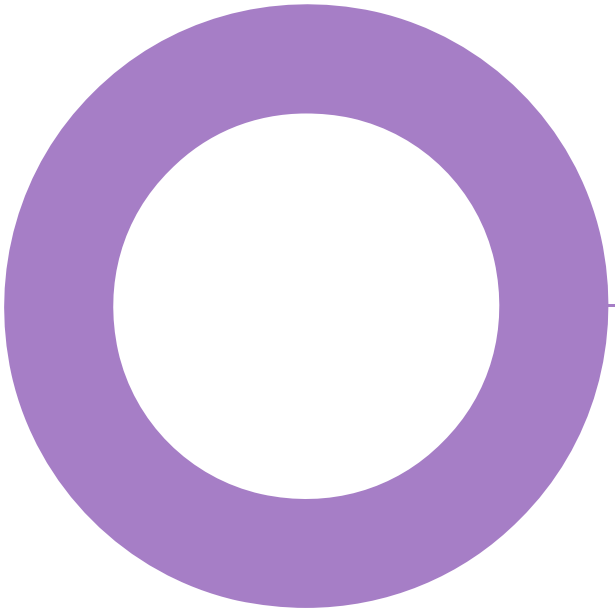
HOARE LEA

Christie Advanced Scanning and Imaging Centre Development (CASICD). Christie Hospital.

The Christie NHS Foundation Trust.

AIR QUALITY
AIR QUALITY ASSESSMENT

REVISION 01 – 31 AUGUST 2023



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	14/08/2023	First Draft	BC	RH/JJ	CE
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Executive Summary.

Hoare Lea have been commissioned by The Christie NHS Foundation Trust to undertake an Air Quality Assessment to support the planning application for the proposed Christie Advanced Scanning and Imaging Centre Development (CASICD) at Christie Hospital, Withington, Manchester M20 4BX (hereafter referred to as the 'Application Site').

The proposals comprise the demolition of the existing blocks 19, 20 and 21 to allow for a new build in their place (hereafter referred to as the 'Proposed Development'). The new build will have a gross floor area of approximately 8,500 m^2 for imaging use, ward accommodation and plantroom space.

The baseline assessment has shown that the Application Site is not located within the Greater Manchester Air Quality Management Area (AQMA), declared for exceedances of the NO_2 annual mean Air Quality Objective (AQO) only. Local monitoring data within the Manchester City Council (MCC) area of administration and background pollution maps from the Department of Environmental, Food and Rural Affairs (Defra) indicated that no exceedances of the respective AQOs for particulate matter (PM_{10} and $PM_{2.5}$) or nitrogen dioxide (NO_2) occurred in 2022 and therefore exceedances of the AQOs for NO_2, PM_{10} and $PM_{2.5}$ are not expected at the Application Site. The 2005 $PM_{2.5}$ World Health Organisation (WHO) guideline is also not expected to be exceeded at the Application Site in 2026, the confirmed opening year for the Proposed Development, based on a review of Defra predicted background concentrations.

The impacts of demolition and construction work on dust soiling and ambient fine particulate matter concentrations have been assessed. This identified that there is a high risk of dust soiling impacts and a medium risk of increases in particulate matter concentrations due to construction activities. The risk of dust causing a loss of local amenity and increased exposure to PM_{10} concentrations has been used to identify appropriate mitigation measures. Provided these are implemented and included within a dust management plan (DMP) the residual impacts are considered to be not significant.

The results of the operational phase traffic screening assessment indicate that, as confirmed by WSP, there will be no change in operational phase LDV or HDV road traffic movements as a result of the Proposed Development at the Christie Hospital in Withington. In accordance with the Environmental Protection United Kingdom (EPUK) and Institute of Air Quality Management (IAQM) planning guidance the impact of operational phase road traffic is therefore considered to be not significant and a detailed assessment is not required.

The proposed energy strategy for the Proposed Development is all electric, utilising zero-emission technologies with no combustion sources. It is proposed that energy will be delivered by a combination of Air Source Heat Pumps (ASHP) located at roof level and Water-to-Water Heat Pumps (WWHP) located in the 3rd floor plantroom. There will be two 2,500 kVA backup generators installed upon the roof of the CASICD, generators will only be routinely operational for testing purposes only, which will occur for one hour per month. As no combustion sources are proposed for the primary energy supply to the Proposed Development, no local air quality impacts are anticipated and a detailed assessment of impacts of combustion emissions from a proposed energy plant have been screened out of this assessment.

A qualitative Site Suitability Assessment has shown that pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ are in compliance with the 1-hour mean, 24-hour mean and annual mean AQOs (also in line with Part F of the Building Regulations (2021)) in addition to the 2005 $PM_{2.5}$ WHO guideline. Therefore, the Application Site is considered suitable for the proposed healthcare use without the need for mitigation measures embedded within the Proposed Development's design.

Based on the assessment results, the Application Site is considered suitable for the Proposed Development without the inclusion of mitigation, air quality should not be considered as a constraint to the planning consent. Therefore the Proposed Development conforms to the principles of the National Planning Policy Framework (NPPF), the Manchester City Council Core Strategy Development Plan and the Manchester City Council Air Quality and Planning Technical Guidance.

1. Introduction.

Hoare Lea have been commissioned by The Christie NHS Foundation Trust to undertake an Air Quality Assessment to support the planning application for the proposed Christie Advanced Scanning and Imaging Centre Development (CASICD) at Christie Hospital, Withington, Manchester, M20 4BX (hereafter referred to as the 'Application Site').

1.1 Proposed Development.

The proposals comprise the demolition of the existing blocks 19, 20 and 21 to allow for a new build in their place (hereafter referred to as the 'Proposed Development'). The new build will have a gross floor area of approximately 8,500 m^2 for imaging use, ward accommodation and plantroom space.

The proposed energy strategy for the Proposed Development has been confirmed to be all electric, utilising zero-combustion emission technologies via a combination of Air Source Heat Pumps (ASHPs) located at roof level and Water-to-Water Heat Pumps (WWHP) located in the 3rd floor plantroom. There will be two 2,500 kVA backup generators installed upon the roof of the CASICD, which will each have a local exhaust upon the roof of the generator sets. The generators will only be routinely operational for testing purposes only, which will occur for one hour per month. As no combustion sources are proposed for the primary energy supply to the Proposed Development, no local air quality impacts are anticipated. Therefore, a detailed assessment of the impacts of combustion emissions from a proposed energy plant have been screened out of this assessment.

1.2 Application Site Description and Location.

The Application Site is located within the Manchester City Council (MCC) administrative area at the approximate National Grid Reference (NGR): X 384910 Y 392580.

The Application Site is located at the eastern section of the existing Christie Hospital adjacent to the B5093 (Wilmslow Road). The Manchester Cancer Research Centre is located directly opposite the Application Site on the eastern side of the B5093. Further east of the B5093 are a combination of commercial, healthcare and residential properties. The nearest school is Manchester Muslim Preparatory School located approximately 60 m north east of the Application Site. There are existing healthcare buildings associated with Christie Hospital located nearby to the west and south of the Application Site, including the newly constructed Patterson Building in the south. Beyond the Christie Hospital boundary in the south and west directions are primarily residential dwellings.

The Application Site is currently occupied by existing blocks 19, 20 and 21 associated with Christie Hospital. Figure 1 illustrates the location of the Application Site.

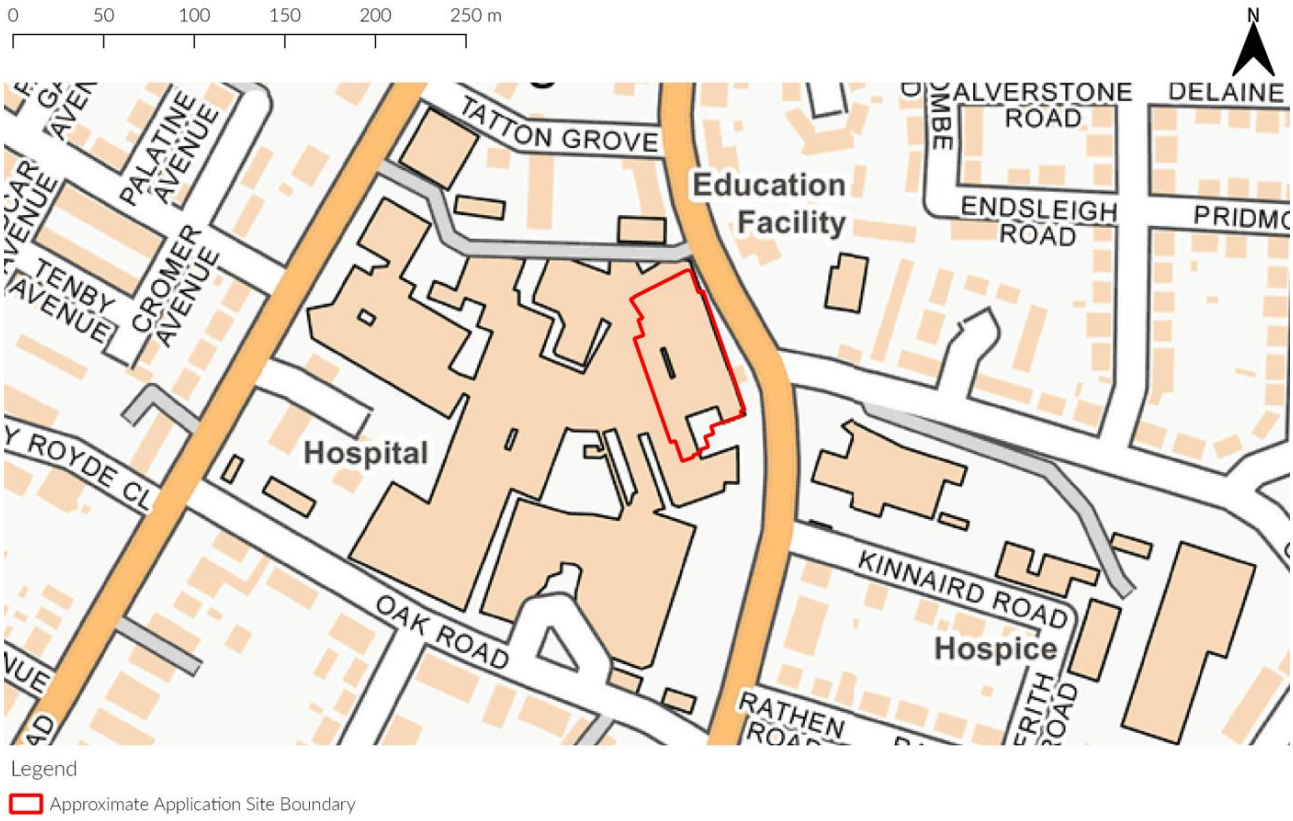


Figure 1: Location of the Application Site. Contains OS Data © Crown Copyright and Database Rights 2023.

1.3 Scope of Assessment.

An email detailing the proposed methodology for the Air Quality Assessment was provided to the MCC on the 8th August 2023. At time of writing a response has not been received. A copy of the correspondence with the MCC has been included in Appendix 1.

A summary of the scope of the assessment includes:

- Review of National and Local Policy;
- Determination of baseline scenario, using MCC monitoring data and Department for Environmental, Food and Rural Affairs (Defra) predicted background concentrations;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of potential air quality impacts during the operational phase;
- An assessment of the suitability of the Application Site for its proposed healthcare use; and
- Identification of required mitigation measures.

2. Legislation, Policy and Guidance Documents.

2.1 Air Quality Strategy and Local Air Quality Management.

The Environment Act 1995 (Part IV)[1] requires the Secretary of State to publish an air quality strategy and local authorities to review and assess the quality of air within their boundaries. The latter has become known as Local Air Quality Management (LAQM).

The Air Quality Strategy[2] provides the policy framework for local air quality management and assessment in the UK. It sets out air quality standards and objectives for key air pollutants. These standards and objectives are designed to protect human health and the environment. The Strategy also sets out how the different sectors of industry, transport and local government, can contribute to achieving these Air Quality Objectives (AQOs).

Local authorities are required to identify whether the AQOs have been, or will be, achieved at relevant locations. If the AQOs are not achieved, the authority must declare an Air Quality Management Area (AQMA) and should prepare an Air Quality Action Plan (AQAP) within 12 months. The action plan must identify appropriate measures and policies that can be introduced to help achieve the AQO(s).

The AQOs set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The AQOs for use by local authorities are prescribed within the Air Quality (England) Regulations 2000[3], and the Air Quality (England) (Amendment) Regulations 2002[4].

The AQOs for Nitrogen Dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$) are given in Table 1. The AQOs for NO_2, PM_{10} and $PM_{2.5}$ were to have been achieved by 2005, 2004 and 2020 respectively and continue to apply in all future years thereafter. These targets are accompanied by the long term (10 µg/m^3 by 2040) and interim (12 µg/m^3 by 31st January 2028) $PM_{2.5}$ targets outlined in the Environmental Improvement Plan 2023[5].

Table 1: Air Quality Objectives for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Air Quality Objective
Nitrogen Dioxide (NO_2)	1-hour Mean	200 µg/m^3 Not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particulate Matter (PM_{10})†	24-hour Mean	50 µg/m^3 Not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
Fine Particulate Matter ($PM_{2.5}$) †*	Annual Mean	20 µg/m^3

Notes:
†Measured gravimetrically.
**The time period in Defra LAQM.TG22 states "Work towards reducing emissions/concentrations of fine particulate matter ($PM_{2.5}$)"

The AQOs apply at locations where members of the public are likely to be regularly present and exposed over the averaging period of the AQO. Examples of where the annual mean AQOs should apply are provided in the Defra Local Air Quality Management Technical Guidance (LAQM.TG(22)[6]) and include: building façades of residential properties, schools and hospitals. The annual mean AQOs are not relevant for the building façades of offices or other places of work where members of the public do not have regular access, nor kerbsides nor gardens.

The 24-hour mean AQO for PM_{10} is considered to apply at the same locations as the annual mean AQO, as well as in gardens of residential properties and at hotels.

The 1-hour mean AQO for NO_2 also applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations, pavements of busy shopping streets, carparks and bus stations which are not fully enclosed. The 1-hour mean AQO does not apply at kerbside sites where the public do not have regular access.

2.2 EU Limit Values.

The European Union (EU) has also set limit values for NO_2, PM_{10} and $PM_{2.5}$; these are legally binding and have been implemented into English legislation by The Air Quality Standards Regulations 2010[7] and The Air Quality Standards (Amendment) Regulations 2016[8].

The limit values for NO_2, PM_{10} and $PM_{2.5}$ are the same as the English AQOs (given in Table 1), but applied from 2010 for NO_2, 2005 for PM_{10} and 2015 for $PM_{2.5}$. The limit values apply at all locations (apart from where the public does not have access, where health and safety at work provisions apply and on the road carriageway).

2.3 WHO Guideline Values

The World Health Organisation (WHO) has produced air quality guidelines[9] to offer global guidance on thresholds and limits for key air pollutants that pose health risks. The 2005 WHO guidelines[9] have been set out in Table 2 for NO_2, PM_{10} and $PM_{2.5}$ concentrations. MCC refer to the 2005 WHO guidelines[9] within the MCC Air Quality and Planning Technical Guidance[10]. The WHO also released revised air quality guidelines in September 2021[11]. The revised annual mean thresholds for NO_2, PM_{10} and $PM_{2.5}$ are 10 µg/m^3, 15 µg/m^3 and 5 µg/m^3 respectively. However, the revised guidelines are yet to be included in policies and carried into effect.

Table 2: 2005 WHO guidelines for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
NO_2	1-hour Mean	200 µg/m^3 1-hour mean
	Annual Mean	40 µg/m^3 annual mean
PM_{10}	Annual Mean	20 µg/m^3
$PM_{2.5}$	Annual Mean	10 µg/m^3

2.4 The Environment Act.

The Environment Act 2021[12] acts as the UK's new framework of environmental protection and came into force on 1st April 2022. With regard to air quality, the Environment Act establishes a legally binding duty on government to bring forward at least two new air quality targets in secondary legislation. This was implemented through the Environmental Improvement Plan which outlines new $PM_{2.5}$ targets for future years. These are a long term target of 10 µg/m^3 by 2040 and an interim target of 12 µg/m^3 by 31st January 2028. These targets are expected to focus on reducing concentrations of, and exposure to, $PM_{2.5}$.

A new Air Quality Strategy has been published in April 2023 which sets out a framework whoch should be followed by local authorities in suport of Defra's long term air quality goals including new $PM_{2.5}$ targets[13].

2.5 Statutory Nuisance Legislation.

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10 µm in diameter (i.e. greater than PM_{10}) typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the Air Quality Strategy. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.6 Clean Air Strategy.

The Clean Air Strategy (CAS)[14], published in 2019, sets out the Government's proposals aimed at delivering cleaner air in England, and also indicates how devolved administrations intend to make emissions reductions. It

sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

2.7 Building Regulations

The Building Regulations help to ensure that new buildings, conversions, renovations and extensions (domestic or commercial) are going to be safe, healthy and high performing. Detailed regulations cover specific topics including structural integrity, fire protection, accessibility, energy performance, acoustic performance, protection against falls, electrical and gas safety. Part F of the Building Regulations (2021)[15] provides guidance on indoor air quality and the pollutant concentrations that must not be exceeded in buildings for use as either dwellings or non-dwellings.

2.8 Planning Policy.

2.8.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2021[16] sets out planning policy for England. It includes advice on when air quality should be a material consideration in development control decisions. Relevant sections are set out below:

> Paragraph 55: *"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."*
>
> Paragraph 104: *"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: a) the potential impacts of development on transport networks can be addressed; b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated; c) opportunities to promote walking, cycling and public transport use are identified and pursued; d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places."*
>
> Paragraph 105: *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*
>
> Paragraph 174: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality."*
>
> Paragraph 185: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*
>
> Paragraph 186: *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these*

opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Paragraph 188: *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."*

The NPPF is supported by Planning Practice Guidance (PPG)[17].

The PPG states that:

Paragraph 001 (Reference ID: 32-001-20191101): *"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance relevant Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit or where the need for emissions reductions has been identified."*

Paragraph 002 (Reference ID: 32-002-20191101): *"Plans may need to consider ways in which the development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable".*

Paragraph 005 (Reference ID: 32-005-20191101): *"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and / or breach legal obligations (including those relating to the conversation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."*

The PPG also sets out the information that may be required in an air quality assessment, stating that:

Paragraph 007 (Reference ID: 32-007-20191101): *"Assessments need to be proportional to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific. The scope and content of supporting information is best discussed and agreed between the local planning authority and applicant before it is commissioned."*

It also provides guidance on options for mitigating air quality impacts, and makes clear that:

Paragraph 008 (Reference ID: 32-008-20191101): *"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact."*

2.9 Local Policy.

2.9.1 Manchester City Council Core Strategy Development Plan.

The Manchester Core Strategy Development Plan[18] was adopted in 2012 and covers the years 2012 to 2027. This document outlines the vision of the MCC for Manchester until the year 2027 alongside the planning policies used to deliver that vision. Policies relevant to air quality are given below:

Policy EN16 Air Quality

"The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated

by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

When assessing the appropriateness of locations for new developments the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas".

Policy CC 5 Transport

"The Transport Strategy for Manchester City Centre will be delivered to ensure that transport is managed in a way which supports the projected growth of the City Centre.

[…]

Proposals will be supported that improve pedestrian safety, improve air quality and increase the scope of accessible public realm improvements."

Policy EN 7 Energy Infrastructure Opportunities

"There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations:

[…]

- The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16 Air Quality.

[…]"

Policy DM1 Development Management

"All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:

[…]

– *Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*

[…]"

2.9.2 Local Air Quality Management in Manchester.

According to the most recent Greater Manchester Combined Authority (GMCA) 2022 Air Quality Annual Status Report (ASR)[19] an AQMA was declared in Greater Manchester in 2016 for exceedances of the annual mean NO_2 AQO only. The AQMA covers the 10 districts of Greater Manchester including the MCC with coverage over arterial routes, district centres, and the airport.

Consequently, the Greater Manchester AQAP 2016-2021[20] was published in 2016 to set out actions and measures to bring about an improvement in air quality, to benefit the health of the population. This AQAP expired in 2021, however it has not yet been replaced so it will be considered for the purpose of this assessment. The proposed actions cover three main themes:

- Reduce Traffic - for instance by encouraging modal shift from private vehicle use to public transport, cycling and walking.
- Increasing Efficiency - of traffic movement by reducing congestion and stop-start travel to achieve a smoother emission profile and overall lower emissions, which may be particularly significant at peak hours.
- Improve Fleet - by incentivising the replacement of older, more polluting vehicles with newer, smaller, cleaner, lower-emissions vehicles.

2.9.3 Greater Manchester Low Emission Strategy

The Greater Manchester Low Emission Strategy[21] presents a long-term approach to carbon emissions and air quality in the period up to 2040. The key aims of the strategy are to:

- Support the UK Government in meeting all EU thresholds for key pollutants at the earliest date;
- Contribute to reducing Greater Manchester's carbon footprint, in line with the Greater Manchester Climate Change Strategy; and
- Reduce air pollution as a contributor to ill-health in Greater Manchester.

2.9.4 Greater Manchester Clean Air Zone

A Clean Air Zone (CAZ) covering Greater Manchester, for which an outline business case[22] was submitted in March 2019, and planned to launch in 2022 to target the most polluting commercial vehicles including older Heavy Duty Vehicles (HDVs), buses, coaches, taxis and private hire vehicles. However, it was decided on 30th May 2022 that this will no longer go ahead due to significant changes in local air quality and economic issues since the COVID-19 pandemic[23].

2.10 Assessment Guidance.

The primary guidance documents consulted in undertaking this assessment are detailed below.

2.10.1 Defra Local Air Quality Management Technical Guidance

Defra LAQM.TG(22)[6] was published for use by local authorities in their LAQM review and assessment work. The document provides key guidance in aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

2.10.2 EPUK and IAQM 'Air Quality Guidance for Planning'

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[24] to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

2.10.3 IAQM 'Construction and Demolition Dust Guidance'

Guidance on the assessment of dust from demolition and construction has been published by the IAQM[25]. The guidance provides a methodology to determine the dust emission magnitude and provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities. This allows for the identification of appropriate mitigation measures that are defined within further IAQM guidance.

2.10.4 Manchester City Council Air Quality and Planning Technical Guidance.

This technical guidance was published in February 2022[10] to inform applicants, developers and air quality consultants of the 'Our Manchester Strategy 2016-2025'. It sets out the relevant local policies and acknowledges the City's current AQMA situation, breaches of AQOs and ambitions to reduce $PM_{2.5}$ concentrations to below the 2005 WHO guidelines[9] by 2030. The guidance also provides best practice recommendations for electric vehicle charging infrastructure.

3. Assessment Methodology.

3.1 Consultation.

The approach to the assessment, as described in section 1.3, was provided to the MCC for review on 8th August 2023. At time of writing a response has not been received. A copy of the correspondence has been included in Appendix 1.

3.2 Existing Air Quality in the Study Area.

A baseline air quality review was undertaken to determine the existing air quality in the vicinity of the Application Site.

This desk-top study was undertaken using the following sources:

- Air quality data for MCC, including a review of the MCC air quality reports and local monitoring data[19];
- Background pollution maps from Defra's Local Air Quality Management (LAQM) website[26];
- Pollution Inventory from the Environment Agency (EA)[27]; and
- Ordnance Survey data and Aerial photography from Google Maps.

3.3 Construction Phase Impacts.

3.3.1 Construction Dust Assessment

The assessment of construction dust impacts has been undertaken in line with the methodology outlined in the IAQM construction guidance[25]. Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

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

The risk of dust emissions has been assessed for each activity with respect to:

- Potential loss of amenity due to dust soiling;
- The risk of health effects due to a significant increase in exposure to PM_{10}; and
- The risk of ecological impacts due to a significant increase in exposure to PM_{10}.

The first stage of the assessment involves screening to determine whether there are any sensitive receptors within the threshold distances defined by the IAQM construction guidance[25]. A detailed assessment of the impact of dust from construction sites will be required where:

- A 'human receptor' is located within 350 m of the boundary of the Application Site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Application Site entrance; and
- An 'ecological receptor' is located within 50 m of the boundary of the Application Site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Application Site entrance.

The magnitude of dust emission for each activity is determined on the basis of the IAQM construction guidance[25], indicative thresholds, information available relating to the project and expert judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the mitigation requirements.

Descriptors for magnitude of impact and impact significance used in this assessment of construction phase dust are given in the IAQM construction guidance[25] available online.

3.3.2 Construction Emissions Assessment

3.3.2.1 Construction Traffic Emissions Screening

A screening assessment has been undertaken with reference to the following EPUK and IAQM planning guidance indicative criteria[24]:

- a change of Light Duty Vehicle (LDV) flows of more than 500 Annual Average Daily Traffic (AADT) (outside an AQMA); and/or
- a change of Heavy Duty Vehicle (HDV) flows of more than 100 AADT (outside an AQMA).

3.3.2.2 NRMM Emissions Screening

Non-Road Mobile Machinery (NRMM) refers to mobile machines, transportable industrial equipment or vehicles which are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads. NRMM emissions have been screened following the IAQM construction guidance[25].

3.4 Operational Phase Impacts.

3.4.1 Road Traffic Emissions Assessment

The screening assessment has been undertaken following the EPUK and IAQM planning guidance[24] indicative criteria:

- a change of LDV flows of more than 500 AADT (outside an AQMA); and/or
- a change of HDV flows of more than 100 AADT (outside an AQMA).

Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

Where impacts can be screened out there is no need to progress to a more detailed assessment.

3.4.2 Site Suitability Assessment

A qualitative 'Site Suitability' assessment has been undertaken to consider the exposure of future occupants, introduced by the Proposed Development, to existing air quality.

Site Suitability will be assessed qualitatively using monitoring data from the GMCA ASR 2022[19] and GMCA ASR 2019[28] in addition to Defra predicted background concentrations[26].

3.5 Assessment of Significance.

3.5.1 Construction Dust

The IAQM construction guidance[25] on the assessment of dust from demolition and construction states that the primary aim of the risk assessment is to identify site specific mitigation that, once implemented, should ensure that there will be no significant effect. Therefore, the assessment has been used to determine an appropriate level of mitigation for the construction phase.

The determination of which mitigation measures are recommended include elements of professional judgement and the professional experience of the consultants preparing this report is set out in Appendix 2.

3.5.2 Operational Impacts

The EPUK and IAQM planning guidance[24] has been used to assess the potential for significant impacts as a result of vehicle emissions from traffic associated with the Proposed Development. The focus of the guidance is to assess traffic emission impacts and advises on how to describe the air quality impacts and their significance.

3.5.3 Site Suitability Assessment

To determine the significance of predicted air quality impacts based upon a Site Suitability assessment, the EPUK and IAQM planning guidance[24] states:

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

In addition, the MCC Air Quality and Planning Technical Guidance[10] states:

"As a member of the WHO Climate and Clean Air Coalition, and UN Environment-led 'Breathe Life' cities network, the GMCA including MCC has pledged to achieve the 2005 WHO air quality guideline for $PM_{2.5}$ of 10 µg/m^3 (micrograms per cubic metre) by 2030."

As such, the 2005 WHO $PM_{2.5}$ guideline[9] will be taken into consideration when determining Site Suitability.

4. Baseline Environment.

This section sets out the available information on air quality in the vicinity of the Application Site.

4.1 Application Site Setting.

The Application Site is located within the MCC area of administration at the approximate NGR: X 384910 Y 392580. The Application Site is located at the eastern section of the existing Christie Hospital adjacent to the B5093 (Wilmslow Road). The Manchester Cancer Research Centre is located directly opposite the Application Site on the eastern side of the B5093. Further east of the B5093 are a combination of commercial, healthcare and residential properties. The nearest school is Manchester Muslim Preparatory School located approximately 60 m north east of the Application Site. There are existing healthcare buildings associated with Christie Hospital located nearby to the west and south of the Application Site, including the newly constructed Patterson Building in the south. Beyond the Christie Hospital boundary in the south and west directions are primarily residential dwellings.

The Application Site is currently occupied by existing blocks 19, 20 and 21 associated with Christie Hospital.

4.2 Local Air Quality Management Review and Assessment.

As required by the Environment Act (1995)[1], GMCA has undertaken review and assessment of air quality within their area of administration. According to the most recent GMCA 2022 Air Quality ASR[19] an AQMA was declared in Greater Manchester in 2016 for exceedances of the annual mean NO_2 AQO only and labelled as "AQMA Greater Manchester". The AQMA covers the 10 districts of Greater Manchester, including the MCC with coverage over arterial routes, district centres, and the airport. The Application Site is not located within this AQMA and is approximately 250 m south at the closest point as shown in Figure 2.



Figure 2: Application Site with Respect to the AQMA Greater Manchester. Contains OS Data © Crown Copyright and Database Rights 2023.

It should be noted that the pollutant concentrations recorded in 2020 and 2021 from the most recent GMCA ASR 2022[19] are lower than previous years as a direct result of reduced traffic levels during the COVID-19 pandemic. As such the pollutant concentrations recorded in 2020 and 2021 are not considered to be representative of 'normal' air quality conditions. Therefore 2022 monitoring data has been presented and discussed as this is the latest year of available monitoring data.

A review of the GMCA ASR 2022[19] has indicated that in 2022, the most recent year of available monitoring data, exceedances of the annual mean NO_2 AQO were typically recorded at kerbside and roadside locations within the GMCA. Exceedances of the NO_2 1-hour mean AQO and respective AQOs for both PM_{10} and $PM_{2.5}$ were not recorded in 2022. However, from 2018 to 2022 while annual mean concentrations of NO_2 have generally decreased, concentrations of PM have remained steady.

4.3 Local Air Quality Monitoring.

According to the GMCA ASR 2022[19] and GMCA ASR 2019[28] the MCC operate 20 automatic monitoring stations, with the closest automatic monitoring station being Stockport Cheadle A34 categorised as Site ID: STK7. Site ID: STK7 is located approximately 4.2 km southeast from the Proposed Development, with recent monitoring data shown in Table 3 and the location of Site ID: STK7 with respect to the Application Site illustrated in Figure 3. Site ID: STK7 is classed as roadside and measures pollutant concentrations of NO_2 and PM_{10} only.

STK7 is located adjacent to the A34 and within an AQMA, which is considered to represent poorer air quality conditions than surrounding the Proposed Development.

Table 3: Automatic Monitoring Station STK7 Monitoring Data

Monitoring station and distance (km) from Application Site boundary (approx.)	Air Quality Objective	2015	2016	2017	2018	2019	2020	2021	2022
NO_2									
STK7 4.2 km	Annual mean (µg/m^3)	-	-	**43**	37	36	26	28	29
	Number of hours with concentrations >200 µg/m^3	-	-	0	0	0	0	0	0
PM_{10}									
STK7 4.2 km	Annual mean (µg/m^3)	-	-	18	19	17	15	16	16
	Number of days with concentrations > 50 µg/m^3	-	-	0	0	3	0	1	1
Notes: Concentrations in bold indicate an exceedance of the relevant AQO n/d = no data									

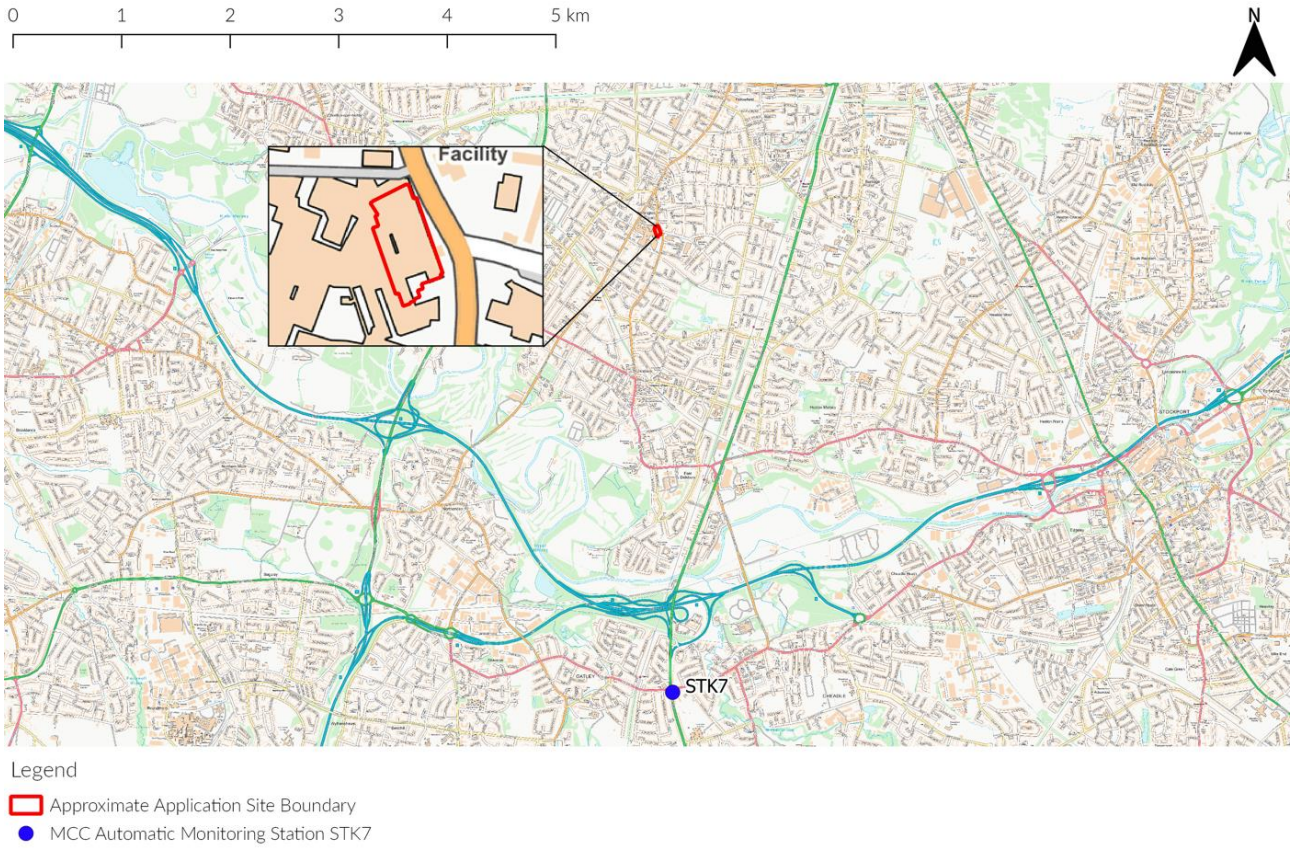


Figure 3: Automatic Monitoring Station STK7 with Respect to the Application Site. Contains OS Data © Crown Copyright and Database Rights 2023.

As shown in Table 3 there has been no exceedance of the respective AQOs for both NO_2 and PM_{10} in 2022, the most recent year of available monitoring data, at Site ID: STK7.

A review of the most recent monitoring data available within the GMCA ASR 2022[19] and GMCA ASR 2019[28] has indicated that there are five passive diffusion tube monitoring locations within 3 km of the Application Site. Table 4 details the monitoring results for all passive diffusion tube monitoring locations for the most recent years of available monitoring data between 2015 and 2022 with the passive diffusion tube monitoring locations with respect to the Application Site illustrated in Figure 4.

Table 4: Passive Diffusion Tube Monitoring Results

Site ID	Site Type	Site Name	Distance (km) from Application Site (approx.)	Annual Mean NO_2 Concentration (µg/m^3)							
				2015	2016	2017	2018	2019	2020	2021	2022
MA81NO	Roadside	Peaceville Road	2.2	-	25.9	25.2	21.8	23.1	16.6	18.1	18.8
MA37NO	Roadside	Princess Road	2.3	-	**46.3**	**42.6**	39.3	38.7	26.9	29.5	32.1
MA74NO	Roadside	Kingsway	2.5	-	38.0	37.1	35.7	33.6	23.3	25.6	25.4
ST27NO	Urban Background	Pinewood Close	2.5	-	22.4	18.7	16.8	17.5	12.6	13.1	13.1
MA80NO	Urban Background	Alma Road	2.8	-	35.3	34.2	32.2	33.2	22.5	25.7	25.7

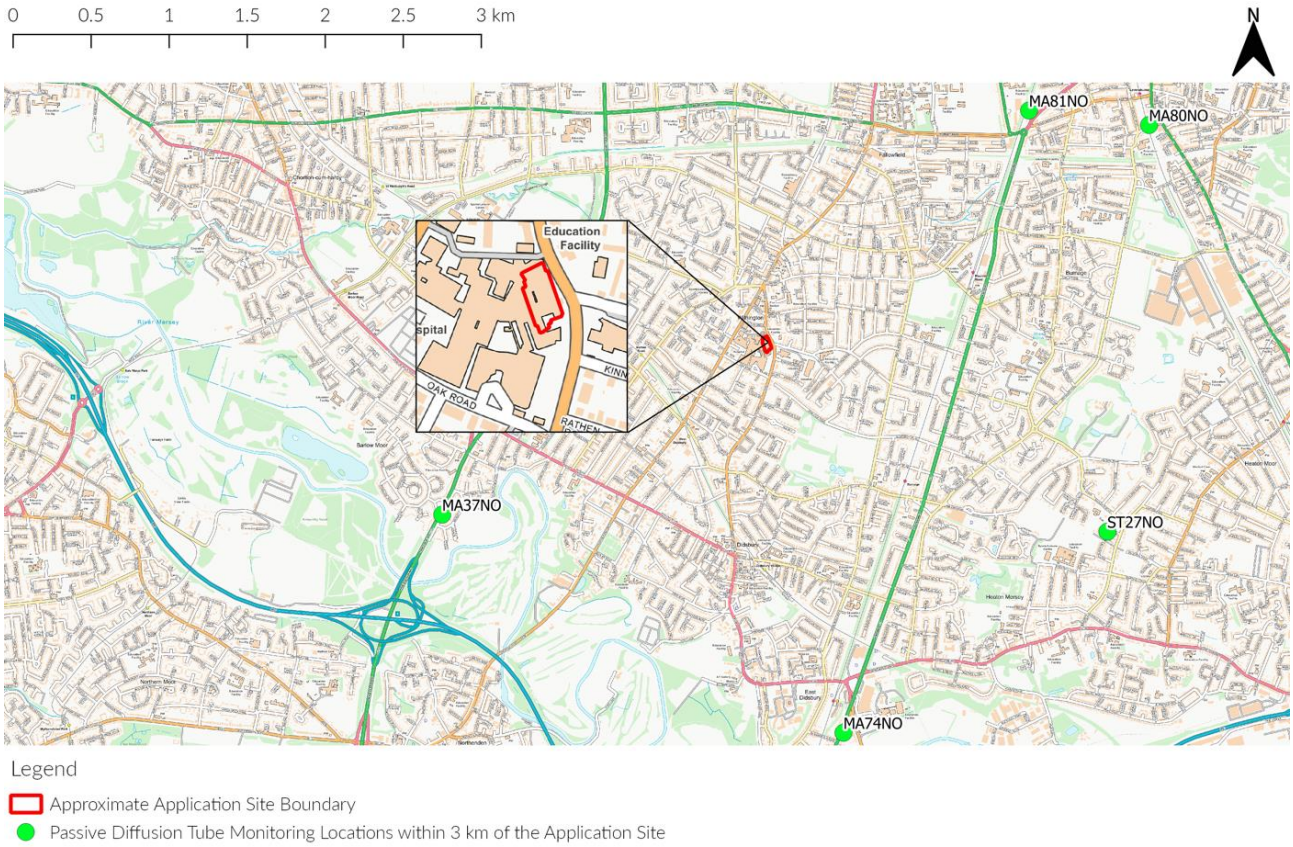


Figure 4: Passive Diffusion Tube Monitoring Locations within 3 km of the Application Site. Contains OS Data © Crown Copyright and Database Rights 2023.

As shown in Table 4 there were no recorded exceedances of the NO_2 annual mean AQO in 2022, the most recent year of available monitoring data. The highest recorded annual mean concentration of NO_2 in 2022 was recorded at Site ID: MA37NO as 32.1 µg/m^3 which is 80.3% of the annual mean AQO.

Furthermore, as outlined in Defra LAQM.TG(22)[6], an annual mean NO_2 concentration of 60 µg/m^3 or above is often used to indicate a possible exceedance of the 1-hour mean NO_2 AQO. There has been no recorded exceedance of the 60 µg/m^3 threshold from monitored NO_2 concentrations at any of the passive diffusion tube monitoring location within 3 km of the Application Site between 2015 and 2022. As such, exceedance of the 1-hour mean NO_2 AQO is unlikely.

4.4 Industrial Pollution.

A desk-based review of potential industrial or waste management sources of air pollution using the EA Pollution Inventory[27] did not identify any significant sources of air pollution within 2.5 km of the Application Site that are likely to affect impact local air quality within the vicinity of the Application Site.

4.5 Defra Predicted Background Concentrations.

The Defra predicted background concentrations have been obtained from the national maps published by Defra[26]. These estimated concentrations are produced on a 1 km by 1 km grid basis for the whole of the UK. The Application Site falls into grid square (NGR): X 384500 Y 392500 and the Defra predicted background concentrations for this grid square for NO_2, PM_{10} and $PM_{2.5}$ are provided in Table 5 for 2022, the most recent year with available monitoring data, for 2023, the current year and for 2026 the confirmed opening year for the Proposed Development.

Table 5: Defra Predicted Background Concentrations for Grid Square X 384500 Y 392500

Year	Defra Predicted Background Concentration (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
2022	16.5	11.5	7.8
2023	16.0	11.4	7.7
2026	14.6	11.2	7.5

As shown in Table 5, Defra predicted background concentrations are below the relevant annual mean AQOs for the pollutants NO_2, PM_{10} and $PM_{2.5}$ in the years 2022, 2023 and 2026. The 2005 $PM_{2.5}$ WHO guideline[9] has not been exceeded in 2022, 2023 or 2026.

4.6 Summary of Background Data.

The baseline assessment has shown that the Application Site is not located within the GMCA AQMA, declared for exceedances of the NO_2 annual mean AQO in 2016, and is approximately 250 m south at the closest point.

A review of local monitoring data indicates no likely exceedances of the respective AQOs for NO_2 or PM_{10} will occur based on 2022 data, the most recent year of available monitoring data.

There are no industrial or waste management sources of air pollution within 2.5 km of the Application Site that could impact local air quality in the vicinity of the Application Site based on a review of the EA Pollution Inventory[27].

Defra predicted background concentrations are expected to be below the annual mean AQOs for all considered pollutants at the Application Site in 2022, 2023 or 2026 the confirmed opening year for the Proposed Development. The 2005 $PM_{2.5}$ WHO guideline[9] is also not expected to be exceeded in 2022, 2023 or 2026.

5. Construction Phase Assessment.

The potential for air quality impacts during the construction of the Proposed Development are assessed in this section.

5.1 Construction Phase Dust Assessment.

The risk of dust impacts is based on the potential dust emissions magnitude and the sensitivity of the area. These two factors are then combined to determine the risk of dust impacts with no mitigation applied. In the absence of any site-specific information, a higher risk category has been applied to represent a worst-case scenario.

5.1.1 Assessment Screening

There are 'human receptors' within 350 m of the Application Site but no designated habitat sites within 50 m of the Application Site boundary or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Application Site entrance.

The closest ecological receptor to the Application Site is Hough End Clough, classified as Ancient Woodland, located 1.7 km to the north west. Therefore, an assessment of construction dust at human receptors is required, but an assessment of construction at ecological receptors can be screened out from this assessment.

5.1.2 Potential Dust Emission Magnitude

The potential magnitude of dust emissions from demolition, earthworks, construction and trackout have been assessed, as identified in Table 6.

Table 6: Predicted Magnitude of Dust Emissions

Activity	Magnitude	Justification
Demolition	Medium	The Application Site currently comprises the existing blocks 19, 20 and 21 of Christie Hospital. The existing building will be demolished prior to the construction of the Proposed Development. Based on estimates of the demolition area within the Application Site from the most recent building plan*, provided by the appointed architect DAY Architectural Ltd, using QGIS and estimating a height of the existing building to be approximately under 10 m using Google Earth it is likely that the demolition volume will be between 20,000 m^3 and 50,000 m^3. The original construction material of the existing building appears to be a mixture of brick and concrete which are both potentially dusty construction material. Therefore, in line with IAQM construction guidance[25], the magnitude of dust emissions from demolition is anticipated to be medium.
Earthworks	Medium	The Application Site currently comprises the existing blocks 19, 20 and 21 of Christie Hospital in addition to a small area of pavement and grassland. However the Proposed Development will require new foundations and landscaping within the entirety of the Application Site as part of the proposals and therefore earthworks will be required. The total Application Site area, as a worst case, has been estimated to be between 2,500 m^2 and 10,000 m^2 from the most recent building plan* for the Application Site. The soil type at the Application Site has been classed as "loamy and clayey" which is a potentially dusty soil type using the application Soilscape[29]. Therefore, in line with IAQM construction guidance[25], the magnitude of dust emissions from earthworks is anticipated to be medium.
Construction	Medium	The proposals are for the construction of a new four storey build at Christie Hospital, replacing the existing blocks 19, 20 and 21. The exact construction volumes for the Proposed Development are not currently available but it has been confirmed that the total area for the new build will be identical to the footprint of the original building and assuming an average height per storey to be 4 m the total volume is estimated to be between 25,000 m^3 to 100,000 m^3. It is expected that concrete will be used as a construction material which has a high potential for dust generation. Therefore, in line with IAQM construction guidance[25], the magnitude of dust emissions from construction is anticipated to be medium.

Activity	Magnitude	Justification
Trackout	Medium	Outward movements of HDVs associated with the Proposed Development has been confirmed by Vinci Building, the appointed construction contractor, to be 23 HDVs per day across an annual average period. As the Application Site is predominantly hardstanding within an urban environment the unpaved road length will be less than 50 m. The soil type at the Application Site has been previously classed as "loamy and clayey" using the application Soilscape[29] which is a potentially dusty soil type. Therefore, in line with IAQM construction guidance[25], the magnitude of dust emissions from construction is anticipated to be medium.
*CASICD-DAY-XX-00-DR-A-900101-A-Proposed Site Plan.pdf		

5.1.3 Sensitivity of the Study Area

The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees or other vegetation, to reduce the risk of wind-blown dust.

The sensitivity of the area and the factors considered are detailed in Table 7 and the construction dust band criteria (350 m, 100 m, 50 m and 20 m) are displayed in Figure 5.

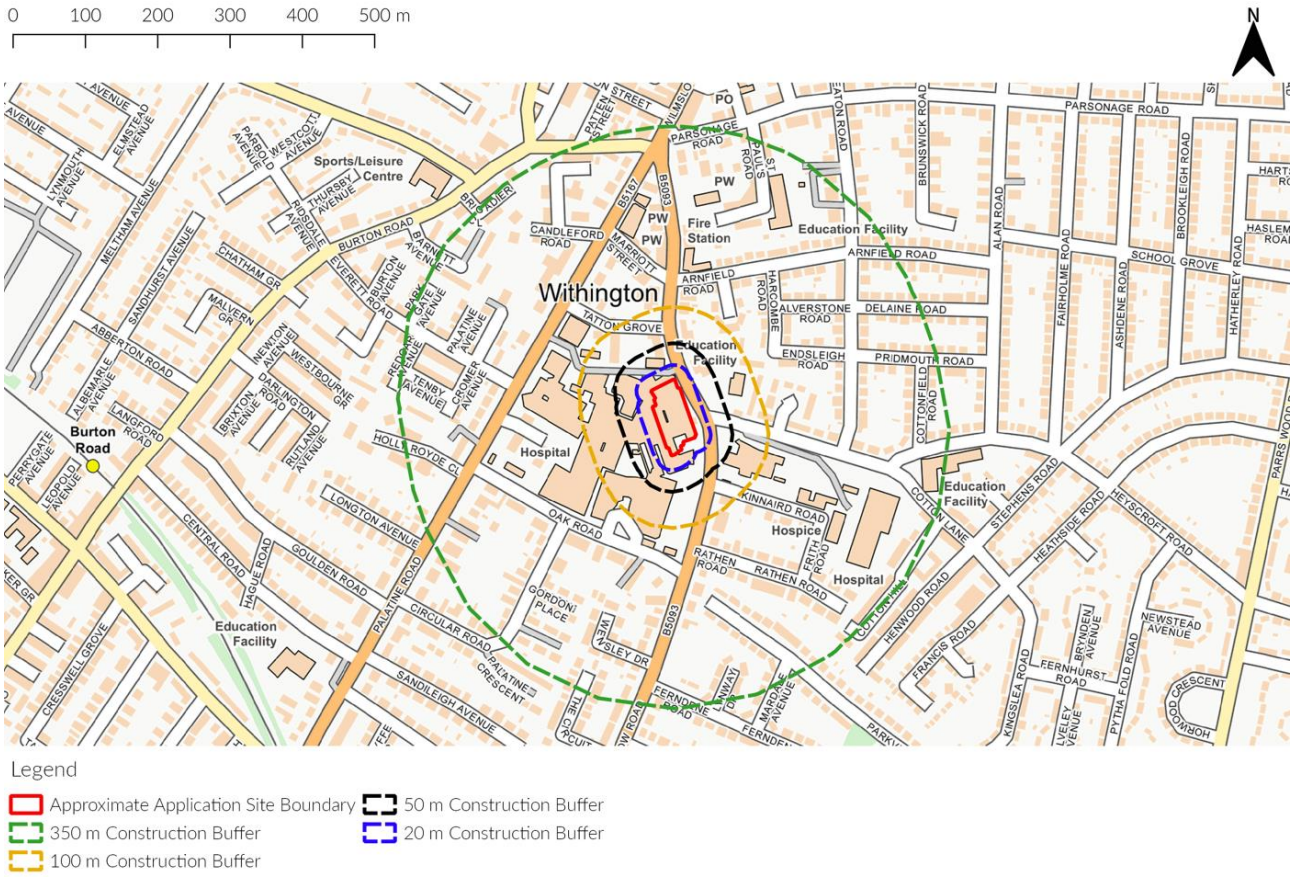


Figure 5: Construction Dust Band Criteria (350 m, 100 m, 50 m, 20 m) with Respect to the Application Site. Contains OS Data © Crown Copyright and Database Rights 2023.

Table 7: Sensitivity of the Area

Sensitivity Type	Factors	Sensitivity of Area	
		On – Site Activity	Trackout
Dust Soiling	There are between 10-100 high sensitivity receptors (hospital buildings) within 20 m of the Application Site boundary. Within 50 m of the Application Site boundary there are greater than 100 medium sensitivity receptors (school park and places of work) and between 10-100 high sensitivity receptors (car parking spaces, hospital buildings and residential dwellings). Therefore, the sensitivity of the area surrounding the Application Site has been classified as high sensitivity with regards to dust soiling for on-site activity. For trackout, there are 10-100 high sensitivity receptors, (hospital buildings, car parking spaces and residential dwellings) and between 10-100 medium sensitivity receptors (greater than 10 places of work and a school playground), along the B5093 within 20 m of the routes likely to be used by construction traffic up to 200 m from the Application Site. Therefore, the sensitivity of the area surrounding the Application Site has been classified as high with respect to dust soiling for trackout.	High	High
Human Health	The Defra predicted background PM_{10} concentration for the 1 km by 1 km grid square in which the Application Site is located is below the annual mean PM_{10} concentration of 24 $\mu g/m^3$ in the years 2022, 2023 and 2026 (the confirmed opening year for the Proposed Development) as provided in Table 5. There are greater than 100 high sensitivity receptors (hospital buildings) within 20 m of the Application Site boundary. Therefore, the sensitivity of the area surrounding the Application Site has been classified as medium sensitivity with regards to human health impacts for on-site activity. For trackout there are greater than 100 high sensitivity receptors (residential dwellings, hospital buildings and a school park) within 20 m of routes likely to be used by construction traffic up to 200 m from the Application Site where people could be exposed to PM_{10} for eight hours or more in one day. Therefore, the sensitivity of the area surrounding the Application Site has been classified as medium with respect to human health for trackout.	Medium	Medium

5.1.4 Risk of Dust Impacts

The outcomes of the assessments of potential magnitude of dust emissions and the sensitivity of the area are combined to determine the risk of impact. This risk is then used to inform the selection of appropriate mitigation. Table 8 details the risk of dust impacts for demolition, earthworks, construction and trackout activities.

Table 8: Summary of Potential Unmitigated Dust Risks

Potential Impact	Sensitivity	Demolition	Earthworks	Construction	Trackout
Magnitude		Medium	Medium	Medium	Medium
Dust Soiling Impacts	High	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Human Health Impacts	Medium	Medium Risk	Medium Risk	Medium Risk	Low Risk

5.2 Construction Phase – Vehicular Pollutants.

The Proposed Development is not located within or adjacent to an AQMA however as associated construction traffic will travel through the nearest AQMA the lower screening criterion (i.e. 100 LDV and/or 25 HDV within an AQMA) would apply.

The AADT of construction traffic during the construction phase has been confirmed by Vinci to be 23 HDV movements per day across an annual average period. This is below the screening criteria within the EPUK and

IAQM planning guidance[24]. Therefore, in accordance with the criterion presented within EPUK and IAQM planning guidance[24], additional road vehicle trips during the construction phase of the Proposed Development *"can be considered to have insignificant effects"* on air quality and no further assessment is required.

5.3 Construction Phase – Non-Road Mobile Machinery.

Exhaust emissions of NO_x and fine particulate matter (PM_{10} and $PM_{2.5}$) from Non-Road Mobile Machinery (NRMM), associated with construction sites, may have a significant effect on local air quality. Typically, NRMM is associated with construction sites and, therefore there is a potential for NRMM emissions to adversely affect local air quality as a result of the Proposed Development.

Furthermore, IAQM construction guidance[25] states that "*Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*."

6. Operational Phase Assessment.

The potential for air quality impacts during the operational phase of the Proposed Development are assessed in this section.

6.1 Road Traffic Emissions Screening Assessment.

It has been confirmed by WSP, the appointed Transport Consultants for the project, that there will be no net increase in both LDV and HDV operational phase road traffic trips on the local road network as a result of the Proposed Development.

This is below the indicative criteria in the EPUK and IAQM planning guidance[24] of a change of more than 500 LDV AADT or 100 HDV AADT outside of an AQMA and therefore no further assessment is required.

In accordance with the EPUK and IAQM planning guidance[24], the impacts on air quality from operational phase traffic generation are considered to be not significant.

6.2 Site Suitability.

This section presents a review of GMCA monitoring data and Defra predicted background concentrations[26] in the vicinity of the Application Site, for the purpose of identifying the suitability of the Application Site for the proposed healthcare use and identifies any requirements for potential mitigation to be embedded into the Proposed Developments design.

As presented in section 2 in line with Defra LAQM.TG(22)[6], the annual mean (also in line with Part F of the Building Regulations (2021)[15]), 24-hour mean, and 1-hour mean AQOs apply to the Proposed Development due to its proposed healthcare use. As such, this section considers the predicted annual mean (also in line with Part F of the Building Regulations (2021)[15]), 24-hour mean, and the 1-hour mean pollutant concentrations at the Application Site. In line with the Manchester City Council Air Quality and Technical Planning Guidance[10] the 2005 $PM_{2.5}$ WHO guideline[9] will also need to be considered.

6.2.1 NO_2 Concentrations

A review of the annual mean and 1-hour mean NO_2 concentrations as part of the baseline review, with recent monitoring results presented in Table 3 and Table 4, has been completed.

At passive diffusion tube monitoring locations within 3 km of the Application Site no exceedances of the NO_2 annual mean AQO have occurred in 2022, the most recent year of available monitoring data. At the closest and most representative passive diffusion tube monitoring location Site ID: MA37NO, no exceedance of the annual mean AQO has been recorded from 2018 to 2022. This passive diffusion tube monitoring location is classed as roadside, similar to the Application Site. However, as Site ID: MA37NO is located adjacent to an A-road whereas the Application Site is located adjacent to a B-road, the road adjacent to Site ID: MA37NO is likely to have greater traffic volumes and subsequently, it is expected that concentrations of NO_2 monitored at the Application Site would be less than those recorded Site ID: MA37NO and therefore not in exceedance of the NO_2 annual mean AQO.

An annual mean concentration of 60 $\mu g/m^3$ or above is often used to indicate a possible exceedance of the 1-hour mean NO_2 AQO in line with Defra LAQM.TG(22)[6]. There has been no recorded exceedance of the 60 $\mu g/m^3$ threshold from monitored NO_2 concentrations at any monitoring location within 3 km of the Application Site in 2022. Furthermore as shown in Table 5 Defra predicted background concentrations[26] for NO_2 at the Application Site are below both the 60 $\mu g/m^3$ threshold and annual mean AQO in 2022. As such, exceedances of both the NO_2 1-hour mean and annual mean AQO at the Application Site are unlikely.

Therefore, NO_2 concentrations in the vicinity of the Application Site are considered to be below both the annual mean AQO (also in line with Part F of the Building Regulations (2021)[15]) and 1-hour mean AQO. Therefore, the Application Site is considered suitable for the proposed healthcare use without the need for additional mitigation measures.

6.2.2 PM_{10} Concentrations

A review of the annual mean and 24-hour mean PM_{10} concentrations as part of the baseline review, with recent monitoring results presented in Table 3 has been completed.

At the closest automatic monitoring station to the Application Site, Site ID: STK7 located 4.2 km southeast from the Application Site, there has been no exceedance of both the annual mean AQO or 24-hour mean AQO in 2022, the most recent year of available monitoring data. This automatic monitoring station is classed as roadside, similar to the Application Site, however it is located adjacent to an A-road, the A34, and within an AQMA which represents poorer air quality conditions than those experienced at the Application Site. Therefore, it is likely that concentrations of PM_{10} recorded at the Application Site will be less than those recorded at Site ID: STK7 and not in exceedance of the PM_{10} annual mean or 24-hour mean AQO.

As shown in Table 5 the Defra predicted background mapped concentration[26] for PM_{10} at the Application Site are below their respective annual mean AQOs in 2022, 2023 and 2026 the confirmed opening year for the Proposed Development. In 2023 the Defra predicted background concentration for PM_{10} was predicted to be 11.4 $\mu g/m^3$ which is 28.5% of the annual mean AQO. As such, there is not expected to be an exceedance of the PM_{10} annual mean AQO at the Application Site.

Therefore, PM_{10} concentrations in the vicinity of the Application Site are considered to be below both the annual mean AQO (also in line with Part F of the Building Regulations (2021)[15]) and 24-hour mean AQO. Therefore, the Application Site is considered suitable for the proposed healthcare use without the need for additional mitigation measures.

6.2.3 $PM_{2.5}$ Concentrations

No review of local $PM_{2.5}$ monitoring was completed as part of the baseline review.

As shown in Table 5 the Defra predicted background concentration[26] for $PM_{2.5}$ at the Application Site is below both the annual mean AQO and 2005 $PM_{2.5}$ WHO guideline[9] in 2022, 2023 and 2026 the confirmed opening year for the Proposed Development. In 2023 the Defra predicted background concentration for $PM_{2.5}$ was predicted to be 7.7 $\mu g/m^3$ which is 30.8% of the annual mean AQO and 77% of the 2005 $PM_{2.5}$ WHO guideline[9]. As such, there is not expected to be an exceedance of both the $PM_{2.5}$ annual mean AQO or 2005 $PM_{2.5}$ WHO guideline[9] at the Application Site.

Therefore, $PM_{2.5}$ concentrations in the vicinity of the Application Site are considered to be below both the annual mean AQO (also in line with Part F of the Building Regulations (2021)[15]) and 2005 $PM_{2.5}$ WHO guideline[9] (in line with the Manchester City Council Air Quality and Planning Technical Guidance[10]). Therefore, the Application Site is considered suitable for the proposed healthcare use without the need for additional mitigation measures.

6.2.4 Significance of Air Quality Impacts

To determine the significance of predicted air quality impacts based upon a Site Suitability assessment, such as that undertaken as part of this assessment, the EPUK and IAQM planning guidance[24] states:

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

With regards to the Proposed Development, the unmitigated impact significance associated with the Proposed Development has been predicted in accordance with the stated assessment methodology. The following factors have been considered when providing justification:

- The Proposed Development will not introduce any new receptor into an area of exceedance of the annual mean NO_2 AQO (also in line with Part F of the Building Regulations (2021)[15]) or 1-hour mean NO_2 AQO based upon a review of NO_2 monitoring data and Defra predicted background concentrations[26] within the vicinity of the Application Site;
- The Proposed Development will not introduce any new receptor exposure into an area of exceedance of the annual mean PM_{10} AQO or 24-hour mean PM_{10} AQO based upon a review of PM_{10} monitoring data and Defra predicted background concentrations[26] within the vicinity of the Application Site; and

– The Proposed Development will not introduce any new receptor exposure into an area of exceedance of both the annual mean $PM_{2.5}$ AQO or 2005 $PM_{2.5}$ WHO guideline[9] (in line with the Manchester City Council Air Quality and Planning Technical Guidance[10])based upon a review of Defra predicted background concentrations[26] within the vicinity of the Application Site.

As no exceedances of the considered AQOs are predicted, mitigation measures are not required for the operational phase of the Proposed Development. As such, the overall effect is considered to be 'not significant'.

7. Mitigation.

7.1 Construction Phase.

To mitigate the potential impacts during the construction phase it is recommended that mitigation measures as detailed in the IAQM construction guidance are implemented. These mitigation measures have been carefully selected for the Proposed Development and are based upon the dust risk categories outlined in Table 8 of this report.

It is recommended that the MCC approve a Dust Management Plan (DMP) prior to works commencing on site, and that this is implemented using an appropriately worded planning condition. Table 9 below details the measures that should be incorporated in the DMP. For general mitigation measures, which excludes those specifically targeted towards demolition, earthworks, construction and trackout (which are given towards the end of the table), medium risk measures have been applied as these represent the highest risk category determined in Table 8. This approach is consistent with the IAQM construction guidance[25].

Table 9: Mitigation Measures

Issue	Mitigation Measure
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
	Display the head or regional office contact information.
Dust Management Plan	Develop and implement a Dust Management Plan (DMP), which may include measures to control emissions, approved by the Local Authority. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make the complaints log available to the Local Authority when asked.
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling check of surfaces such as street furniture, cars, window sills within 100 m of the site boundary, with cleaning to be provided if necessary.
	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
	Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences.
Preparing and maintaining the site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

Issue	Mitigation Measure
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicles/machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.
	Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where applicable).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing)
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimize 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.
Demolition	Soft strip inside building before demolition.
	Ensure effective water suppression is used during demolition activities.
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.
	Bag and remove any biological debris before demolition.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use Hessian, mulches or trackifiers were it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

Issue	Mitigation Measure
	Only remove the cover in small areas during work and not all at once.
Construction	Avoid scrabbling (roughening of concrete surfaces) if possible.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
	For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in continuous use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
	Record all inspections of haul routes and any subsequent action in a site log book.
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
	Access gates to be located at least 10 m from receptors where possible.

Potential dust effects during the construction phase are considered to be both temporary and short-term in nature. The impacts are determined to be 'temporary' as they will only potentially occur throughout the construction phase and 'short term' because these will only arise at particular times when certain activities and meteorological conditions combine to create the predicted level. Notwithstanding this, with the application of the above dust control and mitigation measures, it is considered that residual effect at all receptors will be 'not significant' in accordance with the IAQM construction guidance[25].

7.1.1 Construction Phase Road Traffic Emissions

The need for further assessment of the potential air quality impacts associated with construction phase road traffic emissions, principally HDV movements, have been screened out as they are considered to have an insignificant effect on air quality and mitigation measures are not required.

7.1.2 Construction Phase NRMM Emissions

In accordance with Part 4 of the IAQM Control of Dust and Emissions guidance, all NRMM would need to adhere to the emissions standards for NO_2 and PM_{10} set out for NRMM. It is therefore considered the likely effects of construction plant on local air quality would be insignificant.

7.2 Operational Phase.

7.2.1 Road Traffic Emissions

Potential air quality impacts associated with operational phase development trips have been screened out from further assessment as *'the impacts [on air quality from operational phase movements] can be considered to have insignificant effects'* in accordance with the EPUK and IAQM planning guidance[24]. Therefore, further mitigation measures are not considered to be required.

7.2.2 Baseline Site Suitability Review

A review of MCC monitoring data in consideration of the Application Site, and mapped concentrations by Defra[26] in the locale of the Application Site, indicates no likely exceedance of the respective annual mean AQOs (also in line with Part F of the Building Regulations (2021)[15]), 1-hour mean NO_2 AQO or 24-hour mean PM_{10} AQO. The 2005 $PM_{2.5}$ WHO guidelines[9] is also not predicted to be exceeded at the Application Site.

As no exceedances of any considered AQO are predicted, this follows the 1st hierarchy principle of the IAQM planning guidance to 'prevent and avoid' exposure[30]. Therefore, no embedded mitigation into the Proposed Development design is required.

8. Summary and Conclusions.

This report details the potential air quality impacts associated with the construction and operation of the proposed CASICD at Christie Hospital campus, Withington, Manchester M20 4BX (the 'Application Site').

The findings of the assessment are as follows:

- The baseline assessment has shown that the Application Site is not located within the Greater Manchester AQMA. Local monitoring data within the MCC area of administration including a single automatic monitoring station, passive diffusion tube monitoring locations within 3 km of the Application Site in addition to background pollution maps from Defra[26] indicated that no exceedances of any of the respective AQOs for NO_2, PM_{10} and $PM_{2.5}$ occurred in 2022 within the vicinity of the Application Site. In addition, the 2005 $PM_{2.5}$ WHO guideline[9] was also not exceeded by Defra predicted background concentrations in 2022, 2023 or 2026, the confirmed opening year for the Proposed Development;
- A qualitative assessment of the potential dust impacts during the construction of the Proposed Development has been undertaken. Through good practice and implementation of appropriate mitigation measures, it is expected that the release of dust would be effectively controlled and mitigated, with resulting impacts considered to be 'not significant'. All dust impacts are considered to be temporary and short-term in nature;
- In line with the EPUK and IAQM planning guidance[24], the AADT of construction traffic during the construction phase across an annual average period has been confirmed to be below the screening criteria valid within an AQMA as set-out in the EPUK and IAQM planning guidance[24]. Therefore, in accordance with the criterion presented within EPUK and IAQM planning guidance[24], additional road vehicle trips during the construction phase of the Proposed Development *"can be considered to have insignificant effects"* on air quality and further assessment is not required;
- The results of the operational phase traffic screening assessment indicate that there will be no change in operational phase LDV or HDV road traffic movements on the local road network as a result of the Proposed Development. As such, the trips associated with the Proposed Development will not be in exceedance of the indicative criteria set-out in the EPUK and IAQM planning guidance[24] and the potential impact of additional road traffic on local air quality is considered insignificant. Therefore, a detailed assessment was not required;
- The Proposed Development energy strategy was confirmed to be all electric, utilising zero-combustion emission technologies via a combination of ASHPs located at roof level and a WWHP located in the 3rd floor plantroom. There will be two 2,500 kVA backup generators installed upon the roof of the CASICD, which will only be routinely operational for testing purposes only, which will occur one hour per month. As no combustion sources were proposed for the primary energy supply to the Proposed Development, no local air quality impacts were anticipated. Therefore a detailed assessment of the impacts of combustion emissions from a proposed energy plant was screened out of this assessment; and
- A qualitative Site Suitability Assessment has been undertaken to assess the suitability of the Application Site for the proposed healthcare use, in line with both Part F of the Building Regulations (2021)[15] and the Manchester City Council Air Quality and Planning Technical Guidance[10]. Based on the assessment results no exceedances of the relevant AQOs for any pollutant in addition to the 2005 $PM_{2.5}$ WHO guideline[9] are expected to occur. Therefore embedded mitigation within the design of the Proposed Development is not required.

Based on the information above, it is considered that air quality should not be viewed as a constraint to planning and the Proposed Development conforms to the principles of the NPPF[16], the MCC Core Strategy Development Plan[18] and the MCC Air Quality and Planning Technical Guidance[10].

9. Glossary of Terms.

AADT	Annual Average Daily Traffic
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
ASHP	Air Source Heat Pump
ASR	Annual Status Report
CAS	Clean Air Strategy
CASICD	Christie Advanced Scanning and Imaging Centre Development
CAZ	Clean Air Zone
CT	Computerised Tomography
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EA	Environment Agency
EPA	Environmental Protection Act
EPUK	Environmental Protection UK
EU	European Union
GMCA	Greater Manchester Combined Authority
HDV	Heavy Duty Vehicles (> 3.5 tonnes gross vehicle weight)
IAQM	Institute of Air Quality Management
LAQM.TG	Local Air Quality Management Technical Guidance
LDV	Light Duty Vehicles (≤3.5 tonnes gross vehicle weight)
MCC	Manchester City Council
µg/m^3	Micrograms per cubic metre
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
NRMM	Non-Road Mobile Machinery
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Particulate matter with an aerodynamic diameter less than 10 micrometres
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than 2.5 micrometres
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
Trackout	The process involving the transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site
WHO	World Health Organisation
WWHP	Water to Water Heat Pump

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Appendix 1 - EHO Consultation.

From: Chatha, Bhajan
Sent: 08 August 2023 09:27
To: contact@manchester.gov.uk
Cc: Jones, Josh; Harrison, Rachael
Subject: Christie Advanced Scanning and Imaging Centre Development (CASICD), Christie Hospital, Manchester - Air Quality Assessment Consultation

Hello Rebecca,

Hoare Lea have been instructed to undertake an Air Quality Assessment to support the planning application for the proposed construction and operation of the Christie Advanced Scanning and Imaging Centre Development (CASICD) at Christie Hospital, Manchester M20 4BX.

I have set out our proposed assessment approach below and would invite any comments or local air quality considerations you may have. The site is located at the below location (red outline):



The Proposed Development comprises the demolition of the existing blocks 19 and 20 to allow for a new build in their place. The new build will have a gross floor area of approximately 8500 m^2.

Hoare Lea propose to undertake the assessment using the following methodology:

- A baseline assessment of air quality will be undertaken using Greater Manchester Combined Authority (GMCA) monitoring data, taken from the most recently available Annual Status Report/s.
- Monitoring data for 2020 and 2021 will not be included as part of our assessment, owing to the effects of the COVID-19 pandemic. Monitoring data from 2019 will be used to establish the baseline.
- A review of the Manchester City Council Core Strategy Development Plan and any relevant supplementary planning guidance will be carried out.
- DEFRA's background pollution maps will be used to establish background concentrations in the area.
- An assessment of the construction impacts on air quality and dust using the IAQM methodology, in compliance with 'The Control of Dust and Emissions During Construction and Demolition'.
- Any construction or operational phase mitigation will be recommended as necessary in line with IAQM guidance.
- The energy strategy for the Proposed Development is to be all electric, utilising zero emission technologies. As such, a detailed assessment of impacts of combustion emissions from the energy plant has been screened out of this assessment.

- Initial road traffic data associated with the Proposed Development has been provided by the appointed Transport Consultants for the project. It has been confirmed that there will be no annual average daily traffic (AADT) increase associated with the Proposed Development and therefore the operational phase road traffic associated with the Proposed Development will be below the EPUK and IAQM criteria, indicating that the potential for air quality impacts from road traffic emissions associated with the Proposed Development, is unlikely. As such, a detailed assessment is not required and a screening assessment will be undertaken.
- An assessment of Site Suitability will be undertaken qualitatively with a desk-based review of the existing baseline air quality undertaken to inform the exposure of future users of the development. Local air quality monitoring and DEFRA's background pollution maps will be used to understand concentrations at the Application Site.

I would also be grateful if you could please confirm your acceptance of the proposed methodology and provide me with any comments you may have. However, if you would like to discuss further, please do not hesitate to contact me on the number below.

Please let me know if there are any additional guidance documents that aren't publicly available that you would like us to consider.

In the meantime, if you have any questions, do not hesitate to contact me.

Kind regards,

Bhajan Chatha
Graduate Air Quality Consultant

Appendix 2 - Professional Experience.

Christelle Escoffier (Hoare Lea) MsEng. Msc. PhD MIES MIAQM

Christelle Escoffier is a Senior Associate and Technical Lead for the Air Quality Group at Hoare Lea. She is a Full Member of the Institution of Environmental Sciences and the Institute of Air Quality Management. She graduated with a Master in Science Diploma from Paris VI University, France and holds a Doctor of Philosophy degree in Physical Oceanography, Meteorology and Environment, from the same University.

In her twenty-two years of professional experience, she has managed and delivered air quality services for a wide range of industries in the United Kingdom (UK), the United States of America (USA) and the Middle East. Her portfolio of experience comprehends projects for diverse sectors from road transport, planning and development, wastewater and waste, oil and gas to power (energy centres, landfill gas plant, power reserve facilities, gas-fired and oil-fired combustion turbine stations). Christelle has in-depth knowledge of atmospheric dispersion models. She has delivered dispersion modelling training courses to government agencies, academic, industrial and commercial professionals worldwide since 2005.

Josh Jones (Hoare Lea), Msc (Hons) MIEnvSc, MIAQM

Josh is a Senior Air Quality Consultant with Hoare Lea. He has over 6 years' experience in the Air Quality field. His role includes the production and project management of air quality assessments, including monitoring and detailed dispersion modelling of dust, odour, roads and industrial emissions, in support of both planning and permit applications for a wide variety of clients across a range of sectors, including residential, industrial, energy and healthcare. He also has detailed knowledge of the LAQM process, the EIA process, co-ordination of multi-disciplinary environmental impact assessment work in support of planning applications and dispersion modelling studies.

Rachael Harrison (Hoare Lea) BSc(Hons) AMIEnvSc, AMIAQM

Rachael is a Senior Air Quality Consultant with Hoare Lea. She is an Associate Member of both the Institution of Environmental Sciences and Institute of Air Quality Management. Rachael has experience in managing Air Quality and Odour Assessments for a wide range of UK and international clients covering sectors including; residential, commercial, energy and industrial operations. With experience in quantitative and qualitative atmospheric assessments, complex dispersion modelling, air pollutant monitoring surveys for rail, road transport and energy projects. Rachael's interest's lie in the health implications attributed to poor air quality.

Bhajan Chatha (Hoare Lea), MEng (Hons), AMIEnvSc, AMIAQM

Bhajan is a Graduate Air Quality Consultant with Hoare Lea. He is a MEng Chemical Engineering Graduate from the University of Aberdeen. During his MEng, Bhajan developed his understanding of air pollution, environmental impacts and toxicology throughout multiple modules. He also studied air pollutants, air pollution control equipment, air pollution monitoring and dispersion modelling during his degree. Within air quality, Bhajan's interests lie in air pollution control equipment and human health impacts.

Bhajan has worked on projects across multiple sectors including residential, commercial and industrial sectors. He has experience preparing air quality screening reports, environmental impact assessments, and indoor air quality plans.

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