HyNet North West Hydrogen Pipeline

Delivering clean growth

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Your Gas Network

Chapter 9

Air Quality

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Contents

9. Air Quality

9.1 Introduction

9.1.1 The Draft Environmental Statement (ES) has been produced to fulfil the Applicant's consultation duties and enable consultees to develop an informed view of the likely significant effects of the Project.

9.1.2 This chapter presents the assessment of the likely significant effects of the project with respect to air quality, including construction phase dust assessment and construction phase impacts assessment, based on the information obtained to date. Following consultation, the assessment will be updated for the final ES that will accompany the Development Consent Order (DCO) application for the Project.

9.1.3 This chapter should be read in conjunction with the Project description provided in **Chapter 2: The Project** and with respect to relevant parts of the following chapters:

- **Chapter 5: Biodiversity.**
- **Chapter 11: Traffic and Transport.**

9.1.4 This chapter describes:

- the legislation, policy and technical guidance that has informed the assessment (**Section 9.3**);
- consultation and engagement that has been undertaken and how comments from consultees relating to air quality have been addressed (**Section 9.4**);
- the methods used for baseline data gathering (**Section 9.5**);
- overall baseline, including existing and future baseline (**Section 9.6**);
- embedded environmental measures relevant to air quality (**Section 9.7**);
- the scope of the assessment for air quality (**Section 9.8**);
- the methodology applied for the assessment (**Section 9.9**);
- the assessment of air quality effects (**Section 9.10**);
- the assessment of cumulative (inter-project) effects (**Section 9.11**); and
- a summary of the significance conclusions (**Section 9.12**).

9.1.5 This chapter is supported by the following appendices:

- **Appendix 9A**: Legislation, policy and guidance;
- **Appendix 9B**: Air quality consultation;
- **Appendix 9C**: Air quality automatic and passive monitoring data;
- **Appendix 9D**: Construction dust assessment;

- **Appendix 9E**: Modelled receptors and backgrounds;
- **Appendix 9F**: Traffic data;
- **Appendix 9G**: Model inputs and verification;
- **Appendix 9H**: Full human modelled results; and
- **Appendix 9I**: Full ecological modelled results.

9.2 Project Overview

9.2.1 The Project includes the construction, operation and eventual decommissioning of approximately 100km of new pipeline to distribute hydrogen to industry in the North West. A number of Hydrogen Above Ground Installations (HAGIs), including Block Valve Installations (BVIs) are required to control the flow and pressure of hydrogen at key points along the proposed pipeline.

9.2.2 The Project connects the Hydrogen Production Plant (HPP) at the Stanlow site, as the source of hydrogen, for onward distribution to the network. The pipeline transports hydrogen to the Central Hub at the centre of the network, which then serves as the connection and onward distribution point to the North, East and South corridors, which would extend to St. Helens, Partington and Northwich respectively. Branching off from each main corridor would be pipeline spurs connecting hydrogen customers to the main pipeline. Infrastructure has also been included which supports the potential blending of hydrogen with methane in the existing gas network. The Project would also link to underground hydrogen storage facilities in Cheshire used to balance supply and demand through the network.

9.2.3 The presently anticipated maximum extent of land in which the Project may take place, which is assessed in this Draft ES, is defined by the 'Draft Order Limits', land within which is hereafter referred to as 'land within the Draft Order Limits'.

9.2.4 A proportionate degree of flexibility has been incorporated into the project design so that unforeseen issues that may be encountered following consent can be sufficiently mitigated. For example, previously unidentified poor ground conditions may require a pipeline section to be re-routed slightly for geotechnical reasons. Therefore, to allow for this, new infrastructure would be constructed within specified Limits of Deviation (LoD) which identify a maximum distance or measurement of variation within which the works must be constructed; further detail is provided on LoD in **Chapter 2: The Project**.

Limitations and assumptions

9.2.5 There are limitations associated with both measured and predicted concentrations. The model (ADMS-Roads) used in this assessment relies on input data (including predicted traffic flows), which also have assumptions associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.

9.2.6 In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG(22). As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

9.3 Relevant Legislation, Planning Policy and Technical Guidance

9.3.1 This section identifies the legislation, planning policy and technical guidance that have informed the assessment of effects with respect to air quality and details are provided in **Appendix 9A**. Further information on policies relevant to the Project is provided in **Chapter 4: Legislation and policy overview**.

Legislation

9.3.2 The applicable legislation comprises:

- Environmental Protection Act 1990[1];
- Environment Act 1995[2];
- Air Quality (England) Regulations 2000[3] (as amended, 2002[4]);
- Air Quality Standards Regulations 2010[5] (as amended, 2016[6]);
- Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[7];
- Environment Act 2021[8]; and

[1] The National Archives (1990). *Environmental Protection Act 1990* (online). Available at: https://www.legislation.gov.uk/ukpga/1990/43/data.pdf (Accessed July 2024).
[2] The National Archives (1995). *Environment Act 1995* (online). Available at: https://www.legislation.gov.uk/ukpga/1995/25/data.pdf (Accessed July 2024).
[3] The National Archives (2000). *The Air Quality (England) Regulations 2000* (online). Available at: https://www.legislation.gov.uk/uksi/2000/928/made/data.pdf (Accessed July 2024).
[4] The National Archives (2000). *The Air Quality (England) (Amendment) Regulations 2002* (online). Available at: https://www.legislation.gov.uk/uksi/2002/3043/data.pdf (Accessed July 2024).
[5] The National Archives (2010). *The Air Quality Standards Regulations 2010* (online). Available at: https://www.legislation.gov.uk/uksi/2010/1001/data.pdf (Accessed July 2024).
[6] The National Archives (2016). *The Air Quality Standards (Amendment) Regulations 2016* (online). Available at: https://www.legislation.gov.uk/uksi/2016/1184/made/data.pdf (Accessed July 2024).
[7] The National Archives (2020). *The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020* (online). Available at: https://www.legislation.gov.uk/uksi/2020/1313/made/data.pdf (Accessed July 2024).
[8] The National Archives (2021). *Environment Act 2021* (online). Available at: https://www.legislation.gov.uk/ukpga/2021/30/data.pdf (Accessed July 2024).

- Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[9].

9.3.3 Air Quality Standards (AQS) that are included in the Regulations and are relevant to the assessment presented in this chapter are given in **Table 9.1**.

Table 9.1 Relevant air quality standards and objectives

Pollutant	Averaging period	Value (µg m^{-3})	Set in regulations as…
NO_2	Annual mean	40	Objective and limit value
NO_2	1 hour mean, not to be exceeded more than 18 times a year (equivalent to 99.79th percentile) (1)	200	Objective and limit value
PM_{10}	Annual mean	40	Objective and limit value
PM_{10}	24 hours mean, not to be exceeded more than 35 times a year (equivalent of 90.4th percentile)	50	Objective and limit value
$PM_{2.5}$	Annual mean	20	Limit value
$PM_{2.5}$	Annual mean	12	National government interim target for 2028
$PM_{2.5}$	Annual mean	10	National government target for 2040

Notes:

(1) If the annual mean concentration is less than 60 µg/m^3 it can be assumed that the 1-hour mean standard is likely to be met

9.3.4 Critical levels and critical loads that are applicable at the designated sites considered by this assessment were obtained from the Centre for Hydrology and

[9] The National Archives (2023). *The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023* (online). Available at: https://www.legislation.gov.uk/ukdsi/2022/9780348242959/data.pdf (Accessed July 2024).

Ecology's Air Pollution Information System (APIS)[10] and are set out in **Table 9.2** and **Table 9.3** respectively. The designated sites included in this assessment are Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs) and Ancient Woodlands (AW).

9.3.5 Critical levels are defined as '*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors may occur'*. Critical levels are not habitat specific and have been set to cover broad vegetation types.

9.3.6 Critical loads are defined as '*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur'.* When the deposition of nitrogen exceeds the critical load threshold, it can lead to eutrophication and biodiversity loss. Nitrogen deposition is mainly caused by NH_3 and NO_X. For the purpose of determining links between critical loads and atmospheric emissions, critical loads are further derived to produce a maximum critical load and a minimum critical load. Generally, the lower end of the range should be used to provide a conservative assessment.

Table 9.2 Relevant assessment criteria for ecological receptors

Pollutant	Averaging period	Objective ($\mu g\ m^{-3}$)	AQS/Target/EAL
NO_X	Annual mean	30	AQS
NO_X	Daily mean	200	AQS
NO_X	Daily mean	75	Environmental Assessment Level (EAL)
NH_3	Annual mean	1-3	Target

Table 9.3 Relevant critical loads for ecological receptors

Applicable designated site	Nitrogen deposition Lower critical load (kgN/ha/yr) for the most sensitive feature	Acid deposition Critical loads (keq/ha/yr) for the most sensitive feature
Manchester Mosses SAC/SSSI	5	Min: 0.321 Max: 0.58

[10] Centre for Hydrology and Ecology. Air Pollution Information System (online). Available at: https://www.apis.ac.uk/ (Accessed July 2024).

Applicable designated site	Nitrogen deposition Lower critical load (kgN/ha/yr) for the most sensitive feature	Acid deposition Critical loads (keq/ha/yr) for the most sensitive feature
Rostherne Mere SSSI	10	Not sensitive
Woolston Eyes SSSI	10	Min: 1.071 Max: 5.071
Ancient Woodlands	5	Not available

Planning policy

9.3.7 Policy relevant to the Project and to this environmental topic is summarised below.

- Overarching National Policy Statement for Energy (EN-1)[11];
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)[12];
- Clean Air Strategy 2019[13];
- National Planning Policy Framework (NPPF) 2023[14];

[11] Department of Energy Security and Net Zero, (2023). Overarching National Policy Statement for Energy (EN-1) (Online). Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf (Accessed June 2024).
[12] Department for Energy Security and Net Zero (2023). National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Online). Available at: https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf (Accessed July 2024).
[13] Department for Environment Food and Rural Affairs (2019). *Clean Air Strategy 2019* (online). Available at: https://assets.publishing.service.gov.uk/media/5c3b9debe5274a70c19d905c/clean-air-strategy-2019.pdf (Accessed July 2024).
[14] Department for Levelling Up, Housing and Communities (2023). *National Planning Policy Framework* (online). Available at: https://assets.publishing.service.gov.uk/media/669a25e9a3c2a28abb50d2b4/NPPF_December_2023.pdf (Accessed July 2024).

- UK Air Quality Strategy 2023[15];
- Environmental Improvement Plan 2023[16];
- Cheshire West and Chester Development Plan (Part 1) 2015[17];
- Cheshire East Local Plan Strategy 2017[18];
- Trafford Local Plan: Core Strategy 2012[19];
- Warrington Local Plan 2023[20];
- St Helens Borough Local Plan 2022[21]; and
- Halton Delivery and Allocations Local Plan 2022[22].

Technical guidance

9.3.8 The following guidance documents have been used during the preparation of this Chapter:

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[15] Department for Environment Food and Rural Affairs (2023) *Air Quality Strategy: framework for local authority delivery* (online). Available at: https://www.gov.uk/government/publications/the-air-quality-strategy-for-england/air-quality-strategy-framework-for-local-authority-delivery (Accessed July 2024).
[16] Department for Environment Food and Rural Affairs (2023). *Environmental Improvement Plan 2023* (online). Available at: https://assets.publishing.service.gov.uk/media/64a6d9c1c531eb000c64fffa/environmental-improvement-plan-2023.pdf (Accessed July 2024).
[17] Cheshire West and Chester (2015). Cheshire West and Chester Local Plan (Part One) Strategic Policies 2015 (Online). Available at: https://consult.cheshirewestandchester.gov.uk/kse/event/24907/section/3252243 (Accessed June 2024).
[18] Cheshire East Council (2017). Cheshire East Local Plan Strategy 2010-2030 (Online). Available at: https://www.cheshireeast.gov.uk/pdf/planning/local-plan/local-plan-strategy-web-version-1.pdf (Accessed June 2024).
[19] Trafford Council, (2012). Trafford Local Plan Core Strategy (Online). Available at: https://www.trafford.gov.uk/planning/strategic-planning/docs/core-strategy-adopted-final.pdf (Accessed June 2024).
[20] Warrington Borough Council (2023). Local Plan (Online). Available at: https://www.warrington.gov.uk/sites/default/files/2023-12/Warrington%20local%20plan%20-%202021-22%20-%202038-39%20-%20Adopted%20December%202023.pdf (Accessed June 2024).
[21] St Helens Borough Council (2022). St Helens Borough Local Plan up to 2037 (Online). Available at: https://www.sthelens.gov.uk/media/4315/St-Helens-Borough-Local-Plan-up-to-2037/pdf/Local_Plan_Written_Statement_-_FINAL_adoption_version.pdf?m=1658409100420 (Accessed June 2024).
[22] Halton Borough Council. (2022). Halton Delivery and Allocations Local Plan (Online). Available at: https://www3.halton.gov.uk/Documents/planning/planning%20policy/newdalp/DALP%20Adopted.pdf (Accessed June 2024).

- National Planning Practice Guidance (NPPG) 2019[23];
- Local Air Quality Management Review and Assessment Technical Guidance 2022 (LAQM.TG(22))[24];
- Land-Use Planning and Development Control: Planning for Air Quality 2017[25];
- Guidance on the Assessment of Dust from Demolition and Construction 2024[26]; and
- Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites 2020[27].

9.4 Consultation and Engagement

Overview

9.4.1 The assessment has been informed by consultation responses, statutory and technical engagement. An overview of the approach to consultation is provided in **Section 3.7** of **Chapter 3: Approach to preparing the Draft ES**.

Scoping Opinion

9.4.2 A Scoping Opinion was adopted by the Secretary of State, administered by the Planning Inspectorate, on 08 March 2022. A summary of the relevant responses received in the Scoping Opinion in relation to air quality and confirmation of how these have been addressed within the assessment is presented in **Table 9B.1** in **Appendix 9B**.

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[23] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2019). *Air Quality Guidance* (online). Available at: https://www.gov.uk/guidance/air-quality--3 (Accessed July 2024).
[24] Department for Environment Food and Rural Affairs (2022). *Local Air Quality Management Technical Guidance (TG22)* (online). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf (Accessed July 2024).
[25] Environmental Protection UK and Institute of Air Quality Management (2017). *Land-Use Planning and Development Control: Planning For Air Quality* (online). Available at: https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf (Accessed July 2024).
[26] Institute of Air Quality Management (2024). *Guidance on the Assessment of Dust from Demolition and Construction* (online). Available at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf (Accessed July 2024).
[27] Institute of Air Quality Management (2020). *A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites* (online). Available at: https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf (Accessed July 2024).

Statutory Consultation

9.4.3 Statutory consultation took place between 12 September and 10 November 2022 in accordance with the Planning Act 2008. Prescribed and non-prescribed consultees and members of the public were consulted. Various methods of consultation and engagement were used in accordance with the Statement of Community Consultation (SoCC) including letters, website, public exhibitions, publicity and advertising in newspapers and webinar briefings.

9.4.4 Cadent Gas Ltd (Cadent) ("the Applicant") prepared a Preliminary Environmental Information Report (PEIR) which was publicised at this consultation stage. The Applicant sought feedback on the environmental information presented in that report. Feedback received during statutory consultation was considered by the Applicant and incorporated, where relevant into the design of the Project and its assessment and is presented in this Draft ES.

9.4.5 A summary of the relevant responses received in response to statutory consultation, together with any subsequent discussions held in relation to air quality and confirmation of how these have been considered within the assessment to date is presented in **Table 9B.2** in **Appendix 9B**.

9.4.6 Technical engagement with consultees in relation to air quality is ongoing including communication with the relevant local authorities to ensure up to date baseline information is included and the methodology used in this assessment is agreed.

9.5 Data Gathering Methodology

Study area

The Study Area is illustrated in **Figure 9.1**. Beyond the Study Area any air quality impacts will be negligible and the effects not significant.

9.5.1 The extent of the Study Area has been determined with regard to:

- The spatial limits of traffic predictions for the Project;
- The Draft Order Limits;
- The locations of potentially sensitive human and ecological receptors as shown by available map data;
- The IAQM Guidance on the assessment of dust from demolition and construction;
- IAQM/ EPUK Guidance on land-use planning and development control: planning for air quality; and
- Professional judgement.

9.5.2 Details of the approach to determining the Study Area are provided in sections below.

Desk study

9.5.3 A summary of the organisations that have supplied data, together with the nature of that data is outlined in **Table 9.4**. The data sets used in this assessment are standard practice and based on professional judgement.

Table 9.4 Data sources used to inform the air quality assessment

Source	Date	Summary
Department for Environment, Food and Rural Affairs (Defra) (2020)[28]	November 2020	Background maps of forecast air quality concentrations
Cheshire West and Chester Council Annual Status Report (ASR) (2022)[29]	June 2023	Monitoring data and supporting information on AQMAs
Cheshire East Council ASR (2022)[30]	June 2023	Monitoring data and supporting information on AQMAs
Halton Borough Council ASR (2022)[31]	June 2023	Monitoring data and supporting information on AQMAs
Warrington Borough Council ASR (2022)[32]	June 2023	Monitoring data and supporting information on AQMAs

[28] Defra (2020). Background Mapping data for local authorities (Online) Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 (Accessed June 2024).
[29] Cheshire West and Chester Council (2023). 2022 Air Quality Annual Status Report. (Online) Available at: https://www.cheshirewestandchester.gov.uk/asset-library/air-quality-annual-status-report-2023.pdf (Accessed June 2024).
[30] Cheshire East Council (2023) 2022 Air Quality Annual Status Report. (Online) Available at: https://www.cheshireeast.gov.uk/pdf/environment/air-quality/cec-asr-2023-2.pdf (Accessed June 2024).
[31] Halton Borough Council (2023). 2022 Air Quality Annual Status Report (ASR). (Online) Available at: https://www3.halton.gov.uk/Documents/planning/airquality/assessments/Air_Quality_Review_and_Assessment_2022.pdf (halton.gov.uk) (Accessed June 2024).
[32] Warrington Borough Council (2023). 2022 Air Quality Annual Status Report (ASR). (Online) Available at https://www.warrington.gov.uk/airquality (Accessed December 2021).

Source	Date	Summary
Greater Manchester Combined Authority ASR (2022)[33]	June 2023	Monitoring data and supporting information on AQMAs
St. Helens Council ASR (2022[34]	June 2023	Monitoring data and supporting information on AQMAs

Survey work

9.5.4 No survey work was undertaken for the air quality assessment as there was readily available monitoring undertaken in 2022 by local authorities which was suitable to use in the baseline section and for the verification of the dispersion modelling.

Data limitations

9.5.5 Results recorded in 2020 and 2021 results are presented for information but have not been used in the assessment, as concentrations were affected by both reduced emissions, as a result of COVID-19 lockdowns and logistical monitoring challenges during the lockdowns. As of May 2023, the World Health Organisation (WHO) no longer constituted COVID-19 as a public health emergency of concern and there has been no national lockdown since 2022. COVID-19 changed behavioural patterns (i.e., working from home), therefore, concentrations have not increased to what they were pre COVID-19. However, with only one year of data available, it is not possible to determine what the new 'normal' is.

9.5.6 The projections in the 2018 LAQM Defra background maps are based on assumptions, which were current before the COVID-19 outbreak. Therefore, in consequence these predicted background concentrations do not reflect short- or longer-term impacts on emissions in 2020 and beyond, resulting from behavioural change during the national or local lockdowns.

[33] Greater Manchester Combined Authority (2023). 2022 Air Quality Annual Status Report. (Online) Available at: https://assets.ctfassets.net/tlpgbvy1k6h2/3eJDZpHcCKNK0ZO7TcUkl/3363e762b28868a832ab2200286a4841/Greater_Manchester_Air_Quality_Annual_Status_Report_2022.pdf (Accessed June 2024).

[34] St Helens Council (2023). 2022 Air Quality Annual Status Report. (Online) Available at: https://sthelens.gov.uk/media/3160/Air-Quality-Annual-Status-Report-2023/pdf/ASR_Template_England_2023_v1.0_Issue_290623.docx_.pdf?m=638192786098730 (sthelens.gov.uk) (Accessed June 2024).

9.6 Overall Baseline

Current baseline

9.6.1 A 'Baseline Study Area' has been identified, independent of the Study Area described in **Section 9.7.** Whilst the Study Areas only consider the emission sources associated with the Project, the Baseline Study Area considers the wider area around the Draft Order Limits including all construction traffic routes. Section 9.7 provides further details on the Projects Study Areas.

Air Quality Management Areas

9.6.2 **Figure 9.1** presents the AQMAs within 2km of the Draft Order Limits and affected roads, of which there are seven.

9.6.3 provides details on the AQMAs.

Table 9.5 AQMAs declared within 2km of the Draft Order Limits and affected road network

Local Authority	AQMA name	Pollutant	Description
St Helens Metropolitan Borough Council	M6 AQMA No.1	NO_2 Annual	An area encompassing the M6 for its entire length within the Borough.
Manchester City Council	Manchester AQMA	NO_2 Annual	This is the part of the Greater Manchester Combined Authority AQMA located within the Manchester City Council area.
Salford Metropolitan Borough Council	Salford AQMA	NO_2 Annual	This is the part of the Greater Manchester Combined Authority AQMA located within the Salford Metropolitan Borough Council area.
Trafford Metropolitan Borough Council	Trafford AQMA	NO_2 Annual	This is the part of the Greater

Local Authority	AQMA name	Pollutant	Description
			Manchester Combined Authority AQMA located within the Trafford Metropolitan Borough Council area.
Warrington Borough Council	Warrington AQMA No.1	NO_2 Annual	A 50m continuous strip on both sides of the M6, M62 and M56 motorway corridors, due to potential exceedances of the annual nitrogen dioxide objective.
Cheshire West and Chester Council	Frodsham AQMA Cheshire West and Chester	NO_2 Annual	An area at the junction of Fluin Lane with the A56 High St.
Warrington Borough Council	Warrington AQMA 4 2016	NO_2 Annual	Covering the link roads and the town centre ring road.

Background

9.6.4 Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra UK-AIR website, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1 x 1 km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the prediction reduction in vehicle emissions and emissions from other sources. The background concentrations used in the detailed dispersion modelling assessment are provided in **Appendix 9D**. These figures show that annual average background concentrations of each pollutant are below the respective AQSs reported in **Table 9.1**.

9.6.5 The 2019 minimum and maximum annual average concentrations of NO_X, NO_2, PM_{10} and $PM_{2.5}$ within the Draft Order Limits are reported in

9.6.6 **Table** 9.6. The table shows that the annual mean concentrations for all pollutants are below the respective AQSs reported in **Table 9.1**.

Table 9.6 Background concentrations of air quality pollutants

Pollutant	2022 predicted annual average concentration (ugm^{-3})		2024 predicted annual average concentration (ugm^{-3})	
	Minimum	Maximum	Minimum	Maximum
NO_x	8.2	25.5	7.7	24.3
NO_2	6.4	17.8	6.1	17.0
PM_{10}	9.3	13.9	9.1	13.7
$PM_{2.5}$	6.1	9.0	5.9	8.8

Data source: Defra, UK-AIR[28]

Automatic monitoring

9.6.7 Automatic monitoring of NO_2 was undertaken by the six local authorities during the period of 2018– 2022. Automatic air quality monitoring produce high-resolution measurements (typically hourly or shorter period averages) which are then averaged to annual results. Details of the number of automatic monitoring locations for each local authority in 2022 is as follows:

- Cheshire West and Chester Council: six automatic monitoring locations;
- Halton: two automatic monitoring locations;
- Warrington: four automatic monitoring locations;
- Cheshire East: one automatic monitoring location;
- Trafford: three automatic monitoring locations; and
- St Helens: four automatic monitoring locations.

9.6.8 The location of the NO_2 automatic monitoring sites within 1km of the Draft Order Limits is reported in **Appendix 9C**, alongside the concentrations of NO_2 for the monitoring period 2018 – 2022. The location of the automatic monitoring sites in relation to the Draft Order Limits are shown in **Figure 9.2**.

9.6.9 Automatic monitoring of NO_2 for the period between 2018 – 2022 has shown there were no exceedances of the annual AQS or hourly mean for NO_2 at any of the monitoring sites within 1km of the Draft Order Limits. Annual monitored concentrations in 2022 show a slight increase at three of the automatic monitoring sites within 1km of the Draft Order Limits, although this is expected as COVID-19 restrictions were lifted and society started returning to 'normal', albeit some behavioural change. It should be noted that there is not enough data to determine what this new 'normal' shows and should be assessed with caution.

9.6.10 All annual mean concentrations recorded at all monitoring sites over the five year period from 2018 to 2022 were below 60µg/m^3 and therefore, with reference to

LAQM.TG(22), the hourly mean NO_2 concentrations were unlikely to have exceeded the hourly AQS.

9.6.11 All local authorities, except for Cheshire East, undertook automatic monitoring of PM_{10} during the period 2018 – 2022. There are PM_{10} monitoring sites within 1km of the Draft Order Limits in Cheshire West and Chester Council and St Helens Council. Warrington Borough Council was the only local authority to have undertaken automatic monitoring of $PM_{2.5}$ during this period although the automatic monitoring site is located more than 1km from the Draft Order Limits and therefore is not considered to be relevant to this assessment. The monitored concentrations for 2018 – 2022 at monitoring locations within 1km of the Draft Order Limits for PM_{10} are reported in **Appendix 9C.** Annual mean PM_{10} concentrations for the period 2018 – 2022 show there are no exceedances of the relevant AQS at any of the monitoring sites within 1km of the Draft Order Limits.

Passive monitoring

9.6.12 Passive diffusion tube monitoring of NO_2 concentrations was undertaken by the six local authorities from 2018 – 2022. Passive diffusion tube monitoring includes collecting a monthly sample and calculating an annual average. If there is less than 75% data capture, the data is annualised using the monitoring data collected by automatic sites. Details of the number of passive monitoring locations for each local authority as off 2022 is as follows:

- Cheshire West and Chester Council: 90 monitoring locations;
- Halton: 15 monitoring locations;
- Warrington: 40 monitoring locations;
- Cheshire East: 92 monitoring locations;
- Trafford: 18 monitoring locations; and
- St Helens: 27 monitoring locations.

9.6.13 **Appendix 9B** reports the details of the monitoring sites within 1km of the Draft Order Limits and respective annual mean NO_2 concentrations of NO_2 recorded between 2018 and 2022. The location of the passive monitoring sites in relation to the Draft Order Limits are shown in **Figure 9.2**.

9.6.14 The last year when data is expected to not be affected by reduced emissions as a result of COVID-19 is 2019. The NO_2 annual mean AQS was exceeded at one of the 38 monitoring locations located within 1km of the Draft Order Limits in 2019. Monitored concentrations at this site (Diffusion Tube 19,24 located at 55 Borough Road, in St Helens) was 48.1 $\mu g/m^3$ in 2019 and 40.5 $\mu g/m^3$ in 2022. All annual mean concentrations recorded at all diffusion tube monitoring sites over the five year period from 2018 to 2022 were below 60$\mu g/m^3$ and therefore, with reference to LAQM.TG(22), the hourly mean NO_2 concentrations were unlikely to have exceeded the hourly AQS.

Modelled baseline

9.6.15 All 2022 base year modelled results for existing receptors are provided in Appendix G. These results show that in the 2022 modelled baseline scenario, concentrations of annual mean NO_2 were compliant with the AQS at all, but two of the modelled receptor locations. Exceedance of 40µg/m^3 was predicted at two locations along M60, within Trafford and Salford AQMA.

9.6.16 The AQS for hourly mean NO_2 concentrations is 200µg/m^3, not to be exceeded more than 18 times per year. However, with reference to LAQM.TG(22), where an annual mean NO_2 concentration is below 60µg/m^3, it is unlikely that there will be an exceedance of the hourly mean AQS. The annual mean NO_2 concentrations predicted by the model at all relevant receptor locations were all less than 60µg/m^3 in the baseline scenario, and therefore hourly mean NO_2 concentrations are not likely to exceed the hourly mean AQS.

9.6.17 Modelled 2022 baseline concentrations of annual mean PM_{10} and $PM_{2.5}$, as well as daily mean PM_{10}, are below the respective AQS at all relevant receptor locations.

Future baseline

9.6.18 It is expected there will be a gradual decline in pollutant concentrations in the atmosphere as a result of measures such as the implementation of the Government's Clean Air Strategy (which provides details of actions up to 2050), improvements in real world emissions performance of road vehicles, and more stringent emission limits for industrial sources as environmental permits for operators covering the various industrial sectors are updated in a phased manner to bring them in line with the requirements of the Industrial Emissions Directive[35].

9.6.19 With regard to the potential effects of climate change on the future air quality baseline, the 2007 report produced by the Air Quality Expert Group (AQEG)[36] indicated that the Winter season may become windier with fewer, less stable weather conditions by the end of the century, whilst Summer seasons are anticipated to become hotter and sunnier, with an increase in unstable weather conditions by the 2040s. The net effect of these anticipated changes on the baseline air quality is difficult to establish but is unlikely to significantly alter the baseline air quality to an extent that it would affect the outcome of any assessment. Other factors such as changes in technology and the move away from combusting fossil fuels, driven by climate change abatement would potentially lead to decreases in emissions of the key pollutants, considered in this

[35] European Commission (2010). Directive 2010/75/EU of the European Parliament and of the Council. (Online). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&from=EN (Accessed September 2024)
[36] Air Quality Expert Group (2007). Air Quality and Climate Change: A UK Perspective. (Online) Available at: https://uk-air.defra.gov.uk/library/assets/documents/reports/aqeg/fullreport.pdf (Accessed September 2024)

assessment, and a corresponding decrease in background concentrations of air pollutants into the future.

9.7 Embedded Environmental Measures

9.7.1 As part of the project design process, a number of embedded environmental measures are proposed to reduce the potential for impacts on air quality. These are broken down into measures that are incorporated into the overall design of the Project, and those that are to be implemented during its construction and operational phases. No measures have been specifically identified for the decommissioning phase of the Project. However, it is anticipated that measures equivalent to those implemented during construction would also be effective in mitigating effects during decommissioning. **Table 9.7** outlines how these embedded measures will influence the air quality assessment.

Table 9.7 Summary of embedded environmental measures

Embedded measures	Compliance mechanism
Construction phase	
Where practical, sensitive sites will be avoided by the temporary construction compounds and permanent Project elements including SSSIs, Local Nature Reserves, Local Wildlife Sites, Ancient Woodland, areas of consented development, areas of historic landfill and other known areas of potential contamination, National Trust Land, Listed Buildings and Scheduled monuments.	Development Consent Order (DCO) works plans and Order Limits
Good practice air quality measures will be applied as described in IAQM guidance. These are provided in **Table** *9.8* below.	Construction Environmental Management Plans (CEMP) secured via DCO requirement

Good practice air quality measures as described in the IAQM guidance on the Assessment of Dust from Demolition and Construction[26] to be employed across the Project and incorporated in the CEMP are provided in

9.7.2 **Table *9.8*.**

Table 9.8 Embedded measures for the construction phase

Category	Measures to be incorporated across the Project
Communication	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/ engineer or the Project Manager. • Display the head or regional office contact information for the company in charge of the Project management and on site work. • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority.
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or emissions, either on- or off-site and the action taken to resolve the situation in the log book.
Monitoring	• Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. • Carry out regular site inspections to monitor compliance with the Dust Management Plan (DMP), record inspection results, and make an inspection log available to the local authority when asked. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on-site, when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. • Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the local authority.
Preparing and maintaining site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.

Category	Measures to be incorporated across the Project
	• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. • Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period. • Avoid site runoff of water or mud. • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. • Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicles/ machinery and sustainable travel	• Use Euro VI vehicles for haulage during construction, where possible for the tasks required. • Use Stage V Non Road Mobile Machinery (NRMM), unless there is a specific reason that suitable Stage V equipment cannot be obtained. • Ensure all vehicles switch off engines when stationary and not operating – no idling vehicles. • Avoid the use of diesel- or petrol-powered generators and use low-carbon alternative equipment where practicable. • Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas. • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Dust management	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate • Use enclosed chutes and conveyors and covered skips.

Category	Measures to be incorporated across the Project
	• Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste management	• Avoid bonfires and burning of waste materials
Measures specific to earthworks	• Re-vegetate earthworks and exposed area/ soil stockpiles to stabilise surfaces as soon as practicable • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable • Only remove the cover in small areas during work and not all at once
Measures specific to construction	• Avoid scabbling (roughing of concrete surfaces) if possible • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out (unless this is required for a particular process) • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in solos and suitable emission control systems to prevent escape of material and overfilling during delivery • For small supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust
Measures specific to trackout	• Use water-assisted dust sweepers on the access and local roads to remove any material tracked out of the site • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport • Record all inspections of haul routes and any subsequent action in a site log book • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)

9.8 Scope of the Assessment

9.8.1 The scope of the assessment has been refined as the project design has evolved and responds to feedback received to date as set out in **Section 9.4** and **Appendix 9B**.

Spatial scope

9.8.2 The Study Areas will vary depending on the phase of the assessment. The approach to developing the spatial extent of the Study Area for air quality is described in the sub sections below, where various emissions are discussed separately.

9.8.3 Each emission source has a different Zones of Influence (ZoI) which are dependent upon the location of the emission source(s), the magnitude of the emissions, the extent to which they are dispersed and diluted in the atmosphere, and the relative location of the human and ecological receptors. The emission sources considered within this Draft ES Chapter include:

- Construction dust emissions; and
- Construction road traffic emissions.

9.8.4 The approach to deciding upon the spatial extent of the Study Area for air quality has been informed by the IAQM (2024), EPUK/IAQM (2017). Details of the approach to determining the Study Areas for the various emissions are discussed below.

Construction dust emissions

9.8.5 Construction activities associated with the Project, with the potential to give rise to dust and fine particle emissions will include the construction of HAGIs and BVIs, plus works related to the installation of underground pipelines. The activities associated with construction phase of the Project, considered to cause air quality impacts, include earthworks, construction and vehicle movements that could cause track-out of material.

9.8.6 Following the IAQM guidance, the ZoIs relevant to construction dust emissions are 250m of the boundary of the Draft Order Limits and 50m from routes used by construction vehicles.

Construction road traffic emissions

9.8.7 An initial screening exercise has been undertaken using the EPUK/IAQM criteria summarised in **Table 9.9** to determine the road links that may require detailed assessment, due to transport emissions during the construction phase.

9.8.8 The ZoI from road traffic emissions when considering the impact on human receptors is 50m from roads within the affected road network of the Project. When considering ecological receptors, the ZoI for road traffic emissions is 200m from affected roads.

Table 9.9 Screening criteria for detailed air quality assessment of road traffic emissions

Nature of impact	Screening criteria for a detailed air quality assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: • More than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA; and • More than 500 AADT elsewhere
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors (HDV = goods vehicles + buses >3.5t gross vehicle weight)	A change of HDV flows of: • More than 25 AADT within or adjacent to an AQMA; and • More than 100 AADT elsewhere
Realignment of roads, i.e. changing the proximity of receptors to traffic lanes	Where the change is 5m or more and the road is within an AQMA
Introducing a new junction or removal of an existing junction near to relevant receptors	The introduction of a new junction or removal of a junction will lead to a detailed air quality assessment, when this addition/ removal causes traffic to significantly change vehicle acceleration or deceleration, e.g. traffic lights, or roundabouts

Temporal scope

9.8.9 The temporal scope of the assessment of air quality is consistent with the project construction phase. The peak year of construction is expected to be 2027 or 2028 depending on the area. For the purpose of this assessment the peak construction traffic is used with 2028 background concentrations.

Potential receptors

9.8.10 The air quality receptors that have been identified as being potentially subject to effects are summarised in

9.8.11 **Table** 9.10.

Table 9.10 Air quality receptors subject to potential effects

Receptor	Reason for consideration
Human receptors – sensitive receptors (including residential, schools, hospitals) near to construction sites or along roads affected by traffic associated with the Project.	Sensitive human receptors near construction sites may be subject to the impacts of road traffic emissions, NRMM emissions and dust nuisance.
Ecological receptors – internationally and nationally designated nature conservation sites in the locality of construction sites or roads affected by traffic associated with the Project.	Designated sites may be susceptible to direct exposure to air pollutants emitted during the construction phase of the Project and through indirect effects associated with nitrogen and acid deposition.

Construction phase – dust emissions

9.8.12 Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Project. These would include locations sensitive to an increase in dust deposition and airborne particulate matter exposure as a result of on-site construction activities, locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction traffic associated with the Project and new receptors introduced into the area, as a result of the Project. As the operational phase has been scoped out of this assessment, new receptors are not included.

9.8.13 According to the IAQM Construction Dust Guidance, a dust assessment is undertaken where there are:

- Human receptors within 250m of the Site; and/or
- Human receptors within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the Site entrance(s); and/or
- Ecological receptors within 50m of the Site; and/or
- Ecological receptors within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the Site entrance(s).

9.8.14 It is within these distances that the impacts of dust soiling and increased PM in the ambient air would have the greatest impact on local air quality at sensitive receptors.

9.8.15 According to the IAQM Construction Dust Guidance, residential receptors and schools would be considered high sensitivity receptors for both dust and the health effects of particulates, places of work (e.g. retail / commercial uses) and leisure facilities would generally be considered medium sensitivity receptors for dust and low to medium sensitivity for particulates, and uses such as playing fields, roads and footpaths would be low sensitivity receptors for both dust and particulates.

Construction phase – road traffic emissions

9.8.16 In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time of the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. Box 1.1 of LAQM.TG(22) provides examples of the locations where the air quality objectives should/ should not apply (reproduced in **Table 9.11**).

Table 9.11 Examples of where national air quality standards should apply

Averaging period	Air quality standards should apply at:	Air quality standards should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean	All locations where the annual mean air quality standard would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean 24 and 8-hour mean air quality standard apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations 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 where members of the public might	Kerbside sites where the public would not be expected to have regular access.

Averaging period	Air quality standards should apply at:	Air quality standards should generally not apply at:
	reasonably be expected to spend one hour or longer.	

9.8.17 To complete the assessment of construction phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO_2 and PM concentrations, as a result of the Project.

9.8.18 All receptors have been placed at the building façade facing the road link and have been modelled at a height of 1.5m. The receptors used in this assessment are presented in

9.8.19 **Table** 9.12 and **Figure 9.3**. The selection of receptors generally reflect the locations most likely to experience the greatest changes in concentrations such as locations closest to junctions and closest to roads, on affected links.

9.8.20 Further details on the human health receptors chosen for the construction traffic assessment are given in **Appendix 9E: Receptors and Backgrounds.**

Table 9.12 Human health receptors for construction traffic assessment

Location	Type	ID
A49 Tarporley Road	Residential	R23, R24, R25, R26
A49 Warrington Road	Residential	R26
A49/ NCR 5	Residential	R27, R28
A5060	Residential	R33, R37, R36, R34, R35
A5103 N Cheshire Motorway/ Beechpark Avenue	Residential	R12
A556	Residential	R45, R46, R47, R14
A559 Northwich Road	Residential	R21, R22
A56 Chester New Road	Residential	R31, R32, R30
A6144	Residential	R54, R52, R53
Arley Road	Residential	R18, R19, R20
Clifton Road	Residential	R29
M56	Residential	R17, R15, R13, R16, R11
M6	Residential	R43, R41, R44, R42
M60 Manchester Outer Ring Road	Residential	R6, R5, R9, R8, R10
M60 Manchester Outer Ring Road	School	R7
M60	Residential	R4, R2, R3
M62	Residential	R40, 439 R38
Stannard Road	Residential	R1
Warburton Road	Residential	R48, R51, R49
Warburton Road	School	R50

9.8.21 Ecological receptors have been represented by transects of receptor points at ground level, extending from the nearest designated ecological site boundary to a qualifying road to up to 200m within the designated ecological site. The designated ecological sites included in this assessment are presented in **Figure 9.4**.

9.8.22 'Designated Sites' are defined as any European (including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)), national (Sites of Special Scientific Interest (SSSIs), Areas of Special Scientific Interest (ASSIs) and National Nature Reserves (NNRs)) or local (Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and areas of ancient woodland (AW) ecological site.

9.8.23 The designated ecological sites within the Study Area include:

- Manchester Mosses (SAC, SSSI).
- Alder and Hey Woods (AW).
- Hancocks Bank (AW).
- Ryecroft Covert (AW).
- Warburton Wood (AW).
- Hennersley Bank (AW).
- Davenport Green Wood (AW).
- Black Carr Wood (AW).
- Round's Wood (AW).
- Woolston Eyes (SSSI).
- Black Field Wood (AW).
- Wythenshawe Park (AW).
- Winnington Wood (AW).
- Leonards and Smoker Woods (AW).
- Outer Wood (AW).
- Daresbury Firs (AW).
- Round and Rinks Woods (AW).
- Tabley Mere (SSSI).

Likely significant effects

9.8.24 The effects on air quality receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in

9.8.25 **Table** 9.13.

Table 9.13 Air quality receptors scoped in for further assessment

Receptor	Likely significant effects
Human and ecological receptors	Construction of project infrastructure: Fugitive dust emissions and increases in PM_{10} and $PM_{2.5}$.
Human and ecological receptors	Use of road vehicles for the construction of the Project: Combustion product emissions arising from the construction traffic will affect concentrations of pollutants. Changes in concentrations of pollutants have the potential to affect human receptors and can cause damage to sensitive ecological receptors. The human receptors that could be affected include residents living near to construction sites or along roads affected by traffic associated with the Project. The ecological receptors that could be affected include internationally and nationally designated nature conservation sites in the locality of construction sites or roads affected by traffic associated with the Project.

Elements scoped out of further assessment

9.8.26 The receptors/effects detailed in

9.8.27 **Table** 9.14 have been scoped out from the assessment because the potential effects are not considered likely to be significant.

Table 9.14 Summary of effects scoped out of the air quality assessment

Receptors/potential effects	Justification
The effect of pollutant emission from NRMM on human and ecological receptors	Emissions are controlled by the NRMM (Emission of Gaseous and Particulate Pollutants) Regulations 1999 (as amended) and the nature of construction activity to relevant receptors is not considered to be of a magnitude that would cause significant effects on local air quality. For the construction of the pipelines, as it is a phased project, it is unlikely that there will be a high number of NRMM close to receptors for a long duration of time. The scale of activity from the NRMM expected for the construction of the HAGIs is not expected to be of a magnitude that would cause significant effects on local air quality. The amount of equipment expected is not large, equipment will be placed as far as possible from sensitive receptors, and each item of equipment will only be used when required and will not be used continuously.
The effect of operational road traffic emissions on human and ecological receptors	Negligible amounts of traffic are expected during this phase of the Project and do not meet the screening criteria in **Table 9.9**.
The effect of emissions from road traffic associated with the decommissioning of the Project	Combustion product emissions expected at the time of decommissioning of the Project are expected to be minimal. This is due to the expected changes in technologies and therefore the type of vehicles used for transportation. Negligible amounts of traffic are expected during this phase of the Project and do not meet the screening criteria in **Table 9.9**.
The effect of fugitive dust emissions associated with the decommissioning of the Project	As described in **Chapter 2: The Project**, dust emissions may arise as a result of dismantling the HAGI compounds only. The pipelines will be left in situ. Therefore, it can be concluded that the risk of dust emission impacts from the decommissioning phase of the Project at each HAGI location will be the same as that reported and assessed for the risk of dust emission impacts from the construction phase of the Project at each HAGI location. **See Section 9.9: Assessment of Air Quality Effects**

9.9 Assessment Methodology

Assessment criteria

Construction phase – dust emissions

9.9.1 Dust comprises particles typically in the size range 1-75 micrometres (μm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of the emission. Dust is therefore unlikely to cause long-term or widespread changes to local air quality; however its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

9.9.2 The smaller particles of dust (less than 10μm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction known as $PM_{2.5}$ (with an aerodynamic diameter of less than 2.5μm). These particles are at the smaller end of the size range of dust particles and can therefore be transported by wind over a wider area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which could have a potential impact on health.

9.9.3 An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken with reference to: IAQM Construction Dust Guidance, the available information for this phase of the Project provided by the Client and Project Team; and professional judgement.

9.9.4 The IAQM Construction Dust Guidance assessment methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities; and trackout. It considers the nature and scale of activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. It has been assumed that trackout will be considered for all pipeline works, including street works. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. Additional details of the IAQM Construction Dust Guidance assessment methodology are provided in **Appendix 9D: Construction Dust Assessment**.

Construction phase – road traffic emissions

9.9.5 Of the pollutants included in the AQS, concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been considered in this assessment as road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban areas.

9.9.6 For the prediction of impacts due to emissions arising from road traffic during the construction of the Project, the atmospheric dispersion modelling software (ADMS) ADMS-Roads has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.

9.9.7 Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Meteorological Office observing station at Liverpool John Lennon Airport. This station is considered to provide representative data for the assessment.

9.9.8 EPUK and IAQM provide guidance on screening of road traffic impacts to determine when a detailed air quality assessment is required (as reproduced in **Table 9.9**). Given the widespread nature of the anticipated construction traffic generation, the air quality assessment has focused on determining the greatest impacts from construction traffic on local air quality. To do this, the traffic data provided has been screened to consider the locations with the highest current pollutant concentrations (AQMAs) and the locations where the construction traffic impact is predicted to be greatest during the peak construction year of 2027/28.

9.9.9 Traffic data and pollutant emission factors used in the assessment can be found in **Appendix 9F: Traffic Data**. It includes details of the AADT flows, vehicle speeds (kph) and percentage of HDVs for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG(22) and using professional judgement.

9.9.10 The traffic data has been used to estimate emissions for three scenarios:

- 2022 baseline (used for model verification). Based on 2022 traffic flow data, 2022 emission factors, 2022 predicted background concentrations and 2022 meteorological data;
- 2027 without development. Based on 2027/28 traffic data, 2027 emission factors, 2027 predicted background concentrations and 2022 meteorological data; and
- 2027 peak construction. Based on 2027/28 traffic data with peak construction traffic added, 2027 emission factors, 2027 predicted background concentrations and 2022 meteorological data.

9.9.11 Vehicle emission factors for use in the assessment have been obtained using the Emissions Factors Toolkit (EFT) version 12.0.1 available on the Defra website. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2018 and 2030. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time. Emissions data for 2022 (baseline) and 2030 (peak construction year) have been utilised within this assessment.

9.9.12 Background annual mean concentrations of NO_X, NO_2, PM_{10} and $PM_{2.5}$ have been taken from the national maps provided on the Defra website. Further details on the background concentrations are provided in **Section 9.6: Overall baseline**. It should be noted that the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc.). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double counting'. The traffic data provided for this assessment does not comprise all A Roads within the Study Area. Therefore, in order to avoid underpredicting total concentrations within the vicinity of the Project, total estimated backgrounds were applied within this assessment.

9.9.13 The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Project.

9.9.14 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the Study Area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results and was caried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG(22).

9.9.15 Details of the verification factors calculated are presented in **Appendix 9G: Full Modelled Results**. Three factors were obtained during the verification process (1.39 for motorways and fast dual carriageways, 1.57 for urban environments and 1.29 for air quality management areas), which indicated that the model was under predicting. To compensate, this factor was applied to the model road source NO_X contributions. Total annual NO_2 concentrations at receptors were then calculated by combining the adjusted modelled contributions with background NO_2 concentrations utilising Defra NO_X to NO_2 calculator.

9.9.16 As representative local roadside monitoring data are not available for PM_{10} or $PM_{2.5}$, the modelled road-PM_{10} and road-$PM_{2.5}$ components have been adjusted by the verification factor obtained for NO_X before adding to the appropriate background concentration.

9.9.17 Once processed, the predicted concentrations were compared against the relevant AQS for NO_2, PM_{10} and $PM_{2.5}$ set out in **Table 9.1**.

Significance evaluation methodology

Construction phase – dust emissions

9.9.18 The IAQM Construction Dust Guidance assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation

measures should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will not normally be significant.

Construction phase – road traffic emissions

9.9.19 The approach provided in the EPUK/ IAQM Land-Use Planning Guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Project during the construction phase.

9.9.20 This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. This is summarised in **Table 9.15**.

Table 9.15 Impact descriptors for individual receptors

Long term average concentration at receptors in assessment year	% change in concentration relative to the AQS			
	1	2-5	6-10	>10
75% or less of AQS	Negligible	Negligible	Slight	Moderate
76-94% of AQS	Negligible	Slight	Moderate	Moderate
95-102% of AQS	Slight	Moderate	Moderate	Moderate
103-109 of AQS	Moderate	Moderate	Substantial	Substantial
110% or more of AQS	Moderate	Substantial	Substantial	Substantial

Notes:
Where the % change in concentration is <0.5%, the change is described as 'negligible' regardless of the concentration.
Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.
When defining the concentration as a percentage of the AQS, 'without Project' concentration should be used where there is a decrease in pollutant concentration and the 'with Project', concentration where there is an increase.
Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

9.9.21 The EPUK/ IAQM Land-Use Planning Guidance notes that the criteria in **Table 9.15** should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/ IAQM Land-Use Planning guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

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

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

9.9.23 For ecological receptors, consideration of significance expands on LA 105 guidance. This assessment considers the impacts on annual mean NO_X and NH_3 concentrations and nitrogen deposition in the peak construction year. The 1% change criterion for ruling out a significant effect from nitrogen deposition as given in LA 105 was also applied for NO_X and NH_3. For NO_X and NH_3, if the change is less than 1% of the relevant critical level then the effect is deemed not significant. For nitrogen deposition, if the change is less than 1% of the relevant lower critical load then effect is deemed not significant. However, where a change is greater than 1% of the relevant critical level/load the effect cannot be discounted as not significant and must be considered by a qualified ecologist.

9.10 Assessment of Air Quality Effects

Construction phase

Dust and PM_{10} arising from on-site activities

9.10.1 Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include, but are not limited to:

- Site clearance and preparation including demolition activities;
- Preparation of temporary access/ egress to the Site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Site (including excavators and dumper trucks);
- Use of crushing and screening equipment/ plant;
- Exhaust emissions from Site plant, especially when used at the extremes of their capacity and during mechanical breakdown;

- Construction of roads and areas of hardstanding alongside fabrication processes;
- Internal and external finishing and refurbishment; and
- Site landscaping after completion.

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

Assessment of potential dust emission magnitude

9.10.3 The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition; earthworks; construction; and trackout.

9.10.4 The assessment was undertaken for the following construction activities proposed as part of the Project:

- HAGIs;
- Open trench pipeline construction and;
- Trenchless pipeline construction.

9.10.5 The full assessment of these activities is presented in **Appendix 9D**, but a summary of the risk of impacts is presented in **Table 9.16**.

9.10.6 It should be noted that the risk of impacts shown in **Table 9.16** are before any mitigation measures have been included. Following implementation of the embedded measures (included in

9.10.7 **Table** 9.10) are followed, the residual risk will be negligible and effects **Not Significant**.

Table 9.16 Summary of construction dust assessment

Potential Impact	Earthworks	Construction	Trackout
HAGI			
Dust soiling	Medium	Medium	Medium
Human health	Low	Low	Low
Ecological	Low	Low	Low
Open trench pipeline construction			
Dust soiling	Medium	Medium	High
Human health	Low	Low	Low
Ecological	Medium	Medium	Medium
Trenchless pipeline construction			
Dust soiling	Low	Low	High
Human health	Negligible	Negligible	Medium
Ecological	Negligible	Negligible	Low

Construction road traffic emissions, human health receptors

9.10.8 The AQS for annual mean NO_2 concentrations is 40µg/m^3. In 2027/2028, the anticipated peak construction year, annual mean NO_2 concentrations are predicted to meet the AQS, both without and with the Project. The highest predicted concentration is 27.4µg/m^3 at Receptor 2 both without and with the Project. This receptor is located along M60 within Salford AQMA.

9.10.9 The greatest increase in annual mean NO_2 concentrations due to the Project is 0.13µg/m^3 at Receptor 29 which is located on Clifton Road.

9.10.10 As the predicted changes in annual mean NO_2 concentrations at all of the assessment receptors are below 1% of the AQAL and total concentrations at all receptors are well below 94% of the AQAL, in accordance with the EPUK/IAQM guidance, the impact of the Project on annual mean NO_2 concentrations is considered to be negligible.

9.10.11 Annual mean NO_2 concentrations predicted by the model for both future scenarios were below 60µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to

breach the AQS objective. Consequently, the impact of the Project on hourly mean NO_2 concentrations is negligible.

9.10.12 The AQS objective for annual mean PM_{10} concentrations is 40µg/m^3. In 2027/2028, annual mean PM10 concentrations are predicted to meet the objective, both without and with the Project. The highest predicted concentration is 15.86 µg/m^3 at Receptor 6, both without and with the Project. This receptor is located within the Trafford AQMA along M60.

9.10.13 The greatest increase in concentration due to the Project is 0.08 µg/m^3 at Receptor 29. The predicted changes in annual mean PM_{10} concentrations at all the existing receptors are below 1% of the AQAL and total concentrations are below 94% of the AQAL. Therefore, in accordance with the EPUK/IAQM guidance, the impact of the Project on annual mean PM_{10} concentrations is negligible.

9.10.14 The AQS objective for daily mean PM_{10} concentrations is 50 µg/m^3 not to be exceeded more than 35 times in a year. In 2027/2028, at all the assessment receptors, no exceedances are predicted both without and with the Project. Consequently, the AQS objective for daily mean PM_{10} concentrations is predicted to be met. As such, the impact of the Project on daily mean PM_{10} concentrations is also negligible.

9.10.15 Predicted annual mean concentrations of $PM_{2.5}$ are all well below the AQS objective of 20 µg/m^3 in all modelled scenarios. In 2027/2028, the highest concentration is 10.19 µg/m^3 predicted at Receptor 6 both without and with the Project.

9.10.16 The maximum predicted change in annual mean $PM_{2.5}$ concentrations as a result of traffic associated with the Project is 0.05 µg/m^3 and total concentrations are less than 94% of the AQAL and therefore, based on the EPUK/ IAQM guidance, the impact of the Project on annual mean $PM_{2.5}$ concentrations is also negligible.

Construction road traffic emissions, ecological receptors

9.10.17 The maximum predicted NO_X concentration during the peak construction year with the Project is 67.26 µg/m^3. This exceeds the HRA screening threshold of 1% of the critical level/ load and therefore further assessment will be undertaken to inform the Final ES submission and reported in **Chapter 5: Biodiversity**.

9.10.18 A full list of ecological transects, predicted pollutant concentrations and deposition rates, changes and comparisons against the critical level/ load are presented in **Appendix 9I**.

9.11 Assessment of Cumulative (inter-project) Effects

9.11.1 A Cumulative Effects Assessment (CEA) has been undertaken for the Project which considers the combined impacts with other developments on the same single receptor or resource (inter-project effects). The detailed method followed in identifying and assessing potential cumulative effects is set out in **Chapter 3: Approach to preparing the Draft ES**.

9.11.2 The traffic data used in the assessment has accounted for growth in traffic volume up to the assessment year of 2027/2028. The assessment presented here is therefore considered to be cumulative as this accounts for the trip generation of other developments in the area.

9.11.3 In relation to construction works, IAQM guidance state that potential impacts are limited to a zone within 250m of the site boundary and/or within 50m of roads up to 250m from the site entrance points. Cumulative effects from construction dust would be mitigated as the contractors for the Project and any committed developments would be required to manage construction phase emissions. Therefore, the conclusions of the air quality assessment in relation to amenity (dust impacts) and human health are consistent for effects arising from the Project, both alone and cumulatively. With appropriate mitigation for construction dust impacts, all impacts are negligible and therefore effects are **Not Significant**.

In-combination Climate Change Impact (ICCI) assessment

9.11.4 Climate change will affect weather patterns which will in-turn affect the distribution and levels of air pollutants. Although it is not practicable to quantify how climate change may affect the findings presented in this chapter, it is considered that the influence of climate change is unlikely to substantially affect the findings of this assessment within the timeframe considered.

9.11.5 The Royal Society's report on 'Effects of net-zero policies and climate change on air quality'[37] examines how climate change itself is expected to affect air quality in the UK by influencing emissions, atmospheric processing and transport of many pollutants. Some of these effects are likely to slow or temporarily reverse improvements in air quality. They are also likely to lead to changes in the seasonal and geographical variations in air quality. For example, pollution events associated with secondary pollutants such as ozone and particulate matter are likely to become more common in summer months with more frequent intense heatwaves. Conversely, pollution events in warmer winter months may reduce as stable atmospheric conditions under which pollution levels build up become less frequent.

9.11.6 The report also sets out how the changing climate, and the net zero measures adopted to limit further warming, can affect air quality. Net zero measures will generally compliment measures being implemented through legislation and policy to improve local air quality, with progressive reductions in vehicle exhaust emissions of NOx and particulate matter (PM_{10} and $PM_{2.5}$) expected to continue for the foreseeable future.

9.12 Significance Conclusions

9.12.1 A summary of the results of the air quality assessment is provided in **Table 9.17**. The significance has been assessed on a receptor basis for each emission type, rather than for each construction activity (e.g. pipeline, trenchless crossing, HAGIs).

9.12.2 No significant effects are concluded; therefore, no additional mitigation is required.

[37] The Royal Society (2021). *Effects of net-zero policies and climate change on air quality* (online). Available at: Effects of Net Zero Policies and Climate Change on Air Quality (royalsociety.org) (Accessed July 2024).

Table 9.17 Summary of significance of effects (construction only)

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale	LPA[4] and Chapter section reference
Human receptors. Fugitive dust emissions and increased in PM_{10} and $PM_{2.5}$	High	Negligible to high	Not significant	The embedded measures in **Table** 9.10 will be followed to reduce the impacts to negligible and therefore not significant. The CEMP will incorporate recommended environmental measures to ensure that no adverse effects occur.	All – **Section 9.9**
Ecological receptors. Fugitive dust emissions and increased in PM_{10} and $PM_{2.5}$	High	Negligible to medium	Not significant	The embedded measures in **Table** 9.10 will be followed to reduce the impacts to negligible and therefore not significant. The CEMP will incorporate recommended environmental measures to ensure that no adverse effects occur.	
Human health receptors. Increases to pollutant concentration as a result of construction traffic	High	Negligible	Not significant	Emissions and background pollutant concentrations are expected to reduce by the peak construction year of 2025 such that the AQSs are not expected to be exceeded on the roads used by construction traffic. The impact magnitude is expected to be negligible.	

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in **Section 9.9** and is defined as very low, low, medium and high.
2. The magnitude of change on a receptor resulting from activities relating to the Project is defined using the criteria set out in **Section 9.9** and is defined as negligible, low, medium and high.
3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (potentially significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in **Section 9.9**.
4. Local Planning Authority: Cheshire West and Chester Council (CWACC); Cheshire East Council (CEC); Halton Borough Council (HBC); Warrington Borough Council (WBC); St. Helens Borough Council (SHBC); Trafford Council (TC).

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