissions and background concentrations to those quoted by Defra for year 2018 (Ref. 6.4, Ref. 6.7).

6.9.14. When holding the Defra emission rates and background concentration to baseline (2018) levels, the sensitivity test predicted that all receptors will experience a *negligible* impact with the Proposed Development in operation, with the exception of one receptor. This receptor (R12) is predicted to experience a *moderate adverse* impact in both the opening (2021) and design year (2036). However, the percentage change at this receptor in comparison to the annual mean NO_2 objective is around 1% and the receptor (a hotel) is not considered sensitive with respect to assessing exposure to annual average concentrations. Therefore, the local air quality effect associated with the Proposed Development remains as **not significant**.

6.9.15. The CURED sensitivity test, which takes account higher NO_x emissions than those projected through the Defra EFT, showed that annual and hourly concentrations at existing receptors remained below the respective air quality objectives and associated impacts are predicted to be *negligible* at all existing receptors. Therefore, the local air quality effect associated with the Proposed Development remains as **not significant**.

6.9.16. **Table 6-8** provides a summary of the findings of the assessment.

Table 6-8 – Summary of local air quality effects

Receptor	Potential Effects	Additional Mitigation	Residual Effects	Monitoring
Construction Phase				
Nearby sensitive receptor locations within 350 m of the application site boundary Nearby sensitive receptor locations within 50 m of construction routes, up to 500 m from the application site boundary.	Earthworks, construction & trackout activities on dust and particulate (PM_{10} & $PM_{2.5}$) concentrations	Recommended site-specific mitigation measures, as presented in **Appendix 6.2**	**Negligible (not significant)** T / D / ST	N/A
Operational Phase				
Nearby residential dwellings and other highly sensitive receptors	Effect of Proposed Development-led traffic on NO_2, PM_{10} and $PM_{2.5}$ concentrations	No additional mitigation measures proposed	**Negligible (not significant)** P / D / LT	N/A

Key to table:

P / T = Permanent or Temporary, D / I = Direct or Indirect, ST / MT / LT = Short Term, Medium Term or Long Term, N/A = Not Applicable

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