Extra MSA Group

Warrington Motorway Service Area, J11 M62

Environmental Statement

Part 2 – Air Quality, Odour and Dust Technical

Paper No. 8

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1. Introduction

1.1. Wardell Armstrong LLP has been instructed by Extra MSA Group to undertake an air quality, odour and dust assessment in support of the proposed Warrington Motorway Service Area at Junction 11 of the M62 Motorway.

1.2. The assessment considers the potential air quality and dust impacts of the construction phase, and the air quality impacts of the operational phase of the Proposed Development, at representative sensitive receptors. In addition, the potential odour impacts associated with the nearby Restored Risley Landfill Site are considered for workers during the construction phase, and at sensitive areas of the Proposed Development once it is operational (i.e. at the Hotel and outdoor amenity space/picnic space). The assessment concentrates on road traffic emissions, dust and fine particulate matter, and odour in the construction phase; and road traffic emissions and odour during the operational phase.

1.3. The assessment also considers mitigation to address impacts; and the cumulative effects of other relevant developments in the local area.

2. Documents Consulted

National Air Quality Legislation and Policy

The CAFE Directive

2.1. The European Union (EU) Ambient Air Quality Directive 2008/50/EC[i] (i.e. the CAFE Directive) came into force in June 2008. This EU Directive consolidates previous air quality legislation, with the exception of the 4th daughter Directive[ii], and sets air quality limit values for seven pollutants. The Directive also provides a regulatory framework for fine particulate matter smaller than 2.5µm in diameter ($PM_{2.5}$).

2.2. EU Directive 2008/50/EC was transposed into legislation in the UK on 11th June 2010 as The Air Quality Standards Regulations 2010[iii].

National Air Quality Strategy

2.3. The Environment Act 1995 requires the UK government to prepare a national Air Quality Strategy. The first UK strategy was published in March 1997, setting out policies for the management of ambient air quality. This was subsequently updated in 2007[iv].

2.4. The 2007 strategy establishes the framework for air quality management in England, Scotland, Wales and Northern Ireland. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime.

Air Quality Standards and Objectives

2.5. Air quality standards and objectives are set out in the strategy for the following pollutants: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), lead (Pb), fine particulate matter (PM_{10}), benzene (C_6H_6), 1, 3–butadiene (C_4H_6) and ozone (O_3).

2.6. Objectives for each pollutant, except O_3, were first given statutory status in the Air Quality Regulations 2000[v] and Air Quality (Amendment) Regulations 2002[vi]. These are defined in the strategy as:

"the maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale".

2.7. These are defined as the maximum ambient concentrations which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment.

2.8. The EU limit values, transposed into UK legislation as The Air Quality Standards Regulations 2010, are mostly the same as the air quality objectives in terms of concentrations; however, there are differences in determining how compliance is achieved.

2.9. Whilst there is no specific objective for $PM_{2.5}$ in England and Wales, a limit value of 25µg/m^3 is referred to in the regulations, which has been adopted for use in this assessment (as recommended by the LAQM Helpdesk). An objective has been set for $PM_{2.5}$ in Scotland since early 2016.

2.10. The relevant air quality objectives and limit values for this assessment are included within Table 2.1.

Pollutant	Averaging Period	Objective/Limit Value
Nitrogen Dioxide	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a calendar year
	Annual mean	40µg/m^3
PM_{10}	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a calendar year
	Annual mean	40µg/m^3
$PM_{2.5}$	Annual mean	25µg/m^3

Table 2.1: Air Quality (England) Regulations 2010. Summary of Current Air Quality Standards and Objectives/Limit Values Relevant to This Assessment

2.11. Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(16)[vii] and are included in Table 2.2.

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual Mean	All background locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, libraries, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites or any other location where public exposure is expected to be short term.
24 hour (daily) mean 8 hour mean	All locations where the annual mean objectives would apply together with Hotels. Gardens of residential properties[l]	Kerbside sites, or any other location where public exposure is expected to be short term.
1 hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and railway stations etc. which are not fully enclosed where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend one hour or longer.	Kerbside sites where public would not be expected to have regular access.
15 min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	
[l]: Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens although local judgement should always be applied.		

Table 2.2: Examples of Where the Air Quality Objectives Should/Should Not Apply

National Planning Policy Framework

2.12. The National Planning Policy Framework (NPPF 2019)[viii], introduced in March 2012 and most recently updated in February 2019, requires that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMAs) and Clean Air Zones (CAZs), 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 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 AQMAs and CAZs is consistent with the local air quality action plan".

Planning Practice Guidance

2.13. The National Planning Guidance (PPG), most recently updated in March 2014[ix], states that whether or not 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 generate air quality impacts in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

2.14. Where a proposed development is anticipated to give rise to concerns about air quality an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

Local Air Quality Policy

Local Air Quality Management

2.15. LAQM legislation in the Environment Act 1995 requires local authorities to conduct periodic review and assessment of air quality. This aims to identify all those areas where the objectives are being, or are likely to be, exceeded. Where exceedances are likely to occur, local authorities are required to declare an Air Quality Management Area (AQMA).

2.16. LAQM.TG(16) presents a streamlined approach for LAQM in England and Scotland; however, Northern Ireland is still considering changes to LAQM and therefore works according to the previous regimes.

2.17. The Welsh Government amended the LAQM regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015[x]. This aims to achieve compliance with the national air quality objectives in specific hotspots and to reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.

2.18. Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments, Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).

2.19. Local authorities now have the option of a fast track AQMA declaration option. This allows more expert judgement to be used and removes the need for a Detailed Assessment where a local authority is confident of the outcome. Detailed Assessments should however still be used if there is any doubt.

2.20. As part of the UK Government's requirement to improve air quality, selected local authorities in England are also currently investigating the feasibility of setting up Clean Air Zones (CAZs). These are areas where targeted action and co-ordinated resources aim to improve air quality within an urban setting, in order to achieve compliance with the EU limit values within the shortest possible time.

2.21. Five local authorities outside of London were initially selected to implement a CAZ by 2020 (Birmingham, Leeds, Nottingham, Derby and Southampton). A further 23 local authorities were subsequently chosen to investigate the feasibility of establishing a CAZ, and 33 local authorities may potentially have to proceed to this stage where compliance is not achieved.

Warrington Borough Council LAQM Review and Assessment

2.22. WBC has declared two AQMAs, which cover a number of roads across its administrative area. Details of these have been obtained from the 2017 LAQM ASR, prepared by WBC. The AQMAs have been declared for exceedance of the annual mean objective for NO_2 and incorporate the following areas:

- An area extending 50m from roadside along the M62, M6 and M56 Motorways (within the WBC administrative boundary); and

- Along a number of major roads within Warrington town centre and extending to both the north and south of the town centre (including the A49, the A5060 and the A5061).

2.23. WBC currently operates three automatic monitoring locations and approximately 45 NO_2 diffusion tubes to monitor local air quality. None of these are located in the vicinity of the Proposed Development.

Warrington Borough Council Local Plan Core Strategy

2.24. The WBC Local Plan Core Strategy[xi] was adopted in July 2014, and air quality is referred to in a number of policies.

2.25. Policy CS 4 states:

"The Council will support improvements to Warrington's Transport Network that… reduce the impact of traffic on air quality and reduce carbon emissions to help tackle climate change".

2.26. Policy QE 6 states:

"The Council, in consultation with other Agencies, will only support development which would not lead to an adverse impact on the environment or amenity of future occupiers or those currently occupying adjoining or nearby properties, or does not have an unacceptable impact on the surrounding area. The Council will take into consideration… air quality".

National Odour Policy

2.27. The Environmental Protection Act 1990 is the legal framework dealing with odour from industrial, trade or business premises. If odour is present in sufficient quantity, this may constitute a statutory nuisance. The Local Authority is placed under a duty to inspect, detect any nuisance and to serve abatement notices where necessary.

2.28. Paragraph 180 of NPPF 2019 advises planning policies and decisions should 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".

Guidance for Assessing Construction Phase Impacts

Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction

2.29. The Institute of Air Quality Management (IAQM) guidance document[xii] provides a methodology for assessing the impacts associated with dust and PM_{10} releases, during the construction phase of the development. This comprises four distinct assessment steps.

Step 1

2.30. Step 1 of the assessment is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where:

- There are human receptors within 350m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- There are ecological receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2

2.31. Step 2 of the assessment determines the potential risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts. The risk is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of receptors to dust.

2.32. The risk of dust effects is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon two factors:

- **Step 2A** – the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large; and
- **Step 2B** – the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity.

2.33. These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.

2.34. The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

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

Step 3

2.35. Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2.

2.36. Mitigation measures are detailed in guidance published by the Greater London Authority[xiii], recommended for use outside the capital by LAQM guidance, as well as the IAQM guidance document itself. If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

2.37. Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

Assessment Criteria

2.38. The IAQM guidance document details criteria for assessing the sensitivity of an area to dust soiling effects and the health effects of PM_{10}, as summarised in Tables 2.3 to 2.5 below.

2.39. The guidance then goes on to provide significance criteria for the classification of dust and PM_{10} effects from demolition, earthworks, construction activities and trackout, as summarised in Tables 2.6 to 2.8 below.

Sensitivity of the Area for Human Receptors

2.40. The sensitivity categories for different types of receptors, to both dust soiling effects and the health effects of PM_{10}, are described in Table 2.3.

Sensitivity Category	Dust Soiling Effects	Health effects of PM_{10}
High	Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms.	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}; Examples include residential properties, hospitals, schools, and residential care homes.
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work.	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM_{10}; Examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}.
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would expected to be present only for limited periods of time; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets.

Table 2.3: Sensitivity Categories for Human Receptors

2.41. Based upon the category of receptor sensitivity, the sensitivity of the area to dust soiling effects is determined using the criteria detailed in Table 2.4.

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 2.4: Sensitivity of the Area to Dust Soiling Effects on People and Property

2.42. Based upon the category of receptor sensitivity, the sensitivity of the area to the health effects of PM_{10} is determined using the criteria detailed in Table 2.5.

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20m	<50m	<100m	<200m	<350m
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 2.5: Sensitivity of the Area to Human Health Impacts

Risk of Dust Impacts

2.43. The risk of dust and PM_{10} impacts from demolition activities at the site is determined using the criteria in Table 2.6.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible Risk

Table 2.6: Risk of Dust Impacts for Demolition

2.44. The risk of dust and PM_{10} impacts from earthworks and construction activities at the site is determined using the criteria in Table 2.7.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Table 2.7: Risk of Dust Impacts for Earthworks and Construction

2.45. The risk of dust and PM_{10} impacts from trackout from the site is determined using the criteria in Table 2.8.

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible Risk
Low	Low Risk	Low Risk	Negligible Risk

Table 2.8: Risk of Dust Impacts for Trackout

Guidance for Assessing Operational Phase Air Quality Impacts

Environmental Protection UK and Institute of Air Quality Management – Land-Use Planning and Development Control: Planning for Air Quality

2.46. Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM in relation to the assessment of the air quality impacts of proposed developments and their significance[xiv].

2.47. The impact of a development is usually assessed at specific receptors, and takes into account both the long-term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.

2.48. The impact descriptors for individual receptors are detailed in Table 2.9.

Long Term Average Concentration at Receptor in Assessment Year	Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL) †			
	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

† *Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5% or 0.2µg/m^3) should be described as Negligible*

Table 2.9: Impact Descriptors for Individual Receptors

2.49. Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either 'significant' or 'not significant'.

2.50. Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:

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

Guidance for Assessing Construction and Operational Phase Odour Impacts

Institute of Air Quality Management - Guidance on the Assessment of Odour for Planning

2.51. The IAQM has published guidance on the assessment of odour for planning[xv]. This guidance document sets out methods for assessments supporting planning applications and is the only UK odour guidance document which contains a method for estimating the significance of potential odour effects.

2.52. The IAQM guidance endorses the use of multiple assessment tools for odour, stating that:

"*Best practice is to use a multi-tool approach, where practicable*".

2.53. The IAQM guidance discusses the basis of the Source-Pathway-Receptor approach, which focuses on the concept that for an odour impact to occur, there must be a source of odour, a pathway to transport odour and a receptor to be affected by the odour.

2.54. The probability of an odour impact occurring and the likely magnitude of the effect resulting from the exposure determine the risk of an odour effect occurring. The risk can therefore be estimated using the following relationship:

"Effect ≈ Dose x Response"

2.55. The dose can be considered to be equivalent to the odour exposure (impact) and can be determined using a number of factors, referred to as the 'FIDOL' factors, which are defined in Table 2.10.

Factor	Description
Frequency	How often an individual is exposed to odour
Intensity	The individual's perception of the strength of odour
Duration	The overall duration that individuals are exposed to odour over time
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/intensity. This can be measured in the laboratory as the hedonic tone, and when measures by the standard method and expressed on a standard nine-point scale it is termed hedonic score
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'location' factor can be considered to encompass the receptor characteristics, receptor sensitivity and socio-economic factors

Table 2.10: Description of the FIDOL Factors

2.56. In accordance with the IAQM guidance, the FIDO of the FIDOL factors are used to determine the dose (impact). The response (i.e. receptor sensitivity) is determined by the location factor (L) of FIDOL.

2.57. The IAQM guidance provides a framework for considering the potential for the risk of odour impacts, taking into account the odour-generating potential of relevant site activities (i.e. the Source Odour Potential) and the effectiveness of the pollutant pathway as the transport mechanism through the air to the receptor (i.e. the Pathway Effectiveness).

2.58. The Source Odour Potential takes into account the scale (magnitude) of the release from the odour source, how inherently odorous the emission is and the relative pleasantness/unpleasantness of the odour.

2.59. The Pathway Effectiveness is determined based on the distance between the receptor and source, whether the receptors are downwind, the effectiveness of the release point in promoting good dispersion and the surrounding topography and terrain.

Risk Factors for Source-Pathway-Receptor

2.60. Table 2.11 describes the risk-rating criteria for source magnitude, pathway effectiveness and receptor sensitivity used within the assessment adopted from the IAQM guidance.

Risk Rating	Source Magnitude	Pathway Effectiveness	Receptor Sensitivity
Large Source Odour Potential/ Highly Effective Pathway for Odour Flux to Receptor/ High Sensitivity Receptor	• Large scale source • Odorous compounds with low odour detection thresholds • Hedonic tones (where known) of -2 to -4 • Mitigation: Open air operation with no containment	• Distance: Receptor is adjacent to source/site boundary • Direction: high frequency (%) of winds from source to receptor or receptors downwind of source with respect to prevailing wind direction • Effectiveness of dispersion/dilution: open processes with low level releases	Examples: residential dwellings, hospitals, schools, education and tourist/cultural
Medium Source Odour Potential/ Moderately Effective Pathway for Odour Flux to Receptor/ Medium Sensitivity Receptor	• Medium scale source • Moderately unpleasant odours • Hedonic tones (where known) of -2 to 0 • Mitigation: Some controls but significant residual odour remains	• Distance: Receptor local to source • Where mitigation relies on dispersion/dilution: releases are elevated but comprised by building effects	Examples: places of work, commercial/retail premises and playing/recreation fields
Small Source Odour Potential/ Ineffective Pathway for Odour Flux to Receptor/ Low Sensitivity Receptor	• Small scale source • Mildly odorous compounds with relatively high odour detection thresholds • Hedonic tones (where known) 0 to +4 • Mitigation: effective mitigation with little or no residual odour	• Distance: receptor remote from source and exceeds set back distances where applicable • Direction: Low frequency (%) of winds from source to receptor or upwind of source with respect to prevailing wind • Mitigation: high level stacks/vents not compromised by surrounding buildings	Examples: Industrial, farms, footpaths and roads

Table 2.11: Risk Factors for Source-Pathway-Receptor

2.61. Hedonic scores are the quantitative values assigned to the unpleasantness of source emission samples, by measurement in the laboratory by a panel of trained assessors in an odour panel following the German method VDI 3882 Part 2. Hedonic tone is scored on a nine-point scale ranging from very pleasant (a score of +4, e.g. bakery smell) through neutral to highly unpleasant (a score of -4, e.g. rotting flesh).

2.62. The risk ratings above are then combined with the matrix in Table 2.12 (as taken from the IAQM guidance) to estimate the overall risk of odour impact at the Proposed Development.

Pathway Effectiveness	Source Odour Potential		
	Small	Medium	Large
Highly effective	Low Risk	Medium Risk	High Risk
Moderately effective	Negligible Risk	Low Risk	Medium Risk
Ineffective	Negligible Risk	Negligible Risk	Low Risk

Table 2.12: Risk of Odour Impact at Receptor

2.63. The next stage of the risk assessment is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, using Table 2.13 as taken from the IAQM guidance.

Risk of Odour Exposure (Impact)	Receptor Sensitivity		
	Low	Medium	High
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

Table 2.13: Likely Magnitude of Odour Effect at the Specific Receptor

2.64. In accordance with the IAQM guidance, the overall effect is classed as significant when an impact greater than Slight Adverse is predicted (i.e. Moderate Adverse to Substantial Adverse).

3. Consultations

ES Scoping

3.1. A Scoping Request Report was submitted to WBC on 20th December 2018, as included in Appendix 17 of the ES Part 1 Report. A Scoping Opinion was provided by WBC on 13th February 2019. This is included in Appendix 18 of the ES Part 1 Report.

3.2. With regard to air quality, the Public Protection Department at WBC provided the following comments (dated 18th January 2019):

"Air quality is considered within the report and the suggested approach is acceptable. The applicant is proposing to consider if detailed AQ Assessment would be required using the relevant guidance documents for the planning application. This is also acceptable.

The closest residential to the site has been identified as approx. 300m away, therefore unlikely to be affected by these proposals. By considering the extent of the Motorway Air Quality Management Area, a detailed air quality assessment would only be required if any relevant sensitive locations are within 50m of the site.

Air quality is indicated as being fully considered within the full EIA planning application and therefore no additional comments are necessary at this stage."

3.3. A scoping response was also received from Natural England (NE), dated 10th January 2019. As well as general comments on air quality, one of the key environmental issues identified by NE included the location of the nearby Manchester Mosses SAC (which includes the Risley Moss SSSI and Holcroft Moss SSSI). The response stated with regard to these designated sites that:

"Changes to air quality as a result of changes to traffic volume/flow should also be considered".

3.4. A further response was received from the Greater Manchester Ecology Unit (GMEU), dated 14th January 2019. These comments highlighted the location of the Manchester Mosses SAC within 1km of the Proposed Development, and requested that:

"The potential of the development to cause… Increases in diffuse air pollution arising from increase traffic generation will need to be assessed".

3.5. Finally, further comments were provided in an internal memorandum from Mrs Vicky Simcott, Principal Officer in the Environmental Protection department at WBC on 13th May 2019. With regard to air quality, these state:

"The proposal is adjacent to the Motorway Air Quality Management Area (AQMA). The proposal by itself will not generate additional traffic on the motorway therefore have no air quality impact on the AQMA, and will not place new relevant sensitive receptors within the AQMA. The proposal will redirect some traffic off the motorway, therefore this may affect nearby receptors depending upon location. Therefore, if any access road or the car park is to be built within 50m of existing sensitive receptors, then an Air Quality Assessment will not be required".

Discussions with Warrington Borough Council

3.6. Consultation regarding the scope of the air quality, dust and odour assessment was undertaken between 9th January 2019 and 27th March 2019 with the Environmental Protection Team at WBC.

3.7. An email request was originally sent to WBC on 9th January 2019 to request comments on the ES scoping text. A response was received from Mr Richard Moore, Environmental Protection Officer (Air) at WBC, via email on 10th January. In this response, Mr Moore advised that the assessment scope set out in the scoping text was acceptable, and that there were no major issues. The response went on to state:

"Based on the extent of the Motorway AQMA being 50m, a detailed assessment would only be required if there is any existing sensitive receptors within 50m of the development site. Otherwise AQ impacts should be able to be scoped out".

3.8. Further clarification was sought from WBC, as although there are no existing sensitive receptors within 50m of the Site, there are receptors within 200m of the Junction 11 roundabout which will experience altered traffic flows as a result of the Proposed Development.

3.9. In response to this, in an email on 10th January, Mr Moore requested that the AADT figures be provided to WBC once received, so that a final decision could be made on the need for a detailed air quality assessment.

3.10. Further details of the expected change in traffic flows, as a result of the Proposed Development, were provided by email to WBC on 22nd March 2019. Following a review of the baseline traffic flows on and in the vicinity of the Junction 11 roundabout, and the expected changes with the Proposed Development in place, it was confirmed by Mr Moore that a detailed assessment would not be required.

3.11. The response stated:

"I would not consider the traffic volume when considering the distance of the receptors to have a measurable impact on air quality. I would advise that a detailed assessment is not required but there should be at least a scoping report considering the volume and change in traffic to the distance the receptors to justify that the air quality impacts would be negligible. Can be compared to the Motorway AQMA where that volume of traffic on the M62 leads to exceedance up to a maximum of 50m from the roadside. Obviously, I would have no objection if a detailed assessment is still produced, but I will not be asking for it".

3.12. Table 3.1 provides a summary of the consultations carried out for the air quality, dust and odour assessment.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Air quality, dust and odour assessment methodology	10-01-2019	Warrington Borough Council (Mr Richard Moore)	Email	Scope of air quality, dust and odour assessment	Scope, as detailed in ES scoping text, agreed. Further information on AADT flows requested
Air quality effects on designated habitat sites	10-01-2019	Natural England	Consultee Response on ES Scoping Paper	Comments provided on scope of assessment outlined in ES Scoping Paper	Request that the changes to air quality as a result of changes to traffic volume/flow be considered
Air quality effects on designated habitat sites	14-01-2019	Greater Manchester Ecology Unit	Consultee Response on ES Scoping Paper	Comments provided on scope of assessment outlined in ES Scoping Paper	Request that increases in diffuse air pollution from an increase in traffic generation be assessed
Air quality	18-01-2019	Warrington Borough Council Public Protection Department	Consultee Response on ES Scoping Paper	Comments provided on scope of assessment outlined in ES Scoping Paper	Suggested approach considered to be acceptable
Air quality assessment methodology	27-03-2019	Warrington Borough Council (Mr Richard Moore)	Email	Scope of air quality assessment	Following provision of AADT flow and expected changes, screening assessment considered acceptable (rather than detailed dispersion modelling)

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Air quality assessment methodology	13-05-2019	Warrington Borough Council (Mrs Vicky Simcott)	Memorandum	Comments provided on scope of assessment	Request for a detailed air quality assessment if any access road or car park is to be built within 50m of existing sensitive receptors

Table 3.1: Summary of Consultations and Discussions

3.13. Discussions were also undertaken with i-Transport, the appointed transport consultant for the project, to agree the traffic flow information to be used in the air quality assessment.

4. Methodology and Approach

Construction Phase

Road Traffic Emissions Assessment

4.1. A qualitative assessment has been undertaken to consider the potential air quality impact of construction phase traffic, as detailed traffic flows and routing information are not available at this stage.

Dust Assessment

4.2. A qualitative assessment has also been undertaken to consider the potential dust and PM_{10} impacts associated with the construction phase of the Proposed Development.

4.3. The construction phase dust assessment has been undertaken in accordance with the IAQM guidance and has taken into account the potential dust soiling and human health impacts associated with demolition, earthworks, construction and trackout (where applicable).

4.4. A screening assessment has been carried out in the first instance to identify whether receptors are located within the required distances from where works will take place. Where it has been established that a more detailed assessment is required, the risk of dust impacts (and the significance of effects) have been determined using the IAQM methodology. Mitigation measures have been recommended as appropriate.

Odour Assessment

4.5. A qualitative assessment has been undertaken to consider the potential odour impacts associated with the Restored Risley Landfill Site for workers during the construction phase of the Proposed Development.

4.6. The odour assessment has been undertaken in accordance with the IAQM guidance document and draws upon the Source-Pathway-Receptor approach. The assessment has considered the risk of odour impacts occurring, with reference to meteorological data obtained from the Rostherne recording station.

Operational Phase

Road Traffic Emissions Assessment

4.7. Atmospheric dispersion modelling has been undertaken to consider the potential air quality impacts associated with the operational phase of the Proposed Development.

4.8. It was originally proposed to undertake a qualitative assessment, an approach which was agreed with WBC; however, given the complexity of the traffic situation in the local area, as a result of cumulative developments, it was considered that air dispersion modelling would allow a more accurate prediction of the local air quality situation to be made and assessment of the potential impacts.

4.9. The assessment has been undertaken using the atmospheric dispersion model ADMS-Roads (CERC, Version 4.1) and has considered NO_2, PM_{10} and $PM_{2.5}$ concentrations, as these are generally the pollutants which are most likely to lead to exceedances of the health-based air quality objectives.

4.10. The Proposed Development is not expected to result in newly generated trips, other than perhaps a small number associated with deliveries and staff travel. Rather, the majority of trips to/from the Proposed Development will be transferred trips that are already on the highway network.

4.11. The operational phase will result in the redirection of a small proportion of existing traffic on the M62 Motorway along the off-slip roads, onto the Site access, and then back on to the Motorway using the on-slip roads.

4.12. There are few existing sensitive receptors located in the vicinity of Junction 11 of the M62 Motorway. The closest sensitive receptors, which are subject to the annual mean air quality objectives, are the residential properties along Inglewood Close. These are located approximately 90m from the Site boundary at the closest point (which incorporates Junction 11 of the M62 Motorway), but approximately 290m to the south of the main Site area where the Proposed Development will be located.

4.13. Given the nature of the impact of traffic associated with the Proposed Development, impacts are not expected further afield and therefore, it is not necessary to consider any other existing sensitive receptor locations in the operational phase road traffic emissions assessment.

4.14. This includes the Manchester Mosses SAC and Holcroft Mosses SSSI. No significant change in vehicles, as a result of the Proposed Development, is expected to occur on the M62 Motorway to the east of Junction 11, and these sites lie approximately 1km to the east of Junction 11, at the closest point. It is therefore considered that no further assessment of these habitats sites is required.

4.15. The assessment is therefore considered to take into account the worst-case receptors in terms of potential air quality impacts.

4.16. The assessment of air quality within the Site has been scoped out as no highly sensitive receptors are proposed which are subject to the annual mean air quality objectives/limit values. Pollutant concentrations are not expected to be sufficiently elevated within the Site for exceedances of the hourly mean air quality objective to be observed.

Road Traffic Flow Information

4.17. The following roads have been included within the atmospheric dispersion model:

- M62 Motorway;
- M62 Westbound on and off slip roads;
- M62 Eastbound on and off slip roads;
- Junction 11 M62 Motorway circulatory (i.e. roundabout); and
- A574 Birchwood Way.

4.18. The traffic data used in the assessment, provided by i-Transport, is included within Appendix 8.1.

4.19. A number of committed developments have been included in the traffic data used in the air quality assessment. These comprise the B2/B8 development at The Quadrant at Birchwood Park (2014/23358) and the B1/B2/B8 development on the eastern edge of Birchwood Park (2015/26044). It has not been possible to include any construction vehicles associated with HS2 as this information is not yet available. Further details of the cumulative developments considered within the assessment, and the derivation of the traffic data (including assumed traffic growth), are provided in section 10 of this Technical Paper.

4.20. To provide information on the current air quality situation in the vicinity of Junction 11 of the M62 Motorway, NO_2, PM_{10} and $PM_{2.5}$ concentrations have been predicted for a base year

(2018). In addition, NO_2, PM_{10} and $PM_{2.5}$ concentrations have been predicted for the proposed opening year of the development (2022) and a future year (2029). The model has used emission factors from the most recent version of the Defra's Emission Factor Toolkit (EFT v9).

4.21. Predictions have been made for a total of five scenarios:

- Scenario 1: 2018 Base Year;
- Scenario 2: 2022 Opening Year, Without Development (including committed developments);
- Scenario 3: 2022 Opening Year, With Development (including committed developments);
- Scenario 4: 2029 Future Year, Without Development (including committed developments); and
- Scenario 5: 2029 Future Year, With Development (including committed developments).

4.22. All predicted pollutant concentrations have been compared against the relevant air quality objectives/limit values, which have been derived from scientific evidence on the health effects of each pollutant.

Meteorological Data

4.23. In addition to the traffic flow information, the atmospheric dispersion model also requires the input of meteorological data from a representative recording station. A review has been undertaken of the closest recording stations to the Proposed Development and Rostherne is considered to provide the most representative set of meteorological data.

4.24. The Rostherne recording station is located approximately 10km to the south east of the Proposed Development, at an altitude of 35m AOD. The Proposed Development is located at an altitude of 20-25m AOD.

4.25. 2018 data has been obtained for the Rostherne Recording Station and the wind rose is included in Appendix 8.2.

Model Validation, Verification and Adjustment

4.26. LAQM.TG(16) recognises that model validation generally refers to detailed studies that have been carried out by the model supplier or a regulatory agency. The ADMS-Roads model has been validated by the supplier CERC.

4.27. Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads model is achieved by modelling concentration(s) at existing monitoring location(s) and comparing the modelled concentration(s) with the measured concentration(s).

4.28. There are no existing representative air quality monitoring locations in the vicinity of the Proposed Development and therefore, in this instance, it has not been possible to undertake verification of predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations.

Odour Assessment

4.29. A qualitative assessment has been undertaken to consider the potential odour impacts associated with the Restored Risley Landfill Site at the Proposed Development during the operational phase.

4.30. The odour assessment has been undertaken in accordance with the IAQM guidance document and has taken into account the potential odour effects at sensitive areas of the Proposed Development (i.e. at the Hotel and outdoor amenity space/picnic space).

4.31. As with the construction phase assessment, this has drawn upon the Source-Pathway-Receptor approach and has considered the risk of odour impacts occurring, with reference to meteorological data obtained from the Rostherne recording station.

Receptors

Construction Phase Dust Assessment

4.32. There are few existing residential properties located within 350m of the boundary of the main Site area where the Proposed Development will be located, and none located within 50m of the route that will be used by construction vehicles on the public highway, up to 500m from the Site entrance.

4.33. The closest identified residential properties to the Proposed Development are located along Inglewood Close, approximately 290m to the south at the closest point. There are approximately 15 properties located within 350m of the main Site area where the Proposed Development will be located. Although there are more receptors located within 350m of the Site boundary (which incorporates Junction 11 of the M62 Motorway), no construction will take place here.

4.34. In addition, there are a small number of commercial/industrial units located within 350m of the main Site area where the Proposed Development will be located. However, these are considered to be less sensitive in nature due to their uses.

4.35. Details of the existing dust sensitive receptors (i.e. DSR 1 and DSR 2) considered in the assessment are provided in Table 4.1, and their approximate locations are shown on Figure 8.1.

Receptor	Location	Approximate Grid Reference		Direction from the Site	Approximate Distance from the Boundary of the Main Site Area (metres)
		Easting	Northing		
DSR 1	Existing residential properties along Inglewood Close	366964	393020	South	290m at closest point (i.e. 100 Inglewood Close)
DSR 2	Existing commercial/ industrial premises along Leacroft Road	366784	393160	South West	225m at closest point

Table 4.1: Construction Phase Dust Sensitive Receptors

4.36. There are no potentially sensitive ecological receptors within 50m of the Site or within 50m of the potential routes used by construction vehicles on the public highway, up to 500m from the Site entrance. It is not therefore necessary to consider ecological effects further in this assessment.

Construction Phase Odour Assessment

4.37. The Restored Risley Landfill Site is located immediately to the west and north west of the Proposed Development boundary and has the potential to lead to odour impacts for workers at the Site during its construction.

4.38. For the purpose of this assessment, it is assumed that construction workers could be located anywhere within the Site boundary during this phase of works.

Operational Phase Road Traffic Emissions Assessment

4.39. The Proposed Development is not expected to result in newly generated trips, other than perhaps a small number associated with deliveries and staff travel. Rather, the majority of trips to/from the Proposed Development will be transferred trips that are already on the highway network.

4.40. As discussed earlier in section 4 of this Technical Paper, given the nature of the traffic impacts associated with the Proposed Development, it is not expected that there will be any impacts further afield. The assessment therefore concentrates on those receptors closest to Junction 11 of the M62 Motorway.

4.41. The commercial/industrial units located along Leacroft Road, to the south west, have not been considered in the assessment of operational phase air quality, as the annual mean air quality objectives (taken into account in the assessment) do not apply at places of work or at places where members of the public do not have regular access (as detailed in Table 2.2).

4.42. The closest existing sensitive receptors to Junction 11 are the existing residential properties along Inglewood Close, located approximately 140m from the roundabout and Motorway slip roads, at the closest point. These have been considered as the annual mean air quality objectives do apply at the facades of residential properties.

4.43. Pollutant concentrations have therefore been predicted at these locations and have been compared against the relevant health-based air quality objectives, as set out in the Air Quality (Standards) Regulations 2010. The predicted impact between the 'without development' and 'with development' scenarios has been assessed using the EPUK/IAQM criteria included in Table 2.9.

4.44. Details of the existing sensitive receptors (i.e. ESR 1 and ESR 2) considered in the assessment are provided in Table 4.2, and their approximate locations are shown on Figure 8.2.

Receptor	Location	Approximate Grid Reference		Direction from the Site	Approximate Distance from the Boundary of the Main Site Area (metres)
		Easting	Northing		
ESR 1	104 Inglewood Close	366911	393017	South	290m
ESR 2	100 Inglewood Close	366964	393025	South	290m

Table 4.2: Operational Phase Air Quality Sensitive Receptors

Operational Phase Odour Assessment

4.45. The Restored Risley Landfill Site is located immediately to the west and north west of the Proposed Development boundary and has the potential to lead to odour impacts at the most sensitive areas of the Proposed Development.

4.46. There are no residential uses proposed as part of the development, however there are other uses proposed where users would expect to enjoy at least some level of amenity, including the Hotel, and outdoor amenity space/picnic space.

4.47. Details of the proposed odour sensitive receptors (i.e. OSR 1 and OSR 2) considered in the assessment are given in Table 4.3, and their approximate locations are shown on Figure 8.2.

Receptor	Location	Approximate Grid Reference		Receptor Type
		Easting	Northing	
OSR 1	Proposed Hotel	366953	393647	Hotel
OSR 2	Proposed outdoor amenity space/picnic space	366985	393668	Outdoor amenity space

Table 4.3: Operational Phase Odour Sensitive Receptors

The Sensitivity of the Receptor

4.48. The IAQM documents for construction dust and odour, and the EPUK/IAQM document for air quality, contain guidance for assessing the sensitivity of receptors, in the context of the assessment methodologies. Whilst these have been taken into account in the assessments of construction phase dust, operational phase road traffic emissions and operational phase

odour, the overall sensitivity of the receptor has been determined using the criteria in Table 4.4.

Designation	Development Receptors
International	Receptors with the highest sensitivity to dust and air quality impacts, including internationally designated nature conservation sites which are also known to contain species sensitive to dust or air quality impacts (i.e. may change breeding habits or threaten species in some other way)
National	Receptors of very high sensitivity to dust and air quality impacts including hospitals and residential care homes as well as nationally designated nature conservation sites which are also known to contain species sensitive to dust or air quality impacts (i.e. may change breeding habits or threaten species in some other way)
Regional	Receptors of high sensitivity including regionally designated nature conservation sites which are also known to contain species sensitive to dust or air quality impacts (i.e. may change breeding habits or threaten species in some other way)
County	Receptors of moderate to high sensitivity to air quality and dust impacts including residential dwellings, schools, and play areas as well as locally designated nature conservation sites which are also known to contain species sensitive to dust or air quality impacts (i.e. may change breeding habits or threaten species in some other way) Receptors of high sensitivity to odour impacts including residential dwellings, hospitals, schools and cultural sites
Borough	Receptors of moderate sensitivity to dust, air quality and odour including hotels, offices, commercial/retail premises and playing/recreation fields
Local/Neighbourhood	Receptors of the lowest sensitivity to dust, air quality and odour impacts including industrial estates, farms, footpaths and roads

Table 4.4: Sensitivity of the Receptor

4.49. The existing dust sensitive receptors considered in the construction phase assessment (i.e. DSR 1 and DSR 2) are residential and commercial/industrial in nature. In accordance with the criteria detailed in Table 4.4, these are considered to be of a County and Local/Neighbourhood designation, respectively.

4.50. The existing odour sensitive receptors considered in the construction phase assessment (i.e. construction workers within the Site boundary) are considered to be of a Local/Neighbourhood designation.

4.51. The existing air quality sensitive receptors considered in the operational phase assessment (i.e. ESR 1 and ESR 2) are residential and therefore considered to be of a County designation, in accordance with the criteria detailed in Table 4.4.

4.52. The proposed odour sensitive receptors considered in the operational phase odour assessment (i.e. OSR 1 and OSR 2) comprise a Hotel, and outdoor amenity area/picnic area. In accordance with the criteria detailed in Table 4.4, these are considered to be of a Borough and Local/Neighbourhood designation, respectively.

Environmental Impacts

4.53. The IAQM document provides guidance for considering impacts during the assessment of construction phase dust. The guidance takes into account the risk of dust effects arising from each of the four construction phase activities, along with the sensitivity of the receptor.

4.54. The Air Quality Standards Regulations 2010 set the health-based air quality objectives which allow the impact of operational phase road traffic emissions to be determined. The EPUK/IAQM guidance provides a framework for assessing the significance of air quality impacts, based on the likelihood of exceedance of these objectives, and the scale of impact.

4.55. The IAQM document provides guidance for considering impacts during the assessment of odour throughout the construction and operational phase. The guidance takes into account the Source Odour Potential, the Pathway Effectiveness and the Receptor Sensitivity.

4.56. Whilst these guidance documents have been used for each assessment, for the purposes of this ES, the level of significance is ultimately determined by using the magnitude criteria detailed in Table 4.5, together with the sensitivity of the receptor, as detailed in Table 4.4. This is completed using the significance matrix included in Section 6 of the Environmental Statement Part 1 Report.

Magnitude	Environmental Impact
Substantial	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
High	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be exceeded or to result in undesirable/desirable consequences on the receiving environment.
Moderate	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.
Minor	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated
Negligible	No discernible change in the baseline environmental conditions, within margins of error of measurement.
Neutral	No change.

Table 4.5: Environmental Impacts

Significance of Effects

4.57. Taking into account the significance matrix in Section 6 of the Environmental Statement Part 1 Report, and the criteria in Tables 4.4 and 4.5, it is considered that a neutral, negligible and minor effect is not significant with respect to air quality, dust and odour. This is because any impacts of this magnitude are no more than discernible, and therefore are tolerable. On this basis, a moderate, high or substantial effect is considered to be significant.

Impact Prediction Confidence

4.58. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out in Table 4.6.

Confidence Level	Description
High	The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels.

Table 4.6: Confidence Levels

5. Baseline Information

Operational Phase

Road Traffic Emissions Assessment

5.1. The qualitative operational phase air quality assessment has taken into account background concentrations. This data may be derived through long term ambient measurements at background sites, remote from immediate sources of air pollution or alternatively from the default concentration maps, which have been provided for use with the LAQM.TG(16) guidance.

5.2. In the absence of data being available from a representative WBC operated background monitoring location, background pollutant concentrations have been obtained from the 2015-based default concentration maps provided by Defra on their LAQM web pages.

5.3. The existing sensitive receptors are both located within the same 1km x 1km grid square (366500, 393500). Details of the background pollutant concentrations used in the assessment are included in Table 5.1.

Year of Assessment	Annual Mean Concentration (µg/m³) †			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2018	31.70	20.89	13.48	8.93
2022	27.33	18.82	12.85	8.32
2029	23.19	15.99	12.01	7.47
† *Adjusted to remove the Motorway contribution, in accordance with LAQM.TG(16)*				

Table 5.1: Background Air Pollutant Concentrations

Modelled Baseline Concentrations

5.4. Atmospheric dispersion modelling has been undertaken for a 2018 Base Year scenario to provide an indication of the current air quality situation in the vicinity of Junction 11 of the M62 Motorway.

5.5. The baseline assessment (i.e. Scenario 1) has therefore been carried out for the two existing sensitive receptor locations considered (i.e. ESR 1 and ESR 2). The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 5.2.

Receptor	NO_2†	PM_{10}	$PM_{2.5}$
ESR 1	23.88	14.03	8.78
ESR 2	23.71	14.00	8.76
† *NO_2 concentrations obtained by inputting predicted NOx concentrations into the NOx to NO_2 calculator in accordance with LAQM.TG(16)*			

Table 5.2: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations in 2018 Base Year Scenario (Unadjusted)

5.6. The results show that all predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations in the 2018 Base Year scenario are well below the relevant health-based objectives and limit values. Air quality is not therefore currently considered to be a significant issue in the locality of the receptors considered.

5.7. In addition, atmospheric dispersion modelling has been undertaken to consider the likely evolution of the environment without the Proposed Development in place.

5.8. The future baseline assessment (i.e. Scenarios 2 and 4) has been carried out for the two existing sensitive receptor locations considered (i.e. ESR 1 and ESR 2). The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 5.3.

Receptor	NO_2†	PM_{10}	$PM_{2.5}$
2022 Opening Year, Without Development			
ESR 1	24.06	14.05	8.78
ESR 2	23.87	14.02	8.76
2029 Future Year, Without Development			
ESR 1	24.23	14.07	8.80
ESR 2	24.04	14.03	8.78
† *NO_2 concentrations obtained by inputting predicted NOx concentrations into the NOx to NO_2 calculator in accordance with LAQM.TG(16)*			

Table 5.3: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations in 2012 Opening Year and 2029 Future Year, Without Development Scenarios (Unadjusted)

5.9. The results show that all predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations in the 2022 Opening Year and 2029 Future Year without development scenarios are also well below the relevant health-based objectives and limit values. As a result, based on conservative assumptions, air quality is considered unlikely to be a significant issue in the locality of the receptors considered without the Proposed Development in place.

5.10. The evolution of the environment without the implementation of the development is likely to show that, despite increasing traffic levels on the M62 Motorway, there will be an overall decrease in pollutant concentrations in the locality of the Proposal Development Site. This is due to future changes in the national vehicle fleet which are expected to result in lower emissions.

Odour Assessment

5.11. The Proposed Development is located in a semi-rural area, with the M62 Motorway located immediately to the south, and open land to the north and east.

5.12. The main source of odour in the local area is considered to be the Restored Risley Landfill Site, which is located immediately to the west of the Proposed Development. Landfilling operations began in 1979, with household, commercial and equivalent industrial waste accepted. Tipping of waste ceased in October 2011, with subsequent operations on the Landfill Site involving capping and restoration.

5.13. As a result, the main odour sources associated with the Restored Landfill Site relate to the release of leachate and landfill gases from the restored site.

5.14. Other existing odour sources in the vicinity of the Proposed Development may include agricultural activities at nearby farms, as well as road traffic.

5.15. The evolution of the environment without the implementation of the development is likely to show decreasing odour emissions associated with the Restored Landfill Site, as the level of landfill gas needing to be collected and treated decreases over time.

6. Alternatives Considered

6.1. There are no highly sensitive uses, such as residential dwellings, proposed as part of the development. However, a Hotel and outdoor amenity space/picnic space are proposed, which are considered to be moderately sensitive.

6.2. The proposed location of these uses is in the central part of the Site, with parking areas to the north and south, and the Fuel Filling Station to the south. The layout has been developed based on a number of constraints, but this is considered to be beneficial from an air quality perspective as this means that the more sensitive uses are located further away from the M62 Motorway.

7. Potential Environmental Effects

Construction Phase

Construction Phase Vehicles

7.1. At this stage, the exact, final number and routing of construction phase vehicles is yet to be confirmed. However, calculations have been undertaken by i-Transport, the appointed transport consultant, using a worst-case approach, to estimate the number of vehicles that may be expected to access the Site during the construction phase.

7.2. Vehicles associated with the construction activities at the Site relate to muck shifting/export of material, the import of material for construction, general construction deliveries and the labour force.

7.3. The volume of material to be exported from the Site is expected to be no more than 42,000m^3, and the volume of material for drainage to be imported to the Site is expected to be no more than 45,700m^3.

7.4. The calculations associated with the import/export of materials have assumed that each HDV will carry 15m^3 of material, that vehicle movements will take place over a six-month period, and that these will be spread out evenly throughout a working day between 0700 and 1800.

7.5. With regard to the export of materials, 2,800 one-way HDV movements are expected in total, which results in 2 HDVs in and 2 HDVs out per hour. With regard to the import of materials, 3,047 HDV movements are expected, which relates to 2 HDVs in and 2 HDVs out per hour.

7.6. In addition, it is understood that there will be 20 vehicle movements in and out per day as a result of general construction deliveries. If these are all assumed to be HDVs, this results in 2 HDVs in and 2 HDVs out per hour.

7.7. The construction staff volume is expected to be up to 300 and, with an LDV occupancy rate of 2.0, this results in 75 car/van arrivals in the AM peak hour and 75 car/van departures in the PM peak hour (assuming half arrive and depart during peak hours).

7.8. In summary, this leads to an expected total of 300 LDVs and 130 HDVs travelling to/from the Proposed Development in an average day. It is anticipated that the majority of these vehicles will access the Site from the M62 Motorway.

7.9. Any changes in baseline flows, as a result of the construction of the Proposed Development, are significantly lower than the changes expected once operational (as detailed in Appendix 8.1). In addition, the temporary nature of these changes should be noted.

7.10. The potential air quality impacts and significance of effects associated with vehicles during the construction phase is not therefore considered to be significant and can be classed as **negligible**.

Construction Phase Dust Assessment Undertaken in Accordance with IAQM Guidance

7.11. The construction phase of the Proposed Development has the potential to lead to impacts at existing sensitive receptors. Dust impacts may be caused by demolition, earthworks and construction activities taking place at the Site; as well as through the trackout of dust and dirt from the Site onto the public highway.

7.12. Earthworks covers the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads and car parking areas. Trackout is defined as the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the Site. This dust and dirt can then be deposited and re-suspended by other vehicles.

7.13. There are no proposed demolition activities associated with the Site. Demolition activities are not therefore considered further within this assessment.

Step 2A

7.14. Step 2A of the construction phase dust assessment has been undertaken to define the potential dust emission magnitude from earthworks, construction and trackout in the absence of site specific mitigation.

7.15. Examples of the criteria for the dust emission classes are detailed in the IAQM guidance.

7.16. The results of Step 2A are included in Table 7.1.

Step 2B

7.17. Step 2B of the construction phase dust assessment defines the sensitivity of the area, taking into account the significance criteria detailed in Tables 2.3 to 2.5, to earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling and human health impacts.

7.18. For earthworks and construction, in accordance with the categories within the IAQM guidance, there are between 10 and 100 sensitive receptors within 350m of where these activities will take place. The receptors considered are the existing residential properties along Inglewood Close, which are considered to be of a high sensitivity in accordance with Table 2.3, and the existing commercial/industrial premises along Leacroft Road, which are considered to be of a medium sensitivity.

7.19. For trackout, it is anticipated that the majority of construction vehicles will access the Proposed Development from the M62 Motorway. As a result, in accordance with the categories within the IAQM guidance, there are between 10 and 100 sensitive receptors within 350m of where these vehicles will travel (and within a distance of 500m from the Site access). The receptors considered are the existing residential properties along Inglewood Close, which are considered to be of a high sensitivity in accordance with Table 2.3, and the existing commercial/industrial premises along Leacroft Road, which are considered to be of a medium sensitivity. The results of Step 2B are included in Table 7.1.

Step 2C

7.20. Step 2C of the construction phase dust assessment has defined the risk of impacts from each activity. The dust emission magnitude is combined with the sensitivity of the surrounding area.

7.21. The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in Tables 2.6 to 2.8.

7.22. The results of Step 2C are included in Table 7.1.

	Activity			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Step 2A				
Dust Emission Magnitude	N/A	Large[a]	Large[b]	Large[c]
Step 2B				
Sensitivity of Closest Receptors (Highest sensitivity has been assessed, in accordance with Table 2.3)	N/A	High	High	High
Sensitivity of Area to Dust Soiling Effects (In accordance with Table 2.4)	N/A	Low	Low	Low
Sensitivity of Area to Human Health Effects (In accordance with Table 2.5)	N/A	Low[d]	Low[d]	Low[d]
Step 2C				
Dust Risk: Dust Soiling	N/A	Low Risk	Low Risk	Low Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk

a. Total site area estimated to be more than 10,000m^2
b. Total building volume to be constructed estimated to be more than 100,000m^3
c. Average number of HGV movements per day likely to be more than 50
d. Based on background annual mean PM_{10} concentrations, which are lower than 24µg/m^3 (based on data from the 2015-based Defra default concentration maps)

Table 7.1: Results of Construction Phase Assessment, Based on IAQM Guidance

7.23. The results of the assessment show that there is a low risk of dust soiling and human health effects across the local area as a result of the activities taking place during the construction phase (i.e. earthworks, construction and trackout).

Construction Phase Odour Assessment Undertaken in Accordance with IAQM Guidance

FIDOL Assessment

7.24. The scale of the odour exposure, using information provided by the meteorological data from the Rostherne recording station, can be summarised using the FIDOL factors included in Table 2.10. The results of the assessment are detailed in Table 7.2.

Factor	Description
Frequency	• Greater risks of high odour concentrations are likely to occur during relatively calm weather. The wind rose included in Appendix 8.3 shows that this is likely to be, at worst, approximately 1% of the time • Site activities associated with the Restored Landfill Site, and the location of odour sources (i.e. the leachate treatment plant and gas engine compound), are likely to be constant throughout the year
Intensity	• It has not been possible to determine the intensity of the odour associated with the Restored Landfill Site through on-site observations; however, the intensity is considered likely to be low due to the nature of the sources, and dilution/dispersion that will take place over the distance between the sources and the receptors considered
Duration	• The source emissions associated with the Restored Landfill Site are likely to be continuous throughout the year; although there may be the potential for increased odour emissions during warmer conditions
Odour unpleasantness	• In accordance with guidance from the EA, odour from processes involving biological landfill odours would be described as 'most offensive'
Location	• The Proposed Development comprises a variety of uses, however no residential uses are included. The most sensitive areas associated with the proposals comprise a Hotel, and outdoor amenity space/picnic space. In addition, construction workers may be present at the Site for extended periods of time • The closest boundary of the Proposed Development is located immediately to the east of the Restored Landfill Site; however, the sources of odour within the Restored Landfill Site are located at a greater distance from receptors

Table 7.2: FIDOL Assessment

7.25. The FIDOL assessment demonstrates that the Proposed Development is subject to the three links in the Source-Pathway-Receptor chain and is therefore subject to experience some odour exposure. The risk of odour exposure, and subsequent odour effects (impacts) on the Proposed Development, will therefore take into account the Source Odour Potential, Pathway Effectiveness and Receptor Sensitivity.

Source Odour Potential

7.26. Landfilling operations began at the Restored Risley Landfill Site in 1979 and ceased in 2011, with subsequent operations at the Landfill Site involving capping and restoration. It is understood that the Landfill Site now comprises 10 fully Construction Quality Assurance (CQA) engineered cells, with a total capacity of 8,670,000m^3.

7.27. Prior to the cessation of operations, the Risley Landfill Site accepted a range of household, commercial and equivalent industrial waste. Since completion of the restoration, leachate and landfill gas monitoring and management infrastructure has been put in place.

7.28. Leachate is managed through a drainage system, with an extraction well in place in each cell. This enables the pumping of leachate to an on-site treatment plant where, once it has been treated, it is discharged to foul sewer. The leachate treatment plant is located to the west of the Restored Landfill Site and is accessed from Silver Lane, which joins the Junction 11 roundabout.

7.29. Landfill gas is managed through a series of permanent vertical gas extraction wells and temporary gas impact wells, which are joined by buried pipework and are connected to an extraction system. Twelve landfill gas engines are in place in two compounds off Silver Lane, along with two gas flares.

7.30. Leachate and landfill gas can be highly odorous, given their trace components/compounds. Odour emissions have the potential to arise from management systems as a result of fugitive releases from the leachate well/liner interface and/or insufficient gas extraction rate, or from the treatment plant itself.

7.31. However, research prepared on landfill odour management suggests that under normal operating conditions, leachate treatment and landfill gas combustion sources are unlikely to be significant in terms of off-site odour impacts[xvi] (in particular for combustion sources, as a result of the high temperatures involved).

7.32. For the purpose of this assessment, a worst-case approach is adopted whereby it is assumed that the inherent nature of the odour, and its unpleasantness, are the same as for an operational Landfill Site. However, the magnitude of the odour release has been adjusted so that it reflects the reduced possibility for odour emissions, as well as the mitigation/control measures which are in place.

Summary

7.33. Taking into account all of this information, an assessment of the Source Odour Potential has been undertaken using the criteria detailed in Table 2.11. The results detailed in Table 7.3.

Factors Affecting Source Odour Potential	Risk Factors
Magnitude of Odour Release (Taking into account the type of source and the odour mitigation/control measures in place)	Medium scale
Inherent Odorous Nature of Compounds	Odorous compounds with low odour detection thresholds
Odour Unpleasantness	Hedonic tones likely to be between -2 to -4

Table 7.3: Source Odour Potential

7.34. In accordance with the criteria detailed in Table 7.3, the source odour potential is judged to be **medium** for the Restored Risley Landfill Site, in accordance with the terminology included in the IAQM guidance.

Pathway Effectiveness

7.35. It is important to consider the receptors in terms of proximity to the odour source and the prevailing wind direction to determine the pathway effectiveness.

7.36. To provide information on how odour dispersion might be affected by the local weather conditions, wind speed and wind direction data have been obtained from ADM Limited for the period 2014 to 2018, for the Rostherne recording station. This is located approximately 11km to the south east of the Proposed Development and is considered to be the most representative of on-site meteorological conditions.

7.37. The wind rose for the period 2014 to 2018 is presented in Appendix 8.3. This data shows that the prevailing wind direction at Rostherne is from the South South East (SSE) to South South West (SSW) sectors (accounting for approximately 39% of the total time). The Proposed

Development is therefore not located downwind of the Restored Risley Landfill Site, with respect to the prevailing wind direction.

7.38. It should be noted that although the Proposed Development is located immediately to the east of the Restored Landfill Site, the sources which have the most potential for odour emissions (i.e. leachate and landfill gas extraction wells) are located further away (i.e. approximately 0.1km at the closest point, but with the rest located at intervals across the Restored Landfill Site).

7.39. In addition, the leachate treatment plant and landfill gas engine compounds are located along Silver Lane; with the leachate pumping station and two gas engines approximately 0.8km to the west of the Site boundary, and the treatment plant and the remaining gas engines approximately 1.1km to the west.

7.40. The wind rose data from Rostherne shows that the Proposed Development is located downwind of the Restored Landfill Site for no more than approximately 30% of the year. However, the proportion of time in which the Proposed Development is downwind of the potential odour sources within the Restored Landfill Site is less, due to a decreased angle of view.

7.41. Low wind speeds are most effective at carrying odour (i.e. less than 3 m/s or 6 knots), as the wind fails to dilute and disperse the odour effectively. Higher wind speeds become increasingly effective at diluting and dispersing odour.

7.42. The meteorological data shows that worst case conditions (i.e. the Proposed Development being located downwind of the potential sources, when wind speeds are lower than 3 m/s) occur for approximately 9% of the total time when considering the Restored Risley Landfill Site.

7.43. The effectiveness of dispersion and dilution is subject to any existing mitigation of emissions, the location of the Restored Landfill Site (in relation to the prevailing wind and the Proposed Development), and the wind speed. In this case, pathway effectiveness has been defined based on a balance between the low proportion of time for which the Proposed Development is downwind of the sources, and the distance of the closest sources.

7.44. Taking into account this information, an assessment of the Pathway Effectiveness has been undertaken using the criteria in Table 2.11. The results are presented in Table 7.4.

Receptor	Approximate Distance from Source	Direction from Source	Downwind?	Pathway Effectiveness
Hotel	0.1 to 1.1km	East	No	Moderately effective
Outdoor amenity space/picnic space	0.1 to 1.1km	East	No	Moderately effective

Table 7.4: Effectiveness of Odour Pathway

7.45. From this, the pathway effectiveness from the Restored Risley Landfill Site to the Proposed Development is judged to be **moderately effective**, in accordance with the terminology included within the IAQM guidance. An indicative source pathway and receptor plan is included in Figure 8.3.

Receptor Sensitivity

7.46. During the construction phase, workers will be present within the Site for extended periods of time. The precise location of these workers is unknown, as their deployment will be subject to construction schedules and timelines. As a worst-case approach, it has been assumed that construction workers could be present anywhere within the Site boundary.

7.47. In accordance with the guidance in Table 2.11, construction workers would be considered of a **medium** sensitivity, as users would expect a reasonable level of amenity and could be present for more than a limited amount of time (i.e. as a place of work), in accordance with the terminology included within the IAQM guidance.

Potential Odour Effect

7.48. The assessment of the potential odour effects at the Proposed Development is presented in Table 7.5.

Source Odour Potential	Effectiveness of Pathway	Risk of Odour Impact	Receptor Sensitivity	Likely Odour Effect
Medium	Moderately effective	Low Risk	Medium	Slight Adverse

Table 7.5: Likely Odour Effects at the Proposed Development

7.49. Based on a medium source odour potential, where the pathway is deemed to be moderately effective, the risk of odour impact (dose) is deemed to be low in accordance with the criteria detailed in Table 2.12.

7.50. A low risk of odour combined with a medium receptor sensitivity is deemed to lead to a slight adverse effect, in accordance with the criteria detailed in Table 2.13. As these impacts are no greater than slight adverse, in accordance with the IAQM guidance, the effect is considered to be **not significant**.

7.51. This assessment methodology enables the potential for odour effects to be classified. However, it should be noted that worst-case assumptions have been made with regard to source odour potential and pathway effectiveness. The overall environmental impact has therefore been defined based on the criteria set out in Tables 4.4 to 4.6. With regard to odour, the Proposed Development will not lead to a discernible change in baseline environmental conditions, and therefore the environmental impact is classed as **negligible**.

Summary of Impacts During Construction Phase

7.52. The results of the construction phase assessment have been obtained using the criteria included within IAQM guidance (as discussed separately above). The results for each part of the assessment have been compared against the general criteria detailed in Tables 4.4 to 4.6 in order to determine the overall impact of the construction phase of the Proposed Development. The results of the assessment are detailed in Table 7.6.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Change in baseline air quality at existing sensitive receptors due to construction phase traffic	County/ Local/Neighbourhood	Negligible	Negligible	High

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Change in baseline dust and fine particulate matter levels at existing sensitive receptors due to construction phase activities	County/ Local/Neighbourhood	Minor negative Short-term Temporary Direct	Minor Adverse	High
Odour at locations where construction workers will be present, due to Restored Risley Landfill Site	Local/Neighbourhood	Negligible	Negligible	High

Table 7.6: Significance of Effect - Construction Phase

7.53. Given that the significance of effect is predicted as either minor adverse or negligible, it is therefore considered to be **not significant**.

Operational Phase

Operational Phase Road Traffic Emissions Assessment Undertaken in Accordance with the Air Quality Standards Regulations 2010 and EPUK/IAQM Guidance

7.54. Road traffic, generated during the operational phase of the Proposed Development, has the potential to lead to air quality impacts at representative receptor locations along affected roads.

7.55. The Proposed Development is not expected to result in newly generated trips, other than perhaps a small number associated with deliveries and staff travel.

7.56. The operational phase will result in the redirection of a proportion of existing traffic on the M62 Motorway along the off-slip roads, onto the Site access, and then back on to the Motorway using the on-slip roads.

7.57. The closest existing sensitive receptors to the Proposed Development are the residential properties along Inglewood Close, located approximately 290m to the south of the main Site area where the Proposed Development will be located. However, these are also located approximately 140m from the Junction 11 roundabout and approximately 100m from the A574 Birchwood Way at the closest point. These roads will see a change in traffic flows as a result of the operation of the Proposed Development.

7.58. As previously discussed, no significant change in vehicles is expected to occur on the M62 Motorway to either the east or west of Junction 11. It is not therefore considered necessary to carry out an assessment of potential air quality impacts for receptors further afield, including for the Manchester Mosses SAC and Holcroft Mosses SSSI.

7.59. Pollutant concentrations have therefore been predicted at locations considered to be representative of the closest residential properties along Inglewood Close to Junction 11 and have been compared against the relevant health-based air quality objectives, as set out in the Air Quality (Standards) Regulations 2010. The impacts, with the development in place, have also been assessed in accordance with EPUK/IAQM guidance.

7.60. Current evidence suggests that NO_2 background concentrations and emissions are not decreasing in accordance with expected reductions. The air quality assessment has therefore applied 2018 background pollution concentrations and vehicle emission factors to the 2022 Opening Year and 2029 Future Year scenarios, to provide a robust conservative approach and therefore incorporates a sensitivity analysis within the assessment.

7.61. Table 7.7 details the predicted NO_2 concentrations for the 2022 Opening Year and 2029 Future Year scenarios, for both the 'Without Development' and 'With Development' scenarios. The impact has been assessed in accordance with the descriptors included in Table 2.9.

Receptor	Calculated Annual Mean NO_2 Concentrations (µg/m^3) †				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact *
		Concentration	Percentage in Relation to AQAL		
2022					
ESR 1	24.06	24.12	<75%	<0.5%	Negligible
ESR 2	23.87	23.95	<75%	<0.5%	Negligible
2029					
ESR 1	24.23	24.29	<75%	<0.5%	Negligible
ESR 2	24.04	24.12	<75%	<0.5%	Negligible

† *NO_2 concentrations obtained by inputting predicted NOx concentrations into the NOx to NO_2 calculator in accordance with LAQM.TG(16)*
* *Assessed using the Impact Descriptors from the EPUK/IAQM guidance, detailed in Table 2.9. Changes of less than 0.5% should be described as negligible*

Table 7.7: Predicted NO_2 Concentrations in 2022 Opening Year and 2029 Future Year Scenarios (Unadjusted)

7.62. Table 7.8 details the predicted PM_{10} concentrations for the 2022 Opening Year and 2029 Future Year scenarios, for both the 'Without Development' and 'With Development' scenarios. The impact has been assessed in accordance with the descriptors included in Table 2.9.

Receptor	Calculated Annual Mean PM_{10} Concentrations ($\mu g/m^3$)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact *
		Concentration	Percentage in Relation to AQAL		
2022					
ESR 1	14.05	14.07	<75%	<0.5%	Negligible
ESR 2	14.02	14.03	<75%	<0.5%	Negligible
2029					
ESR 1	14.07	14.09	<75%	<0.5%	Negligible
ESR 2	14.03	14.05	<75%	<0.5%	Negligible

* *Assessed using the Impact Descriptors from the EPUK/IAQM guidance, detailed in Table 2.9. Changes of less than 0.5% should be described as negligible*

Table 7.8: Predicted PM_{10} Concentrations in 2022 Opening Year and 2029 Future Year Scenarios (Unadjusted)

7.63. Table 7.9 details the predicted $PM_{2.5}$ concentrations for the 2022 Opening Year and 2029 Future Year scenarios, for both the 'Without Development' and 'With Development' scenarios. The impact has been assessed in accordance with the descriptors included in Table 2.9.

Receptor	Calculated Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact *
		Concentration	Percentage in Relation to AQAL		
2022					
ESR 1	8.78	8.80	<75%	<0.5%	Negligible
ESR 2	8.76	8.78	<75%	<0.5%	Negligible
2029					
ESR 1	8.80	8.81	<75%	<0.5%	Negligible
ESR 2	8.78	8.79	<75%	<0.5%	Negligible

* *Assessed using the Impact Descriptors from the EPUK/IAQM guidance, detailed in Table 2.9. Changes of less than 0.5% should be described as negligible*

Table 7.9: Predicted $PM_{2.5}$ Concentrations in 2022 Opening Year and 2029 Future Year Scenarios (Unadjusted)

7.64. The significance of the overall effects of the Proposed Development has been assessed in accordance with the EPUK/IAQM guidance.

7.65. The assessment of significance has taken into account a number of factors, including:

- Baseline pollutant concentrations in 2018, 2022 and 2029 are below the relevant health-based objectives and limit values at all existing receptors considered;
- The assessment predicts a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all existing sensitive receptors considered, with the Proposed Development in place; and
- Although the predicted pollutant concentrations are uncorrected, there is sufficient headroom beneath the relevant health-based objectives, meaning that any uncertainty in the results is unlikely to result in exceedances of the objectives.

7.66. Based on the above factors, in accordance with the EPUK/IAQM guidance, the effect of the Proposed Development on human health is considered to be **not significant**.

7.67. As a result, the significance of any effects at existing sensitive receptors is considered to be **negligible**.

Operational Phase Odour Assessment Undertaken Using IAQM Guidance

7.68. The odour assessment methodology, included within IAQM guidance, has been followed to consider the potential odour impacts during the operational phase.

Source Odour Potential

7.69. As previously discussed in Table 7.3, the source odour potential is judged to be **medium** for the Restored Risley Landfill Site, in accordance with the terminology included in the IAQM guidance.

Pathway Effectiveness

7.70. The pathway effectiveness from the Restored Risley Landfill Site to the Proposed Development is judged to be **moderately effective**, in accordance with the terminology included within the IAQM guidance (and as discussed in Table 7.4). An indicative source pathway and receptor plan is included in Figure 8.3.

Receptor Sensitivity

7.71. In accordance with the guidance in Table 2.11, the Hotel is considered to be of a **medium** sensitivity as users would expect a reasonable level of amenity, in accordance with the terminology included within the IAQM guidance. The outdoor amenity area/picnic area is considered to be of a **low** sensitivity as there would be transient exposure (i.e. people would only be present for limited periods of time).

Potential Odour Effect

7.72. The assessment of the potential odour effects at the Proposed Development, during the operational phase, is presented in Table 7.10.

Source Odour Potential	Effectiveness of Pathway	Risk of Odour Impact	Receptor Sensitivity	Likely Odour Effect
Medium	Moderately effective	Low Risk	Medium (Hotel)	Slight Adverse
			Low (amenity area/picnic area)	Negligible

Table 7.10: Likely Odour Effects at the Proposed Development

7.73. Based on a medium source odour potential, where the pathway is deemed to be moderately effective, the risk of odour impact (dose) is deemed to be low in accordance with the criteria detailed in Table 2.12.

7.74. A low risk of odour combined with a medium to low receptor sensitivity is deemed to lead to a low to negligible effect, in accordance with the criteria detailed in Table 2.13. As these impacts are not greater than slight adverse, in accordance with the IAQM guidance, the effect is considered to be **not significant**.

7.75. The overall environmental impact has been defined based on the criteria set out in Tables 4.4 to 4.6. With regard to odour, the Proposed Development will not lead to a discernible change in baseline environmental conditions, and therefore the environmental impact is classed as **negligible**.

Summary of Impacts during the Operational Phase

7.76. The operational phase assessment has been undertaken with reference to the IAQM and EPUK/IAQM guidance. These results have been compared against the criteria detailed in Tables 4.4 to 4.6, in order to determine the overall impact of the operational phase of the Proposed Development. The overall impacts of the operational phase of the Proposed Development are detailed in Table 7.11.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
Air quality at existing sensitive receptors due to operational phase traffic	County	Negligible	Negligible	High
Odour at proposed sensitive receptors due to Restored Risley Landfill Site	Borough/ Local/Neighbourhood	Negligible	Negligible	High

Table 7.11: Significance of Effect - Operational Phase

7.77. Given that the significance of effect is predicted as negligible, it is therefore considered to be **not significant**.

8. Proposed Mitigation

Construction Phase

Dust Assessment

8.1. Step 3 of the IAQM assessment methodology details the Site-specific mitigation required for each of the activities, based on the risk determined in Step 2.

8.2. During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and PM_{10} to be generated.

8.3. Step 2C of the construction phase assessment identified that the risk of dust soiling and human health effects is classed as low for earthworks, construction and trackout.

8.4. This assumes that no mitigation measures are applied, except those required by legislation. Site-specific mitigation measures do not need to be recommended if the risk category is negligible, in accordance with the IAQM guidance.

8.5. As the risk category is not negligible, Site-specific mitigation measures will need to be implemented to ensure that dust effects will not be significant.

8.6. A best practice dust mitigation plan (DMP) will be written and implemented for the Site. The DMP should be incorporated into the Construction Environmental Management Plan (CEMP). A framework CEMP is included in Appendix 12 of the ES Part 1 Report.

8.7. The DMP will set out the practical measures that could be incorporated as part of a best working practice scheme, taking into account recommendations included within the IAQM guidance. These recommendations include ensuring that dry materials and aggregates are handled and stored appropriately and using a wheel wash to prevent dirt and mud being tracked out onto the public highway.

8.8. It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials, and to incorporate the particular skills and experience offered by the successful contractor.

Odour Assessment

8.9. The construction phase odour assessment has been undertaken using guidance included within the IAQM document. Odour associated with the Restored Risley Landfill Site has been considered for construction workers who will be present within the Proposed Development. These receptors are considered to be of a Local/Neighbourhood designation.

8.10. When determining the overall odour impact on the Proposed Development, in accordance with Tables 4.4 to 4.6, the impact of these odour sources on the considered receptors is considered to be **negligible**.

8.11. Mitigation measures are not therefore required, although it should be noted that the only effective way to mitigate odour impacts is through changes to operations at the source.

Construction Phase Mitigation

8.12. Details of mitigation measures that will be put in place during the construction phase of the Proposed Development are provided in Table 8.2.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation
Change in baseline air quality at existing sensitive receptors due to construction phase traffic	Local/ Neighbourhood	Negligible	Negligible	High	Ensure all vehicles switch off engines when stationary

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation
Change in baseline dust and fine particulate matter levels at existing sensitive receptor due to construction phase activities	Local/ Neighbourhood	Minor negative Short-term Temporary Direct	Minor Adverse	High	Various construction Site management measures as part of the DMP
Odour at locations where construction workers will be present, due to Restored Risley Landfill Site	Local/Neighbourhood	Negligible	Negligible	High	None required

Table 8.2: Potential Mitigation Measures for the Construction Phase

Operational Phase

Road Traffic Emissions Assessment

8.13. The operational phase road traffic emissions assessment has been undertaken with reference to EPUK/IAQM guidance. Air quality has been considered at existing sensitive receptors along Inglewood Close. These are considered to be of a County designation.

8.14. When determining the overall air quality impact of the operational phase of the Proposed Development, in accordance with Tables 4.4 to 4.6, the impact is considered to be **negligible**, as it is considered extremely unlikely that health-based air quality objectives will be exceeded.

8.15. However, a Framework Travel Plan will support the development proposals, to ensure that any effects associated with the Proposed Development are no worse than negligible.

8.16. The Travel Plan aims to minimise the level of vehicular use associated with staff trips to the development, particularly single occupancy vehicle trips, and promotes the use of sustainable travel modes. A Travel Plan Co-ordinator will be appointed and travel details will be promoted via the Site's website, on notice boards and in dedicated Travel Packs for staff.

Odour Assessment

8.17. The operational phase odour assessment has been undertaken using guidance included within the IAQM document. Odour associated with the Restored Risley Landfill Site has been considered at the most sensitive uses within the Proposed Development, including the Hotel and outdoor amenity area/picnic area. The indoor uses are considered to be of a Borough designation, whilst the outdoor uses are considered to be of a Local/Neighbourhood designation.

8.18. When determining the overall odour impact on the Proposed Development, in accordance with Tables 4.4 to 4.6, the impact of these odour sources on the considered receptors is considered to be **negligible**.

8.19. Mitigation measures are not therefore required, although it should be noted that the only effective way to mitigate odour impacts is through changes to operations at the source.

Operational Phase Mitigation

8.20. The impact of the operational phase of the Proposed Development is predicted to be **negligible** and therefore mitigation is not considered to be required, as detailed in Table 8.2. However, a Framework Travel Plan will support the development proposals, with the aim of minimising the level of vehicular use associated with staff trips to the development and promoting the use of sustainable travel modes.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation
Air quality at existing sensitive receptors due to operational phase traffic	County	Negligible	Negligible	High	None required (however a Travel Plan with various measures will be implemented)
Odour at proposed sensitive receptors due to Restored Risley Landfill Site	Borough/ Local/Neighbourhood	Negligible	Negligible	High	None required

Table 8.3: Potential Mitigation Measures for the Operational Phase

9. Potential Residual Effects

Overview

Construction Phase

9.1. The construction phase assessment has been undertaken using the guidance included within the IAQM document. In accordance with this criteria, the risk of dust soiling and human health effects is considered to be low for earthworks, construction and trackout.

9.2. When determining the overall impact of the construction phase of the Proposed Development, in accordance with Tables 4.4 to 4.6, the impact is considered to be **minor adverse**. This assumes that no mitigation measures are applied, except those required by legislation (i.e. The Environmental Permitting Regulations 2010, The Environment Protection Act 1990 and European Directives). With site-specific mitigation measures in place, the effect is considered to be **negligible** and therefore **not significant**.

Operational Phase

Road Traffic Emissions Assessment

9.3. The operational phase assessment has taken into account the Air Quality Standards Regulations 2010 and EPUK/IAQM guidance. In accordance with the EPUK/IAQM guidance, there is predicted to be a **not significant** impact, as a result of development generated vehicle emissions at existing residential properties along Inglewood Close.

9.4. When determining the overall effect of the operational phase of the Proposed Development at these sensitive receptor locations, in accordance with Tables 4.4 to 4.6, the effect is considered to be **negligible** and therefore **not significant**. This assumes that no mitigation measures are applied.

Odour Assessment

9.5. The odour assessment has taken into account the IAQM guidance. In accordance with this, there is predicted to be a **not significant** impact at the most sensitive areas of the Proposed Development, as a result of the Restored Risley Landfill Site.

9.6. When determining the overall effect of the operational phase of the Proposed Development at these sensitive receptors, in accordance with Tables 4.4 to 4.6, the effect is considered to be **negligible** and therefore **not significant**. This assumes that no mitigation measures are applied.

Potential Residual Effects – Construction Phase

Step 4

9.7. Step 4 of the IAQM assessment methodology assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

9.8. The implementation of effective mitigation measures during the construction phase, such as those detailed in Table 9.1, will substantially reduce the potential for nuisance dust and PM_{10} to be generated and any residual impact should not be significant.

Summary of Overall Impacts

9.9. The overall impact of the proposal in terms of air quality, odour and dust issues during the construction phase is highlighted in the table below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Change in baseline air quality at existing sensitive receptors due to construction phase traffic	Local/ Neighbourhood	Negligible	Negligible	High	Ensure all vehicles switch off engines when stationary	Negligible

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Change in baseline dust and fine particulate matter levels at existing sensitive receptors due to construction phase activities	Local/ Neighbourhood	Minor negative Short-term Temporary Direct	Minor Adverse	High	Various construction Site management measures as part of the DMP	Negligible
Odour at locations where construction workers will be present, due to Restored Risley Landfill Site	Local/ Neighbourhood	Negligible	Negligible	High	None required	Negligible

Table 9.1: Residual Significance of Effect - Construction Phase

9.10. Given that the residual significance of effect is predicted as negligible, it is therefore considered to be **not significant**.

Potential Residual Effects – Operational Phase

Road Traffic Emissions Assessment

9.11. The impact of the operational phase of the Proposed Development, at existing residential properties along Inglewood Close is considered to be **negligible** and therefore **not significant**. A Travel Plan will however be prepared.

Odour Assessment

9.12. The impact of the Restored Risley Landfill Site at the most sensitive areas of the Proposed Development is predicted to be **negligible** and therefore **not significant**. As a result, mitigation measures are not required.

Summary

9.13. The overall impact of the proposal in terms of air quality, odour and dust issues during the operational phase is highlighted in the table below:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Air quality at existing sensitive receptors due to operational phase traffic	County	Negligible	Negligible	High	None required (however a Travel Plan with various measures will be implemented)	Negligible
Odour at proposed sensitive receptors due to Restored Risley Landfill Site	Borough/ Local/ Neighbourhood	Negligible	Negligible	High	None required	Negligible

Table 9.2: Residual Significance of Effect - Operation Phase

9.14. Given that the residual significance of effect is predicted as negligible, it is therefore considered to be **not significant**.

10. Additive Impacts (Cumulative Impacts and their Effects)

10.1. For the purposes of this ES we define the additive cumulative effects as:

> ***'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself***

10.2. The developments that are likely to have a cumulative impact when considered with the Proposed Development have been scoped with the Local Authority and Key Consultees during the preparation of this ES (a full list is included within Section 9 of the ES Part One Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of Air Quality, Dust and Odour. These are also shown geographically on the plan included at Appendix 14 of the ES Part One Report.

Cumulative Development Reference	Cumulative Development	Details	Status	Considered within this Technical Paper?
1	The Quadrant, Cavendish Avenue, Birchwood Park, Warrington, WA3 6AE Application Ref: 2014/23358	Seven units for general industry and/or warehouse/distribution (Use Class B2 and/or B8) Area 7 of the 3.64ha site area 12,225m^2 of development Within area 7 of original outline permission g	Planning Permission Granted 12-08-2014	Yes, included within traffic data used in operational phase air quality assessment

Cumulative Development Reference	Cumulative Development	Details	Status	Considered within this Technical Paper?
2	Eastern Edge of Birchwood Park Plots 107, 300, 501-502, 611-612, 701-702 and Quadrant, Birchwood Park, Warrington, WA3 6AE Application Ref: 2015/26044	Demolition of existing buildings and erection of new buildings for a combination of offices (B1); light and general industrial (B1/B2); warehousing development (B8) and ancillary retail/financial and professional services/ non-residential institutions /assembly and leisure (A1/A2/D1/D2) floor space. Land safeguarded for the HS2 route. Government consultation.	Part developed. Outline Planning Permission Granted 29-10-2015 (10-year permission)	Yes, included within traffic data used in operational phase air quality assessment
3	HS2 Phase 2b (adjacent to the Site)	Current programme: Advanced works Q4 2022 Development Q4 2024 Commissioning Q4 2031 – Q3 2033	Government consultation	Yes, but unable to consider in detail due to a lack of detailed information on development generated vehicles

Table 10.1: List of Cumulative Development

10.3. Both construction and operational phases will be considered and the short, medium and long-term impacts assessed.

Short Term

10.4. The potential short term cumulative effects relate to the construction phase of the Proposed Development.

10.5. Construction work is anticipated to commence on Site at Quarter 4 of 2021 (i.e. Winter 2021) and will take approximately 12 months, with completion expected in late 2022.

10.6. Construction is expected to continue for development areas within Birchwood Park during this time, however precise work schedules are unknown. In addition, it is understood that the advanced works phase of HS2 may commence as early as Quarter 4 of 2022.

10.7. As a result, there is the potential for some degree of overlap between the construction of the Proposed Development and other cumulative developments in the local area. However, these are all located some distance from those existing sensitive receptors closest to the Proposed Development.

10.8. The development area associated with The Quadrant (2014/23358) is located approximately 1.2km to the south west of the residential properties along Inglewood Close. Therefore, cumulative effects associated with dust and PM_{10} would be extremely unlikely. Given that the majority of construction vehicles associated with the Proposed Development are expected to access the Site directly from the M62 Motorway, cumulative effects associated with road traffic emissions are also considered to be unlikely.

10.9. The development areas associated with the eastern edge of Birchwood Park (2015/26044) are located approximately 1km to the south west of the residential properties along Inglewood Close. Given this distance and the routing of construction vehicles, again, cumulative effects are considered unlikely to occur.

10.10. The HS2 Phase 2b route runs to the east and north of the Proposed Development and is located more than 0.8km away from residential properties along Inglewood Close, at the closest point. Given the distance involved, cumulative effects associated with dust and PM_{10} are considered unlikely to occur.

10.11. It is understood that, although a working draft ES has been produced for HS2 Phase 2b, no detailed information is currently available with regard to the number of construction phase vehicles accessing the relevant areas and their route. Given that a quantitative assessment is

yet to be conducted, it is not possible to derive traffic figures for the construction phase and hence it is not possible to assess the implications of the HS2 Phase 2b construction phase vehicles in combination with the those associated with the Proposed Development.

10.12. It should be noted that, as part of any planning permission for these developments, a CEMP and/or DMP will need to be prepared, to provide details of the measures that will be put in place to minimize any dust or PM_{10} impacts. As a result, any cumulative dust and PM_{10} impacts associated with the simultaneous construction of these developments at these existing sensitive receptors are not considered to be significant, in accordance with the IAQM guidance.

10.13. Taking all these points into account, the air quality effects associated with the construction phase are considered to be **negligible**.

Medium Term

10.14. The potential medium term cumulative effects relate to the first years of operation of the Proposed Development.

10.15. The Proposed Development is expected to become operational during late 2022.

10.16. Construction of the development areas within Birchwood Park may continue in the medium term, given the scale of development proposals. In addition, construction of HS2 Phase 2b will take place over the medium term; however, the majority of this is likely to take place after the Proposed Development becomes operational. As a result, significant cumulative effects associated with construction phase dust and PM_{10} are not considered likely over the medium term.

10.17. Traffic flows associated with the operation of the Birchwood Park development areas have been included within the data used in the operational phase road traffic emissions assessment. The results of this assessment for the 2022 Opening Year scenarios show a negligible impact and a not significant effect for existing sensitive receptors along Inglewood Close.

10.18. As previously discussed, no detailed information is currently available on construction phase vehicles associated with HS2 Phase 2b.

10.19. Taking all these points into account, any cumulative air quality effects during the medium term should not be significant and can therefore be classed as **negligible**.

Long Term

10.20. The potential long term cumulative effects relate to the operational phase of the Proposed Development over a longer period.

10.21. The assessment of road traffic emissions during the operational phase has considered air quality at existing sensitive receptors along Inglewood Close for a 2029 Future Year scenario. The traffic flow information takes into account future growth in vehicle numbers over time. The results of this assessment for the 2029 Future Year scenarios show a negligible impact and a not significant effect for existing sensitive receptors along Inglewood Close.

10.22. As previously discussed, no detailed information is currently available on construction phase vehicles associated with HS2 Phase 2b; however, current information suggests that the commissioning phase is likely to start in Quarter 4 of 2031. Given the nature of the HS2 Phase 2b, significant vehicle emissions will not occur once it is operational.

10.23. Taking all these points into account, any cumulative air quality effects during the long term should not be significant and can therefore be classed as **negligible**.

Summary

10.24. In the short term, the potential for cumulative effects arises as a result of the simultaneous construction of the Proposed Development, the Birchwood Park development areas and HS2 Phase 2b. However, given the distances between the relevant developments, and with suitable site-specific mitigation measures in place, any cumulative effects during the short term should not be significant.

10.25. In the medium term, the potential for cumulative effects is primarily concerned with road traffic emissions. This relates to the first years of operation of the Proposed Development, and both construction and operational traffic from other relevant cumulative sites. This has been considered as far as practicable through the inclusion of committed development vehicles in the traffic data used in the operational phase air quality assessment. It has not been possible

to consider the effect of construction traffic associated with HS2 Phase 2b. The cumulative impacts are considered to be negligible during the medium term, and therefore not significant.

10.26. In the long term, the potential for cumulative effects is primarily concerned with road traffic emissions. However, the air quality assessment has shown that the impacts are predicted to be negligible at the existing sensitive receptors considered. It has not been possible to consider the effect of construction traffic associated with HS2 Phase 2b, although significant vehicle emissions will not occur once it becomes operational. The cumulative impacts are considered to be negligible during the medium term, and therefore not significant.

10.27. Given that the cumulative effect is predicted as negligible, it is therefore considered to be **not significant**.

11. Conclusion

11.1. An air quality, dust and odour assessment has been prepared in support of the proposed Warrington Motorway Service Area at Junction 11 of the M62 Motorway.

11.2. The assessment has concentrated on road traffic emissions, dust and fine particulate matter, and odour in the construction phase; and road traffic emissions and odour during the operational phase.

11.3. Mitigation measures have been considered, along with the cumulative effects that other developments might have.

Construction Phase

Construction Phase Vehicles

11.4. A qualitative assessment has been undertaken to consider the potential air quality impacts and significance of vehicles during the construction phase of the Proposed Development. The overall impact of this is considered to be **negligible** and therefore **not significant**.

Dust Assessment

11.5. An assessment has also been undertaken, using the guidance included within the IAQM document, to determine the risk and significance of dust and PM_{10} impacts from earthworks, construction activities and trackout.

11.6. In accordance with the IAQM guidance, the risk of dust soiling and human health effects is considered to be low for earthworks, construction and trackout. Site-specific mitigation measures will therefore need to be implemented at the Site and with these in place, the residual impact should not be significant.

11.7. In accordance with the criteria detailed in Tables 4.4 to 4.6, the overall impact and significance is considered to be minor negative, short term, direct and temporary, with a minor adverse significance. With Site-specific mitigation measures in place, as detailed in Table 8.1, the residual effect is considered to be **negligible** and therefore **not significant**.

Odour Assessment

11.8. An assessment has been undertaken, in accordance with IAQM guidance, to consider the potential odour impacts associated with the Restored Risley Landfill Site for workers during the construction phase of the Proposed Development.

11.9. In accordance with the criteria detailed in Tables 4.4 to 4.6, the overall effect is considered to be **negligible**, and therefore **not significant**.

Operational Phase

Road Traffic Emissions Assessment

11.10. An operational phase assessment has been undertaken, taking into account the Air Quality Standards Regulations 2010 and the EPUK/IAQM guidance, to determine the risk and significance of air quality impacts from operational phase road traffic.

11.11. The assessment predicts a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all existing sensitive receptors considered, with the development in place. In addition, all predicted pollutant concentrations are well below the relevant health-based air quality objectives/limit values in all scenarios considered.

11.12. In accordance with the criteria detailed in Tables 4.4 to 4.6, the overall effect is considered to be **negligible** and **not significant**.

Odour Assessment

11.13. An operational phase assessment has been undertaken, taking into account IAQM guidance, to determine the risk and significance of odour impacts from the Restored Risley Landfill Site.

11.14. In accordance with the criteria detailed in Tables 4.4 to 4.6, the overall effect and significance is considered to be **negligible**, and therefore **not significant**.

Cumulative Assessment

11.15. A qualitative assessment has been undertaken to consider the potential for cumulative effects as a result of the Birchwood Park development areas and HS2 Phase 2b.

11.16. The potential for cumulative effects has been considered over the short, medium and long term. This has taken into account all available information and has considered both the potential cumulative effects of dust and PM_{10} associated with construction work, and of road traffic emissions.

11.17. In accordance with the criteria detailed in Tables 4.4 to 4.6, the overall cumulative effect is considered to be **negligible**, and therefore **not significant**.

12. Reference List

[i] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[ii] Directive 2004/107/EC of the European Parliament and the Council of 15th December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

[iii] The Air Quality Standards Regulations 2010

[Iv] Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007

[v] The Air Quality Regulations 2000. SI No 928

[vi] The Air Quality (Amendment) Regulations 2002

[vii] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), February 2018

[viii] Ministry of Housing, Communities and Local Government, National Planning Policy Framework, February 2019

[ix] Department for Communities and Local Government. Planning Practice Guidance: Air Quality, March 2014

[x] Well-being of Future Generations (Wales) Act 2015 (anaw 2)

[xi] Warrington Borough Council, Local Plan Core Strategy, Adopted July 2014

[xii] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, February 2014

[xiii] Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

[xiv] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

[xv] Institute of Air Quality Management, Guidance on the Assessment of Odour for Planning (v1.1), July 2018

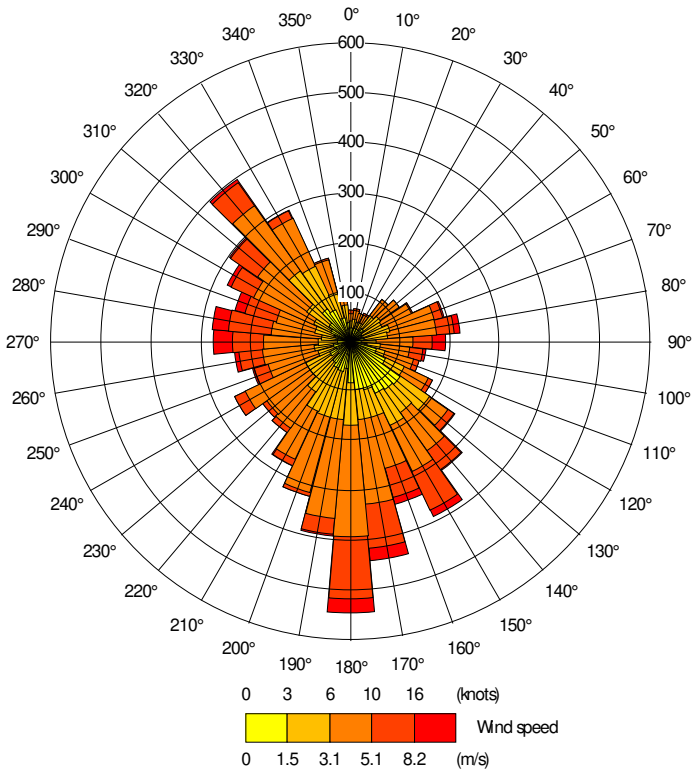
[xvi] Scotland and Northern Ireland Forum for Environmental Research (Sniffer), Odour Monitoring and Control on Landfill Sites, January 2013

13. Appendices

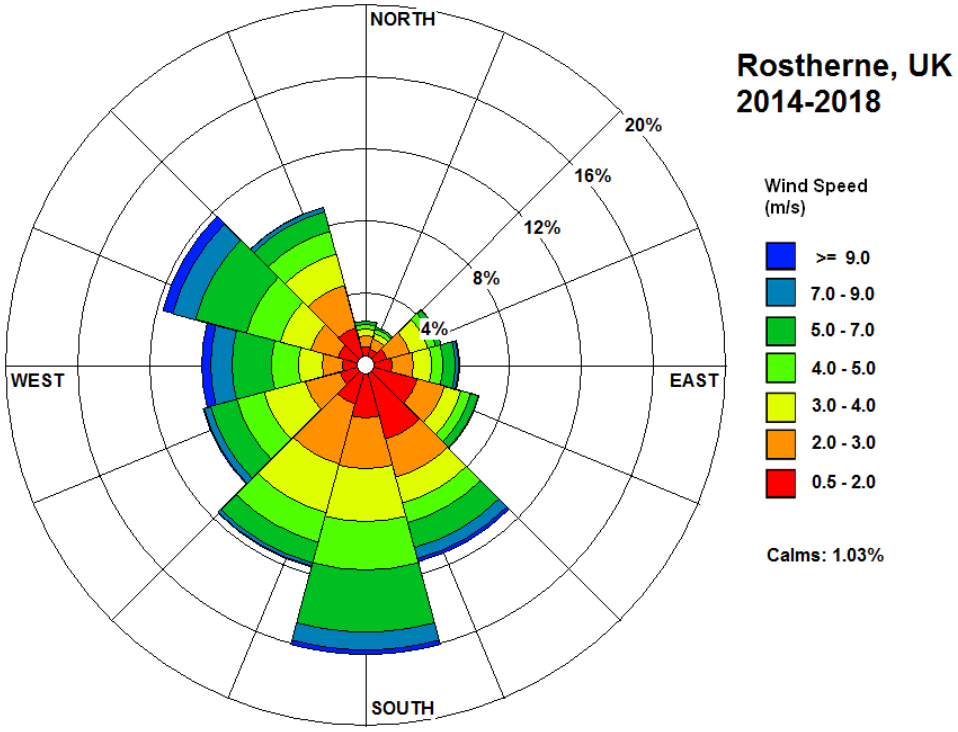
Appendix 8.1 – Traffic Data Used in Air Quality Assessment

Link	Link Name	Scenario 1: 2018 Base Year		Scenario 2: 2022 Assessment Year, No Development (With Committed Developments)		Scenario 3: 2022 Assessment Year, With Development (With Committed Developments)		Scenario 4: 2029 Assessment Year, No Development (With Committed Developments)		Scenario 5: 2029 Assessment Year, With Development (With Committed Developments)	
		LDV	HDV	LDV	HDV	LDV	HDV	LDV	HDV	LDV	HDV
1	M62 Motorway Eastbound On-Slip	5,726	437	5,972	445	8,936	917	5,972	445	8,936	917
2	M62 Motorway Westbound Off-Slip	5,462	374	5,710	383	8,847	858	5,710	383	8,847	858
3	A574 Birchwood Way	20,752	1,558	22,397	1,617	22,479	1,617	22,397	1,617	22,479	1,617
4	M62 Motorway Westbound On-Slip	5,752	393	6,325	413	9,491	888	6,325	413	9,491	888
5	M62 Motorway Eastbound Off-Slip	3,812	354	4,390	376	7,3383	848	4,390	376	7,383	848
6	Site Access	0	0	0	0	14,543	1,936	0	0	14,543	1,936
7	Eastern Circulatory	3,812	354	4,390	376	8,204	862	4,390	376	8,204	862
8	Western Circulatory	5,726	437	5,972	445	9,757	931	5,972	445	9,757	931
9	M62 Motorway Mainline, East of J11	97,160	16,504	101,429	16,295	101,513	16,295	108,106	17,445	108,190	17,445
10	M62 Motorway Mainline, Within J11	84,608	14,581	89,747	15,466	83,730	14,520	96,424	16,617	90,407	15,670
11	M62 Motorway Mainline, West of J11	94,334	15,612	100,462	16,255	100,604	16,255	107,139	17,406	107,281	17,406
All traffic flows 24-hour AADT (Annual Average Daily Traffic) flows											

Appendix 8.2 – 2018 Wind Rose for Rostherne Recording Station for Use in Air Quality Assessment


0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
600
500
400
300
200
100
0 3 6 10 16 (knots)
Wind speed
0 1.5 3.1 5.1 8.2 (m/s)

Appendix 8.3 – 2014-2018 Wind Rose for Rostherne Recording Station for Use in Odour Assessment


NORTH
EAST
SOUTH
WEST
4%
8%
12%
16%
20%
Rostherne, UK
2014-2018
Wind Speed
(m/s)
>= 9.0
7.0 - 9.0
5.0 - 7.0
4.0 - 5.0
3.0 - 4.0
2.0 - 3.0
0.5 - 2.0
Calms: 1.03%