Great Northern

Environmental Statement: Volume 1

November 2022


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Important notice: This Environmental Statement has been prepared by Deloitte, with technical input from Trilogy Real Estate, Simpsons Haugh, Chris Burnett Associates, Heritage Architecture, Hilson Moran, WSP, AA, Forever Consulting, Enfusion "the Consultants". Chapter 1, Volume 1 of this Environmental Statement sets out the parties responsible for preparing each Chapter and associated figures and appendices.

Although we have read the Consultants' reports for consistency and provide our observations based on our knowledge and experience, we accept no liability or responsibility for the Consultant's Reports and will not be responsible for the technical content of Chapters 5-14, Volume 1, nor Volume 2, nor the technical content of the associated separate Non-Technical Summary.

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1. Introduction

1.1. This Environmental Statement ('ES') accompanies Planning and Listed Building Consent Applications for the proposed comprehensive redevelopment of the Great Northern Warehouse, Great Northern Square, Deansgate Terrace and the Leisure Box ('the Site') situated in Manchester city centre. The application is submitted to Manchester City Council ('MCC') by GNW Developments Ltd ('the Applicant').

The Site

1.2. The Site extends 2.97 hectares and is bound by Deansgate to the west, Peter Street to the north, Great Bridgewater Street to the south and Watson Street to the east. The complex comprises three primary components:

- Great Northern Warehouse: Grade II* Listed former goods warehouse that was converted into a 519-car park in the 1990s on the upper floors. The ground and first floors include a casino, gym, event spaces, food and beverages operators.
- Deansgate Terrace: a Grade II Listed row of ground floor shop frontages comprising retail, food and beverage operators below office, storage and further retail space.
- Leisure Box: a cinema complex with three floors of car parking space comprising 721 spaces.

1.3. The Site has been identified for regeneration since the adoption of the 'Great Northern, Manchester Central and Castlefield Quay Strategic Regeneration Framework' ('SRF') (endorsed by MCC Executive Committee in 2017 and updated in 2019), which sets out a clear ambition to guide the redevelopment, re-modelling and refurbishment of the site within the SRF boundary.

1.4. Further details of the Site are set out in Chapter 4 of this Environmental Statement.

The Proposals

1.5. The Proposed Development will come forward in three main phases of development, described as follows:

1.6. The intention is to deliver the proposed development in its entirety, as part of a continuous development process; however, this application allows identifies the following discrete phases of development, each of which are capable of being delivered in their own right. They can be broadly summarised as:

- Phase A: the refurbishment and conversion of the Great Northern Warehouse including the removal of modern features facilitated from the 1997 comprehensive scheme, and the refurbishment of the northern end of Deansgate Terrace for commercial use, alongside the enhancement of Great Northern Square and retention of existing ground floor occupiers;
- Phase B and C: partial demolition of the Leisure Box and retention of car parking below followed by the erection of residential elements (B) and refurbishment and conversion of the southern end of Deansgate Terrace (C).

1.7. In summary, both phases of the completed Proposed Development will comprise:

- 746 residential units (Use Class C3) and 2,057 sq. m of private external amenity space plus 4726 sq. m of shared amenity space (972 sq. m interna and 3,744 sq. m. external);
- 19,926 sq. m (GIA) of office floorspace (Class E) following extension and conversion of Deansgate Terrace North and conversion of the Great Northern Warehouse;
- 8,256 sq. m (GIA) of retained commercial floorspace (Use Class E or Sui Generis) associated with the existing tenancies within the ground and first floors Great Northern Warehouse;

- 5,739 sq. m (GIA) of ground floor commercial (Use Classes E, Sui Generis (Drinking Establishments, Hot Food Takeaway or entertainment venues) across the Site.
- 4,462 sq. m (GIA) of upper level commercial floorspace (Class E)
- 155 sq. m (GIA) of community floorspace (Use Class E or F2(b));
- 25,777 sq. m (GIA) of retained, reconfigured and extended car parking area (Sui Generis), comprising 929 spaces in total; and
- 12,563 sq. m (GIA) of ancillary cycle parking, plant and back of house space.

1.8. The Proposed Description of Development is as follows:

"Phased redevelopment of the Great Northern Warehouse (GNW), Deansgate Terrace and Leisure Box, including areas of public realm, comprising:

- *demolition of the central atrium, GNW car park ramp, and other modern elements, alongside removal of 519 car parking spaces from the GNW, retention of casino (Sui Generis), bowling alley and existing food and drink unit (Use Class E) alongside the refurbishment, restoration, and re-use of the Grade II* Listed Great Northern Warehouse to provide office, retail and / or food and drink use (Use Class E) and ancillary areas;*
- *the refurbishment, restoration, partial demolition and 3-storey extension of the Grade II Listed Deansgate Terrace (northern section) and Goods Yard Entrance to form office, retail and / or food and drink use (Use Class E) and drinking establishments / hot food takeaway (Sui Generis), with associated public realm works comprising the reconfiguration of Great Northern Square and the introduction of additional public realm with associated hard and soft landscaping, together with highways works, access and servicing facilities, rooftop plant and other associated works;*
- *partial demolition of the existing leisure box prior to conversion; reconfiguration and extension of existing car parking to provide 929 parking spaces and associated plant, followed by construction of three residential buildings to provide 746 no. apartments (Use Class C3) above the retained car park comprising ground floor plus 16, 27 and 34 storeys respectively including 753 cycle parking spaces, with office, retail and / or food and drink use (Use Class E), or Sui Generis (drinking establishments / hot food takeaway) at ground floor and level 3, hard and soft landscaping, together with highways works, access and servicing facilities, rooftop plant and other associated works; and,*
- *external alterations and restoration of Deansgate Terrace (southern section) to provide office, retail or food and drink use (Use Class E) or Sui Generis (drinking establishments / hot food takeaway / live music venue), along with delivery of associated public realm, highways works, plant, and associated works."*

1.9. In addition there are three separate Listed Buildings within the Application Boundary, which are:

- Great Northern Warehouse (Grade II*; List ID 1268529);
- 223-233 Deansgate Former Entrance to Deansgate Goods Station (Grade II; List ID 1282974); and
- 235-291 Deansgate Terrace (Grade II; List ID 1210103).

1.10. The description of development as applied for by the Listed Building Consent for the Great Northern Warehouse is as follows:

"Great Northern Warehouse: "Internal and external alterations to the Great Northern Warehouse as part of its restoration, refurbishment and re-use to include office, retail, restaurants / food and drink, alongside retention of the existing bowling alley, ground floor restaurant and casino following removal of non-original building elements."

1.11. The description of development as applied for by the Listed Building Consent for 223-233 Deansgate is as follows:

"223-233 Deansgate: "Removal of non-original buildings and structures attached to the former Goods Yard Entrance (223-233 Deansgate Terrace) to facilitate the construction of a new 3 storey extension for office, food and drink, retail and / or Sui Generis (drinking establishments / hot food takeaway) uses."

1.12. The description of development as applied for by the Listing Building Consent for 235-291 Deansgate is as follows:

"235-293 Deansgate: "Internal alterations, restoration and construction of a new integrated part 2, part 3 storey extension to the rear 235-291 Deansgate Terrace to facilitate office, retail or food and drink use (Use Class E) or Sui Generis (drinking establishments / hot food takeaway / live music venue) uses, and associated works."

1.13. This ES sets out the findings of an Environmental Impact Assessment ('EIA') carried out in respect of the

Requirements for EIA

1.14. The EIA process is the mechanism by which development proposals are appraised in terms of their likely environmental effects, in addition to engineering and technical considerations.

1.15. The purpose of the EIA is to establish the nature of the Proposed Development and the environment in which it is likely to take place, during both construction and operational phases, as to identify the likely significant effects on the environment. The assessment compares the existing situation at the start of the work (baseline) with the situation during demolition, construction and operation.

1.16. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') require that any Proposed Development falling within the description of a 'Schedule 2 development' (as defined within the meaning of the EIA Regulations), will be subject to an EIA where such development is likely to have 'significant' effects on the environment by virtue of such factors as its nature, size or location (Regulations 2(b)).

1.17. The Proposed Development is considered likely to fall under the category of 'urban development projects' (Schedule 2, 10, (b)) where:

- The development includes more than 1 hectare of urban development which is not dwellinghouse development; or
- The development includes more than 150 dwellings; or
- The overall area of the development exceeds 5 hectares.

1.18. A request was submitted to Manchester City Council on 4 August 2022 (Appendix 2.1) in order to obtain a formal Scoping Opinion in relation to proposed coverage of the Environmental Impact Assessment required in respect of the Proposed Development. A formal scoping opinion was received 28 October 2022 (Appendix 2.2). At that time, the following Chapters were scoped into the EIA:

- Townscape and Visual Impact;
- Historic Environment;
- Air Quality;
- Noise and Vibration;
- Wind Microclimate;
- Sunlight, Daylight and Solar Glare;
- Socio-Economics;
- Human Health; and
- Climate Change (incl. Greenhouse Gases).

1.19. The advice contained within the EIA Scoping Opinion including its provisions on the identification of environmental impacts and mitigation measures has been addressed in each of the relevant technical assessments contained within this document. In addition, each of the technical consultants for those Chapters that were both scoped in and scoped out of the EIA, via the October 2022 Scoping Opinion, have further considered whether the development parameters submitted with this application would give rise to any potential additional or modified environmental effects, such that the scope and coverage of the EIA should consider any additional matters.

1.20. The need for this additional consideration is due to the fact that the commercial floorspace identified within the Environmental Impact Assessment Scoping Request in August 2022 was somewhat lower than that which is identified as a basis for assessment within this Environmental Statement. In undertaking this initial exercise, the scope of the EIA has been fully assessed on the basis of the submitted scheme. It should also be noted that the commercial components of the scheme have remained largely unaltered save for the modest extension to the northern end of the Deansgate Terrace and some new areas surrounding the reconfigured Leisure Box phase of the development, and that all other proposed commercial floorspace is contained within existing buildings, primarily comprising the Grade Northern Warehouse and Deansgate Terraces. The individual chapters have assessed the development with the current commercial floorspace and have not identified any demonstrable effect of this from an environmental perspective.

1.21. For completeness, the number of car parking spaces and the quantum and height of the residential development remain consistent, within identified tolerance levels, to that set out in the EIA Scoping Report and Scoping Opinion. Reference is made to this in the individual chapters to confirm that consultants have reviewed the previously assessed commercial floorspace figures and those applied for by the Proposed Development to confirm that the scope of their EIA disciplines remains unchanged.

1.22. In accordance with the EIA Regulations, this ES sets out the following information:

- A description of the Proposed Development comprising information on the Site, design, size and other relevant features of the development;
- A description of the likely significant effects of the Proposed Development on the environment;
- A description of any features of the Proposed Development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- A description of the reasonable alternatives studied by the developer, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;
- A non-technical summary of the information, of the information specified above; and
- Any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

Project Team

1.23. Deloitte has significant experience and expertise in managing the EIA process and hold the IEMA EIA Quality Mark. Details of the EIA Technical Team and qualifications are set out in Table 1.1 below.

Table 1.1: EIA Technical Team

Organisation	Expertise	Qualifications
Trilogy Real Estate	The Applicant	N/A
Deloitte	Town Planning, EIA Coordinator	MRTPI, MRICS, IEMA EIA Quality Mark, MPlan, MSc, BA(Hons)
SimpsonHaugh	Architect	RIBA
Chris Burnett Associates	Townscape & Visual Impact	Bsc, BLD, CMLI
Heritage Architecture	Historic Environment	Ba (Hons), MA – IHBC affiliate

Hilson Moran	Air Quality	Member of Institute of Environmental Science and Member of Institute of Air Quality Management. Chartered Environmentalist
WSP	Noise	BSc (Hons), IOA Diploma in Acoustics and Noise Control, Member of the Institute of Acoustics (MIOA)
WSP	Wind	CEng, MIMechE
AA	Sunlight, Daylight, Overshadowing and Solar Glare	BSc (Hons) MRICS
Forever Consulting	Socio-Economics	Ba, Economics
Enfusion	Human Health	Bsc Msc FIEMA
WSP	Climate Change	MA, Bsc (Hons) Environmental Science Charterered Environmentalist

EIA Scenarios

1.24. The scenarios set out below will be tested for each technical discipline, which are based on the works described in paragraph 1.5.

1.25. Please note, it is acknowledged that the below scenarios may not be appropriate for all technical disciplines assessed. Any differentiation from the scenarios listed below is explained within the individual chapters and will set out the scenarios tested and the justification for this.

1. Existing site (baseline), including committed developments currently under construction (as defined within the Scoping Report);
2. Existing site (baseline) with Proposed Development Phase A (as above) construction phase;
3. Existing site (baseline) with Proposed Development Phase A operational phase and Phase B and C construction phase (as above), including inter-phase mitigation;
4. Existing site (baseline) with Proposed Development Phases A, B, and C operational phase (as above);
5. Existing site (baseline) with Proposed Development Phase A, B and C operational phase (as above) and cumulative developments.

Organisation of the Environmental Statement

1.26. This ES comprises 16 Chapters and is supported by figures (located at the back for each Chapter within Volume 1) and technical appendices (within a separate Volume 2). A non-technical summary (NTS) of the full ES is provided as a separate standalone document.

1.27. Figures have been referenced using the Chapter number as a prefix followed by the number of the figure within a given Chapter. Appendices have been referenced in the same way but due to their size they are contained separately in Volume 2. Table 1.2 sets out the structure of the ES.

Table 1.2: Structure of this Environmental Statement

Chapter No.	Chapter Title	Description
VOLUME 1		Following Chapters
1.	Introduction	Introduction to the ES, EIA requirements, details of the project team, ES organisation and availability.
2.	EIA Methodology	Methods used to prepare each Chapter, description of ES structure and content, generic significance criteria, scoping and consultation.
3.	Alternatives and Design Evolution	Outline of the main alternatives considered by the Applicant.
4.	Site and Development Description	Site description and details of the Proposed Development.
5.	Construction Phasing and Methodology	Details of anticipated programme for development and construction methodology.
6.	Townscape and Visual Impact	To assess the likely significant effects of the Proposed Development on townscape.
7.	Historic Environment	To assess the likely significant effects of the Proposed Development on nearby heritage assets
8.	Air Quality	To assess the likely significant effects of the Proposed Development in relation to air quality.
9.	Noise and Vibration	To assess the likely significant effects of the Proposed Development in relation to noise and vibration.
10.	Wind	To assess the likely significant effects of the Proposed Development in relation to microclimates
11.	Sunlight, Daylight, Overshadowing & Solar Glare	To assess the likely significant effects of the Proposed Development in relation to sunlight, daylight, overshadowing and solar glare.
12.	Socio-Economics	To assess the likely significant effects of the Proposed Development in relation to socio-economics.
13.	Human Health	To assess the likely significant effects of the Proposed Development on human health
14.	Climate Change	To assess the likely significant effects of the Proposed Development on climate change, energy and sustainability.
15.	Type 1 Cumulative Effects	Review of inter project effects, which are combined effects arising from the Proposed Development on defined sensitive receptors.
16.	Summary of Residual Effects	Summary of the effects that remain after mitigation.

Chapter No.	Chapter Title	Description
VOLUME 2	Technical Appendices	Technical data and reports to support the Chapters in Volume 1.
	Non-Technical Summary	Summary of the ES in non-technical language.

Other Documents

1.28. Together with this ES, the documents set out in Table 1.3 will be submitted to MCC in support of the planning and listed building consent applications.

Table 1.3: Planning Application Supporting Documents

	Prepared by
Application Form and Certificates	Deloitte
Site Location, Block Plans, Drawinga	SimpsonHaugh
Design and Access Statement	SimpsonHaugh
Public Realm Strategy	Planit.IE & Light Bureau
Schedule of Proposed Works	Heritage Architecture
Listed Building Drawings	SimpsonHaugh & Heritage Architecture
Structural Listed Building Report	Curtins
Statement of Community Involvement	Forever Consulting
Archaeological Desktop Report	Salford Archaeology
Environmental Standards Statement	WSP
BREEAM Report	WSP
Phase A Preliminary Ecological Assessment	Indigo Surveys
Crime Impact Statement	GMP
Threat and Risk Security Needs Assessment	Grendon
Transport Assessment	Curtins
Travel Plan Framework	Curtins
Waste Management Strategy	Curtins
TV Reception Survey (pre-development)	Pager Power
Safety Assessment (Manchester Airport)	Pager Power
Brodband Connecitivty Statement	Pager Power
Viability Assessment	CBRE

	Prepared by
Ventilation Strategy	WSP
Placemaking Strategy and Local Benefits	Trilogy
Arboricultural Impact Assessment	Indigo Surveys
Fire Statement	OFR Statement
Flood Risk Assessment and Drainage Strategy (Great Northern Warehouse and Deansgate Terrace)	Curtins
Flood Risk Assessment and Drainage Strategy (Leisure Box)	Civic Engineers
UXO Survey	1st Line Defence
Phase A Ground Conditions Assessment	Curtins

Environmental Statement Availability

1.29. The ES is available for public viewing on Manchester City Council's Public Access website at the following address: http://pa.manchester.gov.uk/online-applications/ once the application has been submitted and validated.

1.30. The ES may be purchased in volumes, the costs for which are set out below:

- Volume 1: ES Main Text and Figures - £150;
- Volume 2: ES Appendices - £150;
- Volume 3: Non-Technical Summary (NTS) - £15;
- Full Copy (Volumes 1 and 2, and NTS) of the ES on CD - £15;

1.31. For copies of any the above, please contact the Manchester Planning Team at Deloitte.

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2. EIA Methodology

Introduction

2.1. This Chapter sets out the methodology used to prepare each Chapter of the ES and describes its structure and content. In particular, it sets out the process of identifying and assessing the likely significant effects on the environment of the Proposed Development as referenced in Chapter 1 and described in detail in Chapter 4.

Legislation and Guidance

2.2. The ES has been prepared to comply with EIA Regulations, which implement European Council Directive No. 85/337/EEC as amended by Directive 2014/52/EU and entered into force on 17 May 2017. The EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies. The European Union (Withdrawal) Act 2018 introduced "retained EU law" which provides that EU-derived domestic legislation continues to have effect.

2.3. Reference has also been made to currently available good practice guidance in EIA including:

- Circular 02/99: Environmental Impact Assessment
- The European Commission's numerous EIA guidance documents available here: http://ec.europa.eu/environment/eia/eia-support.html
- Guidance on EIA Scoping, European Commission, June 2001
- Guidance on Transport Assessment, DCLG and DfT, March 2007
- National Planning Practice Guidance – Department for Communities and Local Government (March 2014 and continuously updated as a 'live' resource)

2.4. Reference has been made to the Institute of Environmental Management and Assessment (IEMA) publications, including:

- IEMA ES Review Criteria
- IEMA Guidelines for Environmental Impact Assessment (2004)
- IEMA Special Report into the State of Environmental Impact Assessment Practice in the UK (2011)
- IEMA Shaping Quality Development (2015)
- IEMA Delivering Quality Development (2016)
- IEMA Delivering a Proportionate EIA (2017)

2.5. The ES has also had regard to the National Planning Policy Framework 2021 (NPPF). The NPPF sets out the Government's economic, environmental and social planning policies for England, articulating the Government's aspiration for sustainable development. The NPPF has been considered where it is relevant to EIA.

- As relevant to the ES technical chapter's scope, methodology and assessment of effects, key local planning policy and guidance documents have been considered. These include:
- Manchester City Council Core Strategy (2012)
- Saved Unitary Development Plan Policies (1995)
- Any additional planning policy or guidance documents considered relevant have been identified within the relevant technical chapters.

Screening and Scoping

2.6. A formal EIA Screening and Scoping request was submitted to Manchester City Council on 4 August 2022 (Appendix 2.1) requesting a formal opinion and confirmation as to the proposed scope of the Environmental Impact Assessment required in respect of the Proposed Development. A formal scoping opinion was received 28 October 2022 (Appendix 2.2). The following Chapters have been scoped into the EIA:

- Townscape and Visual Impact;
- Historic Environment;
- Air Quality;
- Noise and Vibration;
- Wind Microclimate;
- Sunlight, Daylight and Solar Glare;
- Socio-Economics;
- Human Health; and
- Climate Change (incl. Greenhouse Gases).

2.7. The results of the scoping exercise have determined the subject areas of the EIA, as set out in Table 1.2 and supporting technical appendices to this Chapter.

Consultation

2.8. The Proposed Development has been prepared in consultation with Manchester City Council and a range of technical stakeholders (refer to Table 2.1)

Table 2.1: Scope of Stakeholder Consultation

Stakeholder Consultation
Manchester City Council Planning Authority
Manchester City Council Highways
Greater Manchester Archaeological Advisory Service
Manchester City Council Environmental Health Officers
Environment Agency
Greater Manchester Ecology Unit (GMEU)
Historic England
Victorian Society

Public Consultation

2.9. The proposals have been subject to pre-application engagement with a wide range of stakeholders including Manchester City Council Planning Officers, Environmental Health Officers, Greater Manchester Ecology Unit and a range of technical stakeholders. Further details are provided in the Statement of Consultation which accompanies application.

Non-Significant Effects

2.10. It is considered that the following disciplines will not give rise to likely significant effects on the environment and therefore do not require inclusion in the Environmental Statement. An explanation for each discipline is provided in the EIA Scoping Report in Appendix 2.1, which was confirmed by the Scoping opinion received by MCC on 28 October 2022. In line with paragraph 1.14 – 1.17 each of the technical consultants for those Chapters that were both scoped in and scoped out of the EIA, via the October 2022 Scoping Opinion, have further considered whether the development parameters submitted with this application would give rise to any potential additional or modified environmental effects, such that the scope and coverage of the EIA should consider any additional matters.

2.11. The need for this additional consideration is due to the fact that the commercial floorspace identified within the Environmental Impact Assessment Scoping Request in August 2022 was somewhat lower than that which is identified as a basis for assessment within this Environmental Statement. In undertaking this initial exercise, the scope of the EIA has been fully assessed on the basis of the submitted scheme. Those disciplines scoped out are as follows:

1. Agricultural Circumstances;
2. Aviation;
3. Archaeology;
4. Arboriculture;
5. Ecology;
6. Ground Conditions;
7. Water Resources;
8. Electronic Interference; and
9. Transport.

Approach to Technical Studies

2.12. Various technical studies were commenced at an early stage in the process. The findings of the baseline environmental studies played an important role in the design of the Proposed Development by defining the environmental sensitivities, constraints and opportunities associated with the Site.

2.13. Project team reviews, attended by members of the project team, were held throughout the pre-application process. These reviews provided a valuable forum for the exchange of information and ensured that the project team was fully aware of the environmental constraints and opportunities and of the interactions between disciplines. Pre-application engagement was also undertaken with Manchester City Council as the Local Planning and Highway Authority.

2.14. The technical studies have been undertaken in accordance with current best practice. Specific guidance used is referenced within each of the respective assessment Chapters.

2.15. The majority of assessments involved consultations with statutory and non-statutory bodies, desk-based research, Site inspections and surveys, impact prediction and mitigation.

2.16. The assessment and conclusions of the ES are based on the description of the Proposed Development provided in Chapter 4.

Structure of Technical Chapters

2.17. Each technical Chapter of the ES has been set out broadly in line with Table 2.2.

Table 2.2: Structure of ES Technical Chapters

Technical Chapter Subheading	Summary of information
Introduction	Each of the technical Chapters begins with an introduction providing context to the EIA completed.
Policy Context	This section includes a summary of legislation and of national and local policies relevant to the environmental discipline and explains its purpose in the context of the Proposed Development and the ES.
Assessment Methodology & Significance Criteria	This section describes the method or approach employed in the assessment of impacts, the criteria against which the significance of effects has been evaluated, the sources of information used and any technical difficulties encountered. Relevant legislation is also identified.
Baseline Conditions	This section describes and evaluates the baseline environmental conditions i.e. the current situation and anticipated changes over time assuming the Site remains unchanged. This is a critical part of the EIA process as it provides a measure against which potential environmental effects can be assessed.
Identification and Evaluation of Key Impacts	This section identifies the likely significant effects on the environment resulting from the Proposed Development. A description of the likely effects of the Proposed Development and an assessment of their predicted significance is provided. The assessment of effect significance has been undertaken using appropriate national and international quality standards. Where no such standards exist, the judgments that underpin the attribution of significance are described. The guidelines, methods and techniques used in the process of determining significance of effects are contained within each of the technical Chapters presented.
Mitigation Measures	One of the main aims of the EIA process is to develop suitable mitigation measures to avoid, reduce or compensate for any significant adverse effects of a project. This section of each technical Chapter describes the measures which would be implemented to mitigate potential adverse effects. Where possible, enhancement measures have also been proposed.
Cumulative Effects	This section considers the cumulative effects of the Proposed Development identified within the vicinity of the Site. Any likely significant effects on the environment arising in this respect are set out in this section. There are two distinct types of cumulative effects: • Type 1 - Cumulative effects are the interactions between effects of the Proposed Development on a single receptor. • Type 2 - Cumulative effects are those that arise from incremental changes caused by other consented or reasonably foreseeable activities ('committed developments') together with the Proposed Development.

Technical Chapter Subheading	Summary of information
Residual Effects	The residual effects, i.e. the remaining effects of the Proposed Development assuming implementation of the proposed mitigation measures, have been estimated and presented. The methods used to make these estimates are described and proposed methods of treatment for any residual effects have been identified and quantified where possible.
Summary	Each technical Chapter concludes with a brief summary outlining the potential residual effects of the Proposed Development.

2.18. Chapter 5 provides information to allow the construction phase of the Proposed Development to be assessed by the disciplines set out this EIA.

Magnitude

2.19. The general approach to applying the methodology for determining the scale, or magnitude, of effect is set out in Table 2.3. Each of the individual chapters specify their own methods of ascribing magnitude depending on their topic area.

Table 2.3: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for Assessing Effect
Major	Total loss or major/substantial alteration to key elements/features of the baseline conditions such that the post development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character / composition / attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Sensitivity

2.20. The general approach to applying the methodology for determining the sensitivity of a receptor is based upon the relative importance of the receptor using the scale in Table 2.4. Each of the individual chapters specify their own methods of ascribing sensitivity depending on their topic area.

Table 2.4: Methodology for Assessing Sensitivity

Sensitivity	Examples of Receptor
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or importance.
Medium	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

Significance

2.21. The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. Table 2.5 below shows how magnitude and sensitivity interact to derive effect significance.

Table 2.5: Methodology for Assessing Significance

Magnitude	Sensitivity		
	High	Medium	Low
Major	**Major Adverse/Beneficial**	**Major - Moderate Adverse/Beneficial**	**Moderate -** Minor **Adverse/Beneficial**
Moderate	**Major - Moderate Adverse/Beneficial**	**Moderate -** Minor **Adverse/Beneficial**	Minor Adverse/Beneficial
Minor	**Moderate -** Minor **Adverse/Beneficial**	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

2.22. The above magnitude and significance criteria have been provided as a guide for technical specialists to assess impact significance. Where discipline specific methodology has been applied that differs from the generic criteria above, this has been clearly explained within the given Chapter under the heading of 'Assessment Methodology and Significance Criteria'.

2.23. For the purposes of this Environmental Statement, an effect will be potentially 'significant' if it is classed as either 'moderate' or 'major' (bold text in Table 2.5).

Baseline Conditions

2.24. Each technical Chapter includes a section which describes and evaluates the baseline environmental conditions (i.e. the current situation and anticipated changes over time assuming the Site remains unchanged). Baseline data has been obtained from a variety of sources, including published documents, maps, historical information and Site survey data. Given the complex nature of the Site and surroundings, each technical Chapter (Chapters 6 to 14) includes a clear description of what is assumed as the baseline against which the assessment is being made.

2.25. The method used to obtain baseline information, where relevant and possible, has been clearly identified within each technical Chapter and agreed in advance with statutory consultees.

Mitigation

2.26. Any adverse environmental effects have been considered for mitigation at the design stage and, where practicable, specific measures have been put forward. Measures have been considered based on the following hierarchy of mitigation:

- Avoidance;
- Reduction;
- Compensation;
- Remediation;
- Enhancement.

2.27. Where the effectiveness of the mitigation proposed has been considered uncertain, or where it depends upon assumptions of operating procedures, data and/or professional judgement has been introduced to support these assumptions.

2.28. Mitigation recommended during the construction phase is set out in the Construction Management Plan (CMP) to be agreed with MCC prior to the commencement of work and implemented throughout the duration of the works.

2.29. Mitigation to be implemented or further investigations required during the construction or operational phases of development would be secured through planning conditions and obligations, which are set out in both EIA chapters and non-EIA documents.

Residual Effects

2.30. The likely significant effects on the environment, assuming the successful implementation of mitigation measures proposed, have been estimated within each Chapter. These are termed 'residual effects' and are considered in Chapter 15 of this Statement, as well as being located within each individual technical chapter.

Cumulative Effects

2.31. The ES considers the potential for likely significant effects on the environment resulting from consented or reasonably foreseeable activities or developments in the area, which could lead to potentially significant cumulative effects in conjunction with the Proposed Development ('Committed Developments'), known as Type 2 Cumulative Effects.

2.32. A search of Manchester City Council's planning applications database and knowledge of the area has identified a number of schemes for which cumulative effects are considered more likely. A full list, as of September 2022 is contained within the Scoping Report at **Appendix 2.1,** to which agreement has been provided from the Local Planning Authority as part of the Scoping Opinion process.

2.33. Each technical Chapter (Chapters 6-14) has assessed the potential for likely significant effects on the environment, as a result of the agreed cumulative developments, together with the phase or whole of the Proposed Development.

2.34. In addition, Chapter 16 assesses the Type 1 Cumulative effects, which sets out the combined effects of various technical EIA disciplines on a particular receptor group e.g. neighbouring buildings, local residents.

Assumptions and Limitations

2.35. The principal assumptions that have been made and any limitations that have been identified in preparing the ES are set out in each technical Chapter. General assumptions include the following:

- All of the principal land uses adjoining the Site remain. Where redevelopment proposals have been granted Planning Permission, the effect of those proposals are considered as part of the Cumulative Impacts;
- Information received from third parties is complete and up to date;
- The various stages of the Proposed Development will satisfy minimum environmental standards, consistent with contemporary legislation, practice and knowledge;
- Assessments are based upon, and conclude, the 'worst case' effects that would arise from the application as defined by the description of development set out in Chapter 4, Site Surroundings and Description of the Proposals;
- Construction and demolition methods and phasing will follow the timetable and methods set out in Chapter 5, Construction Management;
- Conditions will be attached to the Planning Permission that will control disturbance during the Proposed Development; and
- Necessary off-site services infrastructures for the Proposed Development will be provided by statutory undertakers.

Objectivity

2.36. The technical studies undertaken with the ES have been progressed in a transparent, impartial and unbiased way with equal weight attached, as appropriate, to beneficial and adverse effects. Where possible, this has been based upon quantitative and accepted criteria together with the use of value judgements and expert interpretations.

2.37. The assessment has been explicit in recognising areas of limitation within the ES and any difficulties that have been encountered, including assumptions upon which the assessments are based. Where appropriate, the assessment of significance has been given confidence levels.

3. Alternatives and Design Evolution

Introduction

3.1. Regulation 18(3) and Paragraph 2 of Schedule 4 of the EIA Regulations requires the Applicant to provide an outline of the main alternatives studied and an indication of the main reasons for the choice made, taking into account the environmental effects.

3.2. The form of the Proposed Development has been influenced by a range of factors, including location, surrounding land use and input from Manchester City Council, Statutory and Non-Statutory Consultees and other stakeholders.

3.3. This Chapter reviews the principal land use and siting options explored and the reasoning for the selection of the current design for the Proposed Development which forms the subject of assessment within the ES.

3.4. This Chapter considers the following four options in the context of the existing Development Brief:

- The 'do nothing' alternative where the Proposed Development is not progressed;
- Alternative Locations for the Proposed Developments;
- Alternative uses for the Site
- Alternative Design/layout for the Proposed Development in the context of the design evolution.

The "do nothing" Alternative

3.5. The "do nothing" scenario refers to the option of leaving the Site in its current use.

3.6. This scenario would result in the continued underutilisation of a valuable city centre site.

3.7. The Site has been identified as a priority for regeneration and a major opportunity to create a sustainable city centre neighbourhood for a number of years. In 2017, the council endorsed a Strategic Regeneration Framework, which noted that the "*Great Northern does not currently perform to its full potential and is underutilised in relation to much of its commercial floorspace as well as public realm.*" Reasons for this, set out in that document, included:

- An inability historically, to reach the necessary quality thresholds in terms of use has resulted in negative perceptions of the Great Northern. The complex has been partially full, lacks a sense of place and has not fulfilled its potential as a city centre destination in its own right.
- The Cinema has underperformed as an anchor to other uses.
- The impenetrability of the Deansgate façade, together with changes in levels and location and configuration of entrance points and routes prevent the complex from being legible and well-integrated into the city centre.
- The site's key asset: the Great Northern Warehouse, is not best utilised and the existing car parking has a detrimental effect on its setting and character.
- The Great Northern Square has not performed as other truly successful public spaces have. The amphitheatre space has rarely functioned as it was intended.

3.8. The "do nothing" scenario has therefore been discounted due to the long-established need for regeneration, both within Manchester city centre, and the Site specifically.

3.9. The Proposed Development will revitalise the Site and bring about a range of economic, social and environmental (including heritage) benefits to the area that will support Manchester's strategic policy objectives for city centre and Regional Centre and which have regard to Paragraph 8 of the NPPF. The Site is considered a suitable location for mixed-use development given its highly accessible location within the city centre. The Site is also considered a suitable location for residential use, due to its urban location, close proximity to established neighbourhoods, transport links and connections with various locations.

3.10. The Proposed Development will bring further and more regular footfall and activity to the whole Site and boost economic and social activity within the city centre, supporting environmental and social improvements on site and up to a regional scale. Full details of the socio-economic impact are set out in Chapter 12 of this ES and supporting technical appendices.

Consideration of Alternative Locations

3.11. The Site comprises the Grade II* Listed Great Northern Warehouse, and the Grade II Deansgate Terrace. The Proposed Development presents a unique opportunity to make substantial and positive restorations to Listed Assets, which have previously had their historic and architectural significance understated by the current use of the Site as a car park.

3.12. The Proposed Development will be located at the heart of a mixed-use regeneration area, covered by the Great Northern Manchester Central & Castlefield Quay SRF (2017) and the Great Northern Warehouse SRF Update (2019). The site sits within a pivotal location at the southern edge of the city centre between several Manchester's key established and emerging economic growth and regeneration areas, including: the Central Business District, St Peter's Square, the Conference Quarter and Spinningfields; established regeneration initiatives around Corridor Manchester and First Street; and more recent regeneration areas, including Great Jackson Street and St John's. Each of these areas has been the subject of clearly articulated area-based regeneration strategies which have subsequently been implemented, or are in the process of being implemented, to deliver added value and complementary economic growth in the city centre.

3.13. Without significant intervention, the long-term use of the Great Northern Warehouse as a multi-storey car park will continue to have detrimental impacts on the historic fabric of the building. The land occupied by the Leisure Box will also continue to be underutilised, given its prime location within the city centre.

3.14. It can be inferred that there were very few – if any – readily available alternative sites which could support the Proposed Development. On balance, it is considered that, due to the use, land ownership, tenancy contracts and policy support for development in this area and the availability of the site to deliver this unique project in Manchester city centre, alternative locations are not possible for this particular development.

Consideration of Alternative Uses

3.15. The proposed uses have been identified in order to bring together a scheme that is viable and also responds to strategic objectives for this Site, the city centre and Regional Centre more generally. In this regard, the proposed uses are consistent with those identified in the endorsed SRF for the Site (a material planning consideration) and in turn consistent with Development Plan policies for the city and regional centre, as identified in Manchester's Core Strategy, when taken as a whole. For the listed buildings, options have been assessed over a number of years and iterations, in order to establish the optimum viable reuse of those listed buildings. As such, the heritage assessments provided with this application identify that the proposals will result in less than substantial harm, with that harm outweighed by the public benefits that the proposed development will provide.

3.16. Further details for the different aspects of the Great Northern Complex, are provided below.

Great Northern Warehouse

3.17. The Great Northern Warehouse is a large, Victorian-era railway goods warehouse. It is currently occupied by a multi-storey car park on the upper floors and is in need of significant restoration. As established in the SRF, the Great Northern Warehouse is identified as a suitable location for office space.

3.18. This is to reflect the site's highly central and accessible location and the concentration of space of commercial space in the city centre, with close connections to Spinningfields. It also reflects the prioritisation of employment generating uses in Manchester City Centre, as identified in Manchester's Development Plan, which recognises the significant role the City Centre plays as an economic driver for the City Region.

3.19. Other options were also explored, including residential apartments and other forms of commercial development in advance of the scheme being developed for commercial office use. In addition, it is considered that office development forms the most appropriate type of activity generating use in this area, given its key city centre location and the opportunity to drive growth ambitions in the city overall.

Deansgate Terrace

3.20. A detailed exercise was undertaken to identify the best and most viable future use of the Grade II Listed asset, which looks to secure its long-term preservation whilst minimising impact on the historic significance of the building and securing the wider regeneration benefits.

3.21. In order to bring forward a holistic scheme, the Deansgate Terrace requires substantial upfront investment to bring the building up to modern standards due to their age and the quality of tenants; for example, ongoing ad-hoc maintenance and repair, upgrading the mechanical and electrical equipment and repairing the building fabric to a high standard.

3.22. This starting point for this appraisal was to look at what other viable options would allow for minimal interventions, acknowledging the building was designed for, and still operate as, retail and leisure uses. It has considered that the most appropriate use from a heritage and functionality perspective was to retain the ground floor as commercial retail and leisure units as existing whilst delivering new office spaces above. This can be undertaken with minimal impact on the existing listed building fabric and reflects its current and historic use.

Leisure Box

3.23. With lease expires coming up for major leisure occupiers within this part of the scheme, the partial demolition of the Leisure Box presents an opportunity to revitalise an inward looking and underutilised plot of land within the city centre and to reconnect it to the remainder of the site and the wider area. The proposals will re-use of the structural foundations of the Leisure Box development which will reduce embodied carbon compared to a complete demolition and reconstruction and provide high quality homes in accordance with planning policy and SRF objectives and for which there is an identified market need in Manchester.

3.24. Other options were also explored, including the continued use of the site for leisure uses or conversion into workspaces comprising a refurbishment of the building in its current form; however, it was concluded that these were not consistent with SRF and the Development Plan and overall would not represent a sustainable re-use of brownfield land.

Summary

3.25. In response to the SRF, an extensive testing process into a range of potential future uses has been undertaken, with the aim of finding a sustainable, long-term future for the Site as a whole. At the heart of the process is the ambition to enhance the historic and architectural significance of the under-valued Great Northern Warehouse and Deansgate Terrace, and to better utilise a large site within Manchester City Centre.

3.26. The Proposed Development will be of an exemplary design, removing detractors from the visual amenity of the area, whilst also supporting Manchester's broader ambitions to generate high quality employment and residential opportunities and more broadly to establish a sustainable city centre neighbourhood. The proposals are entirely consistent with the Development Plan when read as a whole and other material considerations, including theStrategic Regeneration Framework (2017 and 2019 update) for the Site.

Design Evolution

3.27. The Design and Access Statement, prepared by Simpson Haugh and Planit-IE, which accompanies these applications, addresses the design evolution of the Proposed Development in detail and is summarised below.

3.28. In developing the proposals, the Applicant has sought advice from a wide range of specialist consultants experienced in developing and delivering schemes of a similar nature to the proposals. The proposals have been developed with input from a highly experienced and comprehensive team of specialist consultants with the intention of delivering a unique project that embraces the site's valuable heritage assets and delivers key policy objectives and statutory requirements.

3.29. The proposals have been subject to extensive pre-application consultation with the Local Planning Authority, statutory consultees, and local stakeholders. The involvement of statutory consultees at the pre-application stage has informed the initial brief, and subsequent design of the Development, and changes to the scheme informed by this process have been included where appropriate.

3.30. The design has evolved in terms of:

- Great Northern Warehouse: Designed to celebrate and preserve the character that make the Site so significant. The proposals will remove intrusive areas of car parking which have not been kind to the building's fabric and will restore and repurpose the building overall in order to secure its long term future reuse.
- Overall, the scheme retains and enhances key elements of the significant historic fabric within the complex reveal the Warehouse and the Terrace. The scheme's overall design seeks to respect the existing buildings by integrating high-quality and complementary materials to those in situ.
- Residential element: the layout, height, mass and orientation of the residential development has been developed to minimise the amount of impact associated with the development regarding preservation of residential amenity.
    - Courtyard Configuration: This arrangement has the potential to create a sheltered internal courtyard space. However, to achieve the required number of homes the building would be approximately 16 storeys high over the full extent of the site, making it highly visually obtrusive, and this was therefore not considered a suitable solution.
    - Single Tower: A single tower would need to be approximately 62-75 storeys tall (varying depending on the number of units per floor) to achieve the required number of homes. This would be far taller than the Beetham Tower and Viadux and was not considered an appropriate scale for its context.
    - Two Towers: Whilst two towers would reduce the overall height of the scheme, it would still be necessary for the buildings to both be approximately 37 storeys. This scale may be appropriate for one of the buildings but was considered too high for both buildings within their context.

- Three Towers: Increasing the number of residential buildings to three allows the scale to be further reduced. However, the size of the building floorplates would also need to be reduced to accommodate the buildings comfortably on the site, which would result in three buildings of approximately 30 storeys. This was considered too tall for all three buildings within their context, albeit that this scale may be appropriate for one of the buildings.
- Three Towers & Podium Elements (Proposed Scheme): The introduction of podium elements for each building allowed the positive aspects sense of enclosure for the courtyard option, whilst enabling the scale of the three buildings to be reduced to an average height of circa 20-25 storeys, giving a more fine-grained massing suitable to the site's context. This approach also creates the potential for roof gardens on the podium elements. It was considered that this option could provide the most suitable and successful solution for the site.

- Public realm: significant design evolution has taken place with regard to the Great Northern Square, namely increasing the amount of play space in line with comments from members of the public. There have also been key moves regarding the improvements being made to Watson Street as part of the Petersfield Study and the pedestrianisation of Deansgate.

3.31. It is considered that the Proposed Development has appropriately considered and aligns wholly with the principles set out in the 2017 SRF and its 2019 update, which has been refined as part of the master planning and design development process. For further details please refer to the Design and Access Statement prepared by SimpsonHaugh and submitted as of the application to which this EIA relates.

4. Site, Surroundings and Description of Proposals

4.1. This Chapter incudes a description of the Site, its surrounding context, and a more detailed description of the Proposed Development. It is supported by Figures 4.1, 4.2 and 4.3 showing the existing and proposed site layout and the phasing of the development overall.

Site Description

4.2. The Great Northern Complex covers an area of 2.97 hectares and benefits from a central location in Manchester city centre within the Civic Quarter, located within the Great Northern, Manchester Central and Castlefield Quay Regeneration Area. It is in Manchester City Centre and is bound by Watson Street to the east, Peter Street (A34) to the north, Deansgate to the west and Great Bridgewater Street to the south.

4.3. The complex is divided into four components:

- Great Northern Square;
- Great Northern Warehouse;
- Deansgate Terrace; and
- Great Northern Square.

4.4. The northern part of the Site comprises Great Northern Square, which underwent refurbishment following the previous Full Planning Permission granted on Site in March 2018 (118568/FO/2017). The bar is not included within the red line boundary for the proposals and will remain in its current form.

4.5. Adjacent to the square, to the south, is the Grade II* Great Northern Warehouse building (the former Great Northern Railway Company's Goods Warehouse), which currently accommodates a number of established retail, restaurant and leisure uses including a bowling alley, casino and circulation space, together with public car parking.

4.6. To the south of the Great Northern Warehouse is a modern atrium space which acts as a connecting structure to provide pedestrian access between the warehouse and the Leisure Box building. The Leisure Box building is located within the most southern extent of the complex and contains a cinema and a further multi-storey car park.

4.7. In total, 1,240 car parking spaces are currently provided across the extended SRF site, with 519 bays in the Great Northern Warehouse and 721 bays in the Leisure Box.

4.8. The Grade II Deansgate Terrace is located along the western boundary of the complex fronting Deansgate and range from 2 to 4 storeys in height. At lower levels, there are 29 retail unit frontages, some of which have been merged with neighbouring units, accommodating a mix of uses including cafes, shops, restaurants, and estate agents.

4.9. The upper levels of Deansgate Terrace provide some office space and storage for the units at lower level, as well as the Great Northern Management Suite; however, these areas are currently underutilised.

4.10. The spaces between the three building elements are currently occupied by a mixture of access and servicing arrangements, including the car park ramps providing vehicular access to the upper levels of Great Northern Warehouse.

4.11. The site has excellent public transport connections via Deansgate, which is located adjacent to the site and comprises on of the city's principal transport nodes; offering train, Metrolink and Metroshuttle services. It is also immediately accessible to the Inner Ring Road via Deansgate and Chester Road

Site Specific Environmental Designations

Air Quality

4.12. The Site is situated in the Greater Manchester Combined Authority Air Quality Management Area (AQMA).

Ecology

4.13. There are no ecological designations within the Site. The closest Special Area of Conservation (SAC) and Sites of Special Scientific Interest (SSSI) is the Rochdale Canal.

Flood Risk and Drainage

4.14. The Site is located entirely within Flood Zone 1, defined as having less than a 1 in 1,000 annual probability of river or sea flooding.

4.15. The Site also falls within the Conurbation Core Critical Drainage Area (CDA), designated in 2011 and covering the majority of Manchester City Centre.

Heritage

4.16. The Site is located adjacent to several Conservation Areas, including the Castlefield Conservation Area to the south west, St John Street Conservation to the west, and St Peter's Square Conversation to the north east. The northern edge of the Site falls within the Deansgate / Peter Street Conservation Area.

4.17. There are four listed assets within the application boundary:

- Great Northern Warehouse: The warehouse is Grade II* Listed, which reflects the outstanding national importance of the building, being considered, in its day, to be one of the most advanced railway goods exchanges in the country. The warehouse forms an important group with, and is an integral part of, the adjoining Grade II Listed Deansgate terrace.
- 223-233 Deansgate Terrace and 235-291 Deansgate Terrace (with Former Goods Yard Entrance): The terrace of 34 shop units is Grade II Listed in two separate parts: No's 223-233 and No's 235-291. The listed status of the terrace reflects its national importance architecturally and historically. The arched entrance into the former goods yard at the junction of Peter Street and Deansgate falls in part within the southern boundary of the Peter Street Conservation Area.
- In addition, although likely to be unaffected by the proposals, Manchester & Salford Junction Canal Tunnel is located underneath the site and is Grade II Listed.

4.18. More broadly, there are a further 34 listed assets within 250m of the application boundary, including 34 Grade II Listed Assets and 4 Grade II* Listed Assets. The Grade II* Listed Assets comprise the Free Trade Hall to the north east, Manchester Central to the east, with the Central Library and Midland Hotel located on Peter Street to the north and east. Slightly further beyond this 250m boundary to the north, the Manchester Town Hall and Albert Memorial, are both Grade I Listed.

Regeneration Context

4.19. The proposals for the site form a key part of the Great Northern, Manchester Central and Castlefield Quay SRF Framework area. This was endorsed in February 2017 by Manchester Council Executive Committee and updated in March 2019.

4.20. The SRF was prepared to guide the future regeneration of the Great Northern, Manchester Central and Castlefield Quay sites in Manchester City Centre. These interlinked and strategic sites, at the southern edge of the city centre, sit within a pivotal location between Manchester's key established and emerging economic growth and regeneration areas.

4.21. In the SRF, it is considered that the Great Northern site has broadly underperformed and represents an underutilised part of the city given its location. This is particularly marked in terms of the quality and appropriateness of some of its uses, particularly the car park, the quality and vitality of the environment within and around the site, and challenges it presents in terms of both physical and functional connections to its surroundings.

4.22. For example, Great Northern Square has not functioned as it originally intended and does not maximise the setting of the listed Great Northern Warehouse or provide the utilisation of the site as expected. The SRF identified that the Warehouse itself needs a more appropriate use in contrast to the car park use currently in situ.

4.23. While most commercial spaces within the existing complex are fully let, the impenetrability of the Deansgate façade, changes in levels, poor legibility of entrance points and routes through the complex make it difficult to navigate. The complex is currently under-utilised and is fragmented by unsuccessful modern additions. The opportunity for a refreshed strategy is well documented and would deliver both a high-quality visitor destination, commercial office space, new public areas for the city and a high-quality residential offering.

4.24. Ground floor active uses and a refurbishment of spaces on Deansgate Terrace have been broadly successful, but the upper floors of the exquisite, listed row of terraced buildings remain under-utilised. A refreshed strategy is required to ensure that the active ground floor uses that have been successful are complemented by a thriving workspace environment on the upper floors.

4.25. Beyond these Listed Buildings, the southern half of the Great Northern site is occupied by a further car park and Odeon cinema. A large atrium space also sits between this cinema and the Great Northern Warehouse located to the north, which is proposed for removal in the SRF in line with the current design.

4.26. In the SRF, it states that the cinema is to be demolished to allow for a new podium to be created that provides public realm and a platform for the delivery of new taller, and carefully considered, residential buildings. Through remodelling the retained car park and structure, a refreshed active frontage would be made possible to Watson Street and Great Bridgewater Street.

Immediate Development Context

4.27. The Site is situated to the west of the city centre, in an area of ongoing regeneration. To the south of the Site are several high-profile regeneration schemes and development, including:

- Viadux, a 40-storey residential development and office building adjacent to the Deansgate-Castlefield Metrolink Stop;
- Beetham Tower, a 47-storey residential and hotel building;
- Great Jackson Street and Deansgate Square, containing a cluster of tall residential towers; and
- First Street, comprising an area that now comprises a mixed of commercial office and leisure buildings.

4.28. To the west is Deansgate, a section of the A56 that runs roughly north-south through the western part of Manchester city centre. To the northwest of the Site is Spinningfields containing several past and present FTSE-100 firms, as well as popular bars and restaurants and the Grade II Listed Manchester Opera House.

4.29. Deansgate borders Castlefield, which is one of the largest city centre areas and extends down to the River Irwell leading to Water Street. This area is characterised as bringing about the delivery of St John's and Enterprise City; a 10.6ha area of land currently in the process of delivering 2,500 homes, 600,000 sq. ft of workspace, 400,000 sq. ft leisure space and substantial new public realm. This area extends down to Liverpool Road and Deansgate, including the Upper and Lower Campfield Markets.

4.30. Northeast of the site is St. Peter's Square and Albert Square and the buildings surrounding them broadly defines the area known as the Civic Quarter. A significant amount of development has come forward here over the last decade and is broadly complete. Ongoing development activity includes the 'Our Town Hall' project to renovate the Town Hall progresses toward completion. This follows the delivery of No.1 and No.2 St Peter's Square, refurbishment of the Central Library and the delivery of the combined heat and power network to serve the Civic Quarter.

4.31. The Civic Quarter links into the redeveloped area of Lincoln Square and St. Michael's, the latter of which comprises an office-led mixed-use development on the site of the former police station and synagogue. This surrounding context and further planned regeneration is discussed in more detail overleaf.

Planning History

4.32. The planning history reveals that the Great Northern Warehouse has been extensively redeveloped in the late 1990s. This comprehensive redevelopment introduced the current configuration of the Great Northern Warehouse, introduced the Leisure Box extension and Deansgate Mews, and the refurbishment of Deansgate Terrace.

4.33. The Leisure Box, which includes a 721-space car park and multi-screen cinema, was delivered in 2000 and additions were also made to the remodelled Great Northern Square, including the Pavilion Bar currently in situ.

4.34. More recently, there is the partially implemented extant permission (LPA Reference: 118568/FO/2017, as amended by 124847/JO/2019), outlined below:

"Removal of the central atrium, car park ramp and other modern elements as shown on Drawing References: 10161- Z2-A-B5D9-JC20-XP-00-001 and 10161-Z3-A-B5D9-JC20- XP-00-001 retention of reconfigured casino (Sui Generis) and existing restaurant units (Use Class A3) followed by the refurbishment, restoration, and re-use of the Grade II Listed Great Northern Warehouse to provide additional retail units (Use Class A1 or A3 or A4), gym (Use Class D2), 118 residential units (Use Class C3) and associated storage in addition to the refurbishment, restoration and extension of the Grade II Listed Deansgate Terrace and Goods Yard Entrance to form ground floor retail (Use Class A1 or A3 or A4), and 24 residential units above (Use Class C3) in addition to the reconfiguration of Great Northern Square and the introduction of additional public realm with associated hard and soft landscaping, including the formation of Dean Street (as shown on Plan Reference: 10161-Z0-A-B5D9-G100-P-00-001) together with highways works, access, servicing, rooftop plant and other associated works."*

4.35. The permission was granted on 14 March 2018 and partially implemented, with demolition, public realm and infrastructure works undertaken within Great Northern Square. It has been formally determined that the Permission is extant; however, the conversion of the Great Northern Warehouse and Deansgate Terrace in line with the 2018 permission were never fully realised and fresh proposals are now required to facilitate the permanent and long-term regeneration of the site.

Proposed Development

4.36. In 2021, the development team reconsidered these proposals within a post-pandemic perspective which, along with long-term leasehold expiries and the synergy created with schemes in the immediate surroundings, allowed the whole complex to be looked at - resulting in the comprehensive redevelopment of the Warehouse, Leisure Box and Deansgate Terrace.

4.37. The proposals have been formulated on the basis of a conservation-led approach to regeneration. This has been informed by a holistic vision on both a strategic and site-specific level which includes securing a vibrant and viable long-term future for the Site, developing; a true sense of community as a place to live, work and socialise and bringing all listed assets into fully active uses through sensitive refurbishment and conversion.

4.38. To inform the detail of the restorative, proposals, comprehensive heritage appraisals of the Great Northern Warehouse and Deansgate Terrace have been undertaken to provide a detailed evidence base, against which development options have been assessed.

4.39. The proposals have also been informed through an extensive consultation process conducted by Forever Consulting, in association with the Applicant.

4.40. At one end of the scheme is the Great Northern Square, an existing public space within the city centre's network of spaces. Detailed community engagement has shaped the proposals for the square, allowing those aspects of the space that people appreciate today to be retained, whilst upgrading the space's functional infrastructure. In addition, as a city that developed significant during the industrial revolution, there is an opportunity to create more green spaces in the city centre. The opportunity to create an even greener feel to the Great Northern Square, with a sense of being 'in' nature has been identified as an opportunity from the outset. The proposals will create a multi-functional and characterful space with places where people can be quiet and reflective, as well as playful and sociable.

4.41. In order to restore and better celebrate the historic assets across the stie, the opportunity to remove unsuccessful or intrusive modern interventions and to simplify the Site layout and its component parts, has been a key priority. Through removal of existing car parking ramps, the removal of the existing atrium and the rationalisation of car parking / servicing, it has been possible to improve connectivity and opportunities for public interaction within and around the Site. Enhanced pedestrian linkages through the Great Northern Square and along Watson Street and Deansgate Mews, will combine with new at-grade pedestrian connections north -south and east west. These come in the form of Dean Street – a new route north south from Great Northern Square and running between the listed Warehouse and Deansgate Mews. Secondly, Alport Square, an east west connection which for the first time ever will connect Deansgate and Watson Street. Building interfaces with new streets have been design in all case to support animation, natural surveillance and pedestrian comfort, in order to maximise a positive urban experience.

4.42. The Great Northern Warehouse design will celebrate and preserve the character that makes the Site so significant. The proposals will remove intrusive areas of car parking which have not been kind to the building's fabric and will restore and repurpose the building overall in order to secure its long term future reuse.

4.43. Overall, the scheme retains and enhances key elements of the significant historic fabric within the complex to reveal the Warehouse and the Terrace. The scheme's overall design seeks to respect the existing buildings by integrating high-quality and complementary materials to those in situ.

4.44. With regard to new components of the Proposed Development, a series of residential buildings have been designed for and introduced at the part of the Site currently forming the Leisure Box. These proposals have been rigorously tested in order to ensure that the designs have considered their effect on the historic environment, including the setting of the listed buildings on the site. Importantly, the evolution of the design proposals has carefully considered their effects on adjoining residential properties – including the Great Northern Tower and Beetham Tower and other adjoining owners and occupiers. This has been done through an iterative design process which has responded to detailed environmental appraisals of the site. More detail is provided in the section of this report which provides a 'tall buildings' assessment relative to adopted development plan policy and guidance.

4.45. Due to combination of leasehold arrangements, feasibility and viability factors, the construction logistics of the proposed development is not without its complexity. For the purpose of this submission, three distinct phases of development have been identified, each capable of coming forward in a sequence, or, alternatively as discrete components.

4.46. The phases are broadly as follows:

- Phase A: the refurbishment and conversion of the Great Northern Warehouse (including the removal of modern features), the north end of Deansgate Terrace for commercial use, alongside the enhancement of Great Northern Square and retention of existing ground floor occupiers;

- Phase B and C: demolition of the Leisure Box, erection of residential elements (B) and refurbishment and conversion of the southern end of Deansgate Terrace(C).

4.47. A Phasing Plan has been submitted as part of this Application Pack, to clarify the areas involved with Phase A, B and C of the proposals and the logistics of this phased approach is outlined within the Conservation Method Statements and Construction Management Plans prepared by Heritage Architecture and Real PM, respectively (Chapter 5 and Appendix 5.1).

4.48. Full details of the design and proposals are included in the Design and Access Statement.

Figures

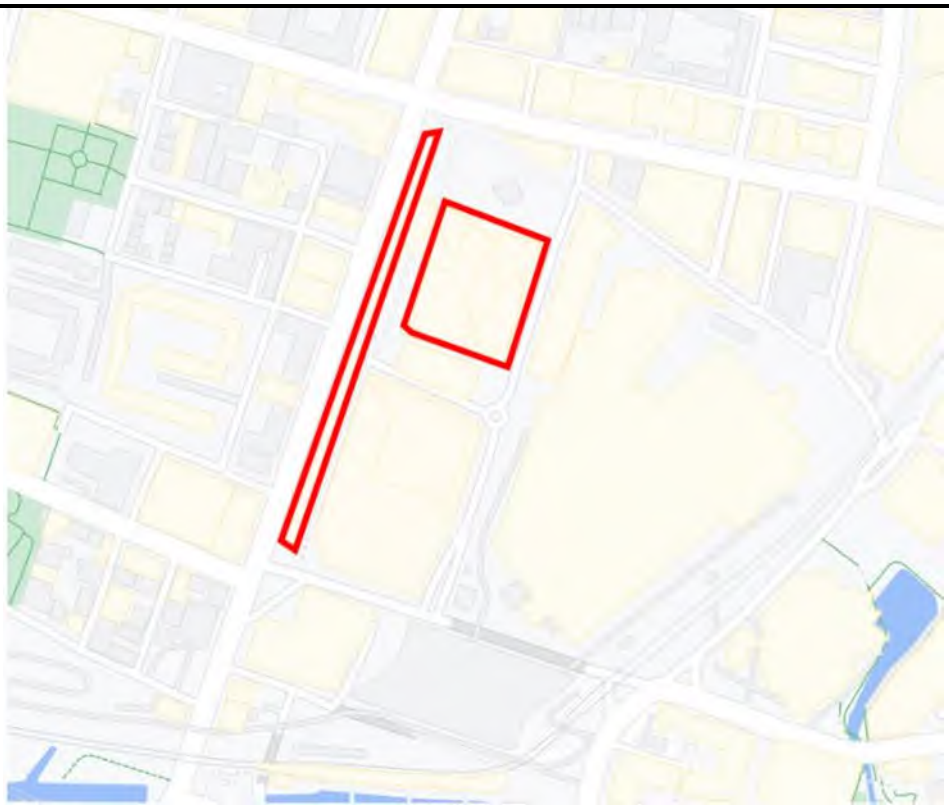


	Figure:	4.1		
	Title:	Listed Assets (Authors Own, 2022)		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



	Figure:	**4.2**		
	Title:	**Great Northern, Manchester Central and Castlefield Quay Strategic Regeneration Framework (2017) (Site Outlined in blue)**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

5. Construction Methodology and Programme

Introduction

5.1. This Chapter of the ES has been prepared by Real PM Limited and assesses the likely demolition and construction impacts of the proposals, as described in Section 4 of this EIA, upon the site and surrounding area.

5.2. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

5.3. This Chapter is accompanied by the following technical Appendices.

- Appendix 5.1: Tenant Operations
- Appendix 5.2: Leisure Box Car Parking
- Appendix 5.3: Sitewide Demolition Phasing
- Appendix 5.4: Leisure Box interventions
- Appendix 5.5: Sitewide Logistics Plans
- Appendix 5.6: Strategic Summary Programme
- Appendix 5.7: Outline Construction Management Plan

5.4. Throughout the demolition and construction periods, appropriate measures will be implemented to minimise and mitigate impact upon the on the surrounding properties and roadways. Close collaboration with all project teams of any impacting construction projects will be maintained at all times to achieve this aim.

5.5. The following narrative explains this methodology and timescales envisaged at the time of the Application for securing Full Planning Permission and Listed Building Consent. More detailed proposals will be developed once contractors are appointed and prior to commencement on site. This will include preparation of detailed plans to incorporate Construction Management, Construction Phase Health and Safety, Environmental Management as well as Site Waste Management, Logistics and Traffic Management.

Programme

5.6. The total construction programme will span a period of approximately five years and will be undertaken in two main construction Phases. In advance of the main construction works commencing on site there will be a pre-construction period of approximately one year which will allow for the delivery of a number of key Utility diversions and reinforcement works including provision of a temporary HV substation. Third party notifications and approvals will be discharged during this enabling works stage.

5.7. A key programme constraint is the retention of existing tenants on the site including the Casino, Bowling alley and Food & Beverage outlet located within the Great Northern Warehouse Building and the requirement to maintain 100 car parking spaces for use by these tenants within the Ground and Basement levels of the existing Leisure Box Structure. The retention of these existing tenants / live operations has dictated the detailed construction sequence, servicing and logistics that are reflected in the construction programme and is detailed in the technical Appendices.

5.8. The current construction phases are provided below and will be brought forward sequentially unless there is an alternative delivery strategy: -

- Phase A - Warehouse conversion (including demolition of glazed atrium link) and Deansgate Terrace North plus Great Northern Square
- Phase B and C - (potentially with some overlap of Phase A) partial demolition of the Leisure Box, delivery of the towers and conversion of the southern end of Deansgate Terrace

Phase A Programme Overview

- Existing tenants: - Casino, Bowling alley and Food & Beverage outlet remain in occupation throughout the entire construction works period including servicing provisions and Public access
- Enabling Works have an estimated duration of 6 Months with completion June 24
- Commence Main Construction works June 2024 with Vacant Possession of non-retained tenant areas
- Great Northern Warehouse Commences August 2024, Construction estimated to take 21 Months with Completion March 2025
- Northern Terraces Commence March 2025, Construction estimated to take 12 Months with Completion March 2025
- External Works will run for the duration of the Phase A construction period and will include all works to the Northern Public realm area
- At the completion of the Phase A works the Great Northern Warehouse, Northern Terraces and Northern Public realm Northern will be operational with full public access, Construction works to the Leisure Box will be ongoing with shared access to the central service area

Phase B and C Programme Overview

- Existing Car parking is proposed to be retained tenants at a reduced level of circa 100 parking spaces at Ground and Basement Levels and will remain in occupation throughout the entire construction works period
- Enabling Works have an estimated duration of 6 Months with completion June 24
- Commence Strip Out April 2024, Demolition Works May 2024, Main Construction works June 2024 with Vacant Possession of non-retained car parking areas and public realm November 2024
- Leisure Box Commences August 2024, Construction estimated to take 58 Months with Completion June 2029
- External Works commence December 2027 with an estimated duration of 14 Months with completion Feb 2029
- Phase B and C works will be ongoing following completion and handover of the Phase A works

5.9. This is an indicative construction programme and the Applicant (Great Northern Warehouse Developments Limited) highlights that there are multiple risks involved in the development process. The Applicant (GNW Developments Limited) notes that this programme may ultimately be extended in the event delays caused by sustained periods of poor weather, existing structure issues, unexpected ground conditions or other abnormals, including volatility in economic and housing markets, political uncertainty, and the availability of funding.

5.10. The programme is based upon normal working hours in line with Manchester City Council Guidance of 7.30hrs to 1800hrs Monday to Friday and 0800hrs to 1400hrs on Saturdays.

5.11. On Sundays and Bank holidays noisy working will generally not be planned. On some occasions there are certain operations that maybe required to proceed during these periods, for example tower crane erection and dismantling. These will be infrequent and will be agreed with the Environmental Health Officer (EHO) and local residents through a series of neighbourly engagements. The frequency of these will vary and respond to demand. Access to the Site will be permitted 30 minutes prior to working day commencing with noise being kept to a minimum for the first half hour of each day.

5.12. We acknowledge the close proximity of the neighbouring residents and existing tenants and as such will endeavour at all times to ensure the working hours are adhered to in order to protect this residential amenity.

Construction Methodology

5.13. The following is a brief overview of the methodology to be adopted for the enabling works, demolition, construction and fit out of the Proposed Great Northern Development. The section also considers general construction logistics as well as traffic management from the movement of material to the disposal of waste.

5.14. Alterations to the listed building elements, will be undertaken in accordance with the schedule of works set out in the Listed Building Consent drawings prepared by SimpsonHaugh. Detailed Conservation Method Statements will be developed prior to commencement of works to the Listed Building Consent.

Site Logistics

5.15. In developing the construction and logistics proposals for the Great Northern Development there are a number of project specific challenges and constraints that will need to be resolved. The following documentation which is included in the appendices identifies the logistical approach to both the construction works and the retained tenants / public interface of the site.

- Appendix 5.1: Tenant Operations

  Detailing access arrangements and approach to maintain existing tenant operations during the works.

- Appendix 5.2: Leisure Box Car Parking

  Sets out the proposals for maintaining access to the Leisure Box car park whilst the enabling and structural works progress.

- Appendix 5.3: Sitewide Demolition Phasing

  Outlines the proposed phasing of the demolition across the proposed phases.

- Appendix 5.4: Leisure Box interventions

  Further details the Phase 2/3 sub-structure, piling works and demolition works.

- Appendix 5.5: Sitewide Logistics Plans

  Sets out the proposed logistics approach for Phase A and B/C detailing vehicle delivery locations and site routing.

- Appendix 5.6: Strategic Summary Programme

  Sets out the overall duration of the works.

- Appendix 5.7: Outline Construction Management Plan

  Builds on the principles set out in this section of the EIA and provides further details on traffic routing, logistics approach and construction methodology.

-

5.16. Within these documents the following key constraints have been addressed including:-

- Interface with the General Public and traffic users
- Existing Tennant Operations (Retail & Leisure) including servicing
- Maintained provision of Car Parking (reduced level)
- Continued access for the General Public including use of the Northern Public Realm
- Enabling works to the central area between the Great Northern Warehouse and Leisure Box structures
- Working on and alongside the Existing Great Northern and Deansgate Terrace listed structures

- Site access and egress and the segregation of the general public and road users so as to mitigate the impact of the works on third party stakeholders
- Traffic movements to the surrounding Road network & junctions including any localised adaptions / improvements
- Site Security, hoardings and encapsulation scaffolds
- Vehicle holding points and off-loading points
- Maximum use of the existing site area for deliveries & unloading of construction vehicles within the site
- Craneage both mobile and tower crane
- Deliveries and materials handling – both off loading and vertical transportation.

Phase A Logistics Overview

- Initial site access and egress to site will be via the existing vehicle entrance on Watson Street until sufficient enabling works have been completed to allow a one way system to be implemented
- The one way site access and egress system will then come into operation with access into site from temporary site crossovers & entrance gates on Peters Street & Great Bridgewater Street, these will merge in the central area of the site with egress from site through the remodelled existing entrance on Watson Street
- Access and egress to the existing car park within the leisure box will be reconfigured on Watson Street to allow continued use based on a reduced number of 100 parking spaces at ground and basement level
- The configuration of the temporary car park provision will alter a number of times during the construction process in line with the construction sequence and programme
- The live construction site will be fully secured with a full heigh close boarded hoarding to the site perimeter
- Pedestrian and vehicular access to the site will be fully security controlled
- The majority of the public realm to the north of the existing Great Northern Warehouse will remain in public use during the works, although localised areas will require hoarding off to undertake specific works at various stages of the construction programme
- Where possible vehicle off loading points will be located within the site boundary, where this is not possible crane off load points will be located on the highway in approved loading bay positions on Watson Street and Deansgate
- Encapsulation scaffolds will be erected to areas of demolition and structural alteration works
- Vertical material distribution will be provided through a combination of mobile craneage, tower cranes and goods hoists which will be located at key positions for both the enabling and new build works.

Phase B and C Logistics Overview

- Towards the end of the Phase A construction works the site entrance off of Peters Street will be removed to allow for completion of hard landscaping works to the Great Northern Square.
- With Phase 1 completed the North are of the site will be fully handed over and will be in use with full public access.
- The one way site access and egress system will then operate with a single access into site from Great Bridgewater Street with egress from site through the remodelled existing entrance on Watson Street.
- Servicing to the newly completed Phase 1 area will be via the central area under banksmen control.

- Access and egress to the existing car park within the leisure box will be in continued use based on a reduced number of 100 parking spaces at ground and basement level.
- The configuration of the temporary car park provision will alter a number of times during the construction process in line with the construction sequence and programme.
- The live construction site will be fully secured with a full heigh close boarded hoarding to the site perimeter reconfigured to separate the North live area from the Southern Construction site area.
- Pedestrian and vehicular access to the site will be fully security controlled.
- Where possible vehicle off-loading points will be located within the site boundary, where this is not possible crane off load points will be located on the highway in approved loading bay positions on Watson Street and Deansgate.
- Vertical material distribution will be provided through a combination of mobile craneage, tower cranes and goods hoists which will be located at key positions for both the enabling and new build works.
- .

5.17. A detailed Construction Management Plan will be developed based on the above documentation and agreed with traffic plan will be agreed with the Highways Authority in advance of starting works on site.

5.18. It is envisaged that the temporary site establishment and welfare space will be either located within areas of the existing structure or by the provision of good quality temporary cabins branded with the Applicant (GNW Developments Ltd) and Principal Contractor logo. The welfare facilities will be suitably sized to suit the anticipated number of operatives. The welfare facilities will be located within the boundaries of the site.

5.19. Any temporary public road or footpath closures associated with the construction phase will be agreed with Manchester City Council highways department and relevant diversion signage put in place.

5.20. Access to the site entrances will be controlled by biometric scanner through a secure metal turnstile. This will monitor project office staff, visitors and construction operative's movements and prevent unauthorised public access to the Site. The main gates will be locked secured at all times with the exception of when a delivery is being made. The gates will be manned by qualified banksmen who will co-ordinate traffic, bank deliveries as well as ensure the road and pavement areas are kept clean.

5.21. Where required, appropriate wheel and vehicle wash facilities will be in place to ensure vehicles leave the Site clean and tidy this will be further supplemented during the groundworks stage of the project with cleaning of the adjacent roads by a visiting road sweeper.

5.22. Waste materials will be placed in skips, and these will be removed on a regular basis. Food waste from canteens and eating areas will be contained within a smaller covered skip to prevent vermin.

5.23. The Site Contractor will employ security guards as appropriate to prevent and discourage nuisance. Regular patrols will take place throughout the shift. As an additional measure, CCTV will be installed to elements of the Site and compound to aid early identification of potential issues.

Construction

5.24. The Construction works generally comprise of the following scope:

Enabling Works

- Discharging all required third party approvals and notifications
- Utility diversion and reinforcement works including elements within the Public Highway
- Establishment of HV temporary substation
- Enabling works within the existing structures to allow the continued occupation of existing tenants throughout the period of the construction works
- Advanced street works and Highways adaptions
- Site investigation and survey works

Great Northern Warehouse and Northern terraces

- Site establishment
- Erection of tower crane & goods hoists including associated enabling works
- Installation of protection to the existing structure / areas of retained tenants
- Existing tenants remain live in occupation. Temporary services
- Decommissioning of existing services
- Soft strip demolition
- Structural demolition including removal of existing link structure, car park ramps & perimeter structures

- Localised groundworks to areas of new structure
- Structural alterations to form new cores, lightwells and atrium and service risers
- Intervention and remedial works to the exiting listed structure will be undertaken with full Listed Building / Heritage approvals
- Construction of new external lift structure
- Installation of new steelwork and floors to areas of alteration
- Removal of existing roof finishes and remedial works to the primary roof structure including structural alterations & new plantroom areas
- Installation of new roof finishes
- Remedial works to existing facades including refurbishment of existing windows, louvres and canopies
- Alterations to existing facades at low level including construction of new plant room areas and retail units
- Installation of internal mechanical and electrical systems including plantroom fit out and lift installation
- Installation of BMU. Explain BMU.
- Cat A fit out of new office floors
- Completion of internal finishes to communal space including new entrance areas
- Fit out to shell status of retail units
- Removal of tower crane & goods hoist
- Testing and commissioning of all MEP Services
- External hard and soft landscaping to public realm areas including required s106 & 278 works
- Reconfigure site hoarding and logistics to new Phase B and C alignment
- Phase A Handover

Leisure Box and Southern Deansgate Terrace.

- Site establishment including scaffold and hoardings
- Installation of protection to the retained car park areas Existing remains live in occupation with a reduced capacity of 100 vehicles
- Decommissioning of existing services and de planting explain de planting.
- Soft strip demolition
- Installation of required temporary works
- Erection of tower cranes & goods hoists including associated enabling works
- Structural demolition of existing Leisure Box structure from roof level down to the top of the existing level 02 structural slab
- Removal of existing façade cladding from level 2 to ground level
- Structural interventions to release new core areas and structural column locations
- Piling & associated groundworks to form new basement extension
- Piling & associated groundworks to form new core bases and pile caps for new structural columns

- Construction of new cores and structural columns from basement to level 2
- Construction, fit out and commissioning of new Primary HV networked substation
- Construction of the three new residential structures A, B & C will be progressively phased and will generally constructed as per the following sequence below: -
- Slipform new building core
- Construction of reinforced concrete frame with post tensioned slabs
- Installation of precast & pre glazed cladding to external facades
- Roof finishes and plantroom construction
- Installation of internal mechanical and electrical systems including risers, residential fit out, plantrooms and lift installation
- Installation of BMU. As before. Explain BMU.
- Residential Fit out
- Fit out to common areas and stairwells
- Removal of tower crane & goods hoist
- Infill cladding / final fit out to hoist locations
- Testing and commissioning of all MEP Services
- External hard and soft landscaping to public realm areas including required s106 & 278 works
- Removal of site set up / hoardings
- Phase B and C Handover

Traffic Management Plan

5.25. The Site is well served by the local road network with vehicle access via Deansgate to the west, Quay Street and Peter Street to the north, Watson Street to the east and Great Bridgewater Street to the south.

5.26. The proposed vehicle routing approach avoids as far as practicable the need for traffic to access via the city centre to the north of the site.

5.27. Following review of the physical location of access nodes to the site, potential routes during the enabling, demolition and construction stage have been identified.

5.28. The primary construction access and egress route to the site for demolition and construction HGVs have been considered carefully to reduce the impact of vehicle movements on the local community and road network alike.

5.29. Following this assessment and review of the local traffic movements and associated survey data, we have identified vehicle access and egress routes from the north and south to ensure efficient links back to the primary road network.

5.30. With the development effectively forming as island there is good access available from the streets bounding the site and these are the focus for the routing to be used for construction vehicle access and egress.

5.31. The primary access and egress routes detailed below identify the optimum route for not only HGVs, but all other vehicle types arriving and leaving the site with swept path reviews carried out at key interfaces entering and exiting the site.

5.32. Due to the phased nature of the enabling, demolition and construction works a number of access routes within the site boundary have been developed, refer to Appendix 5.4 GNW Site Wide Logistics for further details.

5.33. Access for HGV traffic (shown green dotted in Figure 5.5).

5.34. This route directs all HGV traffic approaching from the west bound carriageway of Quay Street A34 which forms part of the primary road network via the M602.

- Approaching Manchester from the M602 eastbound
- Join A57 Regent Road eastbound
- Bear left and join A6042
- Continue on A6042 Trinity Way
- Turn right onto A34 Irwell Street and over bridge to River Irwell
- Continue on A34 onto Quay Street
- Turn right onto Deansgate or join site at north access off Peter Street
- (All arriving vehicles will be controlled by trained traffic marshal appointed by the Principal Contractor).

5.35. The egress for HGV traffic (shown red and blue dotted in Figure 5.5). This route directs all HGV traffic leaving the site via Watson Street, Deansgate and Great Bridgewater Street to the south bound carriageway of A56 which forms part of the primary road network.

- Leave pit lane on Watson Street or Great Bridgewater Street
- Continue south into Deansgate
- Continue south onto A56
- Join A57(M) east or west bound or continue south on A56.

5.36. A full traffic management plan will be developed to address the following issues:

- Integration of traffic management scheme with surrounding construction developments and calming measures.
- Access, egress, drop off and turning areas.
- Temporary and/or permanent alterations to local traffic routes (both vehicular and pedestrian).
- Additions, alterations and positions of any temporary signage, road markings or protection barriers.
- Pedestrian access around site and relevant protection, lighting and signage schemes.
- Temporary suspension / relocation of any parking bays or bus stops.
- Segregation of plant, materials and pedestrians on site and safe access routes between welfare and site areas.
- The provision of car parking, off and on site, and public transport strategy for staff and operatives
- Loading bays, hoist positions and tower crane areas.
- Any other measures to ensure the safe integration of pedestrians, cyclists and road users both on, off and surrounding the development.

5.37. In preparation of the above document, the Principal Contractor will manage the timed and booked deliveries, off peak deliveries and prefabrication will be incorporated to the final design approach where possible.

5.38. To ensure the contractors compliance during the demolition and construction phases, details of the construction traffic access routes detailed below will be issued as part of the Employer's Requirements.

Car Parking

5.39. During the early enabling and demolition works the NCP Great Northern Car park which is accessed from Watson Street will be maintained at a reduced capacity of 100 spaces provided at basement and ground floor will be provided through a number of phases as the works progress. Refer to Appendix 5.2 Leisure Box Car Parking for further details.

5.40. Appropriate temporary signage and advance warnings of changes to the car park will be provided and coordinated with the car park management team.

5.41. With the exception of the retained car park facility, there will be no visitor and staff parking permitted within the confines of the site.

5.42. All site staff, visitors and personnel will be encouraged to utilise the extensive public transport options available in the local area with rail, tram and bus routes available.

Health and Safety

5.43. The project will be carried out in accordance with the Construction, (Design and Management) Regulations 2015, and all other relevant legislation and guidance.

5.44. The successful Principal Contractor will have a track record that demonstrates their competency in the management and execution of Health and Safety. The Principal Contractor will have the appropriately trained management resource and procedures in place to oversee the activities of a complex, phased city centre construction project and be experienced in managing the various constraints in relation to existing tenants during the demolition and construction phases of the works.

5.45. The successful Principal Contractor will work closely with the Principal Designer throughout the early stages of the project and will influence the detailed design to remove construction and residual safety risks.

5.46. The successful Principal Contractor will produce a Construction Phase Health and Safety Plan prior to works commencing on site which will be reviewed and signed off by the Client and their appointed Principal Designer. This document will form the basis of the procedure for managing Health and Safety during the construction phase and will be periodically reviewed and updated accordingly as the works progress.

Site Security and Safety

5.47. Before works commence, the entire site perimeter will be contained by a 2.4m high solid timber hoarding. Hoardings will be subject to licence application with final height and materials to comply with Manchester City Council Highways requirements and the installation observing the 16 November -4 January annual embargo applying to hoardings and scaffolding.

5.48. The hoardings will be lit with energy efficient LED lighting sited so to minimise visual intrusion and light spillage/ pollution at the nearby properties but will comply with regulations to ensure safe passage around the perimeter. The hoarding is to include (where appropriate) public viewing panels that allow children and adults to observe operations and a Freephone contact number to the Logistics and Neighbourhood Liaison Manager.

5.49. To facilitate the delivery of the Development, a series of footpath closures will be implemented to secure and maintain the sites with public safety the priority. Pedestrian routes will be segregated from vehicle and plant routes. These routes will be coordinated on a day to day basis with a drawing of the current routes displayed at the entrances to the site at the start of the working week. Clear warning signs will highlight when extra care is required at cross over points.

5.50. Protecting the public and existing tenants that are to remain in occupation during certain phases of the works from risks to their health and safety arising from the construction work is a high priority. Every care will be exercised to prevent risk to members of the public and appropriate action, including dust & noise control & the erection of perimeter fencing to a specified standard, will be taken.

5.51. Separate gated access will be established to provide segregation between vehicle access and pedestrians to the site which will be controlled by the Principal Contractor to manage the interaction with pedestrians and all road users.

5.52. Vandalism and theft of plant, equipment, materials and fuel is possible throughout the duration of the development. The Principal Contractor will take appropriate action, as described in previous sections, to ensure the site is secure at all times from unauthorised access. The site will be controlled via an access system controlled by an individual proximity fob system.

5.53. The provision of CCTV would be considered if required to main site points and compound areas to assist in the prevention of unauthorised activities in particular at interfaces with existing tenants.

Environmental Management

5.54. An Environmental Management Plan, in line with the appointed Principal Contractors Environmental Management System, will be developed to address and monitor the following issues:

- Applicable environmental legislation.
- Pollution.
- Nuisance (Noise, vibration, dust emission, and light).
- Public relations.

Environmental Legislation

5.55. Applicable environmental legislation will be identified in a register, to ensure that appropriate systems are put in place in order to comply with the legal requirements in question.

Pollution

5.56. The Principal Contractor will establish procedures, to ensure the prevention of water and ground pollution, relating to the following risk activities:

- De-watering of the site (if required).
- Soil contamination remediation.
- Earthworks (including piling, spoil movement and removal, and movement of contaminated soils).
- Concrete works (including washing out of concrete delivery vehicles and pumps).
- Storage and movement of fuels, oils, chemicals and other such fluids.
- Cleaning (including plant, machinery and wheel washing).

5.57. The following measures are to be undertaken to reduce the effects construction vehicles and plant exhaust have on the environment:

- An inventory of all machinery used on site (including date of manufacture, hours of operation, service history, fuel type and emission control devices installed) should be kept on site by the construction site manager. Modern machinery, with adequate pollution control devices (such as catalytic converters), is to be used.

- Optimise the use of all construction vehicles and plant by minimising idling, improving the efficiency of trip times and reducing double handling through appropriate placement of stockpiles, site offices and working areas. This will also aid fuel efficiency and assist in reducing overall fuel costs associated with unnecessary fuel consumption.
- Use of appropriate fuels, including ultra / low-sulphur diesel and unleaded petrol as per manufacturer's instructions.
- Regular maintenance and inspection programme to be implemented for all construction vehicles and plant (to be documented and checked by construction site manager's representative).
- All vehicles and other construction plant and equipment to switch off engines when not in use to limit unnecessary or inadvertent idling.
- On-road vehicles (i.e. construction worker cars / vans, delivery lorries) to comply with the requirements of Manchester's proposed Clean Air Low Emissions Zone.
- Fit enclosing shields or filters on plant likely to generate excessive quantities of dust such as dust extractors, filters and collectors on drilling rigs or excavators.
- Smoky equipment should be given a defect notice and taken out of service until repaired and approved for re-deployment by construction site manager.

Nuisance (Noise, Vibration & Dust)

Noise & Vibration

5.58. To mitigate construction noise and vibration works on all sites within the development will employ the 'Best Practicable Means'. Best Practicable Means (BPM) as defined in Section 72 of the Control of Pollution Act 1974 would be employed to keep the level of noise and vibration generated on Site as low as reasonably practicable. Measures to be considered in implementing best practicable means would be consistent with recommendations of British Standard (BS) 5228-1:2009+A1:2014.

5.59. The principal concerns relating to the nuisances of noise and vibration arise from construction activities such as demolition, excavation, cutting, breaking out and plant movements. Mitigation measures will be considered to include low noise options, noise attenuation techniques and carrying out certain activities during agreed hours of the day.

5.60. Sensitive receptors including the residents of the Great Northern Tower to the east of the site have been identified in the CMP found within Appendix 5.7; a managed approach to mitigate the potential impact of noise, dust and vibration generating activities during the enabling, demolition and construction activities will be employed by the Contractor.

5.61. In order to minimise the impact of noise arising from the works, the successful Principal Contractor will ensure;

- Any compressors brought on to the site to be silenced or sound reduced models fitted with acoustic enclosures;
- All pneumatic tools to be fitted with silencers or mufflers where available;
- Care to be taken when erecting or striking scaffolds to avoid impact noise from banging steel. All operatives undertaking such activities to be instructed on the importance of handling the scaffolds to reduce noise to a minimum;
- The majority of deliveries to be programmed to arrive during normal working hours only. Care to be taken when unloading vehicles to minimise noise. Delivery vehicles to be routed so as to minimise disturbance to local residents. Delivery vehicles to be prohibited from waiting within or in the vicinity of the Site with their engines running;

- All plant is properly maintained and operated according to manufacturers' recommendations in such a manner as to avoid causing excessive noise;
- Where possible, all plant to be sited so that the noise impact at nearby noise sensitive properties is minimised;
- Local hoarding, screens or barriers to be erected as necessary to shield particularly noisy activities; and,
- Problems concerning noise from construction works can often be avoided by taking a considerate and neighbourly approach to relations with the local residents, visitors and existing tenants. Where possible, works should only take place during given periods, e.g. during normal construction hours and not at night.

5.62. In order to minimise the impact of vibration arising from the works, the successful Principal Contractor will ensure;

- Adoption of low vibration working methods. Consideration should be given to use of the most suitable plant;
- Where processes could potentially give rise to significant levels of vibration, on - site vibration levels should be monitored regularly by a suitably qualified person;
- Where piling is to take place, any obstructions should first be removed;
- The provision of cut-off trenches in order to interrupt the direct transmission path of vibrations; and,
- Application of piling techniques aimed at reducing resistance to penetration e.g. pre-boring for driven piles and adding water to the hole for impact bored piles.

Dust

5.63. The principal concerns relating to air quality and emissions from construction activities are in the form of dust and fumes. The degree of dust deposition is usually dependant on the nature of the works. Increased levels of dust are most likely to occur during site activities related to demolition (of which there are none planned on site) piling, moving construction traffic and ground works.

5.64. In order to minimise the impact of dust and fumes arising from the works, the successful Principal Contractor will ensure:

- Hard surfaces are provided where vehicle movements occur;
- Control measures and dust suppression techniques;
- Minimising stock piling and positioning in a manner that reduces risk of dust arising through wind action;
- Measures such as screening and covering;
- Installation of appropriate wheel and body wash facilities;
- Keeping of adjacent roads and pavements clean;
- Ensure plant is turned off and not left running when not in use; and,
- Selection of electrically powered plant where possible in lieu of diesel or petrol plant.

Public Relations

5.65. The successful Principal Contractor will ensure that regular contact is made with existing tenants who remain in occupation during the early works, local residents and community groups to ensure they are kept up to date with general progress on the site. This is especially important for major work elements such as piling and tower crane erection due to our close proximity to adjacent residential schemes. The external hoardings surrounding the site will display a contact number in the event or any complaints which will be operational 24/7.

5.66. It will be a requirement that the appointed Contractor enrols the project in the "Considerate Contractors Scheme" (CCS) and that the project will be managed in a manner to achieve a high score of 41/50 or higher equivalent to attaining 'Exceptional'.

5.67. The name and contact details of the Principal Contractors Project Manager will be provided on appointment and always be displayed on the CCS poster located at the entrance of the site.

5.68. At this stage it is not possible to provide Considerate Constructors Scheme (CCS) registration, but this will be provided on appointment of the Principal Contractors for Demolition and Main Construction Works.

5.69. A member of the Principal Contractor's Project Staff will be appointed as Liaison Officer; they will work with the Client's Development team, local residents, the business community and Manchester City Council. They will always be available and be a dedicated point of contact. Posters will be displayed on the site boundary advising the contractors' names, the name of your liaison officer, and a contact number and address for complaints, details of the Considerate Constructors Scheme registration and a 24hr contact number.

5.70. The Liaison Officer will be responsible for the logging of complaints and ensuring appropriate action is taken and recorded along with steps to avoid recurrence.

5.71. The specific liaison measures to be implemented by the Principal Contractor will include:

- Plan & inform on the nature and timing of all main site activities relating to the CoCP, particularly the demolition, new structure and external envelope.
- All site construction staff will be made aware of the requirements of the code and will be made responsible for its implementation.
- Sufficiently in advance of works, the Principal Contractor will prepare a full programme of works, which will be maintained in a current format for the duration of the works and will be available for inspection when required. This will include an outline method statement for works and any activities affecting the highway.
- Detailed method statements for specific/special activities affecting the environs of the site in line with the principle identified in this report. Temporary works, removal of demolition & excavation material, concrete pours, deliveries of plant.
- Details of site traffic movements showing the projected number of vehicles, what is being delivered, when peaks in activities occur, traffic marshalling arrangements, holding areas, etc.
- Routes to site for deliveries.
- A Health and Safety Plan.

5.72. The Principal Contractor will provide an information and reporting telephone 'Hot Line', staffed during working hours. Information on this facility shall be prominently displayed on site hoardings. The successful Principal Contractor's nominated person will attend monthly reviews with Manchester City Council's Environmental Team, or otherwise as requested.

5.73. At least 2 weeks before any work commences, leaflets will be sent to the local residential and commercial community advising the start and likely completion dates for the works and providing the name and contact details for the liaison officer. During the progress of the works regular updates will be sent out, particularly should there be any change in Liaison Officer or if works have been agreed by Camden to be undertaken outside normal hours.

5.74. In the case of work required in response to an emergency, Manchester City Council, and all neighbours, will be advised as soon as reasonably practicable that emergency work is taking place. Potentially affected occupiers will also be notified of the 'hotline' number, which will operate during working hours.

5.75. Should there be the need to undertake works outside of normal hours that may disturb residents this will be notified to Manchester City Council a minimum of 7 days in advance for approval.

Waste Management Strategy

5.76. In line with the "Site Waste Management Plan Regulations 2008", a Site Waste Management Plan (SWMP) A Site Waste Management Plan (SWMP) will be completed and agreed with Manchester City Council site setting out targets for waste management, redirect from landfill and recycling and reuse rates.

5.77. The Waste & Resources Action Programme (WRAP) template will be used to record volumes of waste and ways which waste volumes and tonnage can be reduced. Initiatives which will be put forward to increase diversion of waste from landfill and reduce waste volume include:

- The use and segregation of the materials brought to the waste transfer station for recycling will provide a reduction in waste generated on site.
- Targets will be set around 90% for recycling.
- Packaging will be reduced or eliminated to reduce the amount of plastic sent to landfill.

5.78. The SWMP will be reviewed along with the contractor's supply chain during the procurement stages and pre-start meetings to identify ways to reduce waste from occurring during the project.

Operational Waste Removal

5.79. The reuse of Site-won materials should be undertaken in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice to minimise the off-Site disposal of materials and the WRAP End of Waste Criteria for the Production of Aggregates.

5.80. Any waste that is generated and cannot be recycled or reused will be segregated and collected by a licensed waste contractor.

5.81. The Principal Contractor will consider the following measures to minimise the production of waste in accordance with the Contractors Construction CMP:

- Aggregate from demolition arising will be considered for use in blinding, mass fill, hardcore and piling mats.
- Measures will be put in place to minimise the quantity of materials ordered and used.
- Consideration of the use of the excavated gravels for use as aggregate, either on the development site or for re-use within the other projects across London.
- Where practical all concrete arising will be crushed on-site and re-used.

5.82. The Contractor will be required to investigate opportunities to minimise and reduce the use of water during demolition and construction. These may include:

- Selection and specification of equipment.
- Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use.
- Use of recycling water systems in functions such as wheel washes and toilets.
- Rainwater harvesting system for equipment and vehicle washing.
- Where possible, water from excavation would be used for dust suppression

5.83. Waste generated during the construction phase is to be cleared on a daily basis to a main holding skip. Each floor plate will have a designated waste area that will see bins located within it that can be emptied at the end of each shift.

5.84. During relatively high waste fit-out activities, this waste removal may need to occur several times a day via the hoists and as such general operatives will be employed to ensure this will occur. Hazardous waste will be stored and disposed of separately, but main waste will enter a common skip where the waste supplier will sort at their transfer station before issuing recycling percentages and data.

5.85. To reduce the volume of waste sent to landfill, all non-recyclable waste from site will be segregated at the waste transfer station into the following categories:

- CAT A: Hazardous waste – Paint tins, mastic etc
- CAT B: Metal
- CAT C: Timber
- CAT D: Plasterboard
- CAT E: General Waste

5.86. All carriers of waste will hold a valid waste transfer licence and provide certification to the Principal Contractor for all elements of the process.

Summary

5.87. Prior to the commencement of each and every relevant Phase of the development a detailed Construction Management Plan will be provided.

5.88. The Construction (Design and Management) Regulations 2015 will apply to this project and all appropriate controls and systems will be in place to comply with the standards of the Regulations and associated guidance.

5.89. Every stage of the project will be pre risk assessed and appropriate controls applied, sub- contractors will be pre vetted and will be subject to extensive pre contract requirements of information transfer and risk assessment.

5.90. A fundamental aspect of the Principal Contractor's role is the development of a Construction Management Plan, which will take account of all known risks, which have been identified at pre- construction stage by the Principal Designer/CDM Consultant, the Design Team and also through site investigations.

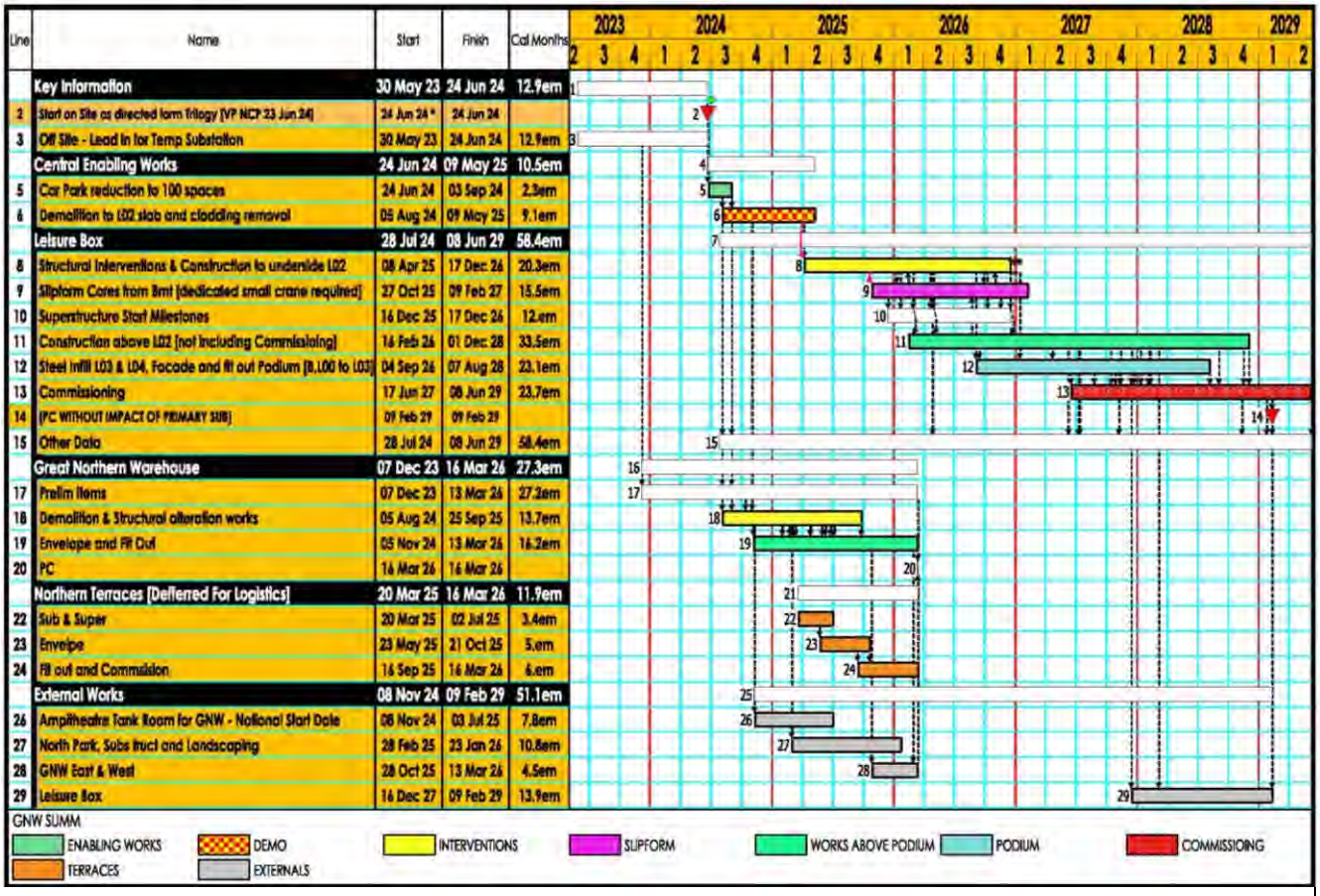
5.91. The Construction Management Plan will describe arrangements and procedures for managing these key risk areas in more detail, as well as any future risk, and also the resources, including personnel, which will be applied to the scheme, and which will ensure the Health and Safety of all those working on or affected by the project works.

5.92. The successful Principal Contractor will have an on-going process of monitoring health and safety standards throughout its organisation. This is normally carried directly by the site management team through regular inspections, toolbox talks etc. and also via the risk assessment process both during the completion of risk assessments and then by monitoring the effectiveness of risk control measures, which have been implemented.

5.93. Health and safety is also incorporated as a fundamental aspect of the overall project review, the Applicant will appoint a Principal Contractor who will be required to demonstrate competency in the management and execution of Health and Safety. The Principal Contractor will work closely with the Principal Designer at this early stage of the project and will influence the detailed design to remove construction and residual safety risks.

5.94. The Principal Contractor will at the earliest possible stage of the project enter into dialogue with all relevant parties, including neighbours to ensure there is effective coordination throughout all stages of construction.

Chapter 5 – Construction Management Plan Figures



Line	Name	Start	Finish	Cal Months
	Key Information	30 May 23	24 Jun 24	12.9em
2	Start on Site as directed form Trilogy [VP NCP 23 Jun 24]	24 Jun 24 *	24 Jun 24	
3	Off Site - Lead in for Temp Substation	30 May 23	24 Jun 24	12.9em
	Central Enabling Works	24 Jun 24	09 May 25	10.5em
5	Car Park reduction to 100 spaces	24 Jun 24	03 Sep 24	2.3em
6	Demolition to L02 slab and cladding removal	05 Aug 24	09 May 25	9.1em
	Leisure Box	28 Jul 24	08 Jun 29	58.4em
8	Structural Interventions & Construction to underside L02	08 Apr 25	17 Dec 26	20.3em
9	Slipform Cores from 8mt [dedicated small crane required]	27 Oct 25	09 Feb 27	15.5em
10	Superstructure Start Milestones	16 Dec 25	17 Dec 26	12.em
11	Construction above L02 [not including Commissioing]	16 Feb 26	01 Dec 28	33.5em
12	Steel infill L03 & L04, Facade and fit out Podium [B.L00 to L03]	04 Sep 26	07 Aug 28	23.1em
13	Commissioning	17 Jun 27	08 Jun 29	23.7em
14	[PC WITHOUT IMPACT OF PRIMARY SUB]	09 Feb 29	09 Feb 29	
15	Other Data	28 Jul 24	08 Jun 29	58.4em
	Great Northern Warehouse	07 Dec 23	16 Mar 26	27.3em
17	Prelim Items	07 Dec 23	13 Mar 26	27.3em
18	Demolition & Structural alteration works	05 Aug 24	25 Sep 25	13.7em
19	Envelope and Fit Out	05 Nov 24	13 Mar 26	16.2em
20	PC	16 Mar 26	16 Mar 26	
	Northern Terraces [Deffered For Logistics]	20 Mar 25	16 Mar 26	11.9em
22	Sub & Super	20 Mar 25	02 Jul 25	3.4em
23	Envelope	23 May 25	21 Oct 25	5.em
24	Fit out and Commission	16 Sep 25	16 Mar 26	6.em
	External Works	08 Nov 24	09 Feb 29	51.1em
26	Amphitheatre Tank Room for GNW - National Start Date	08 Nov 24	03 Jul 25	7.8em
27	North Park, Subs Inst and Landscaping	28 Feb 25	23 Jan 26	10.8em
28	GNW East & West	28 Oct 25	13 Mar 26	4.5em
29	Leisure Box	16 Dec 27	09 Feb 29	13.9em

	Figure:	**5.1**		
	Title:	**Strategic Summary Programme**		
	Project:	**Great Northern, Manchester**		
	Date:	**Nov 2022**	**Scale:**	**NTS**

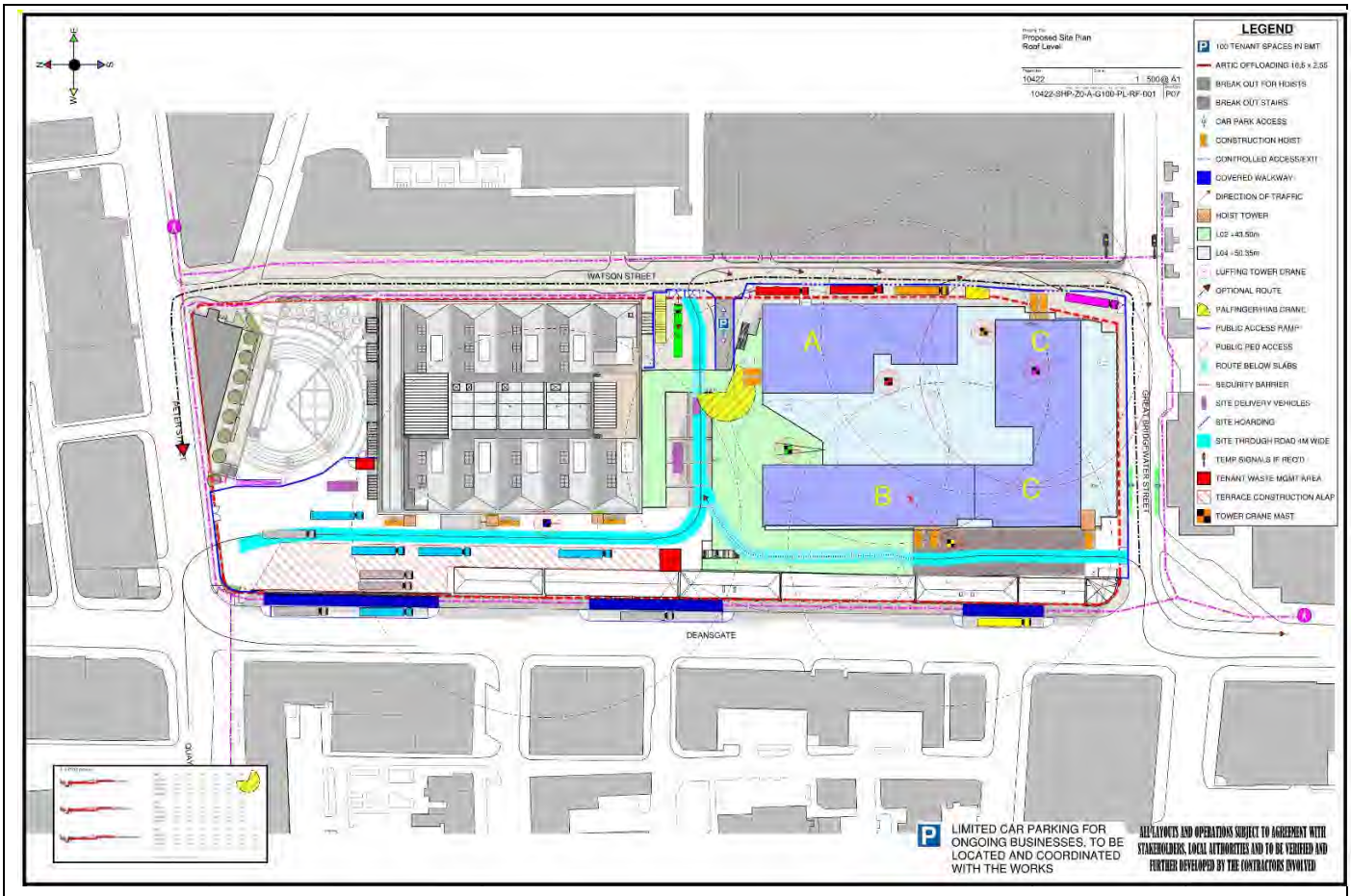


	Figure:	**5.2**		
	Title:	**Phase A Logistics**		
	Project:	**Great Northern, Manchester**		
	Date:	**Nov 2022**	**Scale:**	**NTS**

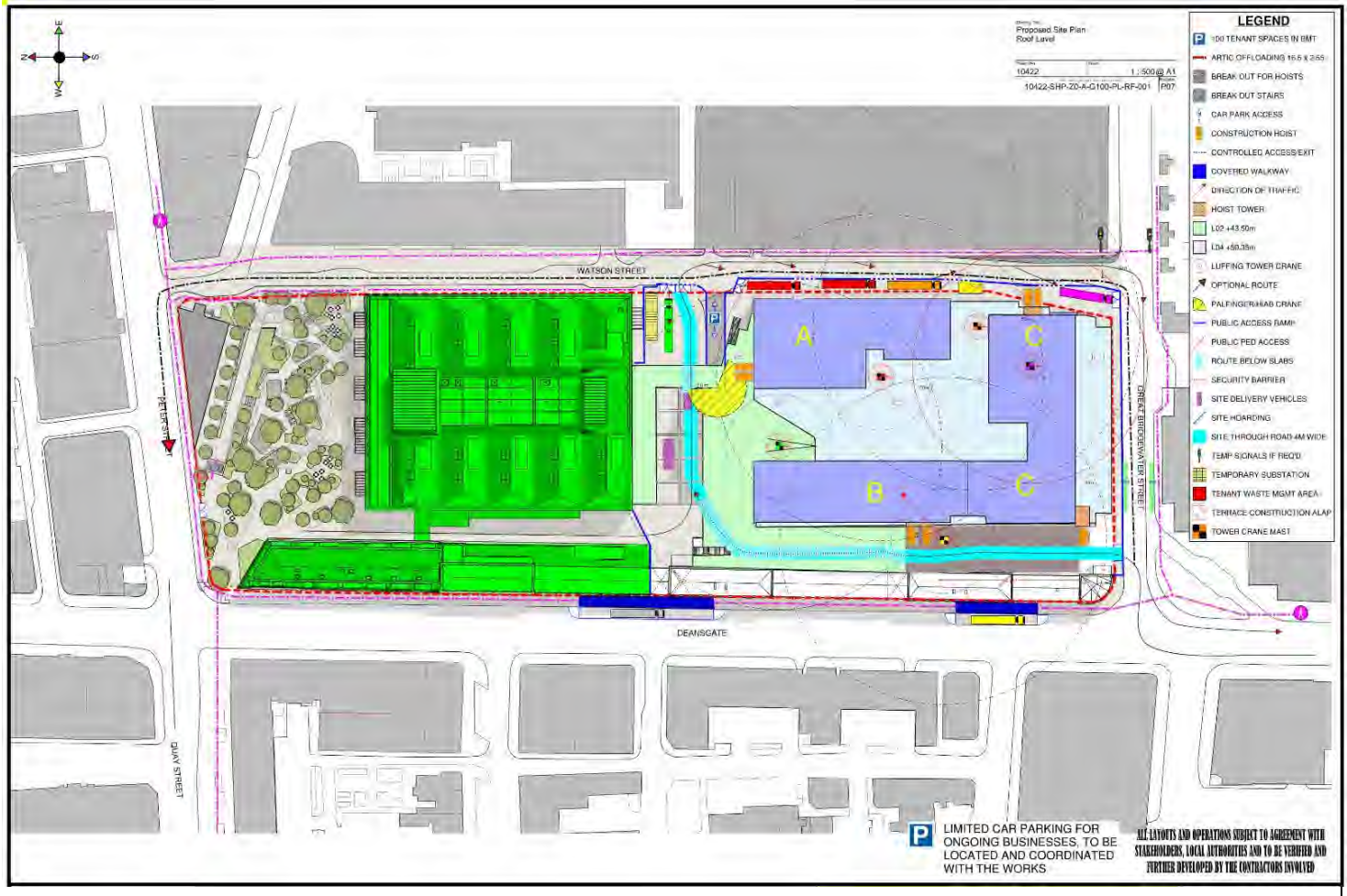


	Figure:	**5.3**		
	Title:	**Phase B & C Logistics Plan from Sitewide Logistics (Appendix 5.5)**		
	Project:	**Great Northern, Manchester**		
	Date:	**Nov 2022**	**Scale:**	**NTS**



	Figure:	**5.4**		
	Title:	**Wider Site Location Plan**		
	Project:	**Great Northern, Manchester**		
	Date:	**Nov 2022**	**Scale:**	**NTS**

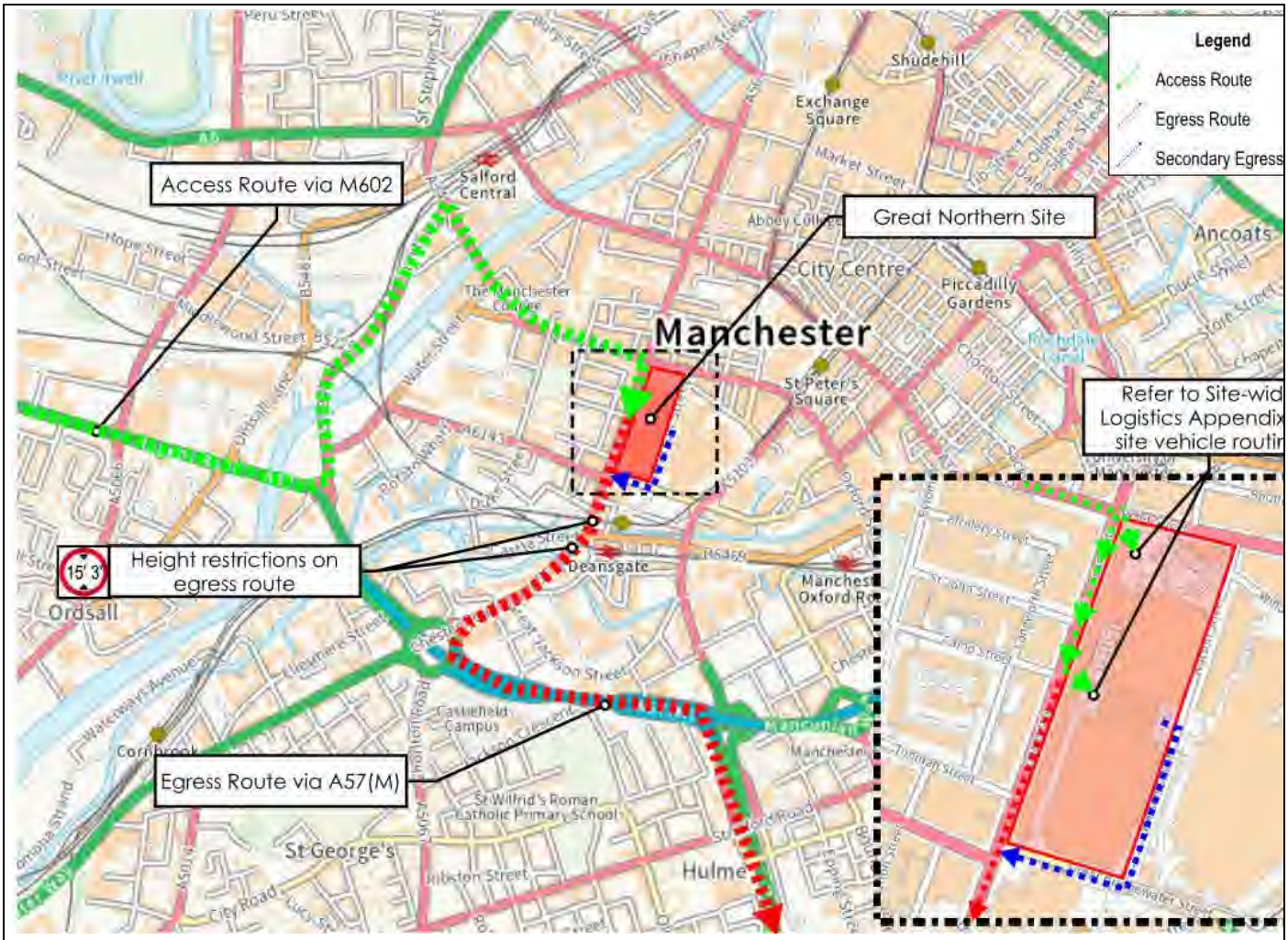


	Figure:	**5.5**		
	Title:	**HGV Construction Access and Egress Routes**		
	Project:	**Great Northern, Manchester**		
	Date:	**Nov 2022**	**Scale:**	**NTS**

6. Townscape and Visual Impact

Introduction

6.1. This Chapter of the ES has been prepared by Chris Burnett Associates and assesses the likely significant effects of the Proposed Development with respect to Townscape and Visual amenity. This Chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; cumulative effects and the likely residual effects. Technical appendices also support this assessment and consist of the following:

- Appendix 6.1: Maps
- Appendix 6.2: Viewpoint and townscape photographs including AVR images
- Appendix 6.3: Visualisation methodology

Phasing

6.2. The Proposed Development will be delivered in 2 phases as follows:

- Phase A: the refurbishment and conversion of the Great Northern Warehouse including the removal of modern features facilitated from the 1997 comprehensive scheme, and the refurbishment of the northern end of Deansgate Terrace for commercial use, alongside the enhancement of Great Northern Square and retention of existing ground floor occupiers;
- Phase B and C: partial demolition of the Leisure Box and retention of car parking below followed by the erection of residential elements (B) and refurbishment and conversion of the southern end of Deansgate Terrace (C).
-

6.3. For the purposes of this TVIA the assessment of effects testing scenarios will test the construction and operational effects of:

- Phase A - Warehouse conversion (including demolition) and Deansgate Terrace North plus Great Northern Square
- The worst case scenario consisting of: Existing site (baseline) with Proposed Development Phase A and Phase B and C operational (as above) and committed developments.

About the Author

6.4. Chris Burnett BSC BLD CMLI, is principal partner of Chris Burnett Associates, a registered practice of landscape architects, who specialises in tall building Townscape and Visual Impact Assessments, as part of Environmental Statements, for many tall building developments throughout the UK since 2002. This includes over 20 tall buildings all of which have received planning consent, in Manchester and Salford including Beetham Hilton, Deansgate Square, New Wakefield Street and others.

Legislative and Policy Context

Legislation

6.5. The European Landscape Convention (ELC, 2000) provides a foundation for closer co-operation on landscape issues across Europe and was ratified in the UK on the 21 November 2006 and became binding on 1 March 2007. The convention identifies the need to recognise landscape in law, to develop and promote landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the evolution and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies.

6.6. The ELC defines landscape under Article 1 as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. It recognises that landscape has important cultural, ecological, environmental and social dimensions and is a key element of achieving sustainable development. Article 3 states that the aims of the Convention are to promote landscape protection, management and planning and to organise European co-operation on landscape issues.

National Planning Policy

6.7. The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

6.8. Key aspects of the NPPF, revised in 2021, which apply to the Townscape and Visual Impact Assessment are the paragraphs 126 and 130 below:

- Para. 126: The creation of high quality, beautiful and sustainable buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.
- Para. 130: Planning policies and decisions should ensure that developments:

  a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;

  b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;

  c) are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);

  d) establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;

  e) optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and

  f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users46; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.

Local planning policy

6.9. The following relevant policies are set out below as extracts from Manchester City Council's Core Strategy:

"The Core Strategy was adopted by Manchester City Council on 11th July 2012. It is the key document in Manchester's Local Development Framework and covers a period of 15 years from 2012 to 2027. It describes Manchester today and outlines the Council's vision for Manchester in 2027 along with the planning policies which will be used to deliver that vision".

6.10. The following Policies contained within the Core Strategy, which are set out in full within the Planning and Tall Building Statement submitted with the Application are of relevance to the Proposed Development:

- Policy EN 1 - Design Principles and Strategic Character Areas
- Policy CC6 High Density Development
- Policy CC 9 Design and Heritage
- Policy EN2 - Tall Buildings
- Policy EN3 - Heritage

Assessment Methodology and Significance Criteria

6.11. This assessment has been undertaken alongside an assessment of the Historic Built Environment which assesses the impact of the Proposed Development on the heritage assets and the surrounding built environment. This chapter assesses the impact of the Proposed Development over a wider area and assesses it against townscape character and visual amenity.

Study Area

6.12. The study area for this assessment comprises an area of approximately 1km in radius focussed on the Proposed Development Site. This area is judged to be appropriate given the height of the Proposed Development, the prevailing topography of surrounding area and its location. Outside this zone townscape and visual effects are unlikely to be significant due to distance, the effects of urban grain and street pattern and also the proximity of a number of intervening tall buildings.

Baseline Surveys

Desk Based Research

6.13. Research included establishing a Zone of Theoretical Visibility (ZTV) and examining appropriate guidance and policies on tall buildings issued by Manchester City Council (MCC) and relevant authorities such as Historic England.

Field Surveys

6.14. Field surveys were undertaken to explore the current baseline of Manchester City Centre. The survey was based on zones using the template set out in Manchester Residential Quality Guidance. Broad Townscape Character Zones were also defined which lie outside the City Centre. During the field survey the ZTV was confirmed and a series of Representative Viewpoints established for assessment, all subsequently subject to Accurate Visual Representation (AVR).

Consultations

6.15. Manchester City Council were consulted on the proposed location of all viewpoints and agreement was reached with the Deputy Head of Planning on their selection in September 2022.

Method of Assessing Significance

6.16. The Townscape and Visual Impact Assessment (TVIA) was undertaken in accordance with the methodology and approach set out in the 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) Third Edition' (2013) – produced by the Landscape Institute (LI) and IEMA.

"The GLVIA requires that a clear distinction is drawn between landscape (which includes the urban townscape) and visual effects:

- Townscape effects relate to the degree of change to characteristics or physical components of an urban area, which together form the character of that townscape, e.g. topography, buildings and vegetation.
- Visual effects relate to the degree of change to an individual receptor's or a receptor group's view of that townscape, e.g. local residents, users of public footpaths or motorists passing through the area."

The relationship between the effects of the Proposed Development on Townscape and Visual Issues are interdependent but not exclusively so. The effects will therefore be examined in terms of:

- Effects on Townscape character. For the purposes of this study the area immediately around the Proposed Development is examined on a character area basis based on the zonal template used by Manchester City Council. Character areas are shown on City Centre Character Areas and Viewpoint Locations, which is located at Appendix 6.1.
- Effects on visual receptors. This is examined through the Representative Viewpoint Approach in which the effects of the Proposed Development are assessed in short, medium and long distance views from variety of key locations.

6.17. In addition, the following guidance documents have also been consulted:

- Guidance on tall buildings published by Historic England: Advice Note 4 March 2022
- History in the View prepared for English Heritage by LUC in 2011
- Manchester Residential Quality Guidance

6.18. The guidance contained in Historic England's advice note on Tall Buildings is particularly relevant:

"Tall buildings need to set exemplary standards in design because of their scale, mass, wide impact and likely longevity. Good design will take the opportunities available for improving the character and quality of an area and respond to local character and history (NPPF paragraphs 58 and 64). It is important that the required high standard of architectural quality is maintained throughout the process of procurement, detailed design, and construction, using conditions and reserved matters.

Given their likely impact on a wide area, it is important that social and environmental effects are also assessed. Consideration needs to be given to a tall building's contribution to public space and facilities. This applies both internally and externally, including the provision of a mix of uses (especially on the ground floor of towers), as part of a well-designed public realm. Consideration of the impact on the local environment is also important, including microclimate, overshadowing, night-time appearance, light pollution, vehicle movements, the environment and amenity of those in the vicinity of the building, and the impact on the pedestrian experience. Well-designed tall buildings provide an inclusive environment, both internally and externally, taking opportunities to offer improved permeability, accessibility and, where appropriate, the opening up or effective closure of views to improve the legibility of the wider townscape."

Townscape Character effects

6.19. The assessment of the Proposed Development on Townscape Character has been based on Manchester City Centre Zones, revised in Manchester Residential Quality Guidance as Neighbourhood Zones, and supplemented by those which lie outside the City Centre. It includes an assessment of the elements which comprise it such as built form and styles, urban grain and street pattern, soft elements such as green spaces and trees and a sense of place and effect that the Proposed Development is judged to have on them. The following zones are potentially affected:

- Manchester City Centre Neighbourhood and Townscape Character Zones
- Medieval Core
- Retail Core
- Civic Quarter
- Spinningfields
- Chapel Street
- St John's
- Petersfield

- Castlefield
- Water Street
- First Street
- Hulme
- Corridor Manchester
- Ordsall

6.20. Their extent is defined on the map of City Centre Character Areas and Viewpoint Locations (Appendix 6.1) and they are described in more detail in the corresponding baseline condition section.

6.21. Townscape effects can be characterised as the changes in the urban grain, character and condition of the townscape as a result of the impact of a development. Specifically, the assessment will examine:

- Direct effects on specific townscape elements
- Effects that are more subtle in nature which affect the character of the townscape
- Effects on a designated asset such as a World Heritage Site, Listed Building or Conservation Area or tourist landmark.

Visual Effects

6.22. The Zone of Theoretical Visibility (ZTV), in the context of the surrounding topography and the height of the Proposed Development, has been established initially through 3D modelling using current Lidar DSM data combined with 10K base mapping to produce a Zone of Theoretical Visibility (ZTV) map, Viewshed Analysis and Viewshed Locations in Appendix 6.1, and then confirmed as part of the field work exercise.

6.23. Considering the scale and height of the Proposed Development, it covers most of the city centre and provides a quick guide as to the Proposed Development's visibility in the immediate vicinity. The Proposed Development consists of the refurbishment, restoration and re-use of the existing Great Northern Warehouse, the reconfiguration of Great Northern Square to allow for redeveloped and additional public realm and the construction of 3 tall buildings, Building A 148.05m AOD in height 34 storeys, Building B 127.05m AOD 27 storeys and Building C 93.2m AOD in height and 16 storeys.

6.24. As with other Townscape and Visual Impact Assessments, and in accordance with guidance issued in GLVIA, the usual, and accepted, practice of selecting and assessing of a range of "Representative Viewpoints", all publicly accessible, has been adopted as being the most appropriate and practical method of assessing and understanding the visual impact of the Proposed Development from a range of viewpoints surrounding the Proposed Development Site. These viewpoint locations are marked in Appendix 6.1 on the ZTV map and also City Centre Character Areas and Viewpoint Locations and are illustrated by way of photographs taken from these viewpoints, represented in Appendix 6.2.

6.25. Representative Viewpoints are, by their very nature, representative and not necessarily site specific, unless a townscape or visual effect from an important regional landmark i.e. Albert Square, is predicted. In each a case a view was sought where the Proposed Development was visible, guided by the results of the ZTV.

6.26. Viewpoints were selected to cover several different locations and varying distances, to reflect the experience of different types of visual receptor and viewing distance. Accordingly, viewpoints ranged from immediate proximity to the Proposed Development site and included residential streets, pedestrianized precincts, public squares footpaths and main approach and ring roads.

6.27. During the main field assessment process which occurred in May 2022, baseline viewpoint photographs were initially taken using a Canon EOS DSLR camera, for consultation purposes, but then subsequently retaken by Our Studio using a Canon 5DMkII FFS with a Canon 24 TS-E 24mm to 35mm lens depending on the proximity of the Proposed Development to the viewpoint.

6.28. Full justification for the use of this camera and lens, together with recommendations on presentation and viewing distance are contained in Appendix 6.3 Visualization Methodology and the lens used for each photograph is contained for each viewpoint in Appendix 6.2.

6.29. The effect of the Proposed Development is then assessed from each of the viewpoints using the information on the height of the building provided by the architects Simpson Haugh and the accurate interpretation of this information by Our Studio in the form of a series of Accurate Visual Representation (AVR) fully rendered, Level 3, images of the Proposed Development superimposed onto photographs from each viewpoint.

Defining Significance of Effect

6.30. The significance of townscape and visual effects can broadly be determined by the interaction of the sensitivity of the receptor and the magnitude of effect with professional judgement playing an important part in identifying the overall significance values for each receptor.

Townscape: Sensitivity of Receptor

6.31. The sensitivity of a townscape receptor is an expression of its ability to accommodate the Proposed Development. Sensitivity is a judgement based on a combination of the susceptibility of the type of change or development proposed and the value attached to the townscape, as set out below.

6.32. Susceptibility indicates the ability of a defined townscape receptor to accommodate the proposed development "without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies." (GLVIA, 3rd version). A description of how susceptibility would be evaluated for each receptor type is included below:

Table 6.1 Susceptibility of Townscape Receptor

Susceptibility	Criteria
High	Little ability to accommodate the proposed development without undue harm.
Medium	Some ability to accommodate the proposed development without undue harm.
Low	Substantial ability to accommodate the proposed development without undue harm.

6.33. Townscape Value is "the relative value that is attached to different landscapes by society". It is assessed on the following scale along with assessment of various undesignated townscape attributes:

Table 6.2 Townscape Value

Value	Description
High	Sites, features or areas of national or international importance with settings of high quality such as World Heritage Site, AONB, National Parks, Grade I and Grade II* Listed buildings or Registered Parks and Gardens.
Medium	Sites, features or areas of local or regional importance with intact character such as Grade II* and Grade II Listed Buildings or Registered Parks and Gardens, Conservation Areas, Scheduled Monuments, local nature site, long distance recreational routes. Tree Preservation Orders (TPO) and local designations that exhibit wider geographic, cultural or townscape significance.

Low	Areas or features of local importance such as Tree Preservation Orders (TPO), Public Right of Way (PROW) and locally listed buildings.

6.34. The overall sensitivity of each townscape receptor would be rated within the range of High-Medium-Low and would be informed by combining the susceptibility and value as described above.

Townscape: Magnitude of Effect

6.35. The magnitude of a townscape effect is assessed in terms of its size or scale, the geographical extent of the area influenced by that effect, and its duration and degree of reversibility and would be rated within the range of Major-Moderate-Minor-Negligible-No Change set out below:

Table 6.3 Magnitude of Townscape Effect

Category	Criteria
Major adverse townscape effect	The proposals will result in a total change in the key characteristics of townscape character; will introduce elements totally uncharacteristic to the attributes of the receiving townscape; and/or will result in a substantial or total loss, alteration or addition of key elements/features/characteristics.
Moderate adverse townscape effect	The proposals will result in a partial change in the key characteristics of townscape character; will introduce elements partially uncharacteristic to the attributes of the receiving townscape; and/or will result in partial loss, alteration or addition of key elements/features/characteristics.
Minor adverse townscape effect	The proposals will result in a small change in the key characteristics of townscape character; will introduce elements that are not uncharacteristic to the attributes of the receiving townscape; and/or will result in a minor loss, alteration or addition of elements/features/characteristics.
Negligible townscape effect	The proposals will result in a just discernible change to townscape character/elements/features/characteristics.
Negligible townscape benefit	The proposals will result in a just discernible improvement to the townscape character/elements/features/characteristics.
Minor townscape benefit	The proposals will achieve a degree of fit with the townscape character/elements/features/characteristics and go some way towards improving the condition or character of the townscape.
Moderate townscape benefit	The proposals will achieve a good fit with the townscape character/elements/features/characteristics, or would noticeably improve the condition or character of the townscape.
Major townscape benefit	The proposals will totally accord with the townscape character/elements/features/characteristics, or would restore, recreate or permanently benefit the condition or character of the townscape.
No Change	The proposals will not cause any change to the townscape character/ elements/ features/ characteristics.

6.36. The size and/or scale of change in the townscape takes into consideration the following factors:

- the extent/proportion of townscape elements lost or added;
- the contribution of that element to townscape character and the degree to which aesthetic/perceptual aspects are altered; and
- whether the effect is likely to change the key characteristics of the townscape, which are critical to its distinctive character.

6.37. The geographical extent of effects relates to:

- the area over which townscape effects are likely to be experienced, i.e. this could be at the site level, the immediate setting of the site, or townscape character type or area;
- the area over which visual effects are likely to be visible; and duration.

Visual receptors: Sensitivity of Receptor

6.38. In terms of assessing the baseline visual sensitivity, key factors to consider are the type of view and the likely numbers and types of viewers (the visual receptors). The type of view and the number of viewers are described in the following terms:

Glimpsed (i.e. in passing) / Filtered / Oblique / Framed / Open Views; and Few / Moderate / Many Viewers

6.39. The value attached to views has regard to a number of factors, including:

- recognition through planning designations or heritage assets; and
- the popularity of the viewpoint, its appearance in guidebooks, literature or art, on tourist maps and the facilities provided for its enjoyment.

6.40. The GLVIA identifies that the susceptibility of visual receptors to changes in views and visual amenity is a function of:

- The occupation or activity of people experiencing the view at a particular location; and
- The extent to which their attention or interest may therefore be focused on the views and visual amenity they experience at particular locations.

6.41. The assessment of receptor sensitivity is rated on the scale High-Medium-Low, and combines judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor, determined from the criteria below.

Table 6.4 Visual Receptor Susceptibility

Susceptibility	Type of Receptor
High	• Users of public space, including users of public rights of way, whose attention is likely to be focused on the townscape and on particular views; • Visitors to heritage assets or other attractions where views of the surroundings are an important part of the experience; • Communities where views contribute to the townscape setting enjoyed by residents; and • Travellers on scenic routes.
Medium	• Travellers on road, rail or other transport routes, where the view is moderately important to the quality of the journey; and

Susceptibility	Type of Receptor
	• Users of public space, where the view is part of the wider experience of the place.
Low	• People at their place of work, where the setting is not important to the quality of working life; • Travellers on road, rail or other transport routes, where the view is fleeting and incidental to the journey; and • People engaged in outdoor sport or recreation, or users of a public space, which does not involve appreciation of views.

Table 6.5 Visual Receptor value

Value	Criteria
High	Views from townscapes/viewpoints of national importance, or highly popular visitor attractions where the view forms an important part of the experience, or with important cultural associations. An example may be where the viewpoint features a nationally important designated asset as the main focus of the view.
Medium	Views from townscapes/viewpoints of regional/district importance or moderately popular visitor attractions where the view forms part of the experience, or with local cultural associations. The viewpoint may be a good location to view a designated asset of regional/ local importance, or where a nationally important designated asset is not the main focus of the view.
Low	Views from townscapes/viewpoints with limited designations, not particularly popular as a viewpoint and with minimal or no cultural associations. The viewpoint may include designated assets of regional/local importance which do not form the main focus of the view.

Visual: Magnitude of Effect

6.42. The magnitude of a visual effect is assessed in terms of its size or scale, the geographical extent of the area influenced and its duration and degree of reversibility and will be rated within the range of Major-Moderate-Minor-Negligible-No Change set out below.

Table 6.6 Magnitude of visual effect

Category	Criteria
Major adverse or beneficial visual effect	The proposals will cause a dominant or complete change or contrast to the view, resulting from the loss or addition of substantial features in the view and will substantially alter the appreciation of the view.
Moderate adverse or beneficial visual effect	The proposals will cause a clearly noticeable change or contrast to the view, which would have some effect on the composition, resulting from the loss or addition of features in the view and will noticeably alter the appreciation of the view.
Minor adverse or beneficial visual effect	The proposals will cause a perceptible change or contrast to the view, but which would not materially affect the composition or the appreciation of the view.
Negligible adverse or beneficial visual effect	The proposals will cause a barely perceptible change or contrast to the view, which would not affect the composition or the appreciation of the view.

Category	Criteria
No change	The proposals will cause no change to the view.

6.43. The size or scale of change in the view relates to the degree of contrast or integration likely to result from the Proposed Development and is influenced by the relative time over which a view is experienced and whether it is a full, partial or glimpsed view.

Duration of Effect

6.44. Both Townscape and Visual effects may be experienced over a range of timescales. For this assessment, the following timescales are considered appropriate:

- Short-term: 1 year or below
- Medium-term: Between 1 and 10 years in duration
- Long-term: Greater than 10 years in duration

Significance of Effect

6.45. The objective of the assessment process is to identify and evaluate the likely significant effects arising from the Proposed Development for both Townscape and Visual Receptors. Significance indicates the importance or gravity of the effect. The table below, Table 6.7 is offered in support of professional judgement in determining the Significance of effect and is used as a guide to the narrative explanation of the nature and significance of both townscape and visual effects brought about by the Proposed Development.

Table 6.7: Significance of Effect

		Magnitude of Effect				
Sensitivity of Receptor		**Major Effect**	**Moderate Effect**	**Minor Effect**	**Negligible Effect**	**No Change**
	High	Major Significance	Moderate Significance	Moderate Significance	Minor Significance	No change
	Medium	Moderate Significance	Moderate Significance	Minor Significance	Negligible	No change
	Low	Moderate Significance	Minor Significance	Negligible	Negligible	No change

6.46. The effects on both townscape and visual receptors is examined in each case. All viewpoints have been subjected to the insertion of an Accurate Visual Representation (AVR) into a baseline photograph so that the extent of both townscape and visual effects can be judged more accurately.

6.47. In each case the effect of the Proposed Development is compared with the baseline condition or view and an assessment made in terms of receptor susceptibility, value of townscape setting or view, receptor sensitivity and magnitude of effect. A judgement is then made as to whether the effect is of major to negligible significance of effect using the Significance of Effect Matrix in Table 6.7 and then a judgement made as to whether the effect is significant or not significant in EA regulation terms.

6.48. For the purposes of this Townscape and Visual Impact Assessment, effects of Moderate Significance and above are considered to be Significant. Those values of Minor and below are therefore deemed to be Not Significant. A professional judgement is then made as to whether the effect is of an adverse or beneficial nature. The effects below are primarily concerned with the effects on townscape character and visual receptors.

6.49. This process has been applied to provide a robust assessment in similar townscape settings, including Manchester City Centre, and is considered to be the most suitable approach in this context. The visual impact of the Proposed Development will demonstrably change as it is constructed.

6.50. As the construction phase is likely to be a relatively short period in the context of the lifecycle of the Proposed Development, the impact of the building upon completion, or operational phase, is the principal focus of this study although the construction effects are also examined below. Similarly, the impact pathway is direct. The building is either visible or it is not.

Mitigation Methodology

6.51. In terms of mitigation this has been incorporated into the design of the Proposed Development by the architects SimpsonHaugh as the design of the building has developed, in consultation with interested parties. Mitigation for the Construction Phase Effects is described in the relevant section below.

Residual Impact Methodology

6.52. Residual Impacts are described based on the assumption that all mitigation measures have been fully deployed.

Baseline Conditions

Townscape Baseline

6.53. A summary set out below describes the main attributes and characteristics of each of the Townscape Zones and Representative Viewpoints that may be potentially affected by the Proposed Development as existing at the time of this assessment in September 2022. Each character area is referenced on Map 2 City Neighbourhood Areas and Viewpoint Locations (Appendix 6.1).

6.54. Only those areas which have the potential to be significantly affected by the Proposed Development are included. For the purposes of this assessment, the baseline conditions that prevail at the current time (September 2022) in terms of townscape character and views are described below and include relevant schemes under construction, which are predicted to be complete when the Proposed Development is due to have been completed. The effects on the baseline together with the Proposed Development and any committed development is dealt with in the Cumulative Effects section.

Medieval Core

6.55. This townscape area is an important regional and local gateway and transport hub containing Victoria Station, a number of Metrolink stops and the Inner relief route on its northern boundary. The major overhaul of Metrolink tracks, station building and platforms at Victoria is now complete.

6.56. It is also a major retail and leisure area with the development of the Corn Exchange, Urbis, now the National Football Museum, MEN Arena and the Printworks. Its significance as a cultural and public area is notable with the presence of Manchester Cathedral which has been the ecclesiastical and scholastic centre of Manchester since the earliest of times.

6.57. To the south and east of the Cathedral Yard lie the Victorian commercial buildings of the impressive Corn and Produce Exchange. These all cluster around the medieval street pattern and are bounded on the outside by the curving line of the Cateaton Street, Hanging Ditch, Todd Street, Victoria Station and Hunts Bank approach. To the north and west, the Cathedral overlooks the broad width of the busy Victoria Street and the deeply incised channel of the River Irwell, both of which run beyond into Salford.

[Representative viewpoint 12 and 18]

Retail Core

6.58. The main retail streets of Market Street, King Street, St. Ann's Square and part of Deansgate constitute this area of the city centre. Two main roads, Cross Street and Deansgate, giving contained axial views on a north to south orientation, cross the area. To the east of Cross Street, the bulk of the Arndale shopping complex dominates, enclosing the pedestrianised Market Street, which leads to Piccadilly Gardens.

6.59. A mix of historic and modern buildings characterise the area between Cross Street and Deansgate. These buildings, including the Cotton Exchange, generally have large footprints and enclose the intimate St Ann's Square at the core of the zone. St Mary's Parsonage is also part of this Character Zone

6.60. The River Irwell forms the western boundary and includes the three bridges which link Manchester with Salford. The river corridor itself is confined by buildings on both banks

[Representative viewpoints 11 and 19]

Civic Quarter

6.61. Constituting the heart of the city, this zone includes many old but also new office buildings. It is criss-crossed by the Metrolink and by main bus and vehicular routes into and out of the city centre. At its core is Manchester Town Hall (Grade I Listed), now in the process of being restored, the spire of which is one of Manchester's most prominent skyline features, and Albert Square, an important civic space.

6.62. Enclosed on all sides by buildings of similar scale and mass, trees have been introduced to soften the architecture and add to the ambience. Other important historic civic buildings include the City Art Gallery (Grade II* Listed) and Central Library (Grade II* Listed). The latter a neo classical masterpiece by Vincent Harris and hemmed in by the neo-Gothic splendour of the Town Hall on one side and the Edwardian baroque red bricks of the Midland Hotel (Grade II Listed).

6.63. The square is a major tram stop and contains the city's war memorial, which extends to form the Peace Garden at the back of the Town Hall.

[Representative viewpoints 9,10]

Spinningfields

6.64. The result of a major regeneration initiative which commenced in 1997 this area is now home to Manchester's financial community and restaurant scene. New development dominates and this is a vibrant busy district popular in equal measure both day and night.

6.65. The area also includes the Crown and County Courts (Grade II Listed) and the cultural assets of the People's History Museum (Grade II Listed) and the newly refurbished John Rylands Library (Grade I listed). The area contains, Sunlight House (Grade II*), Masonic Lodge (Grade II).

6.66. In addition, new apartment blocks have been constructed on the River Irwell frontage. Most of the building forms are large in scale and mass. The redevelopment has created several new and re-vamped public open spaces including Irwell Square, Hardman Square and Spinningfields Square, linked by a network of legible and pedestrian friendly routes. Views are varied depending on the orientation of the road junctions and the axial emphasis of the public open spaces but generally are few and far between.

[Representative viewpoint 1]

Chapel Street

6.67. Chapel Street is part of the historic core of Salford and a key part of the city centre. Recently it has seen many new developments for residential, educational, civic and business uses. The area includes the city centre's first five star rated hotel, the Lowry Hotel, on the banks of the River Irwell, which forms the southern boundary of the zone.

6.68. Development along the river has created a predominantly 'canyon' effect, although views open up at various crossing points. A small plaza combines with a pedestrian bridge next to the Lowry Hotel and forms one such nodal point. The raised section of the railway corridor linking Salford Central Station, in the centre of this zone, with Manchester Victoria also bisects the area obscuring many ground level views towards the city centre. In general, the area has a dense urban fabric with few open spaces and limited opportunities for panoramic views out.

[Representative viewpoint 17]

St John's

6.69. The area comprises a variety of buildings associated with the former ITV Quay Street estate but which is now the focus of a major scheme of redevelopment: The St John's Masterplan which has many varied components including several tall buildings.

6.70. The area contains one Listed structure (the Grade II Listed Manchester and Salford Junction Canal tunnel, which is underground); the Grade II Listed Colonnaded Railway Viaduct also falls partially within the area. The area contains a number of non-designated heritage assets, many of which are proposed to be retained and re-used as part of the St. John's Masterplan.

6.71. It also lies adjacent to a number of listed structures, including the Grade I Liverpool Road Station and 1830s Warehouse. The area contains a number of natural assets, including riverside frontages and a mature garden that faces the existing St. John Street public gardens. The central part of the area comprises the Granada Studios and associated car park as part of the former ITV Quay Street estate. This area is undergoing a major renaissance with several notable schemes under construction which include The Factory, Enterprise City, Globe and Simpson, the Bonded Warehouse, now complete, and OGS.

6.72. To the south of the zone a range of high quality heritage buildings which line Liverpool Road, including the original Liverpool Road Station Buildings, the first passenger transport terminal that received Stephenson's Rocket (Grade I Listed), and various industrial buildings, which have now been utilised for the Museum of Science and Industry. These buildings have extremely fine architectural quality and Liverpool Road forms an important perspective vista. The area at the junction of Water Street and Liverpool Road is dominated by several viaducts and bridges over different periods (Grade I to Grade II Listed). A major new scheme known as the Ordsall Chord - an elegant bridge and viaduct - carries a railway line north towards Salford Central adjacent to the inner ring road.

6.73. Immediately to the north of Liverpool Road, and to the west of Deansgate, is an area of high townscape quality consisting of the low rise Georgian streets of the St John's quarter, home to the chambers and practices of Manchester's legal and medical professions. The quiet oasis of St John's gardens occupies a small tranquil green space in the centre of this district, a welcome contrast to the busy and noisy Deansgate which is a short distance away.

[Representative viewpoints 4]

Petersfield

6.74. Several of the landmark buildings in this zone have been developed as high quality conference and leisure and facilities including Manchester Central, Bridgewater Hall and the Great Northern Warehouse (Grade II*). Squares and plazas exist alongside these facilities which include the open space enclosed by Manchester Central and the Midland Hotel, Barbirolli Square and the plaza in front of the Great Northern at the junction of Peter Street and Deansgate.

6.75. These spaces, together with large buildings, provide an open, spacious quality to the area, which is in direct contrast to the narrow tightly knit street patterns that characterise much of the city centre. The varied forms of the buildings ranging from the angularity of the new Bridgewater Hall to the curve of the Manchester Central's roof contribute positively to the irregular and eclectic visual character of this zone. This has been further enhanced with the construction of the Beetham Tower (47 storeys), Manchester's highest building but now eclipsed by the Deansgate Square, and Axis developments.

6.76. [Representative viewpoints 2 and 5]

Castlefield

6.77. This zone forms Britain's first Urban Heritage Park and is one of Manchester's key tourist destinations. It is the terminus for the world's first industrial canal: the Bridgewater Canal and the world's first passenger railway terminated nearby in 1830. Its historic interest is therefore very much linked with the historic transport networks formed by the railways and canals. It also includes the remaining sections of a Roman fort. In addition, the area provides a highly attractive location for offices, apartments, cafes, bars and hotel developments and includes public spaces and an events area. Castlefield Conservation Area covers this area.

6.78. The visual character of the area is varied. The many viaducts that pass through the zone provide the opportunity for panoramic views of the city but also visually enclose the spaces below. These strongly horizontal features contrast with the chimneys and towers all associated with the industrial development of the area. The historic fabric is well represented in Castlefield and the older buildings tend to assert themselves in defiance of more recent development.

6.79. The enclosed canal basins dominated by its restored heritage with an influx of new residential and leisure development are a particular characteristic feature of the zone. Here the public spaces and towpaths provide a very human scale and intimacy to the area. Throughout the canal system the views are constantly changing, even slight distances creating very different juxtapositions and views.

6.80. The Mancunian Way passes through this area and links with the inner ring road affording occasional interrupted views of the City centre. Recent development includes the 20 storey development overlooking the basin, 2- 4 Chester Road.

[Representative viewpoints 3, 6, 7, 8, 13,14 and 23.]

Water Street

6.81. A pocket of urban Manchester defined by transport connections which include the river Irwell, tram and railway lines, much of which is located on viaducts, and through which the inner ring road A57 runs. Recent development includes the tall building development of Water Street itself. Vacant land, earmarked for the Trinity Island development lies in this zone.

[Representative viewpoint 15]

First Street

6.82. This zone is the focus of a major scheme of regeneration in Manchester. Populated by a mixture of commercial, cultural and residential development it has become a busy and thriving area with many restaurants and bars and home to one of Manchester's newest theatres: Home. Student accommodation is also a feature of the many tall buildings which are in this neighbourhood.

[Representative viewpoint 20]

Hulme

6.83. This zone has also been subject to a considerable amount of regeneration in recent years and a large area of recent mostly low rise housing has emerged as a result. In addition, this zone contains one of the largest public open spaces close to the city centre: Hulme Park. The principal southern approach road: Princess Road cuts through this zone and although the road is sunken, the footbridges that cross over it offer some of the best views of central Manchester. The zone is predominantly residential.

6.84. [Representative viewpoint 22]

Corridor Manchester

6.85. Embracing the area between Oxford Road and Cambridge Street as a main approach into Manchester City Centre this zone is characterised by its dense fabric of educational establishments focused on Manchester Metropolitan University but with elements of Manchester University and their associated teaching facilities and halls of residence.

6.86. Liberty Living, a 34-storey tower, is a principal landmark in close proximity to Oxford Road station and the 32 storey tower on New Wakefield Street. A busy and bustling zone this is an area of constant activity. It also includes the Whitworth Street Conservation Area. The urban grain is orientated on a north west – south east axis and the multi building Circle Square development on the old BBC site has a significant impact on both townscape character and views.

[Representative viewpoint 21]

Ordsall

6.87. Ordsall is a suburb of Salford consisting largely of residential housing with large areas of low rise housing, much of it terraced with gardens and cul-de-sacs. Occasional small open areas of public open space occur throughout. Representative viewpoint 16

Assessment of Effects

Limitations and Assumptions

6.88. The principal limitation as far as the field survey work was concerned has been that photography was undertaken in the summer months when the extent of foliage on trees is at its maximum and therefore reflects a best case scenario in terms of visibility but only a limited number of views are affected.

Embedded Mitigation

6.89. Mitigation in terms of visual and townscape effects has been incorporated into the Proposed Development as part of the design process by the scheme architects SimpsonHaugh and has evolved through consultation with the Local Planning Authority and others.

Sources of Effect

Demolition and construction phases

6.90. The construction of this building on a site on the centre of Manchester will clearly involve procedures and processes that are unsightly and intrusive consistent with operations on most large scale construction sites. However, this process is comparatively short-lived in nature when considered in the context of the lifespan of the Proposed Development concerned and will also be screened to some extent by existing buildings which surround it. The demolition and construction programme will commence as a single operation at the start of the project. The key physical activities will include:

- Site clearance.
- Construction plant such as cranes etc.

- Mobile construction plant.
- Delivery and stockpiling of materials.
- Protective fencing and hoardings.
- Unfinished appearance of the Proposed Development and its core for the majority of the construction period.
- Traffic movements associated with the above.

Assessment of Construction Phase Effects

6.91. The construction phase effects, for both Phases, Phase A and Phase B and C, as with the Operational Phase effects, are assessed against the Baseline. The townscape character area most affected by the demolition and construction operations are the Townscape Character Zones in and around the Proposed Development Site namely: Castlefield, Petersfield, St Johns and Civic Quarter.

6.92. In view of the scale of the Proposed Development, the magnitude of effect, and significance of effect is therefore predicted to be moderate adverse for the duration of the construction period due to site clearance works, stockpiling of demolition and construction materials, the use of construction equipment such as cranes and temporary fencing. The effects, however, should be relatively localised and temporary and will not affect other Townscape Character zones in any measurable way.

Effects of demolition, clearance and construction on Views

6.93. The effects of demolition and clearance on the Representative Viewpoints will also be readily visible in the immediate area surrounding the Proposed Development, as the ZTV demonstrates, but less so within the core of the city centre. Nonetheless, there is little doubt that the construction phase of any building of any scale, until it is fully clad, will involve processes that are visually unsightly and are likely, in visual effect terms to be largely adverse in nature.

6.94. This period, however, is only likely to be transitional and will be of short duration in relation to the lifespan of the Proposed Development itself. In view of the scale of the Proposed Development, the magnitude of effect, and significance of effect is therefore judged to be moderate adverse during the construction period in the following Zones: Castlefield, Petersfield, St Johns and Civic Quarter where views are obtained.

Operational phases

6.95. The source of the effect during the operation phase is concerned with the physical impact that the Proposed Development will have on views, visual and townscape receptors.

6.96. The townscape and visual effects of the Proposed Development are considered to be long term in terms of their duration.

Assessment of Operational Phase Effects

Effects of completed Development on Townscape Character and Views on Phase A and Phase B and CI

6.97. The visual and townscape effects of Phase A of the completed Proposed Development are now summarised with respect to the effects on townscape character and views. Phase A consists of the - Warehouse conversion (including demolition) of Deansgate Terrace North plus Great Northern Square

Phase A

6.98. The effects on surrounding townscape character will be very localized as the building is largely concealed by existing buildings on either side. This includes Deansgate Terrace to the west and Great Northern Tower to the east.

6.99. As the proposed development will be focussed on refurbishment, restoration and re-use of the existing Great Northern Warehouse, the reconfiguration of Great Northern Square the magnitude of townscape effect is judged to be moderate beneficial. Townscape sensitivity is high due to the proximity of listed buildings and the iconic status of Great Northern Warehouse in the townscape of central Manchester. Significance of effect for townscape receptors is therefore judged to be moderate beneficial which is significant in EA Regulation terms.

6.100. In visual terms the effects are also judged to be beneficial as the façade of the warehouse will be cleaned and repaired, new windows fitted to vacant openings as it refurbished and re-purposed. The removal of the functional Odeon building at the southern end of the scheme and its replacement with a well-designed frontage, complete with new pedestrian access to the rear of Deansgate terrace, is also considered to be a visual improvement on the baseline.

6.101. The same is true for the redevelopment of the public square at the north end. In terms of visibility however, the effects of this phase are localised and confined to the immediately adjacent character areas: Petersfield, Civic Quarter, Spinningfields, St Johns, and Castlefield. Here the magnitude of visual effect is also judged to be moderate beneficial with moderate beneficial significance of effect which is significant in EA Regulation terms.

Phase B and C

6.102. The visual and townscape effects of Phase B and C are now summarised with respect to the effects on townscape character and views through a narrative description of the nature of the effect on each of the Representative Viewpoints which lie within each character area. Phase B and C consists of partial demolition of the leisure box, (there is some overlap here with Phase A), delivery of the taller elements of the scheme, Buildings A , B and C and conversion of the southern end of Deansgate Terrace.

Medieval Core

Viewpoint 12 Manchester Cathedral

6.103. The urban grain opens out at this point and exposes a panoramic if somewhat channelled view, down the River Irwell corridor. Townscape Character is mixed with much of the development in this view recent in origin including the Premier Inn but dominated by the ongoing works on the previous Ramada hotel site in the foreground which is in the process of being demolished.

6.104. As a result, townscape susceptibility is judged to be low but the location is situated within the Cathedral Conservation Area so townscape sensitivity is medium overall. Visual receptor sensitivity is also medium, as this is a recently pedestrianized routeway, with adjacent local memorial, where receptors can sit and appreciate the view which includes Manchester Cathedral nearby.

6.105. The Proposed Development is barely perceptible in this view. Magnitude of effect for both categories therefore is no change which also translates into significance of effect values of no change which is not significant in EA regulation terms.

Retail Core

Viewpoint 18 Corporation Street

6.106. This viewpoint is located on the interface between the Medieval Core and Retail Core character areas but is focussed on the Retail Core looking down Corporation Street with the Arndale Centre on the left and major store outlets on the right. Modern development dominates the street view which is softened considerably by mature tree planting.

6.107. Townscape sensitivity is judged to be low with low susceptibility and value levels. Visual receptor sensitivity is also judged to be low in the context of a busy shopping area with most receptors in transit either on foot or on the tram where the view is part of the wider experience.

6.108. The Proposed Development is not visible in this view. Magnitude of effect for both categories therefore is no change which also translates into significance of effect values of no change which is not significant in EA regulation terms.

Viewpoint 11 New Cathedral Street

6.109. Located deep in the heart of the Retail Core this viewpoint is situated on the edge of St Ann's Conservation area. Recent development in the form of Beetham Tower, St Michaels and Deansgate Square is visible on the distant horizon but the focus of the view is dominated by the listed buildings that enclose St Ann's Square, including the tower of St Ann's Church.

6.110. Townscape susceptibility is judged to be medium and townscape value high due to the influence of St Anne's Conservation Area, medium high overall. Visual receptor sensitivity is equally high as St Anne's square is a key destination for visitors in Manchester and has many high-quality retail outlets and sitting areas to appreciate the view and surroundings. Visual receptor susceptibility is drawn from the more sensitive categories and visual receptor value is high also as this area is a key feature of central Manchester. Visual receptor sensitivity is therefore judged to be high.

6.111. The Proposed Development will be completely concealed from view by St Michaels in this view, so a value of no change is registered in terms of magnitude of effect, for both categories of receptor. This translates into no change for significance of effect for both categories which is not significant in EA regulation terms.

Viewpoint 19 Piccadilly Gardens

6.112. This viewpoint offers a niche view down Moseley Street. Townscape character is derived from a heterogenous mix of historic styles and modern development supplemented by a major tram route south to Peter's Square. Townscape susceptibility and value are both judged to be low as a result inferring low townscape sensitivity. This is a busy interchange close to a tram and bus terminus with most receptors in transit where the setting is not important. Visual receptor sensitivity is also judged to be low. The Proposed Development is not visible from this location. Magnitude of effect for both categories is no change and this translates into significance of effect values of no change also which is not significant in EA regulation terms.

Civic Quarter

Viewpoint 9 Albert Square

6.113. Closed temporarily for the refurbishment of the Town Hall, Albert Square remains nonetheless one of Manchester's most celebrated and iconic civic spaces. Townscape susceptibility and value are both high as the viewpoint is located within the Albert Square Conservation Area so townscape sensitivity is high. Similarly, visual receptor susceptibility and value are high as this is one of Manchester's key public spaces where the focus of attention and views are an important part of the experience. Visual Receptor sensitivity is high therefore. The tallest parts of the Proposed Development, the two towers, will consolidate the cluster of existing tall buildings including Great Northern Square and Beetham Hilton and reinforce the north south urban grain street pattern which mirror Deansgate from this perspective. The profile of this group of buildings will be extended marginally but not in any significant way. St Michael's has also radically changed the baseline from this viewpoint. The fit therefore, in both townscape and visual terms, is judged to be complementary. Magnitude of effect for both categories of receptor is judged to be negligible beneficial. As a consequence, significance of effect for townscape and visual receptors is considered to be minor beneficial which is not significant in EA regulation terms.

Viewpoint 10 St Peter's Square

6.114. This viewpoint is located on the north eastern corner of the square where potential visibility is at its maximum. Townscape susceptibility, value and consequently sensitivity are judged to be high as this is also one of Manchester's key civic spaces with the Central Library, Midland Hotel and war memorial key buildings and monuments featured in this space and part of the St Peter's Square Conservation Area.

6.115. Visual receptor sensitivity is medium with several receptors drawn from users of a public space where the view is part of the wider experience but mixed as many will be in transit either as pedestrians or as tram users. The viewpoint is of regional importance in terms of visual receptor value. The taller buildings A and B both feature in this view filling the void between the Central Library and Beetham Hilton and rising above the roofline of the Midland Hotel.

6.116. In so doing the Proposed Development adds to the panoply of tall buildings that provide the background to this square. Both buildings provide a contemporary interpretation of the materials and features found in Great Northern Warehouse and Deansgate Terrace. These finishes are sympathetic in tone and colour to the Midland Hotel and Central Library and the form is balanced in terms of its scale and fit between them both. Importantly, in visual composition terms, the towers step down and away from Beetham, connecting with the dome of the Central Library in the process.

6.117. The eroded top corners of the buildings help to soften the visual impact of their profile and are further softened with balconies and planting. Altogether, the magnitude of effect in both townscape and visual effect terms is judged to be minor beneficial which translates to significance of effect values of moderate beneficial townscape receptors and minor beneficial visual receptors which is significant and not significant in EA regulation terms.

Spinningfields

Viewpoint 1 Quay Street

6.118. Located at the busy intersection between Deansgate and Quay Street this viewpoint offers a close-up view of the Proposed Development. In townscape susceptibility terms the listed Victorian terrace façade to Deansgate is very prominent but recent development has emerged to add depth and new forms to the character of the townscape here.

6.119. This includes Beetham tower, constructed in 2004 and the more recent Deansgate Square and Viadux developments, currently under construction. In terms of townscape susceptibility therefore a value of medium is registered for this viewpoint. Townscape value is high as the viewpoint lies within the Deansgate Conservation Area inferring that townscape sensitivity is medium high overall. Visual receptor susceptibility is low as this is a busy intersection with most receptor categories in transit.

6.120. The view, however, is heavily influenced by listed buildings so visual receptor value is high as a result so visual receptor sensitivity is medium overall. The two key existing components of the townscape: Deansgate Terrace and the Great Northern Warehouse have laid the foundations for the development of the proposed scheme and influenced both the materiality and finish of the facades of the taller elements of the Proposed Development. The flexible 3m grid, which is the principal building block of the façade is derived from the repetitive fenestration pattern of the Great Northern Warehouse and represents the unitized approach to the design of the Proposed Development.

6.121. However, the approach is a contemporary interpretation using tones and colours derived from the red and blue bricks deployed so effectively, in a utilitarian way, in Great Northern Warehouse and in Deansgate Terrace. At higher elevations, lighter metal frames fit within the grid pattern and replace the shadow cast solid frame insets at lower levels. Vertical perforated ventilation panels, balconies and glazed panel all help to ensure that visual interest is varied across the whole building facade but not at the expense of unity of design.

6.122. Eroded top corners and broken vertical corners, adorned with green balconies, add to the detail contemporary interpretation, and help to soften the profile of the taller components. Both in profile and mass, buildings A, B and C work effectively to secure a broken profile that fits with the silhouette of Beetham and Great Northern Towers and relate well to Deansgate Terrace and Deansgate. As a result, the Proposed Development does not overwhelm in terms of scale.

6.123. The revised and improved landscape treatment of the public open space at the northern end helps to soften and enrich the public realm at street level. The net effect in terms of magnitude of effect for both categories is judged to be major beneficial which translates to major moderate beneficial significance of effect for both townscape and visual categories which is significant in EA regulation terms.

Chapel Street

Viewpoint 17 Trinity Way

6.124. A view taken to demonstrate the long distance effects of the Proposed Development on the emerging skyline of Manchester from one of the city's busiest routes: Trinity Way or the Inner Ring Road. Beetham tower and Deansgate Square are now notable tall buildings which are part of the baseline. Visual receptor sensitivity is mixed here, high associated with the residential apartments of Wilburn Street close by and low at ground level as this a major and constantly busy road so medium overall. Townscape sensitivity is low and with a good capacity to accommodate change. All three of the taller component parts of the Proposed Development are visible fitting effectively into the void between Great Northern tower and Beetham Hilton with their height allowing a subordinate but successful transition between the two. Façade details will be difficult to determine in detail at this distance but the colours are clearly muted and recessive and sufficient to allow them to be differentiated between the smooth glazed façades of Beetham Hilton and Great Northern Tower. Townscape fit is therefore judged to be complementary with recent development a significant feature in this view. Visual interest, in compositional terms, is improved as a new cluster emerges focussed on the Beetham tower such that in terms of magnitude of effect, for both categories, the effect is considered to be minor beneficial. This translates into a significance of effect of negligible beneficial for townscape and minor beneficial for visual receptors both of which are not significant in EA regulation terms.

St John's

Viewpoint 4a St John's Gardens

6.125. Located in St John's Garden, a quiet small public square offering sanctuary from the bustling city centre, this viewpoint offers an alternative location to many of the more urban viewpoints. Townscape susceptibility is medium high as modern development is not an intrinsic part of this setting although Beetham tower is located to the margins of the view filtered by foliage.

6.126. Townscape value is high as this viewpoint is located in the heart of the St John's Conservation Area so townscape sensitivity is medium high overall. Visual receptor susceptibility and sensitivity is also judged to be medium as this is a local facility of local value where views are part of the wider experience. Both buildings A and B of the Proposed Development are visible in this view and create a new skyline rising above the roofline of the low rise housing on Byrom Street.

6.127. The broken profile and permeable vertical edges of the taller elements of the scheme help to soften their visual impact but create a clearly separate sense of identity, divorced from the red brick buildings that line Byrom and St John's Street. They are not of the same scale or mass; however, as Beetham and do not overwhelm the view, but add depth to it. In terms of magnitude of effect the effects are judged to be moderate beneficial for both townscape and visual receptors. This translates into moderate beneficial effect for both townscape and visual categories which is significant in EA regulation terms.

Viewpoint 4b St John Street

6.128. Also located in the heart of the St John's Conservation Area this view explores the relationship the Proposed Development has with historic St John Street. Modern development is absent from this view inferring high townscape susceptibility and value levels.

6.129. Townscape sensitivity is high as a result. Visual receptor sensitivity is more likely to be medium as most receptors will be in transit or part of the business community of St John Street. Only the top of the tallest tower is visible in this view with minor subtle changes to the façade of the Great Northern Warehouse itself as the glazing is added to the windows.

6.130. The net effect in terms of magnitude of townscape and visual effects is negligible beneficial which translates into minor beneficial significance for townscape receptors and negligible beneficial for visual receptors both of which are not judged to be significant in EA regulation terms.

Petersfield

Viewpoint 2 Watson Street

6.131. This viewpoint provides an axial view of the eastern façade of the Proposed Development. Recent development visibly contributes to the townscape character in the form of Beetham Tower, Deansgate Square and most recently Viadux which is under construction. The focus of the view, Great Northern Warehouse, is part of the Strategic Regeneration Framework endorsed by MCC in 2017 for this complex. Townscape susceptibility is low as a result.

6.132. Although this viewpoint lies outside a Conservation Area the focus of the view, Great Northern Warehouse is a listed building townscape value is judged to be medium. Townscape sensitivity is therefore considered to be medium low. Most receptors at this point are travellers along Peter Street or Watson Street where the view is fleeting and incidental to their journey. Visual receptor sensitivity is judged to be low.

6.133. In terms of magnitude of effect tall buildings are very much part of townscape character and the view from this viewpoint. Building B is concealed behind Building A in this view and Building C is not visible. Building A replaces Beetham and brings the vertical element of the composition closer to the viewer in this view and ties into the podium of the Great Northern Warehouse more effectively here. The relationship with the warehouse in terms of materiality and finish is clear to see.

6.134. The vacant windows of the Warehouse are now glazed and the fenestration pattern and proportions are repeated throughout the Proposed Development reinforcing a sense of place. Beetham tower, which is somewhat detached in the baseline view now becomes a background feature, as does Viadux. The broken corner silhouette of Building A also helps to soften the profile and steps down to Beetham tower behind in subtle fashion. Visual composition, and interest, is therefore improved in this view and townscape character is also strengthened in a consistent way as tall buildings are very much a component part of the baseline.

6.135. Magnitude of effect for both townscape and visual receptors is judged to be moderate beneficial. This translates into significance of effect values of moderate beneficial significance which is significant in EA regulation terms.

Viewpoint 5 Lower Moseley Street

6.136. Located just outside the Midland Hotel the view is panoramic in nature and is a good illustration of the way in which recent development is shaping the townscape character of central Manchester. Manifest in the forms of Deansgate Square, Beetham Tower, Axis and, most recently Viadux, towers the latter of which is in the process of construction, these tall buildings are making a dramatic contribution to this view and altering the baseline in a significant way.

6.137. As such, townscape susceptibility is judged to be low but townscape value is high in the context of the public open space and the presence of two key listed buildings inferring that townscape sensitivity is medium overall. Most visual receptors are from transit categories drawn to and from the bulk of the buildings ranging from hotels, conference venues to concert halls. Visual receptor value is medium however, as two of central Manchester's key buildings: Manchester Central and the Midland Hotel occupy pivotal positions in the view enclosing a small area of public open space. Visual receptor sensitivity is judged to be medium overall.

6.138. The Proposed Development will achieve a good fit with the existing townscape character here which is heavily influenced by recent tall building development. The mass of the Beetham tower is now much better balanced and the varied heights of the two towers contrast effectively with the smoothed curved profile of Manchester Central and consolidate as a cluster. The granular nature of the façade resulting from the 3m modular grid system and the more textured approach to materiality with a more traditional colour finish offer welcome contrasts to the smooth glazed profiles of Beetham and Deansgate Square.

6.139. The magnitude of effect in both visual and townscape terms is therefore judged to be moderate beneficial. This translates into significance of effect values of moderate beneficial significance which is significant in EA regulation terms.

Castlefield

Viewpoint 3 Deansgate

6.140. This viewpoint represents a view looking up Deansgate just below its intersection with Liverpool Road and is a close up view of the Proposed Development form one of Manchester's principal streets. The view is dominated by Deansgate Terrace and the Beetham Hilton. Townscape susceptibility is judged to be medium influenced to a large extent by the Beetham Hilton and the fact that the focus of the view is part of an SRF.

6.141. Townscape value is medium with Deansgate Terrace, a listed façade, occupying such a prominent position in an area of coherent townscape character. Townscape sensitivity is therefore medium overall. Most categories of visual receptor are drawn from those in transit in connection with retail, transport or hotel visitors.

6.142. Visual receptor value is judged to be low at this point as it is not associated with a visitor attraction or viewpoint. Visual receptor sensitivity is therefore low overall. The street level perspective view will largely remain unaffected from this location but the connection between the Proposed Development, Deansgate Terrace and the new development associated with Great Northern Warehouse will radically improve both in terms of connectivity at street level, where access to the rear of Deansgate terrace is now addressed successfully, but also in terms of design and materiality.

6.143. Once again, the principal, detailed, components of the Proposed Development, referenced in viewpoint 1, are evident in buildings A, B and C as a modern flexible interpretation of materials and themes involved in the construction of the Great Northern Warehouse and Deansgate Terrace. In terms of mass and scale the taller elements of the Proposed Development step down coherently and in a measured way successfully tying Beetham tower down to street level. The principal perspective, influenced so strongly by Deansgate Terrace at street level, remains uncompromised.

6.144. In terms of magnitude of effect therefore, values of moderate beneficial for both receptor categories apply in this instance. This translates into values of moderate beneficial for townscape receptors and minor beneficial for visual receptors which are significant and not significant respectively in EA regulation terms.

Viewpoint 6 Liverpool Road

6.145. This view incorporates the world's oldest surviving terminal railway station, Liverpool Road which is now part of the Museum of Science and Industry. Beetham Hilton terminates this axial view and Viadux will join it nearby Townscape sensitivity is judged to be high here, derived from combined high values for susceptibility and townscape value as the station is a Grade 1 Listed building and such a dominant feature of the townscape.

6.146. Visual receptor sensitivity is also high as the station is such a dominant visual feature of national importance. In townscape terms; however, tall buildings are already an accepted part of the townscape character and the Proposed Development serves to ensure that the existing tall buildings do not appear as isolated elements but rather are now part of an established rhythm on the horizon. The colours, tones and textures used in the design of the taller elements of the scheme reflect the historical origins of the Great Northern Warehouse and Deansgate Terrace and soften the visual impact on townscape character to a considerable degree, providing a visual connection to most of buildings along Liverpool Road including the Railway Station.

6.147. Magnitude of effect in townscape terms is therefore considered to be minor beneficial. In visual terms, the isolating effect of Beetham is now improved by the addition of two towers which establish a vertical rhythm on the horizon with similar gaps between them. Importantly, their height is subordinate to Beetham which remains the preeminent building in this composition. The net magnitude of visual effect is minor beneficial also. This translates to a significance of effect value of moderate beneficial significance for both categories which is significant in EA regulation terms.

Viewpoint 7 Liverpool Road

6.148. Located in the centre of Liverpool Road this viewpoint explores the relationship of the Proposed Development with the Museum of Science and Industry (MoSI). This is also a listed building and a prominent feature of the townscape along Liverpool Road. Modern development in the form of Beetham tower is filtered by foliage in this view. Townscape sensitivity is similarly judged to be high here.

6.149. Visual receptor sensitivity is also high as the listed buildings are such a dominant visual feature and a major tourist attraction and the entrance to the Roman Fort is adjacent. The Proposed Development lies closer here and becomes more of a background feature to MoSI. The Proposed Development blends in rather than stands out.

6.150. As a consequence, the magnitude of effect for both receptor categories, townscape and visual, is considered to be minor beneficial. This translates to a significance of effect value of moderate beneficial which is significant in EA regulation terms.

Viewpoint 8 Castlefield Urban Heritage Park

6.151. Home to Mamcumium, Roman fort the remains of which are still present, this small green space is now part of Castlefield Urban Heritage Park and is within Castlefield Conservation Area. Beetham Hilton dominates the view and is now an established feature of the townscape conferring a townscape susceptibility value of medium. Townscape value is high so townscape sensitivity is medium high.

6.152. Visual receptor sensitivity is high also as visual receptors are drawn from the highest category and townscape value is high for heritage attraction reasons. Only the top of building A however, is seen from this space rising above the tree line. A value of negligible beneficial is therefore registered for townscape and visual magnitude of effects.

6.153. Values of minor beneficial significance of effect are registered for both receptor categories which is not significant in EA regulation terms.

Viewpoint 13 Castlefield

6.154. Castlefield Basin sits within Castlefield Conservation Area and Castlefield Urban Heritage Park and has a strong sense of townscape character derived for the most part by its large collection of historic buildings and features such as the Bridgewater Canal. However, in recent years the emergence of a cluster of tall buildings near Castlefield basin such as Deansgate Square, Crown Street Phase A, 2 – 4 Chester Rd and Viadux has changed the townscape and visual baseline to a significant degree. Townscape sensitivity is therefore judged to be medium as a result.

6.155. Visual receptor sensitivity is medium also in this quiet basin where the focus of the view remains within the confines of the enclosed townscape and where the focus remains on quiet enjoyment of the surroundings which are of high quality and value. Visible on the horizon, the multiple buildings of the Proposed Development complete the sense of enclosure at all levels connecting well with Beetham at lower levels. The taller elements of the scheme do not compete with any of the existing tall buildings in terms of scale or height and in terms of its materiality and design features there is an effective visual connect with the red brick used in so many historic buildings in Castlefield basin and link with Merchants warehouse, a former canal warehouse, in particular.

6.156. In terms of magnitude of effect therefore, the Proposed Development fits well and with the townscape character as a background element. Visually, the development is also very much a background feature which will not materially alter the composition or appreciation of the view. Values of minor beneficial are registered for this viewpoint for both categories which translates to significant of effect values of minor beneficial significance which is not significant in EA regulation terms.

Viewpoint 14 Castlefield

6.157. This viewpoint is also situated in the centre of Castlefield Conservation Area and Castlefield Urban Heritage Park. Townscape and visual receptor sensitivity remain medium for the reasons outlined above in Viewpoint 13. The buildings A and B are more prominent in this view but remain subordinate to Beetham Hilton and Viadux. The eroded top corners of both buildings A and B are prominent features helping to soften their profile noticeably.

6.158. In terms of magnitude of effect, they are consistent fit with other tall buildings in this view and at this distance will become part of the background and will reduce the isolation of Beetham Hilton in terms of visual composition. Magnitude of effect from both townscape and visual receptors is judged to be minor beneficial. As a consequence, significance of effect values are judged to be minor beneficial significance as a result for both categories. These values are not significant in EA regulation terms.

Viewpoint 23 Chester Road

6.159. Located at the traffic interchange between the Mancunian Way and the A56 Chester Road, this viewpoint offers a niche view into central Manchester. New development has made a significant contribution to a changing townscape with Beetham Hilton, 2- 4 Chester Road and Crown Street all present in this view. Townscape susceptibility is low as a result as is townscape value as the location is outside the Castlefield Conservation Area. Townscape sensitivity is therefore judged to be low. Visual receptor sensitivity is low also as most receptors are in transit and visual receptor value is low. The Proposed Development will form part of the tall building cluster at this point formed by Beetham Hilton, 2-4 Chester Road and Viadux and is a complementary fit both in terms of townscape character and improvements to visual composition. Magnitude of effect is judged to be minor beneficial for both categories of receptor. Significance of effect is judged to be negligible beneficial as a result which is not significant in EA regulation terms.

Water Street

Viewpoint 15 Ring Road

6.160. Located at traffic interchange between the Trinity Way, or the Inner Ring Road and the A57, this viewpoint offers a panoramic view of the skyline of central Manchester. Beetham Hilton is the notable landmark in this view along with Viadux which is emerging alongside. Townscape susceptibility is low as is townscape value at this location. Townscape sensitivity is therefore judged to be low.

6.161. Visual receptor sensitivity is low also as most receptors are in transit and visual receptor value is also low. The Proposed Development is partially concealed by trees such that only building B is visible which is well below and subordinate to Beetham consolidating the tall building cluster albeit at a lower level. The materiality, colour and unitized approach to the façade ensure that the buildings blend in with the foreground building without undue effort. As such it is judged to be a complementary fit both in terms of townscape character and improvements to visual composition.

6.162. Magnitude of effect is judged to be minor beneficial for both categories of receptor. Significance of effect is judged to be negligible beneficial as a result which is not significant in EA regulation terms.

First Street

Viewpoint 20 Medlock Street

6.163. This viewpoint is situated on a major access road into Central Manchester, Medlock Street. Development activity in this zone has been considerable in recent years and is ongoing as the emerging Viadux development testifies. Townscape susceptibility is low as a result and as this viewpoint lies outside a conservation area townscape value is low also. Townscape sensitivity is therefore low. This is primarily a commercial, rather than a residential, district at present with a mixture of offices and shops.

6.164. Most visual receptors are either at their place of work or in transit. Visual receptor sensitivity is judged to be low therefore. Viadux will effectively screen the Proposed Development from view. Magnitude of effect for both categories is therefore no change and this translates into significance of effect values of no change also which is not significant in EA regulation terms.

Hulme

Viewpoint 22 Hulme Park

6.165. Hulme Park is an open green space south of the city centre deep in the heart of Hulme. Because of its wide and open aspect it offers views of the city centre skyline above a ring of enclosing trees. This viewpoint was selected in towards the edge of the park avoiding Deansgate square towers which have now become the dominant visual influence. Receptor sensitivity is judged to be low here in the context of the Great Jackson Street SRF which has driven so much townscape change. Townscape susceptibility and sensitivity and is low as a result. The park is the largest park in Hulme and, as such, is a valuable green space of district value.

6.166. Visual receptor sensitivity is judged to be medium as the view is part of the experience but not focussed on a feature of special significance. The Proposed Development features in an imperceptible way, in comparison to the towers of Deansgate Square, above the tree line. Viadux will also have an effect in screening most of it.

6.167. Magnitude of effect is judged to be negligible beneficial which translates into negligible beneficial significance of effect which is not significant in EA regulation terms.

Corridor Manchester

Viewpoint 21 Princess Road

6.168. The Stretford Road crosses Princess Road at this point on a bridge which affords panoramic views of the city centre at an open point in the urban fabric of Hulme. Beetham Hilton forms a notable landmark on the horizon along with Deansgate Square and River Street which can all be clearly seen.

6.169. Townscape sensitivity is judged to be low here as this area has been the subject of much regeneration in recent years, which has increased its capacity to absorb change. Although it is a residential area the presence of Princess Road as a busy route and lack of any formal conservation designation reduces its sensitivity.

6.170. Visual receptor sensitivity is therefore judged to be low also. Viadux will effectively screen the Proposed Development from view. Magnitude of effect for both categories is therefore no change and this translates into significance of effect values of no change also which is not significant in EA regulation terms.

Ordsall

Viewpoint 16 Regent Road

6.171. Located on a busy crossing, this location supplies a middle-distance view of south Manchester from one of Manchester's principal access roads. The cluster of tall buildings emerging from the Great Jackson Street SRF are all prominent features of the townscape.

6.172. Both townscape and visual receptor sensitivity are judged to be low at this busy junction. The Proposed Development is barely perceptible in this view. Magnitude of effect for both categories, therefore, is registered as no change which also translates into significance of effect values of no change which is not significant in EA regulation terms.

Assessment of Cumulative Effects

Inter-project cumulative effects

6.173. In terms of inter- project cumulative effects, or effects arising from similar developments that are either consented or are coming forward in the planning process in close proximity to the Proposed EIA Development Site, there are developments that, cumulatively, are considered to affect the significance values for townscape and views. Table 6.9 summarises these schemes. Details of the Cumulative schemes are outlined in the ES Appendices and appear as different coloured wirelines in the AVRs in Appendix 6.2.

Table 6.9 Cumulative schemes

Planning reference	Cumulative Scheme	No of storeys / Ht
125804/FO/2019	325-327 Deansgate	22 storeys
111003/FO/2016/C1	10-12 Whitworth St	35 Storeys
068662/FO2003/C	Beetham Hilton Office Buildings	10 storeys
132199/FO/2021	Gt Jackson St	51 Storeys
129406/FO/2021	Deansgate South	28 Storeys
128002/FO/2020	One City Road	14 Storeys
118398/FO/2017	79 Moseley St	5 Storeys

6.174. The developments listed above will not have a universal effect on all of the selected viewpoints and the townscape character of the affected city centre zones of Salford and Manchester. The baseline schemes have already been assessed under the Operational Effects section earlier in this chapter. An assessment of cumulative schemes is necessary to understand the manner in which the Proposed Development fits in with neighbouring developments in the future.

6.175. Table 6.10, has been compiled to facilitate this process by first summarising the effect of the Proposed Development on its own, using the values resulting from the Operational Effects section, and then reassessed the effect in respect of the relevant committed cumulative scheme on a viewpoint-by-viewpoint basis. Where a cumulative scheme is predicted to have an effect on views or townscape character then the significance of effect values is reassessed and adjusted accordingly to take the scheme or schemes into account in each case.

6.176. The relevant cumulative schemes have been modelled and are represented as different coloured wirelines in the Cumulative Views in Appendix 6.2 Viewpoint and townscape photographs including AVR images.

6.177. Of course, as the cumulative schemes come forward then, in certain cases, visual receptor sensitivity is likely to increase as many of the developments contain apartments. However, by the same token, the magnitude of effect is likely to decline as the Proposed EIA Development will now be seen in the context of a greater number of similar developments of equivalent scale. As a result, the net effect, where the effect is deemed to be significant, is generally a lowering of the significance of effect value in cumulative terms. This is exacerbated to a value of not significant if the cumulative building obscures the view of the Proposed EIA Development completely which occurs in a few cases

Table 6.10 TVIA Committed Cumulative Schemes Impact Assessment summary table

(Note. The cumulative schemes listed below include those schemes with planning permission that have not yet commenced development. Those that have started construction are included in the baseline. Where townscape (T) and visual receptor (VR) significance of effect values are the same, one shared value is provided. Where they are different, a value is provided for both categories. Abbreviations: Maj = Major ;Mod = Moderate; Min = Minor ; Neg = Negligible)

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
1 Quay Street **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Medium** **Medium high** **Maj Beneficial** **Maj Beneficial** **Maj /Mod Beneficial**	 **Significant**	 **325-327** **Deansgate** **Gt Jackson St**	 **Maj/ mod** **beneficial**

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
2 Watson Street				
Sensitivity (VR)	**Low**			
Sensitivity (T)	**Medium Low**			
Magnitude (VR)	**Mod Beneficial**			
Magnitude (T)	**Mod Beneficial**			
Significance of effect	**Mod Beneficial**	**Significant**		**Mod beneficial**
3 Deansgate				
Sensitivity (VR)	**Low**			
Sensitivity (T)	**Medium**			
Magnitude (VR)	**Mod Beneficial**			
Magnitude (T)	**Mod Beneficial**			
Significance of effect (T)	**Mod Beneficial**			
Significance of effect (VR)	**Min Beneficial**	**Significant**		**None**
4a St John's Gardens				
Sensitivity (VR)	**Medium**			
Sensitivity (T)	**Medium / High**			
Magnitude (VR)	**Mod Beneficial**			
Magnitude (T)	**Mod Beneficial**			
Significance of effect	**Mod Beneficial**	**Significant**		**None**

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
4b Byrom St				
Sensitivity (VR)	**Medium**			
Sensitivity (T)	**High**			
Magnitude (VR)	**Neg Beneficial**			
Magnitude (T)	**Neg Beneficial**			
Significance of effect (T)	**Min Beneficial**			
Significance of effect (VR)	**Neg beneficial**	**Not significant**		**None**
5 Lower Moseley Street				
			10-12 Whitworth	
Sensitivity (VR)	**Medium**			
Sensitivity (T)	**Medium**			
Magnitude (VR)	**Mod Beneficial**			
Magnitude (T)	**Mod Beneficial**			
Significance of effect	**Mod Beneficial**	**Significant**		**Minor beneficial**
6 Liverpool Road				
Sensitivity (VR)	**High**			
Sensitivity (T)	**High**			
Magnitude (VR)	**Min Beneficial**			
Magnitude (T)	**Min Beneficial**			
Significance of effect	**Mod Beneficial**	**Significant**		**None**
7 Liverpool Road				
Sensitivity (VR)	**High**			
Sensitivity (T)	**High**			

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
Magnitude (VR) **Magnitude (T)** **Significance of effect**	**Min Beneficial** **Min Beneficial** **Mod Beneficial**	**Significant**		**None**
8 Castlefield Urban Heritage Park **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **High** **Medium high** **Neg Beneficial** **Neg Beneficial** **Min Beneficial**	**Not significant**		**None**
9 Albert Square **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **High** **High** **Neg Beneficial** **Neg Beneficial** **Min Beneficial**	**Not significant**		**None**
10 St Peter's Square **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect (T)** **Significance of effect (VR)**	 **Medium** **High** **Min Beneficial** **Min Beneficial** **Mod Beneficial** **Min Beneficial**	**Not Significant**	**2-4 Whitworth St** **79 Moseley St**	**Mod Beneficial** **Min Beneficial**

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
11 New Cathedral Street			**2-4 Whitworth St**	
			Gt Jacksons St	
Sensitivity (VR)	**High**			
Sensitivity (T)	**Medium high**			
Magnitude (VR)	**No change**			
Magnitude (T)	**No change**			
Significance of effect	**No change**	**Not significant**		**No change**
12 Manchester Cathedral				
Sensitivity (VR)	**Medium**			
Sensitivity (T)	**Medium**			
Magnitude (VR)	**No change**			
Magnitude (T)	**No change**			
Significance of effect	**No change**	**Not significant**		**No change**
13 Castlefield			**325-327 Deansgate**	
Sensitivity (VR)	**Medium**			
Sensitivity (T)	**Medium**			
Magnitude (VR)	**Min Beneficial**			
Magnitude (T)	**Min Beneficial**			
Significance of effect	**Min Beneficial**	**Not significant**		**Neg beneficial**
14 Castlefield			**325-327 Deansgate,**	
Sensitivity (VR)	**Medium**		**Beetham office building**	
Sensitivity (T)	**Medium**			
Magnitude (VR)	**Min Beneficial**			
Magnitude (T)	**Min Beneficial**			

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
Significance of effect	**Min Beneficial**	**Not significant**		**Min Beneficial**
15 Ring Road **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Low** **Low** **Min Beneficial** **Min Beneficial** **Neg Beneficial**	 **Not significant**		 **None**
16 Regent Road **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Low** **Low** **No change** **No change** **No change**	 **Not significant**	**2-4 Whitworth St** **One City Rd** **Gr Jackson St**	 **None**
17 Trinity Way **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect (T)** **Significance of effect (VR)**	 **Medium** **Low** **Min Beneficial** **Min Beneficial** **Neg Beneficial** **Min Beneficial**	 **Not significant**	**2-4 Whitworth St** **Deansgate South** **Gt Jacksons St**	 **Neg beneficial**
18 Corporation Street **Sensitivity (VR)**	 **Low**			

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
Sensitivity (T) **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	**Low** **No change** **No change** **No change**	**Not significant**		**None**
19 Piccadilly Gardens **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Low** **Low** **No change** **No change** **No change**	 **Not significant**		 **None**
20 Medlock Street **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Low** **Low** **No change** **No change** **No change**	 **Not significant**	**2-4 Whitworth St** **One City Road**	 **No change**
21 Princess Road **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)**	 **Low** **Low** **No change** **No change**		 **2-4 Whitworth St** **One City Road** **Gt Jackson St**	

Location	Development Only (included Residual Impact)	EIA significance	Relevant Cumulative Scheme	Cumulative Effect
Significance of effect	**No change**	**Not significant**		**No Change**
22 Hulme Park **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Medium** **Low** **Neg beneficial** **Neg beneficial** **Neg beneficial**	 **Not significant**	**2-4 Whitworth St** **Deansgate South** **Gt Jackson St**	 **No change**
23 A56 Chester Road **Sensitivity (VR)** **Sensitivity (T)** **Magnitude (VR)** **Magnitude (T)** **Significance of effect**	 **Low** **Low** **Min Beneficial** **Min Beneficial** **Neg Beneficial**	 **Not significant**	**2-4 Whitworth St** **Deansgate South** **325-327** **Deansgate**	 **Neg Beneficial**

Mitigation Measures

Mitigation of effects during the construction phase.

6.178. Mitigating the effects of the construction phase will involve high quality hoardings that will be used to limit unsightly visual impacts during the construction phase at street level. These will secure and protect the Proposed Development Site and prevent views of an unsightly construction site.

Mitigation of effects during operational phase

6.179. Mitigation measures for the operational phase are focussed on embedded mitigation measures which are an integral part of the design of the building, as progressed by architects SimpsonHaugh and fully described in the Design and Access Statement which accompanies the planning application. These mitigation measures deal with the Proposed Development's relationship to the site's heritage, the establishment of a sense of place derived from a unitised approach to the design of the scheme and the use of materials and features which sit comfortably with the surrounding neighbourhood.

Residual Effects

6.180. The visual impact assessment has been carried out based on the assumption that all the necessary mitigation measures have been accounted for in the design process. The images for selected viewpoints illustrated in Appendix 6.2 represent the accurate definition of the location and mass of the component parts of the Proposed EIA Development. The predicted significance of effect values are therefore the same for each representative viewpoint and Townscape Character Area as the residual effect values and are illustrated in Table 6.10 above.

7. Historic Environment

Introduction

7.1. This Chapter of the ES has been prepared by Stephen Levrant Heritage Architecture (SLHA) and assesses the likely Built Heritage impacts of the proposals upon the Site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

7.2. This Chapter is accompanied by one technical appendix: the accompanying Heritage Statement (Appendix 7.1). All work has been produced by Sarah Stirling (BA Hons, MA) and Anna Manley (BA Hons, MA) who both have four years' experience in producing ES Chapter reports on the built historic environment.

Limitations and Assumptions

7.3. Survey of the identified heritage assets within the study area was undertaken from publicly accessible areas, in order to identify appropriate areas for key views. As such the study is limited to assessment from ground level. Comprehensive, on-site surveys of the Listed Buildings within the subject site were undertaken in April 2022. An assessment of below ground archaeology does not form part of this assessment.

Legislative and Policy Context

7.4. The Heritage Statement (Appendix 7.1) has been prepared in accordance with or with reference to the following legislation, policy and guidance:

- Planning (Listed Buildings & Conservation Areas) Act 1990
- National Planning Policy Framework (NPPF) Conserving and enhancing the historic environment (2021);
- Planning Practice Guidance (PPG), Historic Environment, July 2019
- Principles of Selection for Listing Buildings, DCMS 2018
- Manchester Core Strategy (2012) Policy CC9 Design and Heritage and Policy EN3 Heritage;
- Historic England guidance: Conservation Principles Policies and Guidance (2008);
- Historic England's Good Practice Advice Note 2: Managing Significance in Decision-Taking in the Historic Environment (2015);
- Historic England's Good Practice Advice Note 3 (second edition): The Setting of Heritage Assets (2017);
- Historic England's Advice Note 1: Conservation Areas (second edition) (2019);
- Historic England's Advice Note 4: Tall Buildings (second edition) (2022).
- Historic England's Advice Note 12: Statements of Heritage Significance (2019)

Legislation

7.5. The Site contains a number of listed buildings, the Grade II* Great Northern Warehouse and the Grade II Deansgate Terrace (including the Former Entrance to Deansgate Goods Station and Nos. 223-291 Deansgate, comprising of two separate listings). The Site is also partially located within the Deansgate/Peter Street Conservation Area.

7.6. Section 66 of the Planning (Listed Building and Conservation Areas) Act 1990 requires the Local Planning Authority to "have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses" when considering to grant planning permission.

7.7. Section 72 of the Act is also of relevance, as it embodies the "general duty as respects conservation areas in exercise of planning functions" and stipulates that "special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area"

National Planning Policy

7.8. Section 16 of the National Planning Policy Framework (NPPF, 2021) sets out the Government's planning policies on the conservation of the historic environment.

7.9. The policies in the NPPF constitute the Government's view of what sustainable development in England means in practice. In these terms, development proposals which fail to give due weight to the conservation of heritage assets are deemed not to be sustainable development and consequently shall not be supported. This is because one of the key dimensions of sustainability is protecting and enhancing our historic environment.

7.10. The NPPF stresses that "great weight" should be given to the conservation of designated heritage assets (paragraph 199), emphasising the need to avoid substantial harm, in terms of demolition, alteration or the compromise of its setting. The fundamental objective is to ensure that the balance of the impact on the heritage assets is demonstrably beneficial, minimising any negative impact on their significance.

7.11. The NPPF establishes a clear hierarchy of significance for heritage assets, derived from their designated status. The fundamental objective is to avoid compromising designated heritage assets, such that any potential 'harm' from a development must be balanced against the potential advantages of the public benefits that may outweigh any harm (paragraphs 201-202).

7.12. The 'designated heritage asset' status of the identified Listed Buildings and Conservation Areas within and in the setting of any site requires that any potential 'harm' must be weighted and balanced against the potential advantages of the particular development. It is thus necessary to establish whether the effects of the proposals outweigh any perceived harm, in the context of the statutory duties set out above.

7.13. Local planning authorities may identify non-designated heritage assets. These are buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting their consideration in planning decisions, but which are not formally designated heritage assets.

Local Planning Policy

7.14. Within Manchester's Local Development Framework, Extant Policies DC18.1 (Conservation Areas) and DC19.1 (Listed Buildings) of the Unitary Development Plan (UDP) and Policies CC9 (Design and Change) and EN3 (Heritage) of the Core Strategy 2012-17 are relevant to this assessment. These policies seek to preserve and enhance the setting of buildings and areas of architectural or historic interest.

Assessment Methodology and Significance Criteria

7.15. This Chapter assesses the effect of the Proposed Development on designated built heritage assets, both within the Site and within a 500m study area. The study area was determined using professional experience and knowledge of the area and an understanding of the nature and form of the development, and its presence within the townscape. Please refer to Table 7.1 for significance criteria. A baseline 500m radius was decided upon following a desk-based assessment, which incorporated the results of the Zone of Visual Influence (ZVI), produced by Chris Burnett Associates. The study demonstrated the Proposed Development would not be viewed in conjunction with a number of heritage assets within the wider townscape due to existing, urban form. While there will be some negligible visibility in areas beyond 500m, these areas contain no heritage assets. As such, the proposed radius of 500m is considered to be proportionate and robust for the purposes of this assessment.

7.16. The Zone of Visual Influence (ZVI) prepared by Chris Burnett Associates has also been used to identify those assets within the setting of the Site that have the potential to be indirectly affected by the Proposed Development. The visual study has demonstrated that a number of the designated heritage assets within the study area will not be materially affected by the development and subsequently these have been scoped out of our assessment. The list of heritage assets scoped in for assessment is provided in Table 7.2.

Methods of Baseline Data Collection

7.17. Baseline data of the study area was collected utilising Historic England's Online Mapping tool and Manchester City Council's online data. Google Earth was also utilised as part of the baseline data collection.

Survey and Data Sources

7.18. On-site surveys of the Site and surrounding area were undertaken in January 2021 and a follow up site visit in August 2022. This informed both the appraisal of the Site as a component of the historic environment and its contribution to the setting of surrounding heritage assets.

7.19. Principal sources of baseline information therefore included Historic England's National Heritage List for England (NHLE) and the Conservation Area Appraisals on Manchester City Council's website were also a primary data source. Non-designated heritage assets are as identified during pre-application discussions with the Local Planning Authority

Assessment Methodology

7.20. The assessment methodology for the historic environment is a synthesis of established guidance, best practice and professional judgement. The assessment of effects of the proposed development has been undertaken in accordance with an adapted form of the methodology set out in the ICOMOS Guidance on 'Heritage Impact Assessments' (January 2011), in which the value of heritage attributes is assessed in relation to statutory designations.

7.21. The judgements on the significance or heritage value of assets are also informed by priorities or recommendations set out in national research agendas and ascribed values. Professional judgement is then used to determine the importance of the resource. The receptor (which for the purposes of this assessment are 'heritage assets') which has the potential to be affected by the Proposed Development is ascribed a value and subsequently the impact of the Proposed Development on them is assessed in order to determine the significance of the effect.

7.22. The following Historic England guidance has also informed the assessment undertaken in this Chapter:

- Historic England's Conservation Principles, Policies and Guidance (2008);
- Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets (2017);
- Historic England. Advice Note 4: Tall Building Guidance (2022); and
- Historic England (2019). Understanding Place: Conservation Area Designation, Appraisal and Management

7.23. The aims of the assessment have been:

- To establish the baseline environment regarding designated heritage assets related to the historic built environment, i.e. Listed Buildings and Conservation Areas.
- Assessment of the significance of the asset.
- Evaluation of the magnitude of impacts on the identified asset.
- Identification of mitigation in the form of further surveys, investigation and recording to be undertaken in light the identified impacts

Significance Criteria

7.24. Criteria has been established to appraise a heritage asset's significance. Statutory criteria, as set out in the 'Principles of Selection for Listing Buildings', DCMS (2018), provides a list of principles of assessing significance based on architectural and historic interest, age and rarity, aesthetic merits, selectivity and national interest. Historic England's criteria outlined in 'Conservation Principles, Policies and Guidance' (2008), are also considered in this assessment.

7.25. Evaluation of significance has been informed primarily by the designation of the assets at an international, national, regional or local level as well as their ability to contribute to an understanding of the past. This value rating has also been applied when considering sensitivity of views containing heritage assets. Indicative definitions for each of these ratings are outlined in Table 7.1.

Table 7.1 Significance Criteria for determining the value of heritage assets

Significance / Sensitivity	Definition of receptor
Very High	- Grade I listed buildings / Grade I registered parks and gardens - World Heritage Sites.
High	- Grade I and Grade II* listed buildings. - Other buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. - Conservation Areas containing very important buildings.
Medium	- Grade II listed buildings. - Historic buildings that can be shown to have exceptional qualities in their fabric or historical associations. - Conservation areas containing buildings that contribute significantly to its historic character.
Low	- Locally listed buildings. - Historic buildings of modest quality in their fabric or historical association.
Negligible	- Recorded on the HER in record form or as 'Find Sites' - buildings, structures, or designed landscape features, which detract from the architectural design, historic, communal, or townscape interest of the principal heritage asset.
Unknown / none	- Buildings/sites where the potential importance interest requires determination - Or sites determined to be of no heritage interest

Baseline Conditions

Brief History and Development

7.26. A detailed historical development of the Site and the surrounding area is provided in the Heritage Statement reproduced at Appendix 7.1 to this Chapter. We provide a summary description of the Site's historic development below.

7.27. The Site is located formerly known as Alport. This area on the outskirts of Manchester remained relatively undeveloped until the compulsory purchase of the Site by the Great Northern Railway Company in 1896. The purchase of the Site reflected one example of the intensification and industrialisation of the area in the second part of the 19th century and the contemporaneous development of the area with poor quality terraced housing, historically identified as an area of slums with a reputation of ill repute.

7.28. In 1880, the area to the east of the Site was cleared for the development of the new Central Station. This acted as a catalyst for further development and improvement works in the localised area, including the widening of key routes across the townscape.

7.29. The northern part of the Site was developed with a range of purpose-built goods offices to Peter Street. The development was designed to house the railway company's goods depot staff on the upper floors with shop units to the ground floor. Another building, the former 'Trafford Club' was located on the corner of Watson Street, and acted as the engineer's office for the warehouse site. The central section of the range comprised of a central railway office entrance flanked on either side by shops. The new railway offices were still in the process of construction when the site opened for business in 1898.

7.30. The main body of the Site was purchased in 1895 by the Great Northern Railway Company, the plot included alongside a number of surrounding shops and small residences, totalling an area of six to seven acres.

7.31. The company had no independent outlet or inlet for their traffic from Manchester or surrounding districts. The new depot was to compete with the Great Central Railway Company and the North Western and Midland Companies. The Site was cleared in 1897 and work commenced under a manual labour force of 800 men.

7.32. By the early 1900s the goods station required enlargement, with new railway sidings proposed to the east and the west of the goods yard in 1907 and in 1910, however these proposals were only partly built in 1920. Further incremental structures and officers were added to the Site into the mid-20th century.

7.33. With traffic slowing through the Site across the 1940s and 1950s, the warehouse eventually closed in 1963. It was subsequently used as a multi-level carpark with redevelopment of the site occurring in the early 2000s.

Current Baseline Conditions

7.34. The Site includes contains the Grade II* Great Northern Warehouse and the listed terraces at Nos. 223-291 Deansgate (covered by two separate designations). The Grade II listed Manchester & Salford Junction Canal Tunnel extends underneath the Site. A portion of the Site's northern boundary falls within the Deansgate/Peter Street Conservation Area. There are a number of listed buildings and Conservation Areas in the setting of the Site.

7.35. There have been alterations to the listed buildings on the Site across the 20th and 21st centuries. In c.2000, the subject site was redeveloped into leisure facilities, shops and restaurants with a large new building added to the south of the historic former warehouse, connected with a link building, and providing a large multi-screen cinema complex. The warehouse was converted into car parking. The Deansgate Terrace features a number of shops, restaurants and business units.

7.36. No heritage significance is derived in these later alterations, some of which are considered to have harmed the special historic and architectural value of the listed buildings on the Site and negatively affected the setting of surrounding heritage assets.

7.37. In March 2018, Planning Permission and Listed Building Consent were granted for the development and conversion of the warehouse for residential use with a new building replacing the c.2000 'Leisure Box' to the south. The proposals included the redevelopment of Deansgate Terrace. The scheme has not been fulfilled and the warehouse site is considered to be without a meaningful use.

Baseline Assessment

7.38. The baseline assessment was undertaken using a combination of a desk-based review of plans, maps, records and other documents followed by on-site surveys in order to identify and assess the heritage significance of designated heritage assets within the study area. The baseline assessment also establishes the way in which the settings and the Site contribute to the heritage significance of these assets.

7.39. Consideration has also been given to the historical development of the area, building types and materials and key views towards notable historic buildings which contribute to the identification of the built form and understanding of the character and special interest of the area.

7.40. The Local Planning Authority does not retain a local list of heritage assets, nor do they have established criteria for the identification of buildings or sites which have heritage significance at local level. As stated within Para 039 of the Planning Practice Guidance (PPG – updated July 2019), non-designated heritage assets should be identified by plan-making bodies. Para 040 goes on to state that "Plan-making bodies should make clear and up to date information on non-designated heritage assets accessible to the public to provide greater clarity and certainty for developers and decision-makers. This includes information on the criteria used to select non-designated heritage assets and information about the location of existing assets". In the absence of this information, there is no objective way to identify non-designated heritage assets as part of the baseline assessment. It should however be noted, buildings of some perceived historic interest (and their setting) are discussed within the Visual Impact Assessment (Section 6.6 of the Heritage Statement: Appendix 7.1). For instance, Viewpoint 8 in which the Oxnoble Public House is identified as a receptor within the view. With regards to features of archaeological interest, there is some discussion (where relevant) within the Heritage Statement report, including an assessment of the Grade II listed Salford Junction Canal Tunnel and the Scheduled Ancient Monument within the Castlefield Urban Heritage Park. The assessment has sought to be robust while remaining inherently proportionate, in line with the requirements of Para. 194 of the NPPF, which requires the level of detail to be "proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance".

7.41. The heritage assets identified for assessment are valued and the impact of the Proposed Development on each is determined and the impact ascribed a significance of effect.

7.42. In order to predict the magnitude and significance of effect of the potential visual impact of the Proposed Development, the following criteria is considered:

- The sensitivity and proximity of receptors (i.e. heritage assets);
- The nature of the existing views;
- The degree of change to existing views and the visibility of the Proposed Development; and
- The availability and amenity of alternative views

7.43. The assessment has identified 189 listed buildings (Figure 7.1) and a number of Conservation Areas in the 500m study area (Figure 7.3). The scoping exercise has determined that a number of these heritage assets have the potential to be impacted by the Proposed Development, including 52 listed buildings and seven Conservation Areas. For the purposes of this assessment, the Local Authority have not identified any non-designated heritage assets that they consider should be included within the study area of scoped in for assessment.

7.44. Please refer to Figure 7.2 for the approximate location of the identified listed buildings and scheduled monuments and Figure 7.3 for Conservation Areas within the Site and the study area. Table 7.2 below sets out the heritage assets scoped in for assessment within this Chapter and their ascribed heritage value.

Value/Importance of Heritage Assets

7.45. The relative 'value' and importance attributed to the identified heritage assets largely coincides with their national status. In line with ICOMOS terminology, Grade I buildings are considered to be of very high significance; Grade II* of high significance; and Grade II of medium heritage significance. The value of Conservation Areas is informed by the quality and significance of the built form within them and may be influenced by the status of listed and locally listed buildings which make up the designated area. The Heritage Statement (Appendix 7.1) has been written within this overarching framework.

Table 7.2 – heritage assets scoped in for assessment

Map Reference (Figure 7.2)	Description	Designation	Value / sensitivity
Listed Buildings			
1	Deansgate Goods Station and Attached Carriage Ramp	II*	High
2	Former Entrance to Deansgate Goods Station Including Numbers 223 to 233	II	Medium
3	Manchester and Salford Junction Canal Tunnel	II	Medium
4	235-291, Deansgate	II	Medium
5	G-Mex (Manchester Central)	II*	High
6	Castlefield Information Centre	II	Medium
7	Former Market Hall (Liverpool Road)	II	Medium
8	21-41 Liverpool Road	II	Medium
9	Museum Of Science and Industry, Air and Space Museum	II	Medium
10	Power Hall Of Museum of Science and Industry	II	Medium
11	Manchester Museum of Science and Industry, Former Lower Byrom Street Warehouse	II	Medium
12	Old Warehouse to North of Former Liverpool Road Railway Station	I	Very High
13	Former Liverpool Road Railway Station Masters House	I	Very High
14	Former Commercial Hotel	II	Medium
15	123 Liverpool Road	II	Medium
16	St. John Street (13 Listed Buildings – St. Johns	II (multiple entries)	Medium

	Street Nos.8-8a; No.10; No.12-16; Nos.18-20; No.22; No.24; No.24a-26; No.28; No.21-25; No.19 and No.11-17) and Byrom Street No.14 and No.15.		
17	St Johns College (Great John Street Hotel)	II	Medium
18	Royal London House	II	Medium
19	184 and 186, Deansgate	II	Medium
20	Onward Buildings	II	Medium
21	St. Ann's Church	I	Very High
22	Albert Memorial Hall	II	Medium
23	Free Trade Hall	II*	High
24	Royale Club	II	Medium
25	56-58 Peter Street	II	Medium
26	Midland Hotel	II*	High
27	Central Public Library	II*	High
28	Town Hall	I	Very High
29	Town Hall Extension	II*	High
30	Manchester Art Gallery	I	Very High
31	Britain's Protection Public House	II	Medium
32	13-17 Albion Street	II	Medium
33	Rochdale Canal Lock Keepers Cottage at Lock Number 91	II	Medium
34	Deansgate Station	II	Medium
35	Former Congregational Chapel	II	Medium
36	Castlefield Railway Viaduct	II	Medium
37	Merchants Warehouse	II	Medium

38	Middle Warehouse at Former Castle Field Goods Yard	II	Medium
39	Bridgewater Canal Offices	II	Medium
40	Former St Matthews Sunday School	II	Medium
Conservation Areas			
A	The Deansgate/Peter Street Conservation Area	Conservation Area	High-to-Medium
B	St John Street Conservation Area	Conservation Area	High-to-Medium
C	Albert Square Conservation Area	Conservation Area	High
D	St Peter's Square Conservation Area	Conservation Area	High-to-Medium
E	St Mary's Parsonage Gardens Conservation Area	Conservation Area	Medium
F	St Ann's Conservation Area	Conservation Area	High-to-Medium
G	Castlefield Conservation Area	Conservation Area	Medium

Identification and Evaluation of Significant Effects

7.46. Impacts may be beneficial or adverse. If the Proposed Development will enhance heritage values or the ability to appreciate them, then the impact on heritage significance will deemed to be beneficial. However, if the Proposed Development fails to sustain the heritage values of an asset or impairs an appreciation of their value then the impact will be deemed to be adverse.

Determining Magnitude of Impact and Significance of Effect

7.47. Table 7.3 below summarises the factors to be taken into consideration when assessing the magnitude of impact of the Proposed Development. The criteria are not intended to be prescriptive and the weighting to be accorded to each requires professional judgement.

Table 7.3 Significance Criteria for determining the value of heritage assets (adopted from ICOMOS Guidance)

Magnitude of Impact	Criteria for Assessing impact
Major beneficial	The development considerably enhances the heritage values of the heritage assets, or the ability to appreciate those values.
Moderate beneficial	The development enhances to a clearly discernible extent the heritage values of the heritage assets, or the ability to appreciate those values.

Minor beneficial	The development enhances to a minor extent the heritage values of the heritage assets, or the ability to appreciate those values.
Negligible beneficial	The resultant difference will be imperceptible but have a positive impact on the understanding or appreciation of the heritage asset.
Neutral	This does not necessarily mean that there will be no physical or visual change, rather that the resultant difference will be imperceptible or appropriately balanced
Negligible adverse	The development would not diminish the value of the heritage assets' significant physical fabric, their settings or significance to any appreciable degree.
Minor adverse	The development erodes to a minor extent the heritage values of the heritage assets, or the ability to appreciate those values.
Moderate adverse	The development erodes to a clearly discernible extent the heritage values of the heritage assets, or the ability to appreciate those values.
Major adverse	The development severely erodes the heritage values of the heritage assets, or the ability to appreciate those values.

7.48. Derived by combining the significant rating of each heritage asset with the magnitude of impact of the Proposed Development on each, Table 7.4 provides the overall assessment of the significance of the effect.

Table 7.4 – significance of effect.

Magnitude	Sensitivity		
	Very High / High	Medium	Low
Major	Major Adverse/Beneficial	Major-Moderate Adverse-Beneficial	Moderate – Minor Adverse-Beneficial
Moderate	Major –Moderate Adverse/Beneficial	Moderate –Minor Adverse-Beneficial	Minor Adverse/Beneficial
Minor	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor- Negligible Adverse/Beneficial
Negligible	Negligible Adverse/Beneficial	Negligible Adverse/Beneficial	Negligible Adverse/Beneficial
Neutral	Neutral	Neutral	Neutral

Testing Scenarios

7.49. Due to the phasing of the Proposed Development (comprising Phases 1 and 2; Deansgate Terrace South included in Phase B and C), a series of individual testing scenarios have been established to assess the impacts of the scheme at various points, including demolition and construction, and completed and operational phases. The testing scenarios are defined across the ES as follows:

1) Existing site (baseline), including developments currently under construction;
2) Existing site (baseline) with Proposed Development Phase A (as above) construction;

3) Existing site (baseline) with Proposed Development Phase A operation and Phase B and C construction (as above), including inter-phase mitigation;
4) Existing site (baseline) with Proposed Development Phase A and Phase B and C operation (as above); and
5) Existing site (baseline) with Proposed Development Phase A and Phase B and C operational (as above) and committed developments

Existing / Baseline (Testing Scenario 1)

7.50. As detailed in the Heritage Statement (reproduced at Appendix 7.1), in the baseline scenario, the listed buildings within the Site are generally well preserved, albeit. The low architectural and townscape quality of the early 2000s additions within the Site (principally the 'Leisure Box' development in the southern part of the plot) contribute negatively to the significance and setting of the listed buildings, diminishing an appreciation of their special interest independently and as a group, including their contribution to the wider Deansgate/Peter Street Conservation Area.

7.51. Low quality additions to the Site also detract from the setting of the closest listed buildings in the setting of the Site, reducing the positive contribution made by the listed buildings in the Site to the setting of localised heritage assets. For those assets located at a greater distance from the boundary, the Site's contribution to their setting and subsequently an appreciation of their significance is more limited and is generally considered to be neutral.

Demolition and Construction Phases (Scenarios 2 and 3)

7.52. During the two phases of demolition and construction works (across Phases A and B), works related to the Proposed Development will trigger various construction impacts which in turn will temporarily directly and indirectly impact the heritage assets within the Site and indirectly impact those in its setting.

7.53. During Phase A (Testing Scenario 2), the direct demolition and construction impacts on the listed buildings within the Site will comprise physical works to their fabric including, for example, the replacement of glazing and the creation of a new atrium within the Warehouse. It is considered that these works will give rise to temporary Moderate adverse impacts on the listed buildings within the Site during this phase, with a Minor-Moderate adverse impact identified for the Conservation Area. These effects are temporary, and so not significant.

7.54. These designated assets will also be indirectly affected by construction works in their setting (as part of both Testing Scenarios 2 and 3), resulting in temporary impacts such as dust, vibration and noise. Appropriate measures for the protection of sensitive historic fabric within the Site (the listed buildings) would be subject to agreement with the Local Authority and secured through the Listed Building Consent applications.

7.55. A selection of nearby heritage assets will also be affected through the same temporary impacts across both the construction works in Phases A and B (both Testing Scenarios 2), albeit to a lesser extent than the assets within the Site and to varying degrees dependent on their distance from the Site boundary. The affected heritage assets will have to be adequately protected during the works to ensure no unprecedented direct (physical) harm (i.e. loss of historic fabric) occurs. Where potential effects arising from the demolition and construction phases are identified on specific heritage assets in the study area, these impacts are considered to range from Minor adverse to Negligible adverse.

7.56. Comprehensive demolition and construction method statements have been submitted alongside the Planning and Listed Building Consent applications in order to minimise any unwarranted direct heritage impact to any designated heritage assets. Subject to these effective mitigation measures, it will be clear there will be no permanent adverse impact upon the aforementioned assets during the operational phase.

7.57. The potential impacts across all of the demolition and construction phases of the Proposed Development (Testing Scenarios 2 and 3) on designated heritage assets within the Site and identified assets within its setting are summarised in Table 7.5.

Completed and Operational Phase (Scenarios 3 and 4)

7.58. The Proposed Development will result in direct and indirect effects to the heritage assets within the Site (Deansgate Goods Station and Attached Carriage Ramp (Grade II*), Former Entrance to Deansgate Goods Station Including Numbers 223 to 233 (Grade II), 235-291, Deansgate (Grade II), and The Deansgate/Peter Street Conservation Area) through the conversion of the listed buildings to new office, retail and leisure uses and through the introduction of a series of new tall buildings into their local setting and the regeneration of associated areas of public realm within the Site.

7.59. These impacts are considered in the context of Testing Scenarios 3 and 4 which address the direct works to the listed buildings and Conservation Area and the demolition and construction work associated with Phase B in their setting. In Testing Scenario 3, the direct impact on the listed buildings and Conservation Area is considered to be **Moderate beneficial** owing to the restoration of the historic structures and the injection of new positive uses. The temporary impact on their setting through the construction works related to Phase B would be **Moderate adverse** owing to the effects described above including noise, dust, and vibration.

7.60. Heritage assets in the environs of the Site will be impacted indirectly to varying degrees by the Proposed Development through works to their setting across Testing Scenarios 3 and 4.

7.61. Overall, this assessment has identified that the completed and operational phase of the Proposed Development will result in varying degrees of beneficial and adverse impacts on the built historic environment within the identified study area.

7.62. The potential direct and indirect effects for individual heritage assets are presented in Table 7.5.

Table 7.5 Likely Designated Effects at Demolition and Construction Stage and Completion and Operational Stage

Receptor(s)	Significance / Sensitivity value	Scale of Impact	Significance of Effect
Demolition and Construction			
Deansgate Goods Station and Attached Carriage Ramp (Grade II*)	High	Moderate adverse	**Moderate adverse** (direct and indirect)
Former Entrance to Deansgate Goods Station Including Numbers 223 to 233 (Grade II)	Medium	Moderate adverse	**Moderate adverse** (direct and indirect)
Manchester and Salford Junction Canal Tunnel (Grade II)	Medium	Minor adverse	**Minor adverse** (indirect)
235-291, Deansgate (Grade II)	Medium	Moderate adverse	**Moderate adverse** (direct and indirect)
G-Mex (Manchester Central) (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Castlefield Information Centre (Grade II)	Medium	Minor adverse	**Minor adverse** (indirect)
St. John Street Numbers 25 to 31 and Attached Former Chapel	Medium	Minor adverse	**Minor-moderate adverse** (indirect)
St John Street No.8-8a	Medium	Minor adverse	**Minor adverse** (indirect)

Receptor(s)	Significance / Sensitivity value	Scale of Impact	Significance of Effect
St John Street No.10	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.12-16	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.18-20	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.22	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.24	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.24a-26	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.28	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.21-25	Medium	Minor adverse	**Minor adverse** (indirect)
St John St. No.19	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.11-17	Medium	Minor adverse	**Minor adverse** (indirect)
Royal London House (Grade II)	Medium	Minor adverse	**Minor adverse** (indirect)
Free Trade Hall (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Albert Memorial Hall (Grade II)	Medium	Minor adverse	**Minor adverse** (indirect)
Royale Club (Grade II)	Medium	Negligible adverse	**Negligible adverse** (indirect)
Conservation Areas			
The Deansgate/Peter Street Conservation Area	High-to-Medium	Minor adverse	**Minor-Moderate adverse** (direct and indirect)
St John Street Conservation Area	High	Minor adverse	**Minor adverse** (indirect)
Castlefield Conservation Area	Medium	Minor adverse	**Minor adverse** (indirect)
Completed and Operational			
Listed Buildings			
Deansgate Goods Station and Attached Carriage Ramp (Grade II*)	High	Moderate beneficial	**Moderate beneficial** (direct and indirect)
Former Entrance to Deansgate Goods Station Including Numbers 223 to 233 (Grade II)	Medium	Moderate beneficial	**Moderate beneficial** (direct and indirect)
Manchester and Salford Junction Canal Tunnel (Grade II)	Medium	Negligible	**Neutral** (direct and indirect)

Receptor(s)	Significance / Sensitivity value	Scale of Impact	Significance of Effect
235-291, Deansgate (Grade II)	Medium	Moderate beneficial	**Moderate beneficial** (direct and indirect)
G-Mex (Manchester Central) (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Castlefield Information Centre (Grade II)	Medium	Minor beneficial	**Minor beneficial** (indirect)
Former Market Hall (Liverpool Road) (Grade II)	Medium	Minor beneficial	**Minor beneficial** (indirect)
21-41 Liverpool Road (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Museum Of Science and Industry, Air and Space Museum (Grade II)	Medium	Negligible	**Negligible adverse** (indirect)
Power Hall Of Museum of Science and Industry (Grade II)	Medium	Negligible	**Negligible adverse** (indirect)
Manchester Museum of Science and Industry, Former Lower Byrom Street Warehouse (Grade II)	Medium	Negligible	**Negligible adverse** (indirect)
Old Warehouse to North of Former Liverpool Road Railway Station (Grade I)	Very High	Negligible	**Neutral** (indirect)
Former Liverpool Road Railway Station Masters House (Grade I)	High	Negligible	**Neutral** (indirect)
Former Commercial Hotel (Grade II)	Medium	Negligible	**Neutral** (indirect)
123 Liverpool Road (Grade II)	Medium	Negligible	**Neutral** (indirect)
St. John Street Numbers 25 to 31 and Attached Former Chapel	Medium	Minor-moderate adverse	**Minor-moderate adverse** (indirect)
St John Street No.8-8a	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.10	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.12-16	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.18-20	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.22	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.24	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.24a-26	Medium	Minor adverse	**Minor adverse** (indirect)

Receptor(s)	Significance / Sensitivity value	Scale of Impact	Significance of Effect
St John Street No.28	Medium	Minor adverse	**Minor adverse** (indirect)
St John Street No.21-25	Medium	Minor adverse	**Minor-moderate adverse** (indirect)
St John St. No.19	Medium	Minor adverse	**Minor-moderate adverse** (indirect)
St John Street No.11-17	Medium	Minor adverse	**Minor-moderate adverse** (indirect)
Byrom Street - No.15.	Medium	Minor adverse	**Minor adverse** (indirect)
St Johns College (Great John Street Hotel) (Grade II)	Medium	Neutral	**Neutral** (indirect)
Royal London House (Grade II)	Medium	Neutral	**Neutral** (indirect)
184 and 186, Deansgate (Grade II)	Medium	Neutral	**Neutral** (indirect)
Onward Buildings (Grade II)	Medium	Neutral	**Neutral** (indirect)
St. Ann's Church (Grade I)	Very High	Minor adverse	**Neutral** (indirect)
Albert Memorial Hall (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Free Trade Hall (Grade II*)	High	Negligible	**Negligible beneficial** (indirect)
Royale Club (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
56-58 Peter Street (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Midland Hotel (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Central Public Library (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Town Hall (Grade I)	Very High	Negligible	**Negligible adverse** (indirect)
Town Hall Extension (Grade II*)	High	Minor adverse	**Minor adverse** (indirect)
Manchester Art Gallery (Grade I)	Very High	Neutral	**Neutral** (indirect)
Britain's Protection Public House (Grade II)	Medium	Neutral	**Neutral** (indirect)
13-17 Albion Street (Grade II)	Medium	Negligible	**Neutral** (indirect)

Receptor(s)	Significance / Sensitivity value	Scale of Impact	Significance of Effect
Rochdale Canal Lock Keepers Cottage at Lock Number 91 (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Deansgate Station (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Former Congregational Chapel (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Castlefield Railway Viaduct (Grade II)	Medium	Negligible	**Neutral** (indirect)
Merchants Warehouse (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Middle Warehouse at Former Castle Field Goods Yard (Grade II)	Medium	Negligible	**Negligible beneficial** (indirect)
Bridgewater Canal Offices (Grade II)	Medium	Neutral	**Neutral** (indirect)
Former St Matthews Sunday School	Medium	Negligible	**Neutral** (indirect)
Conservation Areas			
The Deansgate/Peter Street Conservation Area	High-medium	Minor beneficial	**Minor beneficial** (direct and indirect)
St John Street Conservation Area	High	Minor-moderate adverse	**Minor-moderate adverse** (indirect)
Albert Square Conservation Area	Very High	Negligible	**Negligible adverse** (indirect)
St Peter's Square Conservation Area	High	Negligible	**Negligible adverse** (indirect)
St Mary's Parsonage Gardens Conservation Area	Medium	Neutral	**Neutral** (indirect)
St Ann's Conservation Area	High	Minor adverse	**Neutral** (indirect)
Castlefield Conservation Area	High	Negligible	**Negligible beneficial** (indirect)

Mitigation Measures

7.63. Heritage considerations have been integral to the design of the proposals. Enlisting appropriate specialists and consultation with the Local Planning Authority and Historic England has informed the design development and assessment process to ensure potential adverse impacts, including direct and indirect (visual and setting) impacts, on the identified heritage assets are minimised.

7.64. In line with Historic England's 2017 guidance on assessing the setting of heritage assets, it will be clear that for "some developments affecting setting, the design of a development may not be capable of sufficient adjustment to avoid or significantly reduce the harm, for example where impacts are caused by fundamental issues such as the proximity, location, scale, prominence or noisiness of a development. In other cases, good design may reduce or remove the harm, or provide enhancement" (HE, GPA3. 2nd Edition 2017 - Para.39)

Embedded Mitigation

7.65. No additional mitigation is required in the operational phases of the Proposed Development because the key mitigation measures have been designed, or 'embedded', into the scheme. Throughout the design development process and the options analysis for the redevelopment of the Site, the Applicant and Design Team has considered how mitigation could be embedded into the Proposed Development to reduce as far as possibly likely effects resulting from the completed and operational phases on the historic built environment.

7.66. The Proposed Development has been designed to respond to the architectural qualities of the Grade II* listed Great Northern Warehouse and Grade II listed Deansgate Terrace. Despite the variation in aesthetic treatment, the heritage assets share group value by virtue of the terrace being constructed a few years later as a 'screen' to the Victorian warehouse. The Proposed Development has sought to provide a complementary, yet assertive backdrop to this significant group of Listed Buildings, utilising grid-like proportions and warm tones of red-brick to create the sense of a cohesive group.

7.67. The proposed redevelopment of the landscaping strategy to Great Northern Square will encourage a more successful and sustainable use of the space, promoting greater pedestrian activity to the area and in turn, a beneficial impact upon the setting of the Grade II* listed warehouse and Former Goods Shed Entrance (Grade II).

7.68. The introduction of 'Dean Street' to the west of the warehouse will further enhance pedestrian activity and movement through the significant site, and will see the removal of the highly obtrusive, early 2000s alterations and additions which currently detract from the setting of the Listed Building group. Dean Street will feature a number of new access points into the warehouse, allowing for the western elevation to be appreciated for the first time in decades. Although it is recognised the glazed lifts and circulation core will be read as a contemporary addition, the impact of this alteration has been minimised through the use of light-weight, reflective materials.

7.69. Following analysis of initial key views, it was evident the height and massing of the proposals would incur some adverse, visual impact upon the setting(s) of designated heritage assets within the wider townscape. The project team has sought to minimise this impact where possible, through creating set back balconies to select corners of Buildings A and C. This mitigation measure has successfully minimised the visual impact on the setting of highly significant groups of heritage assets, such as the collection of Grade II listed Georgian properties fronting St John Street.

7.70. The Grade II listed Former Goods Shed entrance at 223-233 Deansgate was originally designed as a screen wall / facade, which was redeveloped in the early 2000s to accommodate new office spaces. Whilst the current proposals will not reverse this insensitive alteration in principle, the replacement extension will be of much greater design-quality; featuring an active roof terrace and poetry wall in place of the current provision.

Demolition and Construction

7.71. Recommended measures to be included within a Construction Environmental Management Plan for the Site include:

- Use of high quality hoardings;
- Dust management;

- Vibration monitoring;
- Regular cleaning of roads and the public realm surrounding the Site;
- Edge protection to be affixed whilst concreting operations are in place; and
- Implementation of a traffic management plan.

Cumulative Effects (Scenario 5)

7.72. The cumulative impact is considered as direct (physical) and indirect (visual) to help disaggregate the type and degree of change. This can be cumulative, temporary and permanent, reversible or irreversible, visual, physical, social and cultural, even economic. As stated within Historic England's Guidance on 'Managing Significance in Decision Taking', *"the cumulative impact of incremental small-scale changes may have as great an effect on the significance of a heritage asset as a larger scale change…consideration still needs to be given to whether additional change will further detract from, or can enhance, the significance of the asset in order to accord with NPPF policies."* It is therefore necessary to assess cumulative change as a result of consented schemes, in conjunction with the change brought about by the Proposed Development.

7.73. The cumulative schemes list that has been agreed as part of the scoping process (provided by Deloitte) provided a baseline for assessment. The cumulative scheme list identified consented development within a 500m radius of the site. Those schemes which would be visible in conjunction with the proposals (as demonstrated by AVR views) are identified as follows:

2) – 3 St. John's (fuchsia) Ref: 120062/FO/2018

3) – St Michaels (Yellow) Ref: 114664/FO/2016

4) – Viadux (Green) Ref: 115871/FO/2017

8) – 325 Deansgate (Dark Blue) Ref: 125804/FO/2019

10) – Vision (Turquoise) Ref: 111003/FO/2016/C1

7.74. Refer to full cumulative list (Deloitte) for details of additional cumulative schemes and refer to cumulative schemes map (OurStudio).This can be found at Appendix 2.1 within the Scoping Report.

7.75. The Proposed Development will knit into an area which is already characterised by buildings of considerable scale, principally including the Viadux scheme (under construction) and the Beetham Tower. It will be clear the Proposed Development responds well to the existing and emerging townscape context, contributing to the emerging cluster of tall buildings around Watson Street; an area which has been identified as a key nodal point within the city centre.

7.76. The cumulative impact assessment has identified the minor adverse visual impact upon the Grade I listed Church of St Ann (and the St Ann's Square Conservation Area) will be mitigated (neutral impact) once the St. Michaels Scheme is operational. The consented scheme will largely obscure views of the Proposed Development, resulting in a neutral impact overall. This is reflected within the residual effects table below.

7.77. In views from Deansgate South, looking north, the Proposed Development will be read alongside the St. Michael's tower; which will punctuate above the established roofline of the listed terrace. Although the additional mass and scale within the view will incur some adverse impact and some further distraction above the dynamic roofline of Deansgate Terrace, this adverse impact would be negligible at most. The enhancement to the immediate setting of the Grade II listed Deansgate Terrace will continue to be the principal focus of the view. Incurring an overall beneficial impact from north facing views along Deansgate overall.

7.78. While the Proposed Development will be read alongside additional, consented schemes (listed above), their presence will not result in any material change to heritage impact, with the exception of Viewpoint 11. Please refer to the Heritage Statement report (Appendix 7.1) for detailed discussion.

Residual Effects

7.79. As described above, consideration to mitigating the impacts on the identified heritage assets has been made throughout the development of the proposals.

7.80. A summary of the potential and residual effects is set out below in Table 7.6.

Table 7.6 – Summary of Residual Effects in relation to heritage

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Construction			
Listed Buildings			
Deansgate Goods Station and Attached Carriage Ramp (Grade II*)	**Moderate adverse** (direct and indirect)	CEMP	**Moderate - neutral** (direct) Moderate adverse (indirect)
Former Entrance to Deansgate Goods Station Including Numbers 223 to 233 (Grade II)	**Moderate adverse** (direct and indirect)	CEMP	**Moderate - neutral (direct)** **Moderate adverse (indirect)**
Manchester and Salford Junction Canal Tunnel (Grade II)	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
235-291, Deansgate (Grade II)	**Moderate adverse** (direct and indirect)	CEMP	**Moderate - neutral (direct)** **Moderate adverse (indirect)**
G-Mex (Manchester Central) (Grade II*)	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
Castlefield Information Centre (Grade II)	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St. John Street Numbers 25 to 31 and Attached Former Chapel	**Minor-moderate adverse** (indirect)	CEMP	**Minor-moderate adverse** (indirect)
St John Street No.8-8a	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.10	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.12-16	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.18-20	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.22	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.24	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.24a-26	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)
St John Street No.28	**Minor adverse** (indirect)	CEMP	**Minor adverse** (indirect)

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
St John Street No.21-25	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
St John St. No.19	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
St John Street No.11-17	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Royal London House (Grade II)	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Free Trade Hall (Grade II*)	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Albert Memorial Hall (Grade II)	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Royale Club (Grade II)	Negligible adverse (indirect)	CEMP	Negligible adverse (indirect)
Conservation Areas			
The Deansgate/Peter Street Conservation Area	Minor-Moderate adverse (direct and indirect)	CEMP	Minor-Moderate adverse (direct and indirect)
St John Street Conservation Area	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Castlefield Conservation Area	Minor adverse (indirect)	CEMP	Minor adverse (indirect)
Operational			
Listed Buildings			
Deansgate Goods Station and Attached Carriage Ramp (Grade II*)	Moderate – neutral (direct and indirect)	Design development and public benefits	Moderate– neutral **(direct and indirect)**
Former Entrance to Deansgate Goods Station Including Numbers 223 to 233 (Grade II)	Moderate – neutral (direct and indirect)	Design development and public benefits	Moderate– neutral (direct and indirect)
Manchester and Salford Junction Canal Tunnel (Grade II)	Negligible neutral (direct and indirect)	n/a	Negligible neutral (direct and indirect)
235-291, Deansgate (Grade II)	Moderate– neutral (direct and indirect)	Design development and public benefits	Moderate– neutral (direct and indirect)
G-Mex (Manchester Central) (Grade II*)	Minor adverse (indirect)	n/a	Minor adverse (indirect)

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Castlefield Information Centre (Grade II)	Minor beneficial (indirect)	Design development and public benefits	Minor beneficial (indirect)
Former Market Hall (Liverpool Road) (Grade II)	Minor beneficial (indirect)	Design development and public benefits	Minor beneficial (indirect)
21-41 Liverpool Road (Grade II)	Negligible beneficial (indirect)	n/a	Negligible beneficial (indirect)
Museum Of Science and Industry, Air and Space Museum (Grade II)	Negligible adverse (indirect)	n/a	Negligible adverse (indirect)
Power Hall Of Museum of Science and Industry (Grade II)	Negligible adverse (indirect)	n/a	Negligible adverse (indirect)
Manchester Museum of Science and Industry, Former Lower Byrom Street Warehouse (Grade II)	Negligible adverse (indirect)	n/a	Negligible adverse (indirect)
Old Warehouse to North of Former Liverpool Road Railway Station (Grade I)	Neutral (indirect)	n/a	Neutral (indirect)
Former Liverpool Road Railway Station Masters House (Grade I)	Neutral (indirect)	n/a	Neutral (indirect)
Former Commercial Hotel (Grade II)	Neutral (indirect)	n/a	Neutral (indirect)
123 Liverpool Road (Grade II)	Neutral (indirect)	n/a	Neutral (indirect)
St. John Street Numbers 25 to 31 and Attached Former Chapel	Minor-moderate adverse (indirect)	n/a	Minor-moderate adverse (indirect)
St John Street No.8-8a	Minor-moderate adverse (indirect)	n/a	Minor-moderate adverse (indirect)
St John Street No.10	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John Street No.12-16	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John Street No.18-20	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John Street No.22	Minor adverse (indirect)	n/a	Minor adverse (indirect)

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
St John Street No.24	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John Street No.24a-26	Minor adverse- (indirect)	n/a	Minor adverse- (indirect)
St John Street No.28	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John Street No.21-25	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St John St. No.19	Minor-moderate adverse (indirect)	n/a	Minor-moderate adverse (indirect)
St John Street No.11-17	Minor-moderate adverse (indirect)	n/a	Minor-moderate adverse (indirect)
Byrom Street - No.15.	Minor adverse (indirect)	n/a	Minor adverse (indirect)
St Johns College (Great John Street Hotel) (Grade II)	Neutral (indirect)	n/a	Neutral (indirect)
Royal London House (Grade II)	Neutral (indirect)	Design development and public benefits	Neutral (indirect)
184 and 186, Deansgate (Grade II)	Neutral (indirect)	Design development and public benefits	Neutral (indirect)
Onward Buildings (Grade II)	Neutral (indirect)	Design development and public benefits	Neutral (indirect)
St. Ann's Church (Grade I)	Minor adverse (indirect)	n/a Cumulative view – St. Michaels will screen proposed development	Minor adverse Neutral (indirect)
Albert Memorial Hall (Grade II)	Negligible beneficial (indirect)	T Design development and public benefits	Negligible beneficial (indirect)
Free Trade Hall (Grade II*)	Negligible beneficial (indirect)	Design development and public benefits	Negligible beneficial (indirect)
Royale Club (Grade II)	Negligible beneficial (indirect)	Design development and public benefits	Negligible beneficial (indirect)
56-58 Peter Street (Grade II)	Negligible beneficial (indirect)	n/a	Negligible beneficial (indirect)
Midland Hotel (Grade II*)	Minor adverse (indirect)	n/a	Minor adverse (indirect)
Central Public Library (Grade II*)	Minor adverse (indirect)	n/a	Minor adverse (indirect)
Town Hall (Grade I)	Negligible adverse (indirect)	n/a	Negligible adverse (indirect)

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Town Hall Extension (Grade II*)	**Minor adverse** (indirect)	n/a	**Minor adverse** (indirect)
Manchester Art Gallery (Grade I)	**Neutral** (indirect)	n/a	**Neutral** (indirect)
Britain's Protection Public House (Grade II)	**Neutral** (indirect)	n/a	**Neutral** (indirect)
13-17 Albion Street (Grade II)	**Neutral** (indirect)	n/a	**Neutral** (indirect)
Rochdale Canal Lock Keepers Cottage at Lock Number 91 (Grade II)	**Negligible beneficial** (indirect)	n/a	**Negligible beneficial** (indirect)
Deansgate Station (Grade II)	**Negligible beneficial** (indirect)	Design development and public benefits	**Negligible beneficial** (indirect)
Former Congregational Chapel (Grade II)	**Negligible beneficial** (indirect)	n/a	**Negligible beneficial** (indirect)
Castlefield Railway Viaduct (Grade II)	**Neutral** (indirect)	n/a	**Neutral** (indirect)
Merchants Warehouse (Grade II)	**Negligible beneficial** (indirect)	n/a	**Negligible beneficial** (indirect)
Middle Warehouse at Former Castle Field Goods Yard (Grade II)	**Negligible beneficial** (indirect)	n/a	**Negligible beneficial** (indirect)
Bridgewater Canal Offices (Grade II)	**Neutral** (indirect)	n/a	**Neutral** (indirect)
Former St Matthews Sunday School	**Neutral** (indirect)	n/a	**Neutral** (indirect)
Conservation Areas			
The Deansgate/Peter Street Conservation Area	**Minor beneficial** (direct and indirect)	Design development and public benefits	**Minor beneficial** (direct and indirect)
St John Street Conservation Area	**Minor-moderate adverse** (indirect)	n/a	**Minor-moderate adverse** (indirect)
Albert Square Conservation Area	**Negligible adverse** (indirect)	n/a	**Negligible adverse** (indirect)
St Peter's Square Conservation Area	**Negligible adverse** (indirect)	n/a	**Negligible adverse** (indirect)

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
St Mary's Parsonage Gardens Conservation Area	**Neutral** (indirect)	n/a	**Neutral** (indirect)
St Ann's Conservation Area	**Minor adverse** (indirect)	n/a	**Neutral** (indirect)
Castlefield Conservation Area	**Negligible beneficial** (indirect)	Design development and public benefits	**Negligible beneficial** (indirect)

Reference List

1. DCMS's Principles of Selection for Listing Buildings (2018);
2. Historic England's Conservation Principles, Policies and Guidance (2008);
3. Historic England's Good Practice Advice Note 2: Managing Significance in Decision-Taking in the Historic Environment (March 2015);
4. Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets (2017);
5. Historic England's Good Practice Advice Note 4: Tall Buildings (2022); and
6. Historic England's Understanding Place: Conservation Area Designation, Appraisal and Management (2019).

Figures



	Figure:	**7.1**		
	Title:	**Listed Buildings (identified by blue triangles) within 500 indicative Site boundary (identified by red line). Source: England NHLE**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**NTS**



	Figure:	**7.2**		
	Title:	**Listed Buildings scoped in for assessment. Indicative boundary shown in red.**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**NTS**

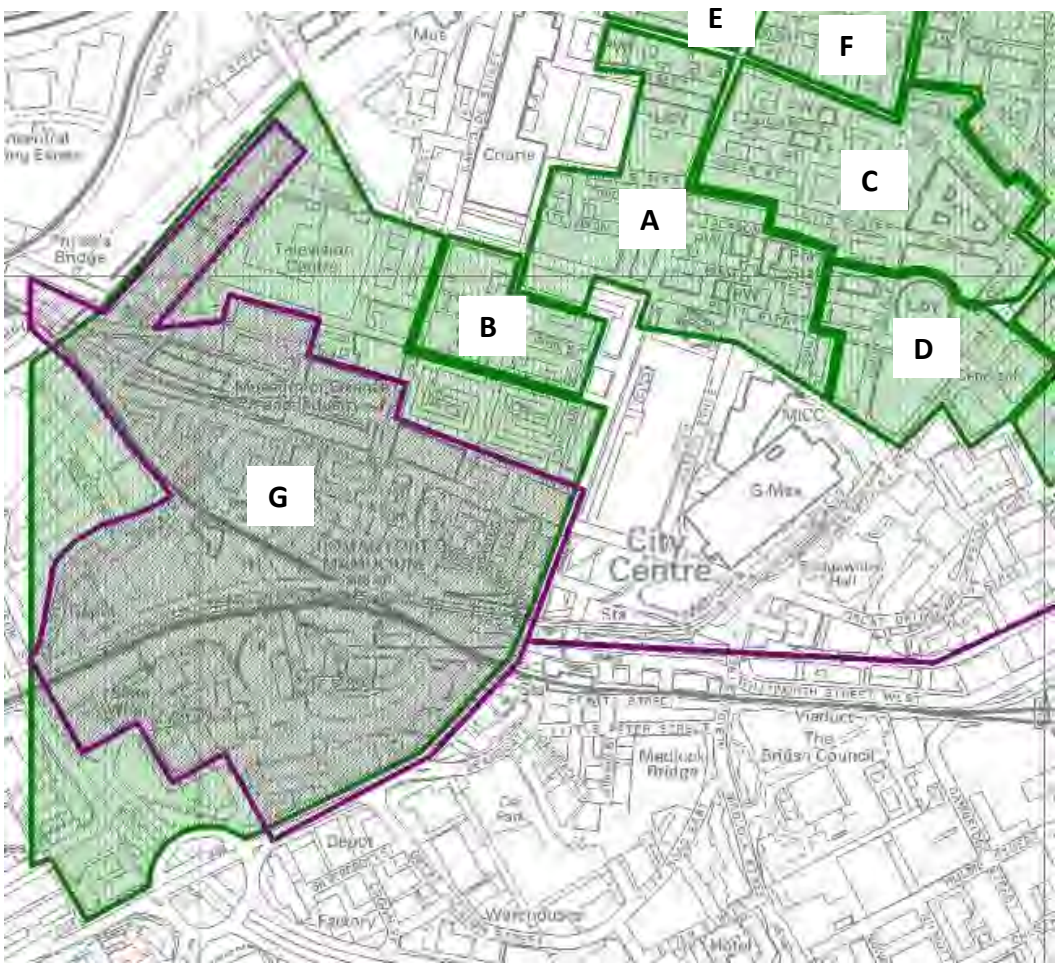


	Figure:	**7.3**		
	Title:	**Conservation Areas scoped in for assessment. Indicativ boundary shown in red. Purple line indicative WHS (not implemented).**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**NTS**

8. Air Quality

Introduction

8.1. This Chapter of the ES has been prepared by Hilson Moran and assesses the likely air quality impacts of the proposals upon the site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

8.2. This Chapter is accompanied by an Air Quality Technical Appendices:

- Appendix 8.1: Glossary of Terms
- Appendix 8.2: Legislation, Policy and Guidance
- Appendix 8.3: Windrose
- Appendix 8.4: Traffic Data
- Appendix 8.5: Receptors and Background Concentrations
- Appendix 8.6: Verification Details
- Appendix 8.7: Modelled Buildings
- Appendix 8.8: Impact Assessment Results

8.3. Tom Reade is Associate Sustainability Consultant at Hilson Moran. He is a Chartered Environmentalist with over 10 years technical experience. He is a member of the Institute of Environmental Science (IES) and the Institute of Air Quality Management (IAQM).

8.4. Sian Grimsley is an Air Quality Consultant at Hilson Moran with 2 years technical experience. She is a member of the IES and IAQM.

Assumptions

8.5. Professional judgement has been used in the complete of the construction phase dust assessment for the Proposed Development.

8.6. Information provided by the transport consultants (Curtins) and M&E engineers (WSP) has been used for the purpose of the assessment.

8.7. The ADMS-Urban dispersion models have been used in this assessment to assess the existing and future baseline concentrations in the vicinity of the Application Site. The dispersion model relies on input data, such as traffic data and predicted emissions data, etc., which may have uncertainties associated with them. The models simplify complex environments and does not always accurately reflect local micro-climatic conditions which may ultimately affect the predicted pollutant concentrations.

8.8. The Application Site is in a relatively flat location, therefore gradients in the form of terrain data have been excluded from the ADMS model.

8.9. The assumptions made in the assessment are considered reasonable and robust.

Limitations

8.10. This report has been prepared on behalf of and for the exclusive use of GNW Developments Limited for whom the services were undertaken and is subject to and issued in connection with the provisions of the agreement set out by Hilson Moran Partnership Ltd. Hilson Moran Partnership Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party. Furthermore, this report is subject to the following limitations:

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8.14. Hilson Moran Partnership Ltd has not taken any steps to update this report since it was produced, and it accept no liability for any part of this report that has or may become inaccurate as a result of circumstances that have occurred or arisen in relation to the project after the date of this report.

Legislative and Policy Context

8.15. Full details of relevant legislation, policy and guidance are provided in Appendix 8.2. A summary of the relevant legalisation policy and guidance is provided below:

Legislation

- Air Quality Strategy for England Scotland, Wales and Northern Ireland;
- Air Quality Standards Regulations;
- Environment Act 19955, 20216; and,
- Environment Protection Act 1990;
- National Planning Policy
- National Planning Policy Framework.
- Defra Clean Air Strategy (2019);
- DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy;
- Defra (2017) Air quality plan for nitrogen dioxide (NO2) in the UK; and,
- Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations.

Local Planning Policy

- Manchester City Council's (MCC) Local Plan.

Guidance

- National Planning Practice Guidance;
- Local Air Quality Management Review and Assessment Technical Guidance;
- Land-Use Planning and Development Control: Planning for Air Quality;
- Guidance on the Assessment of Dust from Demolition and Construction;
- EMAQ. Control of Odour and Noise from Commercial Kitchen Exhaust Systems; and,
- Guidance on the Assessment of Odour for Planning.

Assessment Methodology and Significance Criteria

8.16. The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at MCC Council to agree the scope of the assessment and the methodology to be applied;
- Review of MCC's latest review and assessment reports and the air quality data for the area surrounding the Application Site, including MCC and Defra;
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, and a review of the Proposed Development to establish the location of new sensitive receptors; and,
- Review of the traffic data provided by Curtins (the Applications Transport Consultant).

8.17. The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant;
- Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational; and,
- Increase in odorous emissions as a result of the operation of the proposed restaurants.

8.18. It is understood that there is no proposed onsite combustion plant including Combined Heat and Power (CHP) Units, gas-fired boilers or diesel generators for the provision of heating and hot water. At this stage it is understood that this will be provided via an all-electric approach, therefore an assessment of this source has been scoped out.

8.19. It is understood that the proposals include two back up diesel generators for use in an emergency. The proposed size of the generators are 1250kVA and 500Kva. The aggregated output and the proposed testing schedule is below the thresholds set out in the Medium Combustion Plant Directive. Furthermore, there is limited information available from the WSP (M&E consultations), therefore at this stage an assessment of this source has been scoped out. As the proposals progress into detailed design and additional information is made available, an assessment of any potential impact may be required.

Consultation

8.20. The approach and methodology for the air quality assessment was set out in the Scoping Report submitted to MCC in August 2022. The scoping report set out the current air quality baseline position in the vicinity of the Site, detailed the method in which the assessment would be undertaken in relation to detailed dispersion modelling and how potential impacts at existing and proposed receptor locations would be considered. Furthermore, the scoping report set out the effects that were likely to be significant and those that were not. A formal scoping opinion was received on 28 October 2022 which confirmed that the approach to the air quality assessment was acceptable.

8.21. The assessment has been undertaken in accordance with the agreed methodology through the EIA scoping stage.

- Construction
- Construction Dust

8.22. Assessment of the risk of impact associated with the generation of dust during the construction phase of the Proposed Development and determination of subsequent mitigation measures necessary has been undertaken following IAQM guidelines.

8.23. The assessment is based on a series of steps: screening the requirement for a detailed assessment, classification of the likely magnitude of dust emissions; characterisation of the area of influence and establishment of its sensitivity to dust; and establishment of the overall risk of impact. The risk of impact from dust emissions from the Proposed Development considers effects on human health, nuisance as a result of dust soiling and ecological receptors from four main activities: demolition; earthworks; construction; and trackout. The potential for dust emissions from each activity should be considered, unless any of them are not relevant to the Proposed Development.

Identification of Receptors

8.24. The guidelines identify appropriate screening criteria for the identification of potential receptors, based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of deposition with distance. 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 site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance;
- An 'ecological receptor' is located within 50 m of the boundary of the site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance.

Identification of Impact Magnitude

8.25. The magnitude of dust emissions for each activity is classified as small, medium or large* depending upon the scale of the works proposed, materials involved, and level of activity required. The IAQM guidelines provide examples of how the magnitude of emission can be defined, which are identified in Table 8.1. The Proposed Development is unlikely to satisfy all criteria within the examples, therefore professional judgement and site-specific information are used to identify appropriate emission magnitude.

Table 8.1 Dust Emission Magnitude (Source: IAQM Guidance, v1.1 Updated June 2016)

Activity	Small*	Medium*	Large*
Demolition	Total building volume <20,000 m3 Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities <10 m above ground level Demolition during wetter months	Total building volume 20,000 – 50,000 m3 Potentially dusty construction material Demolition activities 10-20 m above ground level	Total building volume >50,000 m3 Potentially dusty construction material (e.g. concrete) On-site crushing and screening Demolition activities >20 m above ground
Earthworks	Total site area <2,500 m2 Soil type with large grain size (e.g. sand) <5 heavy earth moving vehicles active at any one time Formation of bunds <4 m in height Total material moved <20,000 tonnes Earthworks during wetter months	Total site area 2,500 – 10,000 m2 Moderately dusty soil type (e.g. silt) 5-10 heavy earth moving vehicles active at any one time Formation of bunds 4-8 m in height Total material moved 20,000-100,000 tonnes	Total site area >10,000 m2 Potentially dusty soil type (e.g. clay) >10 heavy earth moving vehicles active at any one time Formation of bunds >8m in height Total material moved >100,000 tonnes
Construction	Total building volume <25,000 m3 Construction material with low potential for dust (e.g. metal cladding or timber)	Total building volume 25,000 – 100,000 m3 Potentially dusty construction material (e.g. concrete) On-site concrete batching	Total building volume >100,000 m3 On-site concrete batching, sandblasting
Trackout	<10 HDV (>3.5t) outward movements** in any one day# Surface material with low potential for dust release Unpaved road length <50 m	10 – 50 HDV (>3.5t) outward movements* in any one day# Moderately dusty surface material (e.g. high clay content) Unpaved road length 50 – 100 m	>50 HDV (3.5t) outward movements* in any one day# Potentially dusty surface material (e.g. high clay content) Unpaved road length >100 m

*The impact of magnitude in EIA methodology is referred to as minor, moderate and major.

** A vehicle movement is a one way journey, i.e. from A to B, and excludes the return journey

HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Identification of Receptor Sensitivity

8.26. Consideration is given to the likely sensitivity of the area to the impacts of dust, establishing a sensitivity of low, medium or high for dust soiling, human health and ecological receptors. The sensitivity of the area considers a number of factors, including the specific sensitivities of receptors in the area, the proximity and number of those receptors, local baseline conditions such as background concentrations and site-specific factors.

8.27. The first step in identifying the sensitivity of the area is to establish the sensitivity of the receptor, based on the presence or level of activity associated with the area of influence of the Proposed Development. Professional judgement and site-specific information are used to assign an appropriate level of receptor sensitivity using the principles outlined in Table 8.2. Following this, the sensitivity of the area can be established from Tables 8.3 to 8.5 based on the sensitivity of the receptor, number of receptors (in the case of human health and dust soiling) and the distance from source.

Table 8.2 Receptor Sensitivity Definitions (Source: IAQM Guidance, v1.1 Updated June 2016)

Activity	Small*	Medium*	Large*
Dust Soiling	Enjoyment of amenity would not reasonably be expected; There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; Transient exposure, where people or property is only expected to be present for limited periods of time as part of the normal pattern of use; Indicative examples including playing fields, farmland, footpaths, short-term car parks and roads.	Users would expect to enjoy a reasonable level of amenity, but not reasonably at same level as in their home; The appearance, aesthetics or value of property could be diminished by soiling; Indicative examples include parks and places of work.	Users can reasonably expect enjoyment of a high level of amenity; The appearance, aesthetics or value of property would be diminished by soiling, and continuous or regularly extended periods of presence expected during normal pattern of land use; Indicative examples include dwellings, museum and other culturally important collections, medium and long-term car parks and car showrooms.
Human Health	Locations where human exposure is transient; Indicative examples include public footpaths, playing fields, parks and shopping streets.	Locations where the people exposed are workers#, and exposure is over a time period relevant to the air quality objective for PM10*; Indicative examples include office and shop workers, but not those occupationally exposed to dust.	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM10*; Indicative examples include residential properties, hospitals, schools and residential care homes.
Ecological	Locations with a location designation where the features may be affected by dust deposition, e.g. Local Nature Reserve	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; Locations with a national designation where the features may be affected by dust deposition, e.g. Site of Special Scientific Interest.	Locations with an international or national designation and the designated features may be affected by dust soiling, e.g. Special Area of Conservation with acid heathland; Location where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.

*The impact of magnitude in EIA methodology is referred to as minor, moderate and major.

**A vehicle movement is a one way journey, i.e. from A to B, and excludes the return journey

HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Table 8.3 Sensitivity of the Area to Dust Soiling Effects on People and Property (Source: IAQM Guidance, v1.1 Update June2016).

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

Table 8.4 Sensitivity of the Area to Human Health (Source: IAQM Guidance, v1.1 Updated June 2016)

Receptor Sensitivity	Annual Mean PM10 Concentrations	Number of Receptors	Distance from Source				
			<20m	<50m	<100m	<200m	<350m
High	>32 µg/m3	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	28 – 32 µg/m3	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	High	Medium	Low	Low	Low
	24 - 28 µg/m3	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	<24 µg/m3	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Medium	>32 µg/m3	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 - 32 µg/m3	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 - 28 µg/m3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	<24 µg/m3	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 8.5 Sensitivity of the Area to Ecological Impacts (Source: IAQM Guidance, v.1.1 Updated June 2016)

Receptor Sensitivty	Distance from Source	
	<20m	<50m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Establishing Significance

8.28. The risk of dust related impacts from the Proposed Development is established from the sensitivity of the area and the likely dust emission magnitude. The risk should be established, on the worst-case area sensitivity and in the absence of mitigation, for each of the construction related activities (demolition, earthworks, construction and trackout) following the matrix in Table 8.6.

Table 8.6 Risk of Dust Impacts from Each Activity (Source: IAQM Guidance, v1.1 Update June 2016)

Sensitivty of Area	Activity	Dust Emission Magnittude		
		Large	Medium	Small
High	Demolition	High Risk	Medium Risk	Medium Risk
	Earthworks	High Risk	Medium Risk	Low Risk
	Construction	High Risk	Medium Risk	Low Risk
	Trackout	High Risk	Medium Risk	Low Risk
Medium	Demolition	High Risk	Medium Risk	Low Risk
	Earthworks	Medium Risk	Medium Risk	Low Risk
	Construction	Medium Risk	Medium Risk	Low Risk
	Trackout	Medium Risk	Low Risk	Negligible
Low	Demolition	Medium Risk	Low Risk	Negligible
	Earthworks	Low Risk	Low Risk	Negligible
	Construction	Low Risk	Low Risk	Negligible
	Trackout	Low Risk	Low Risk	Negligible

8.29. The IAQM guidelines identify a range of mitigation measures intended to reduce the emission and effects of dust from construction sites and identify their likely applicability to a development based on the level of impact risk attributed. Consideration is given to these in the development of mitigation measures, with the significance of the residual effect based on professional judgement

Construction Non-Road Mobile Machinery (NRMM)

8.30. NRMM emissions, as stated within IAQM guidance16, are unlikely to significantly impact on local air quality and in most cases do not need to be quantitively assessed. Thus, significant impacts from NRMM can be discounted. However, mitigation measures for NRMM have been identified to ensure best practice.

Construction Traffic

8.31. Following consultation with the project transport consultation (Curtins) it has been agreed that construction traffic impacts will be assessed by undertaking detailed dispersion modelling of NO2, PM10 and PM2.5 emissions.

8.32. To consider the impact on NO2, PM10 and PM2.5 concentrations at specified sensitive receptor locations, a detailed assessment has been undertaken using the air dispersion model ADMS-Urban, Version 5 (release date March 2022). This model uses detailed road traffic information, surface roughness, and local meteorological information to predict the impact on pollutant concentrations at specific receptor locations.

8.33. A summary of the air quality modelling parameters for road traffic is provided Table 8.7 below.

Table 8.7 ADMS Roads Modelling Parameters

Parameter	Local Area	Met.Measurement Site
Latitude	53	53
Surface Roughness	1.5	1.5
Monin-Obukhov Length (m)	30	30

Meteorological Data

8.34. The ADMS model uses meteorological data including wind speed and direction to determine the how pollution is transported and diluted with distance from the source. For this assessment, meteorological data from 2019 for Manchester has been utilised for all modelled scenarios. This meteorological site is considered representative of the application site and aligns with the baseline traffic data obtained from Curtins. Furthermore, 2019 is the most recent year of available data that is unaffected by the COVID-19 pandemic.

8.35. See Appendix 8.3, for the 2019 Manchester Wind Rose.

Traffic Data

8.36. A summary of the traffic data used in the air quality assessment is presented in Annex 4 and illustrated in Figure 8.1. Annex 4 includes details regarding Annual Average Daily Traffic (AADT) flows, percentage of Heavy Goods Vehicles (HGV's) and vehicle speeds (km/hr). An updated traffic survey was undertaken in 2022 and the collected data was adjusted to reflect the following modelling scenarios.

Dispersion Modelling Scenarios

8.37. The dispersion modelling of road vehicle emissions considered the following scenarios:

- 2019 Baseline (Model Verification);
- 2024 Baseline + Committed Developments;
- 2024 Baseline + Committed Developments + Peak Construction Traffic;
- 2026 Baseline + Committed Developments;
- 2026 Baseline + Committed Developments + Operational Traffic (Phase A);
- 2030 Baseline + Committed Developments;
- 2030 Baseline + Committed Developments + Operational Traffic (Phase A & 2); and,
- 2030 Baseline + Committed Developments + Operational Traffic (Phase A & 2) - Sensitivity analysis*.

* A sensitivity analysis will be conducted which assumes the carpark will be utilised to its full capacity (932 spaces) to assess the worst-case scenario impacts – the results of this analysis are summarised in Paragraphs 8.163-8,186, alongside the results of the impact assessment of construction and operational traffic emissions. It is understood from Curtins the car park will generate 3210 AADTs once the Proposed Development is fully operational in 2030.

Vehicle Emission Factors

8.38. Vehicle emission factors for input into ADMS-Urban have been calculated using the EFT version 11 (published November 2021)22, 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 fleet composition, such that vehicle emissions are assumed to reduce over time.

8.39. There is good evidence from real-world testing of EURO 6 (VI) compliant vehicles of substantial improvements in vehicle emissions comparted to earlier EURO categories, in particular with respect to NOX emissions. Total pollutant concentrations are, therefore, likely to be lower in 2030 than in 2019.

8.40. Defra's EFT calculator has been used to calculate the emission factors for NOX, PM10 and PM2.5.

8.41. Emission factors for 2019 have been used for the baseline and model verification scenario and emission factors for 2024, 2026 and 2030 have been used for future scenarios.

Selection of Background Concentrations

8.42. The background concentrations of those pollutants included within the AQS and used within the air quality assessment have been mapped at a grid resolution of 1x1 km for the whole of the UK and are available on Defra's website23. Estimated background concentrations are available for all years between 2018 and 2030 and the maps assume that background concentrations will reduce (i.e., improve) over time. This assumption is based upon improvements in emissions from various sources. In line with the findings (usually based on monitoring data) of local authorities, measured concentrations have not reduced as expected over time.

8.43. For the purpose of this assessment, background concentrations from 2019 have been used in the baseline and verification scenarios and background concentrations from 2024, 2026 and 2030 have been utilised in the future scenarios. The background concentrations and relevant receptors used in the assessments are presented in Appendix 8.5.

Model Verification

8.44. The ADMS-Urban dispersion model has been validated by the software developer and is considered to be fit for purpose, however local model validation, i.e., in the vicinity of the proposed development, has not been undertaken. Therefore, to validate the model and to determine how well the model is performing at a local level, comparing the modelling results with local monitoring data is undertaken. The verification process aims to minimise model uncertainty and error by adjusting the modelled results by a factor to offer greater confidence in the final results. This is undertaken in accordance with the methodology specified in Chapter 7, Section 4, of LAQM.TG16.

8.45. Details of the verification factor calculations are presented in Figure 8.2 and Appendix 8.6. An adjustment factor of 1.4 was obtained during the verification process, which indicated that the model was under-predicting. This factor was applied to the modelled road-NOX outputs prior to conversion to annual mean NO2 concentrations utilising the NOX to NO2 calculator (version 8.1, released August 2020)24 provided by Defra.

8.46. No local monitoring data was available for PM10 and PM2.5, therefore the adjustment factor calculated for NOX has been applied to both the modelled PM10 and PM2.5 concentrations prior to adding to the appropriate background concentration. This approach is in accordance with LAQM.TG22.

Operational

Operational Traffic Emissions

8.47. Following consultation with Curtins (project Transport Consultants), it has been confirmed that emissions from the development-generated traffic exceeds the thresholds detailed in the IAQM & EPUK Air Quality Guidance (+/- 100 Annual Average Daily Traffic (AADT) for LGV and or +/- 25 AADT for HGV's). As such a detailed assessment of operational phase impacts has been undertaken – following the same methodology as the construction traffic assessment detailed above.

Point Source Emissions

8.48. Following consultation with WSP (project Energy/M&E engineers), it is understood that the provision of heating and hot water will be provided via an all-electric approach and no onsite combustion plant for this provision will be provided. Therefore, a detailed assessment of any onsite combustion plant has been scoped out.

Emergency Generators

8.49. As part of the proposals there are two diesel fired life safety generators with a total power output of 1750kVA – the generators are only proposed to run in the case of emergencies. As per the requirements of the Medium Combustion Plant Directive (MCPD) back up emergency generators are excluded from the specified generator controls if compliance of the following is met:

- Balancing services (whether procured or not) are not provided;
- Demand side response operations such as triad avoidance or fast frequency response are provided; and,
- Testing of this generator does not exceed 50 hours per year.

8.50. It is understood that the proposed life safety generator is compliant with the above and therefore a detailed assessment of this has been scoped out. However, registration with the local authority may be required and a number of conditions may be attached, typically these include, but are not limited to:

- A limit of 50 hours testing a year for each backup generator; and,
- For each backup generator, a record of the number of testing hours per year must be kept demonstrating that you meet the exclusion criteria.

8.51. If the number of testing hours needs to be increased above the limit of 50 or there is a required change of use for the generator, agreement in writing with the regulator is required. Such changes may lead to the requirement of a permit for which more detailed air quality analysis would be required. Should any of the permit conditions be breached without written agreement the regulator will take appropriate enforcement action.

Car Park Provision

8.52. It is understood that the proposals include the provision of 929 car park spaces. As noted in Section 8.30, consideration has been given to the operation of the car park at full capacity (6025 AADT) and at average usage (3210 AADT).

8.53. Consideration will need to be given to the proposed car park ventilation strategy, specifically where the proposed car park vents are located – therefore to ensure any impact on sensitive receptor locations is minimised the emissions of the car park will be considered using the detailed dispersion model ADMS 5.2.

8.54. Following consultation with WSP it is understood that the car park is vented using a centralised system, with the car park extract being located along Deansgate at the second floor (7.2m above ground level). The emission rate for NO_x, PM_{10} and $PM_{2.5}$ has been calculated using traffic data provided by Curtins and following the guidance document 54 (Modelling Car Parks) provided by CERC. Figure 8.3 and Table 8.8 below provides a summary of the model inputs – further information can be found in Appendix 8.7.

Table 8.8 ADMS 5.2 input data

ADMS Input	Input Value			
Diameter	1			
Temperature (°C)	15			
Efflux Velocity (m/s)	0.1			
Year	**2022**	**2026**	**2030**	**2030 (Sens)**
Emission Rate – NOx (g/s)	0.0448	0.0467	0.0315	0.0592
Emission Rate – PM10 (g/s)	0.0057	0.0060	0.0061	0.0115
Emission Rate – PM2.5 (g/s)	0.0033	0.0035	0.0035	0.0066

Odour – Kitchen Extracts

8.55. The scale of exposure (impact) is determined by the parameters collectively known as FIDOL factors (Frequency, Intensity, Duration, Offensiveness and Location) – a description is provided in Table 8.9.

Table 8.9 Description of the FIDOL Factors

Averaging Period	Objectives should generally not apply
Frequency	How often an individual is exposed to odour.
Intensity	The individual's perception of the strength of the odour.
Duration	The overall duration that indivudlas are expsoed to an odour over time.
Odour Unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

8.56. The magnitude of the effect experienced at a receptor is determined by the scale of exposure and the sensitivity of the receptor. It should be noted that different combinations of the FIDOL factors can result in different exposures at a location. For example, odours may occur as a one-off, as frequent short bursts, or for longer, less-frequent periods, and may be said to give 'acute' or 'chronic' exposures, respectively.

8.57. Once exposure to odour has occurred, the process can lead to disamenity, annoyance nuisance and / or complaints. It is important to note the technical differences between annoyance and nuisance, as described below:

- Annoyance – the adverse effect occurring from an immediate exposure; and,
- Nuisance – the adverse effect caused cumulatively, by repeated events of annoyance.

8.58. There are a number of considerations that should be given that could affect the potential for an odour emission to be classified as a nuisance, these include:

- The likely magnitude of odour emissions (after control by measures incorporated into the scheme, if applicable);
- The duration and frequency of emissions;
- The likely meteorological characteristics at the site;
- The dispersion and dilution afforded by the pathway to the receptors and the resulting magnitude of odour that could result;
- The sensitivity of receptors to the emission; and,
- The potential cumulative odour effects with any odour of a similar character.

Sensitive Receptors

IAQM Assessment Methodology

Stage 1 – Source of Odour Potential

8.59. The IAQM categorises the source of odour potential into three categories: Large, Medium and Small. The factors that affect the source odour potential include the magnitude of odour release, how inherently the odorous compounds are, and the unpleasantness of the odour. Table 8.10 provides a definition of each category.

Table 8.10 Defining Receptor Sensitivity

Receptor Sensitivity	Description
Large	Magnitude - Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m3 per year; area sources of thousands of m2. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness - processes classed as "Most offensive" in H4; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.
Medium	Magnitude - smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m3 per year; area sources of hundreds of m2. The compounds involved are moderately odorous. Unpleasantness - processes classed in H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control - some mitigation measures in place, but significant residual odour remains.
Small	Magnitude - falls below Part B threshold; materials usage hundreds of tonnes/m3 per year; area sources of tens m2. The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness - processes classed as "Less offensive" in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control - effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.

Stage 2 – Pathway Effectiveness

8.60. Stage 2 – pathway effectiveness intends to consider the mechanism in which the odour is 'transported' to a sensitive receptor. The pathway is affected by the following five factors: distance from the source to the receptor, the frequency of winds blowing from the source towards the receptor, the effectiveness of any mitigation or controls, the effectiveness of dispersion and dilution, and the topography /terrain of the local area. Table 8.11 defines the pathway effectiveness into three categories:

Table 8.11 Pathway Effectiveness

Receptor Sensitivity	Description
Highly Effective	Distance - receptor is adjacent to the source/site; distance well below any official set-back distances. Direction - high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution - open processes with low-level releases, e.g., lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.
Moderately Effective	Distance - receptor is local to the source. Where mitigation relies on dispersion/dilution - releases are elevated but compromised by building effects.
Ineffective	Distance - receptor is remote from the source; distance exceeds any official set-back distances. Direction - low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution - releases are from high level (e.g., stacks, or roof vents > 3m above ridge height) and are not compromised by surrounding buildings.

Stage 3 – Predicted Risk of Odour Exposure

8.61. At this stage the source odour potential and pathway effectiveness are brought together to predict the risk of odour exposure at the receptor being considered. Table 8.12 identifies the risk of odour exposure when considering the source odour potential and pathway effectiveness in combination.

Table 8.12 Risk of Odour Exposure

Pathway Effectiveness	Source Odour Potential		
	Low	Medium	High
Highly Effective	Low Risk	Medium Risk	High Risk
Moderately Effective	Negligible	Low Risk	Medium Risk
Ineffective	Negligible	Negligible	Low Risk

Stage 4 – Likely Magnitude of Effect at Receptor Locations

8.62. Stage 4 identifies the likely magnitude of effect at receptor locations by combining the risk of odour exposure and the sensitivity of receptors. Complete definitions of each level of sensitivity has not been provided here, however as the Proposed Development is residential led this is classified as highly sensitive. Table 8.13 presents identifies the magnitude of effect based up on the risk of odour exposure and sensitivity of the receptor.

Table 8.13 Likely Magnitude of Impact at Receptor Locations

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight Adverse	Moderate Adverse	Major Adverse
Medium Risk	Negligible	Slight Adverse	Moderate Adverse
Low Risk	Negligible	Negligible	Slight Adverse
Negligible	Neglibilbe	Negligible	Negligible

Identification of Sensitive Receptors

Construction

8.63. The IAQM guidelines identify appropriate criteria for the identification of potential receptors based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of disposition with distance.

8.64. Tables 8.1, 8.2, 8.3, 8.4 and 8.5 provide the criteria to define receptor sensitive to dust soiling and fugitive PM10 emissions associated with construction activities.

8.65. Receptor sensitivity ranges from low (indicative examples include public footpaths, playing fields and parks), to medium (offices and shops) to high sensitivity (residential dwellings, hospitals, schools and care homes) – see Table 8.14 below for receptor sensitivities and where the AQS objectives apply.

8.66. Sensitive ecological receptors are defined as a site with features determined to be sensitive to NOx, NO2, PM10 or PM2.5, either directly or indirectly. No ecological receptors are within 50m of the Proposed Development and/or 200m of the likely construction route, therefore ecological construction phase impacts are scoped out of this assessment

Operational

8.67. Sensitive human receptors are defined as locations that have potential to be impacted by emissions from road traffic emissions. These locations include those sensitive land uses (residential dwellings, hospitals, schools and care homes), in worst-case locations, in the vicinity of highways used by traffic travelling to and from the Proposed Development.

8.68. No ecological designated sites are within 200m of the road network utilised by traffic generated by the Proposed Development, and therefore ecological operational phase impacts are scoped out of this assessment.

8.69. Defra provides guidance on locations where the air quality objectives should apply, and Table 8.14 and professional judgement have been used to select receptors where likely significant exposure to pollutant concentrations may occur.

Table 8.14 Examples of where Air Quality Objectives apply

Averaging Period	Objectives should apply	Objectives should generally not apply
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 locations where public exposure is expected to be short-term.
24-Hour Mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short-term.
1-Hour Mean	All locations where the annual mean and 24-hour mean objectives 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 reasonably be expected to spend 1 hour or longer.	Kerbside sites where the public would not be expected to have regular access
15-Minute Mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

8.70. IAQM provides guidance on defining receptor sensitivity (see Table 8.15) with respect to odour, however professional judgement should be used.

Table 8.15 Defining Receptor Sensitivity

Receptor Sensitivity	Description
High	Surrounding land where: Users can reasonably expect enjoyment of a high level of amenity; and People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium	Surrounding land where: Users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or People wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low	Surrounding land where: The enjoyment of amenity would not reasonably be expected; or There is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

Significance Criteria

Existing Receptors

8.71. The EPUK and IAQM provide guidance for establishing the significance of air quality impacts arising as a result of the Proposed Development. The impact on individual receptors is dependent upon the long-term average pollutant concentrations at the receptor in the assessment year and the percentage change relative to the Air Quality Assessment Level (AQAL). The assessment of significance within this chapter is based on this criteria, as identified in Table 8.16.

Table 8.16 Impact Descriptors

Long-term Average Concentration at Receptor in Assessment Year	Percentage Change in Concentration to AQAL*			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Minor*	Moderate
76 – 94% of AQAL	Negligible	Minor	Moderate	Moderate
95 – 102% of AQAL	Minor	Moderate	Major	Major
103 – 109% of AQAL	Moderate	Moderate	Major	Major
110% or more of AQAL	Moderate	Major	Major	Major

* Where the % change is <0.5% the change is described as 'Negligible' regardless of concentration.

8.72. In addition to predicting the effect of significance at individual existing receptor locations, IAQM guidance states that other influences should be accounted for, such as:

8.73. The existing and future air quality in the absence of the development, notably whether the Air Quality Objectives are likely to be met or the scale of exceedances in the long-term and short-term concentrations;

8.74. The extent of current and future population exposure to the impacts, notably the number of properties and/or people present and the scale of impact (e.g., whether the majority of the local population is subject to substantial or minor impacts);

8.75. The influence and validity of any assumptions adopted when undertaking the prediction of impacts, such as establishing a worst-case scenario for sensitive receptors.

8.76. These factors are considered to determine whether the overall impact of the operational phase is adverse or beneficial.

Proposed Receptors

8.77. As the proposed receptor locations are introduced to the site through the Proposed Development, a change in pollutant concentrations from the baseline cannot be assessed at these locations. Instead, the modelled results at proposed receptor locations will be compared to the relevant AQOs to determine the potential of any exceedances.

8.78. Where a relevant AQO is predicted to be exceeded, the significance of effect is considered to be 'Major' in the absence of mitigation. Where no exceedance is predicted, the effect is considered to be of 'Negligible' significance and no mitigation is required to precent exposure to elevated pollution concentrations. This criterion is set out in Table 8.17 below.

Table 8.17 Significance of Effect Criteria – Proposed Receptors

Significance Criteria for Proposed Receptors Category	Applicable Annual Mean AQO	Significance	Recommendation
Below AQO	40 µg/m3 (NO2 and PM10) 25 µg/m3 (PM2.5)	Negligible (Not Significant)	No mitigation required beyond the best practise measures already incorporated into the design.
Equal to or greater than AQO	40 µg/m3 (NO2 and PM10) 25 µg/m3 (PM2.5)	Major Adverse (Significant)	Additional mitigation required in addition to the best practise measures already incorporated into the design.

Baseline Conditions

Local Air Quality Information

8.79. The Site is located in the administrative area of Manchester City Council (MCC), adjacent to Deansgate (A56) and Peter Street (A34) (National Grid Reference: SJ 383500, 397500). The Greater Manchester Combined Authority (GMCA) declared an Air Quality Management Area (AQMA) encompassing the airport, arterial routes and district centres across the ten local districts of Manchester.

8.80. The AQMA was declared in 2016 for exceedances of Nitrogen Dioxide (NO2), and subsequent reviews including the latest GMCA Annual Status Report, consider the AQMA to continue to be appropriate in both extent and declared pollutants. Extent of the AQMA is shown in Figure 8.4 – as shown the Application Site is located within the AQMA.

8.81. Local background concentrations for 2019-2028 have been taken from the 2018-Defra background maps for the 1km-by-1km grid square (SJ 383500, 397500) where the Site is located; these are summarised in Table 8.18 below.

Table 8.18 Defra Background Concentrations

Pollutant	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
NO2	26.07	24.66	23.72	22.82	22.08	21.29	20.58	20.05	19.55	19.12
PM10	13.48	13.15	13.04	12.92	12.80	12.69	12.57	12.56	12.55	12.54
PM2.5	8.69	8.48	8.39	8.30	8.22	8.13	8.05	8.04	8.03	8.02

8.82. The Defra background concentrations in between 2019-2028 for NO_2, PM_{10} and $PM_{2.5}$ are well below the relevant AQS objectives (40µg/m3 for NO2 and PM10, and 25µg/m3 for PM2.5).

Local Air Quality Monitoring

8.83. GMCA operate a of automated and non-automated air quality monitoring stations. In MCC this network includes three automated monitors and 46 diffusion tubes. The latest monitoring report, published in 2020, indicates that air quality in administration of MCC has gradually been improving year on year, however at roadside locations concentrations still remain above the relevant AQS objective (40 µg/m3 - annual mean NO2).

8.84. A summary of the air quality monitoring sites which are considered representative of the Application Site (<1km) are identified in Tables 8.18, 8.19, 8.20, 8.21, 8.22 and 8.23, and Figure 8.5 below.

Nitrogen Dioxide

8.85. The annual mean NO2 concentrations and the number of exceedances of the 1-hour NO2 objective at MCC automatic monitoring sites between 2016-2019 are presented in Table 8.18 and Table 8.19, respectively.

8.86. The annual mean NO2 objective (40µg/m3) is exceeded at MAN1–Oxford Road (2016-2019) and at MAN3–Piccadilly (2016), as shown in bold in Table 8.19. The monitoring data identifies one exceedance of the 1-hour NO2 objective (200µg/m3) at MAN1-Oxford Road in 2016. Both monitors were compliant with the relevant objective in 2019, as shown in Table 8.20.

Table 8.19 MCC Continuous Monitoring – Annual Mean NO2

Monitoring Site	X, Y	Type	Annual Mean (µg/m^3)			
			2016	2017	2018	2019
MAN1 – Manchester Oxford Road	384233, 397287	Kerbside	66	65	62	59
MAN3 – Manchester Piccadilly	384310, 398337	Urban Centre	40	36	35	36

Table 8.20 MCC Continuous Monitoring – Hourly Mean NO2

Monitoring Site	X, Y	Type	1-Hour Mean (Number of 1-Hour Means >200 µg/m^3)			
			2016	2017	2018	2019
MAN1 – Manchester Oxford Road	384233, 397287	Kerbside	66	65	62	59
MAN3 – Manchester Piccadilly	384310, 398337	Urban Centre	40	36	35	36

8.87. The annual mean NO2 concentrations from all diffusion tube monitoring locations considered representative of the Application Site (<1km) are identified in Table 8.21.

8.88. The annual mean NO2 objective (40µg/m3) is exceeded at all diffusion tube locations throughout the monitoring period. Monitors MA59NO/MA60NO/MA61NO–Piccadilly Gardens and MA77NO-Hewitt Street were compliant in 2017-2019 and 2017, respectively.

Table 8.21 MCC Diffusion Tube Monitoring – Annual Mean NO2

Monitoring Site	X, Y	Type	Annual Mean (µg/m^3)			
			2016	2017	2018	2019
MA24NO – Princess Street	383968, 398070	Kerbside	45.3	44.7	40.3	40.8
MA29NO – Manchester Oxford Road	384119, 397503	Roadside	66.2	57.7	58.8	55.4
MA59NO, MA60NO, MA61NO – Piccadilly Gardens	384310, 398337	Urban Background	40.8	35.7	31.6	33.1
MA77NO – Hewitt Street	383576, 397489	Urban Background	44.2	38.8	41.0	43.7

Particulate Matter

8.89. The annual mean PM10 concentrations and the number of exceedances of the 24-hour PM10 objective at automatic monitoring sites are presented in Table 8.22 and Table 8.23, respectively.

8.90. Both monitoring locations were compliant with the annual mean PM10 objective (40µg/m3) between 2019-2016. The monitoring data also indicates that the automatic monitors were compliant with the 24-hour PM10 objective (>50µg/m3 to be exceeded more than 35 times/year) throughout the monitoring period.

Table 8.22 MCC Automatic Monitoring – Annual Mean PM10

Monitoring Site	X, Y	Type	Annual Mean (µg/m3)			
			2016	2017	2018	2019
MAN1 – Manchester Oxford Road	384233, 397287	Kerbside	27	27	30	26
MAN3 – Manchester Piccadilly	384310, 398337	Urban Centre	20	20	21	20

8.91.

Table 8.23 MCC Automatic Monitoring – Daily Mean PM10

Monitoring Site	X, Y	Type	24-Hour Mean (Number of 24-Hour Means >35 µg/m3)			
			2016	2017	2018	2019
MAN1 – Manchester Oxford Road	384233, 397287	Kerbside	27	27	30	26
MAN3 – Manchester Piccadilly	384310, 398337	Urban Centre	20	20	21	20

8.92. The annual mean PM2.5 concentrations are presented in Table 8.24. The automatic monitoring results indicate that the PM2.5 concentrations are below the AQS objective (25µg/m3) between 2016 and 2019 at both automatic monitoring locations.

Table 8.24 MCC Automatic Monitoring – Annual Mean PM2.5

Monitoring Site	X, Y	Type	Annual Mean (µg/m3)			
			2016	2017	2018	2019
MAN1 – Manchester Oxford Road	384233, 397287	Kerbside	16	15	15	18
MAN3 – Manchester Piccadilly	384310, 398337	Urban Centre	10	8	11	12

Site Specific Diffusion Tube Survey

8.93. Hilson Moran are currently undertaking an independent diffusion tube survey in support of the Proposed Development. The monitors are located on the road network surrounding the site where development-generated traffic is likely to travel, see Figure 8.6. The monitors were installed in June 2022 and the survey is still ongoing. The results will be presented in a separate design note once the survey is complete.

Receptors and Receptor Sensitivity

8.94. Existing receptors were selected in locations that in locations that are likely to experience the greatest impact from traffic generated by the Proposed Development. A summary of the existing receptors in the vicinity of the site is illustrated in Figure 8.6 and Table 8.25.

Table 8.25 Existing Receptors

Receptor ID	XY	Type	Sensitivity
E1	383195, 398131	Educational	High
E2	383438, 398006	Office	Medium
E3	383549, 397993	Resturant/Bar	Medium
E4	383498, 397913	Office	Medium
E5	383424, 397707	Resturant Bar	Medium
E6	383482, 397681	Hotel (Ground -Floor 22)/Residential (Floor 25-47)	Medium (Ground-Floor 22)/High (Floors 25-47)
E7	383345, 397737	Office	Medium
E8	383065, 397812	Hotel	Medium
E9	383418, 397687	Workplace	Medium
E10	383577, 397750	Resturant/Bar	Medium
E11	383618, 397867	Residential	High
E12	383637, 397967	Resturant/Bar	Medium
E13	383776, 397923	Office	Medium
E14	383561, 398035	Medical	High
E15	383627, 398206	Office	Medium
E16	383953, 397805	Medical	High
E17	384056, 397615	Residential	High
E18	384193, 397416	Residential	High
E19	384218, 397305	Educational	High

8.95. A summary of the introduced (proposed) receptors is illustrated in Figure 8.7 and Table 8.26.

8.96. Table 8.26 below identifies the proposed receptor locations introduced to the site as a result of the Proposed Development. These were selected on the outer facades of each new development block.

8.97. It is understood that proposed receptors P1-P3, P6-P9, P16 and P17 will be introduced to the site and operational by upon the completion of Phase A (before 2030). These receptor locations are considered as existing receptor locations within the '2030 With Development (full-build out)' modelling scenario.

8.98. By 2030 all remaining receptors will be introduced and operational (P1-P17).

Table 08.26 Proposed Receptors

Receptor ID	XY	Type	Sensitivity
P1 - Terrace	383538, 397956	Office/Commerical	Medium
P2 - Terrace	383519, 397905	Office/Commerical	Medium
P3 – Terrace	383497, 397844	Office/Commerical	Medium
P4 – Terrace	383478, 397785	Office/Commerical	Medium
P5 - Terrace	383456, 397725	Office/Commerical	Medium
P6 – Great Northern Warehouse	383555, 397910	Office/Commerical	Medium
P7 - Great Northern Warehouse	383600, 397897	Office/Commerical	Medium
P8 - Great Northern Warehouse	383600, 397863	Office/Commerical	Medium
P9 - Great Northern Warehouse	383588, 397827	Office/Commerical	Medium
P10 – Leisure Box	383564, 397754	Residential/Commerical	Medium/High
P11 – Leisure Box	383547, 397709	Residential/Commerical	Medium/High
P12 – Leisure Box	383506, 397699	Residential/Commerical	Medium/High
P13 – Leisure Box	383481, 397719	Residential/Commerical	Medium/High
P14 – Leisure Box	383493, 397757	Residential/Commerical	Medium/High
P15 – Leisure Box	383506, 397795	Residential/Commerical	Medium/High
P16 - Great Northern Warehouse	383526, 397849	Office/Commerical	Medium
P17 - Great Northern Warehouse	383536, 397878	Office/Commerical	Medium

Identification and Evaluation of Significant Effects

Construction

Assessment of Potential Dust Emission Magnitude

8.99. The likely magnitude of dust emissions from the Proposed Development for the four main activities has been assessed, as identified in Table 8.26.

Table 8.25 Predicted Magnitude of Dust Emissions from Proposed Development

Activity	Magnitude	Justification
Demolition	Medium	It is understood that the significant removal of the existing building will be undertaken, including the existing link structure, car park ramps, terrace deck. The existing building volume is estimated to fall between 20,000-50,000m^3 – based on this demolition works have been classified as Medium.
Earthworks	Large	The site area is estimated 30,000m^2. At this stage, it is assumed that there is likely to be some excavation works. The number of heavy earth moving vehicles has not been confirmed, but it is estimated that this could exceed 10 based up on the site locale. Based on the above the Site has been classified as Large.
Construction	Large	The total building volume is estimated to exceed 100,000m^3 based up on the floor area and height which corresponds in the IAQM Guidance as Large threshold. The material to be used in the construction stage includes steel and brick/masonry products – the dust release potential is Large.
Trackout	Large	Given the size of the site, the proposed haul roads are expected to be less than 100m in length. These roads are expected to be unpaved, therefore there is potential for dust releases. It is estimated that there would be >50 HDV movements per day at the peak of construction. Based on the above, trackout works have been classified as Large.

Sensitivity of the Area

8.100. A wind rose for Manchester 2019 is provided in Appendix 8.3 and this indicates that the prevailing wind direction is from the south-west. Therefore, existing receptors that are located to the north and east are most likely to fall within the area of influence from dust emissions generated by the construction phase.

8.101. The majority of dust generated by the construction phase is likely to be deposited in close proximity to the source (see Figure 8.8). Surrounding the Application Site there are a number of highly sensitive existing residential receptors – mainly to the west along Tonman Street, Camp Street, St John Street and Artillery Street and immediately east of the Site on Watson Street – in particular Great Northern Tower which is a residential building (>100 within 100m). There are no ecological receptors located within 50m of the Application Site, or within 500m of the likely construction traffic route and therefore consideration of these receptors has been scoped out.

8.102. The Defra background PM10 concentration is 13.48µg/m3 in 2019 which is well below the annual mean air quality objective.

8.103. The sensitivity of the area to each of the previously identified impact types associated with the Proposed Development are identified in Table 8.27.

Table 8.26 Predicted Magnitude of Dust Emissions from Proposed Development

Impact Type	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Low	Low	Low	Low
Ecological	N/A	N/A	N/A	N/A

8.104. To determine the risk of impacts prior to the implementation of mitigation the dust emission magnitude and the sensitivity of the area have been combined. Table 8.28 below summaries the potential risk of impacts during the construction phase.

Table 8.27 Predicted Magnitude of Dust Emissions from Proposed Development

Impact Type	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Human Health	Medium Risk	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

8.105. The risk of dust soiling impacts of the Proposed Development on existing receptors in the vicinity of the Application Site is medium Risk for demolition, earthworks, construction and trackout activities, without the implementation of mitigation. The risk of human health impacts from the Proposed Development on existing receptors is medium for demolition works and low for earthworks, construction and trackout activities without the implementation of mitigation.

Non-Road Mobile Machinery (NRMM)

8.106. The greatest impact on air quality due to construction traffic and NRMM is likely to be along roads in the vicinity of the Application Site. It is likely that construction traffic will enter the Application Site via the A56 Deansgate, Great Bridgewater Street and Watson Street. It is likely that the volume of construction traffic will be low compared to the existing traffic flows.

8.107. A detailed assessment using ADMS Urban will be undertaken to consider the impact of construction traffic on annual mean NO_2, PM_{10} and $PM_{2.5}$ at existing receptor locations.

Construction Traffic Emissions

8.108. Detailed dispersion modelling of construction traffic emissions was undertaken in accordance with the AQS objectives set out in Table 1 within Appendix 8.2.

8.109. The annual mean NO2 AQS objective (40 µg/m^3) applies to highly sensitive receptors (i.e., residential) and has been used to assess impacts at these locations. The 1-hour NO_2 AQS objective (200 µg/m^3) applies to medium sensitivity receptors (i.e., office, commercial, retail, hotel) and has been used to assess impacts at these locations.

8.110. A full breakdown of the detailed dispersion modelling results for construction traffic emissions is presented in Appendix 8.8, however a summary is provided below.

Annual Mean NO_2 Concentrations

8.111. 'Without' and 'with' the construction of the Proposed Development, the annual mean NO_2 concentrations at 18 existing receptors are below the annual mean AQS of 40 µg/m^3. At receptor location E6_0 and E_1 (hotel) concentrations exceed the annual mean AQS objective, however they are well below the relevant 1-hour mean AQS objective of 200 µg/m^3.

8.112. The greatest predicted change in annual mean NO_2 brought about by the construction generated road traffic is 0.3 µg/m^3 at existing receptor location E6_0 (hotel), according to the EPUK/IAQM guidance the impact at this location is Moderate Adverse. The predicted change at all remaining existing receptor locations is negligible.

8.113. Where an adverse impact is identified, mitigation is normally required to minimise the impact, however in this case existing receptor E6 is classified as a medium sensitivity receptor (hotel) and typically the annual mean NO_2 objective is not applicable – the 1 hour mean objective is applied. Therefore, on this basis mitigation to protect existing receptors from elevated annual mean NO_2 concentrations resulting from construction traffic is not required. Although the impact of construction traffic emissions are not considered to be significant and will be temporary and short-medium term, the best practice mitigation measures outlined in Table 8.29, including no idling of vehicles, avoidance of diesel or petrol powered plant, speed restrictions on unpaved haul roads, and the implementation of a Construction Logistics Plan and Travel Plan should be employed, where practicable to minimise any air quality impacts resulting from construction traffic.

Hourly Mean NO_2 Concentrations

8.114. To determine compliance with the 1-hour mean objective for NO_2 (200 µg/m^3) detailed modelling has been undertaken.

8.115. All modelled existing receptor locations predicted annual mean NO_2 concentrations are well below the AQS objective of 200 µg/m^3. The highest predicted concentration is 83.2 µg/m^3 at E6_0 (hotel). On this basis, mitigation to protect existing receptors from elevated hourly mean NO_2 concentrations resulting from construction traffic is not required.

Annual Mean PM_{10} Concentrations

8.116. The objective for annual mean PM_{10} concentrations is 40 µg/m^3 (applicable to Medium-High sensitivity).

8.117. 'Without' and 'with' the construction of the Proposed Development, the annual mean PM_{10} concentrations at all 19 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 16.8 µg/m^3 at existing receptor E6_0.

8.118. With the construction of the Proposed Development the greatest predicted change in annual mean PM_{10} concentrations is 0.1 at existing receptor E6_0. According to the EPUK/IAQM guidance, the impacts on annual mean PM_{10} concentrations at all existing receptors were negligible.

8.119. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean PM10 concentrations is not required.

Daily Mean PM_{10} Concentrations

8.120. The AQS objective for daily mean PM_{10} concentrations is 50 µg/m^3, to be exceeded no more than 35 times a year (applicable to Medium-High sensitivity).

8.121. The assessment demonstrates that all existing receptors fall within the daily mean PM_{10} objective with a maximum of 1 days of exceedance predicted in both the 'without' and 'with' Development scenarios. Furthermore, there are no differences between the 'without' and 'with' development scenarios. As a result, the impacts on daily mean PM_{10} concentrations are negligible.

8.122. On this basis, mitigation to protect future users of the Proposed Development from elevated daily mean PM_{10} concentrations is not required.

Annual Mean $PM_{2.5}$ Concentrations

8.123. The objective for annual mean $PM_{2.5}$ concentrations is 25 µg/m^3 (applicable to Medium-High sensitivity).

8.124. 'Without' and 'with' the construction of the Proposed Development, the annual mean $PM_{2.5}$ concentrations at all 19 existing receptor locations are compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 10.6 µg/m^3 at existing receptor E6_0.

8.125. With the construction of the Proposed Development there is no predicted change in annual mean $PM_{2.5}$ concentrations at existing receptor locations. According to the EPUK/IAQM guidance, the impacts on annual mean $PM_{2.5}$ concentrations at all existing receptors were negligible.

8.126. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean $PM_{2.5}$ concentrations resulting from construction traffic is not required.

Completed Development

Operational Traffic Emissions

8.127. Detailed dispersion modelling of operational traffic emissions was undertaken in accordance with the AQS objectives set out in Table 1 within Appendix 8.2.

8.128. The annual mean NO_2 AQS objective (40 µg/m^3) applies to highly sensitive receptors (i.e., residential) and has been used to assessment impacts at these locations. The 1-hour NO2 AQS objective (200 µg/m^3) applies to medium sensitivity receptors (i.e., office, commercial, retail, hotel) and has been used to assess impacts at these locations.

8.129. The modelling of operational traffic emissions considered the impacts of Proposed Development in two phases: Phase A (2026) and Full-build out (2030). In 2026 proposed receptors P1-3, P6-9, P16 and P17 (see Figure 8.7) will be operational and the impacts of the Phase A development-generated traffic at these locations is presented below. By 2030 all modelled proposed receptors (P1-17) will be operational and the impacts of Phase A and 2 development-generated traffic is presented at all locations.

8.130. A full breakdown of the detailed dispersion modelling results for operational traffic emissions is presented in Appendix 8.8, however a summary is provided below.

Phase A Build Out (2026)

Annual Mean NO_2 Concentrations

8.131. 'Without' and 'with' the Proposed Development (Phase A) operational, the annual mean NO_2 concentrations at 18 existing receptors are below the AQS of 40 µg/m^3. At existing receptor E6 (ground – third floor) (hotel), concentrations exceed the annual mean AQS objective, however they fall well below the relevant 1-hour mean AQS objective of 200 µg/m^3.

8.132. The greatest predicted change in annual mean NO_2 concentrations brought about by the development generated road traffic is 4.7 µg/m^3 at E6_0. Existing receptor location E6 is located at Beetham Tower on Great Bridgewater Street. Despite the predicted change in concentration, NO2 concentrations at E6 remain below the relevant AQS for 1-hour mean NO2 of 200 µg/m^3.

8.133. According to EPUK/IAQM guidance, the predicted change at existing receptor location E6 ranges from Substantial Adverse (ground-1st floors) to moderate adverse (2nd–25th floors). The predicted change at existing receptor locations E4 and E5 is slight adverse, and at all remaining existing receptors is negligible.

8.134. With the Proposed Development (Phase A) operational annual mean NO_2 concentrations at all modelled proposed receptor locations are below the annual mean AQS of 40 µg/m^3. The highest concentration is 26 µg/m^3 at proposed receptor P3.

8.135. On this basis, mitigation to protect existing receptors and future users of the Proposed Development from elevated annual mean NO_2 concentrations is not required.

Hourly Mean NO_2 Concentrations

8.136. To determine compliance with the 1-hour mean objective for NO_2 (200 µg/m^3) detailed modelling has been undertaken.

8.137. All modelled existing and proposed receptor locations predicted annual mean NO_2 concentrations of well below the AQS objective of 200 µg/m^3. The highest predicted concentration is 118.2 µg/m^3 E6_0 (hotel). On this basis, mitigation to protect existing receptors and future users of the Proposed Development from elevated hourly mean NO_2 concentrations is not required.

Annual Mean PM10 Concentrations

8.138. The objective for annual mean PM_{10} concentrations is 40 µg/m^3.

8.139. 'Without' and 'with' the operation of the Proposed Development (Phase A), the annual mean PM_{10} concentrations at all 19 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 18.2 µg/m^3 at existing receptor E6_0.

8.140. With the operation of the Proposed Development (Phase A) the greatest predicted change in annual mean PM_{10} is 0.8 µg/m^3 at existing receptors E6_0 and E6_1. According to the EPUK/IAQM guidance the impacts on annual mean PM_{10} concentrations at all existing receptors are negligible.

8.141. With the Proposed Development operational annual mean PM_{10} concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 13.6 µg/m^3 at proposed receptor location P3.

8.142. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean PM_{10} concentrations is not required.

Daily Mean PM_{10} Concentrations

8.143. The AQS objective for daily mean PM_{10} concentrations is 50 µg/m^3, to be exceeded no more than 35 times a year.

8.144. The assessment demonstrates that all existing receptors fall within the daily mean PM_{10} objective with a maximum of 2 days of exceedance predicted in both the 'without' and 'with' Development scenarios. Furthermore, the only difference between the 'without' and 'with' development scenarios is at E6_0 which changes from 1 day exceedance to 2 days exceedance with the operation of the Proposed Development (Phase A). As a result, the impacts on daily mean PM_{10} concentrations are negligible.

8.145. For daily mean PM_{10}, it is predicted that all new receptors would be well within the AQS objective, again with a maximum of 1 predicted exceedance of the limit at all proposed receptor locations.

8.146. On this basis, mitigation to protect future users of the Proposed Development from elevated daily mean PM_{10} concentrations is not required.

Annual Mean $PM_{2.5}$ Concentrations

8.147. The objective for annual mean $PM_{2.5}$ concentrations is 25 µg/m^3.

8.148. 'Without' and 'with' the construction of the Proposed Development, the annual mean $PM_{2.5}$ concentrations at all 19 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 11.3 µg/m^3 at existing receptor E6_0.

8.149. With the operation of the Proposed Development the greatest predicted change in annual mean $PM_{2.5}$ concentrations is 0.6 at E6_0. According to the EPUK/IAQM guidance, the impacts on annual mean $PM_{2.5}$ concentrations at all existing receptors are negligible.

8.150. With the Proposed Development operational annual mean $PM_{2.5}$ concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 8.6 µg/m^3 at proposed receptor locations P2 and P3.

8.151. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean $PM_{2.5}$ concentrations is not required.

Full-Build Out (2030)

8.152. The modelling of operational traffic emissions considered the impacts of Proposed Development in two phases: Phase A (2026) and Full-build out (2030). In the '2030 with development (full-build out)' scenario receptor locations P1-3, P6-9, P16 and P17 are considered as existing receptors and receptor locations P4, P5 and P10-P15 are classified as proposed receptors (see Figure 8.7).

Annual Mean NO_2 Concentrations

8.153. 'Without' and 'with' the Proposed Development operational, the annual mean NO_2 concentrations at 27 existing receptors are below the AQS of 40 µg/m^3. At existing receptor E6 (ground – fourth floor) (hotel), concentrations exceed the annual mean AQS objective, however they fall well below the relevant 1-hour mean AQS objective of 200 µg/m^3.

8.154. The greatest predicted change in annual mean NO_2 concentrations brought about by the development generated road traffic is 3.9 µg/m^3 at E6_0. Despite the predicted change in concentration, NO_2 concentrations at E6 remain below the relevant AQS for 1-hour mean NO_2 of 200 µg/m^3.

8.155. According to EPUK/IAQM guidance, the predicted change at existing receptor location E6 ranges from Substantial Adverse (ground-1st floors) to moderate adverse (2nd–25th floors). The predicted change at existing receptor locations E4 (commercial) and E5 (retail) is slight adverse, and at all remaining existing receptors is negligible.

8.156. With the Proposed Development (full-build out) operational annual mean NO_2 concentrations at all modelled proposed receptor locations are below the annual mean AQS of 40 µg/m^3. The highest concentration is 27.9 µg/m^3 at proposed receptor P4.

8.157. On this basis, mitigation to protect existing receptors and future users of the Proposed Development from elevated annual mean NO_2 concentrations is not required.

Hourly Mean NO_2 Concentrations

8.158. To determine compliance with the 1-hour mean objective for NO_2 (200 µg/m^3) detailed modelling has been undertaken.

8.159. All modelled existing and proposed receptor locations predicted annual mean NO_2 concentrations of well below the AQS objective of 200 µg/m3. The highest predicted concentration is 118.2 µg/m^3 E6_0 (hotel). On this basis, mitigation to protect existing receptors and future users of the Proposed Development from elevated hourly mean NO_2 concentrations is not required.

Annual Mean PM_{10} Concentrations

8.160. The objective for annual mean PM_{10} concentrations is 40 µg/m^3.

8.161. 'Without' and 'with' the operation of the Proposed Development (full-build), the annual mean PM_{10} concentrations at all 28 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 19.4 µg/m_3 at existing receptor E6_0.

8.162. With the operation of the Proposed Development (full-build) the greatest predicted change in annual mean PM_{10} is 0.8 µg/m_3 at existing receptors E6_0 and E6_1. According to the EPUK/IAQM guidance the impacts on annual mean PM_{10} concentrations at all existing receptors are negligible.

8.163. With the Proposed Development operational annual mean PM_{10} concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 15 µg/m^3 at proposed receptor locations P4.

8.164. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean PM_{10} concentrations is not required.

Daily Mean PM_{10} Concentrations

8.165. The AQS objective for daily mean PM_{10} concentrations is 50 µg/m^3, to be exceeded no more than 35 times a year.

8.166. The assessment demonstrates that all existing receptors fall within the daily mean PM_{10} objective with a maximum of 3 days of exceedance (at E6_0) predicted in both the 'without' and 'with' Development scenarios. Furthermore, the only difference between the 'without' and 'with' development scenarios is at E6_0 which changes from 2 day exceedance to 3 days exceedance with the operation of the Proposed Development. As a result, the impacts on daily mean PM_{10} concentrations are negligible.

8.167. For daily mean PM_{10}, it is predicted that all new receptors would be well within the AQS objective, again with a maximum of 1 predicted exceedance of the limit at all proposed receptor locations.

8.168. On this basis, mitigation to protect future users of the Proposed Development from elevated daily mean PM_{10} concentrations is not required.

Annual Mean $PM_{2.5}$ Concentrations

8.169. The objective for annual mean $PM_{2.5}$ concentrations is 25 µg/m^3.

8.170. 'Without' and 'with' the operation of the Proposed Development (full-build), the annual mean $PM_{2.5}$ concentrations at all 28 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 12 µg/m^3 at existing receptor E6_0.

8.171. With the operation of the Proposed Development the greatest predicted change in annual mean PM2.5 concentrations is 0.6 µg/m^3 at E6_0. According to the EPUK/IAQM guidance, the impacts on annual mean $PM_{2.5}$ concentrations at all existing receptors are negligible.

8.172. With the Proposed Development operational annual mean $PM_{2.5}$ concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 9.4 µg/m^3 at proposed receptor location P4.

8.173. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean $PM_{2.5}$ concentrations is not required.

Sensitivity Analysis

8.174. A sensitivity analysis was undertaken to assess the worst-case scenario impacts. This assumed the car park will operate at full capacity (929 spaces) each day. Therefore, assuming the maximum possible trip generation of the proposed development and volume of emitted pollutants.

8.175. The results of the sensitivity analysis are not considered to be representative of the Application Site. A full breakdown of the detailed dispersion modelling results for the sensitivity analysis is presented in Appendix 8.8, however a summary is provided below (paragraphs 8.165-8.186).

Annual Mean NO2 Concentrations

8.176. The objective for annual mean NO_2 concentrations is 40 µg/m^3.

8.177. 'Without' and 'with' the operation of the Proposed Development, the annual mean NO_2 concentrations at all 27 existing receptor locations are below the AQS of 40 µg/m^3. At existing receptor E6 (ground-sixth floor) (hotel), concentrations exceed the annual mean AQS objective, however they fall well below the relevant 1-hour mean AQS objective of 200µg/m^3.

8.178. The greatest predicted change in annual mean NO_2 brought about by development generated road traffic is 4.3 µg/m_3 at existing receptor locations E6_0. Despite the predicted change in concentration, NO_2 concentrations at E6 remain below the relevant AQS for 1-hour mean NO_2 of 200 µg/m^3.

8.179. According to EPUK/IAQM guidance, the predicted change at existing receptor location E6 ranges from Substantial Adverse (ground-3rd floors) to moderate adverse (4th–25th floors). The predicted change at all remaining existing receptors is negligible.

8.180. With the Proposed Development operational annual mean NO_2 concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 29.9 µg/m^3 at proposed receptor locations P12.

8.181. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean NO_2 concentrations is not required.

Hourly Mean NO_2 Concentrations

8.182. To determine compliance with the 1-hour mean objective for NO_2 (200 µg/m^3) detailed modelling has been undertaken.

8.183. All modelled existing and proposed receptor locations predicted annual mean NO_2 concentrations of well below the AQS objective of 200 µg/m^3. The highest predicted concentration is 118.2 µg/m^3 E6_0 (hotel). On this basis, mitigation to protect existing receptors and future users of the Proposed Development from elevated hourly mean NO_2 concentrations is not required.

Annual Mean PM_{10} Concentrations

8.184. The objective for annual mean PM_{10} concentrations is 40 µg/m^3.

8.185. 'Without' and 'with' the operation of the Proposed Development, the annual mean PM_{10} concentrations at all 28 existing receptor locations are compliant with the AQS objective. The highest predicted concentration with the Proposed Development operational is 19.8 µg/m^3 at existing receptor E6_0.

8.186. With the operation of the Proposed Development (full-build) the greatest predicted change in annual mean PM10 is 1.4 µg/m^3 and 1.2 µg/m^3 at existing receptors E6_0 and E6_1. According to the EPUK/IAQM guidance the impacts on annual mean PM_{10} concentrations at all existing receptors are negligible.

8.187. With the Proposed Development operational annual mean PM_{10} concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 16.7 µg/m^3 at proposed receptor locations P12_0.

8.188. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean PM_{10} concentrations is not required.

Daily Mean PM_{10} Concentrations

8.189. The AQS objective for daily mean PM_{10} concentrations is 50 µg/m^3, to be exceeded no more than 35 times a year.

8.190. The assessment demonstrates that all existing receptors fall within the daily mean PM_{10} objective with a maximum of 3 days of exceedance (at E6_0) predicted in both the 'without' and 'with' Development scenarios. Furthermore, the only difference between the 'without' and 'with' development scenarios is at E6_0 which changes from 2 to 3 days exceedance with the operation of the Proposed Development. As a result, the impacts on daily mean PM_{10} concentrations are negligible.

8.191. For daily mean PM_{10}, it is predicted that all new receptors would be well within the AQS objective, again with a maximum of 1 predicted exceedance of the limit at all proposed receptor locations.

8.192. On this basis, mitigation to protect future users of the Proposed Development from elevated daily mean PM_{10} concentrations is not required.

Annual Mean $PM_{2.5}$ Concentrations

8.193. The objective for annual mean $PM_{2.5}$ concentrations is 25 µg/m^3.

8.194. 'Without' and 'with' the operation of the Proposed Development (full-build out), the annual mean $PM_{2.5}$ concentrations at all 28 existing receptor locations were compliant with the AQS Objective. The highest predicted concentration with the construction of the Proposed Development is 12.2 µg/m^3 at existing receptor E6_0.

8.195. With the operation of the Proposed Development the greatest predicted change in annual mean $PM_{2.5}$ concentrations is 0.8 µg/m^3 at E6_0. According to the EPUK/IAQM guidance, the impacts on annual mean $PM_{2.5}$ concentrations at all existing receptors are negligible.

8.196. With the Proposed Development operational annual mean $PM_{2.5}$ concentrations at all modelled proposed receptor locations is below the AQS objective. The highest concentration is 10.4 µg/m^3 at proposed receptor location P12_0.

8.197. On this basis, mitigation to protect future users of the Proposed Development from elevated annual mean $PM_{2.5}$ concentrations is not required.

Odour Emissions

8.198. The following section considers the source odour potential, the pathway effectiveness, the risk of exposure at receptor locations, and likely magnitude of effect.

Source Odour Potential

8.199. The sources of potential odour relate to the proposed kitchen extracts associated with the Proposed Development.

8.200. Given the nature of the potential odorous activities (cooking from a restaurant/cafe kitchen) the Source Odour Potential is classified as small. Whilst there is currently limited information available as to the type of restaurant being brought forward and the kitchen odour control system is to be designed by the tenant, it is not anticipated that the operation of the restaurant would result in a higher Source Odour Potential – however when further information becomes available it is recommended that this assessment is revisited.

Effectiveness of Pathway

8.201. Potential sensitive locations are likely to be the existing residential receptors located near the Proposed Development. There are a number of potential existing sensitive receptors located to the in close proximity to the Site, in particular those existing residential dwellings to the west. Furthermore, as part of the proposals there is an extensive provision of new residential dwellings, which are sensitive in relation to odorous emissions associated with the new restaurant/cafes being brought forward. A number of these sensitive receptors are located within or adjacent to the development and have the potential to be downwind of the odour source.

8.202. Considering the prevailing wind direction in the UK is from the south, southwest (see Appendix 8.3 – wind rose for Manchester 2019), there is potential for receptors located to the north and northeast of the source to be more susceptible to odour.

8.203. With the proximity of the existing and proposed receptor locations, the effectiveness of pathway is classified as highly effective.

Risk of Odour Exposure

8.204. With a small source odour potential and highly effective pathway, the risk of odour exposure for the existing receptors in the vicinity of the Application Site is Low Risk.

Assessment of Impact

8.205. The sensitivity of the existing and proposed receptor locations is classified as high, the risk of odour exposure is classified as Low therefore in accordance with Table 8.13 the impact of odour is slight adverse.

8.206. It should be noted that once confirmation has been established for the type of restaurant/café to come forward a suitable odour control system should be designed and implemented to ensure that existing and proposed receptors are not exposed to odorous emissions that may pose a nuisance.

Mitigation Measures

Construction

Construction Dust Emissions

8.207. The IAQM guidelines provide an indication of the mitigation measures that would be appropriate for inclusion within the Proposed Development, based on the level of risk of dust related impacts identified for each of the activities. Consequently, the following mitigation measures should be incorporated into the Proposed Development and delivered through the implementation of a Construction Environment Management Plan (CEMP), which can be secured via a suitably worded planning condition.

8.208. Mitigation measures that are generic to each of the activities, and therefore should be implemented for the duration of the construction related works where applicable are identified in Table 8.29, whilst activity specific mitigation measures are identified in Table 8.30.

Table 8.29 Mitigation to be implemented during the construction phase

Development Element	Mitigation Measure
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 site manager. Display the head or regional office contact information.
Planning	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the measures recommended in this table.
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. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning 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 PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if at a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
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. 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 run-off 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 Vehicle/Vehicle Movements	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 appropriate). 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. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fin 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.

Table 8.30 Activity Specific Mitigation Measures to be implemented during the Construction Phase

Development Acitivity	Mitigation Measure
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Only remove the cover in small areas during work and not all at once.
Construction	Avoid scabbling (roughening of concrete surfaces) if possible. Ensure sand and other aggregates are stored in bunds in areas that 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 small 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 continuously in use. Avoid dry sweeping of large areas.

Construction Traffic Emissions

8.209. The impacts of construction traffic on PM_{10} and $PM_{2.5}$ concentrations has been determined as negligible at all existing receptor locations.

8.210. The annual mean NO_2 AQS objective (40 µg/m^3) applies to highly sensitive receptors (i.e., residential) and has been used to assess impacts at these locations. The 1-hour NO_2 AQS objective (200 µg/m^3) applies to medium sensitivity receptors (i.e., office, commercial, retail, hotel) and has been used to assess impacts at these locations.

8.211. The air quality modelling indicated moderate adverse (ground floor) and slight adverse (first floor) impacts on annual mean NO_2 concentrations at existing receptor location E6 (Beetham Tower – Hotel) – however concentrations at this location remain well below the relevant 1-hour NO_2 mean of 200 µg/m^3.

8.212. Whilst an adverse impact has been identified in relation to annual mean NO_2 concentrations, mitigation to protect receptors from elevated annual mean NO_2 concentrations is not required as the annual mean AQS objective is not typically applicable at medium sensitivity receptors (i.e., E6 – hotel). Although site-specific mitigation is not required, this should not deter from the good site practice measures, as set out in Tables 8.29 and 8.30 being employed.

8.213. The residual effects of construction traffic emissions are not significant.

Completed Development

8.214. The impacts of development-generated traffic (Phase A) on PM_{10} and $PM_{2.5}$ concentrations have been determined as negligible at all existing and proposed receptor locations. The impacts of development-generated traffic (full-build out) on PM_{10} and $PM_{2.5}$ concentrations have also been determined as negligible at all existing and proposed receptor locations. Mitigation is therefore not required.

8.215. The annual mean NO_2 AQS objective (40 µg/m^3) applies to highly sensitive receptors (i.e., residential) and has been used to assess impacts at these locations. The 1-hour NO_2 AQS objective (200 µg/m^3) applies to medium sensitivity receptors (i.e., office, commercial, retail, hotel) and has been used to assess impacts at these locations.

8.216. The air quality modelling indicated moderate adverse and substantial adverse impacts of development-generated traffic (Phase A and Full-Build out) on annual mean NO_2 concentrations at existing receptor location E6 (Beetham Tower – Hotel) – however concentrations at this location remain well below the relevant 1-hour NO_2 mean of 200 µg/m^3.

8.217. Whilst an adverse impact has been identified in relation to annual mean NO_2 concentrations, mitigation to protect receptors from elevated annual mean NO_2 concentrations is not required as the annual mean AQS objective is not typically applicable at medium sensitivity receptors (i.e., E6 – hotel). Although site-specific mitigation is not required, this does not deter from best practice design and the following design commitments should be made:

- Where possible locate air intakes along facades that face away from roads;
- Locate air intakes at height (<4th or 5th floor, where possible); and,

8.218. Be mindful of locating air intakes at roof level - where roof level intakes are necessary it is important to consider existing flues (energy plant/kitchen extracts) associated with any neighbouring buildings and any exhausts (kitchen or ventilation) associated the Proposed Development itself. This will reduce the likelihood of recirculating 'dirty' air. Where possible air intakes should be located approximately 20m from an exhausts (See Part F of the Building Regulations).

8.219. The Proposed Development will also encourage sustainable travel and reduce the reliance on road vehicles surrounding the site to improve local air quality conditions. These measures are set out in Curtins Transport Statement and include:

- Net reduction in the number of car park spaces;

- Improved pedestrian, cycle and public transport accessibility; and,
- The production of a Framework Travel Plan.

8.220. In the future there is an expectation that tailpipe emissions from road traffic will continue to decrease as cleaner and more efficient vehicle technologies become available, including the increased uptake of electric and hybrid vehicles (cars, vans, lorries, and buses), both of which have the potential to substantially decrease NOx emissions. Furthermore, MCC are actively striving to reduce road traffic in the city centre and encourage greater uptake of sustainable travel methods such as public transport, walking and cycling. In addition to this, there are plans regarding the closure and potential pedestrianisation of some major roads within Manchester which is likely to lead to a reduction of road traffic in the city centre, and thus improving local air quality.

8.221. The residual effects of the operational phase are not significant.

Cumulative Effects

Construction

8.222. The Development has been identified as posing a medium risk for dust soiling and low risk for human health, however the significance of effects in the absence of mitigation is likely to be greater when considered in the context of other construction sites. Consequently, there is potential for greater exposure of the population to effects and/or prolonged exposure to impact. Without the implantation of mitigation for both our site and other sites in the vicinity the cumulative impact is conservatively, considered to be major adverse.

8.223. To minimise the contribution of emissions from the Site during the construction phase to local cumulative effects the mitigation measures outlined in Tables 8.29 and 8.30 should be employed and secured through the CEMP. Furthermore, it is expected that other construction sites should be employing the appropriate mitigation measures (the same or similar to those identified in Tables 8.29 and 8.30) to minimise their contribution to local air quality associated with the construction phase.

8.224. Nonetheless, the following measures should be implemented to ensure co-ordination of efforts to reduce dust impacts on shared receptors and minimise cumulative effects:

- Regular meetings and close liaison with other construction site managers to ensure construction emissions are being minimised as much as practicably possible.
- Community engagement to give confidence to the local community that good construction practice measures are being employed and appropriate mitigation is being implemented to ensure any impact is minimised.

8.225. On the basis that the Site and other construction sites implement the mitigation set out above and in Table 8.29 and 8.30, the cumulative impact is classified as minor adverse.

8.226. The residual effects are considered to be not significant.

Completed Development

8.227. The assessment of operational phase impacts will consider the cumulative impacts of the Development, and localised committed schemes, on air quality through the inclusion of traffic data from such schemes in the air quality dispersion modelling.

8.228. The traffic data utilised for the detailed modelling has been provided by Curtins which accounts for all cumulative schemes and localised traffic growth in the future. A breakdown of the raw traffic data utilised is provided in Appendix 8.4.

8.229. The conclusions of the assessment indicate that the impacts at modelled receptor locations were negligible with regards to particulate concentrations (PM_{10} and $PM_{2.5}$) and ranged from negligible-substantial adverse with regards to annual mean NO_2 concentrations (at medium sensitivity receptors only). All modelled receptors complied with the 1-hour mean NO_2 AQS objective, which is most applicable to those medium sensitivity receptors where adverse impacts where identified in relation to the annual mean NO_2 AQS objective.

8.230. The annual mean NO_2 AQS objective (40 µg/m^3) applies to highly sensitive receptors (i.e., residential) and has been used to assess impacts at these locations. The 1-hour NO_2 AQS objective (200 µg/m^3) applies to medium sensitivity receptors (i.e., office, commercial, retail, hotel) and has been used to assess impacts at these locations. Whilst an adverse impact has been identified in relation to annual mean NO_2 concentrations, mitigation to protect receptors from elevated annual mean NO_2 concentrations is not required. Although site-specific mitigation is not required, this does not deter from the best practice design measures identified in paragraph 8.207.

8.231. The residual effects are considered to be not significant.

Residual Effects

Table 8.31 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
All Receptors (existing)	Construction Dust Emissions (Dust Impacts)	Mitigation measures to be implemented through the construction phase – see Table 8.29. Construction activity specific mitigation measures – see Table 8.30	Negligible
All Receptors (existing)	Construction Dust Emissions (Human Health)	Mitigation measures to be implemented through the construction phase – see Table 8.29. Construction activity specific mitigation measures – see Table 8.30	Negligible
All Receptors (existing)	Construction Traffic Emissions (NO_2)	Mitigation measures to be implemented through the construction phase – see Table 8.29. Construction activity specific mitigation measures – see Table 8.30	Negligible
All Receptors (existing and proposed)	Operational Traffic Emissions (PM_{10} and $PM_{2.5}$) – Negligible	No site-specific mitigation is required, however best practice design measures are recommended – see Paragraph 8.217.	Negligible
All Receptors (existing and proposed)	Operational Traffic Emissions (NO_2)	No site-specific mitigation is required, however best practice design measures are recommended – see Paragraph 8.217.	Negligible

Reference List

8.232. This ES Chapter has been prepared by reference to the following:

- Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007).
- The Air Quality (England) Regulations 2000 – Statutory Instrument 2000 No. 928.
- The Air Quality (England) (Amendment) Regulations 2002 – Statutory Instrument 2002 No. 3043.
- The Air Quality Standards (Amendment) Regulations 2016 – Statutory Instrument 2016 No. 1184.
- The Environment Act 1995.
- The Environment Act 2021.
- The Environmental Protection Act 1990.
- Ministry of House Communities and Local Government (July 2021). National Planning Policy Framework
- Defra (2019) Clean Air Strategy 2019, Defra.
- DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy.
- Defra (2017) Air quality plan for nitrogen dioxide (NO2) in the UK.
- Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations.
- Manchester City Council Local Plan.
- National Planning Practice Guidance (October 2019).
- Local Air Quality Management Review and Assessment Technical Guidance (LAQM. TG22) (August 2022).
- IAQM. Land-Use Planning and Development Control: Planning for Air Quality (v1.2) (2017).
- IAQM. Guidance on the Assessment of Dust from Demolition and Construction. (v1.1) (2016).
- EMAQs. Control of Odour and Noise from Commercial Kitchen Exhaust Systems.
- IAQM. Guidance on the assessment of Odour for Planning (v1.1, 2018).
- Manchester City Council (2021). Air Quality Annual Status Report.
- Defra Local Air Quality Management (LAQM) Support Pages. Available at: http://laqm.defra.gov.uk/. Accessed on 20/10/2022
- Defra (2021) Defra Emission Factor Toolkit (v11.0). Available at https://laqm.defra.gov.uk/review-and-assessment/tools/emission-factors-toolkit.html. Accessed on 24/10/2022.
- Defra Background Maps. Available at: https://uk-air.defra.gov.uk/data/laqm-background-home. Accessed on 24/10/2022
- Defra NOx to NO2 Calculator. Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/. Accessed on 24/10/2022.

Figures

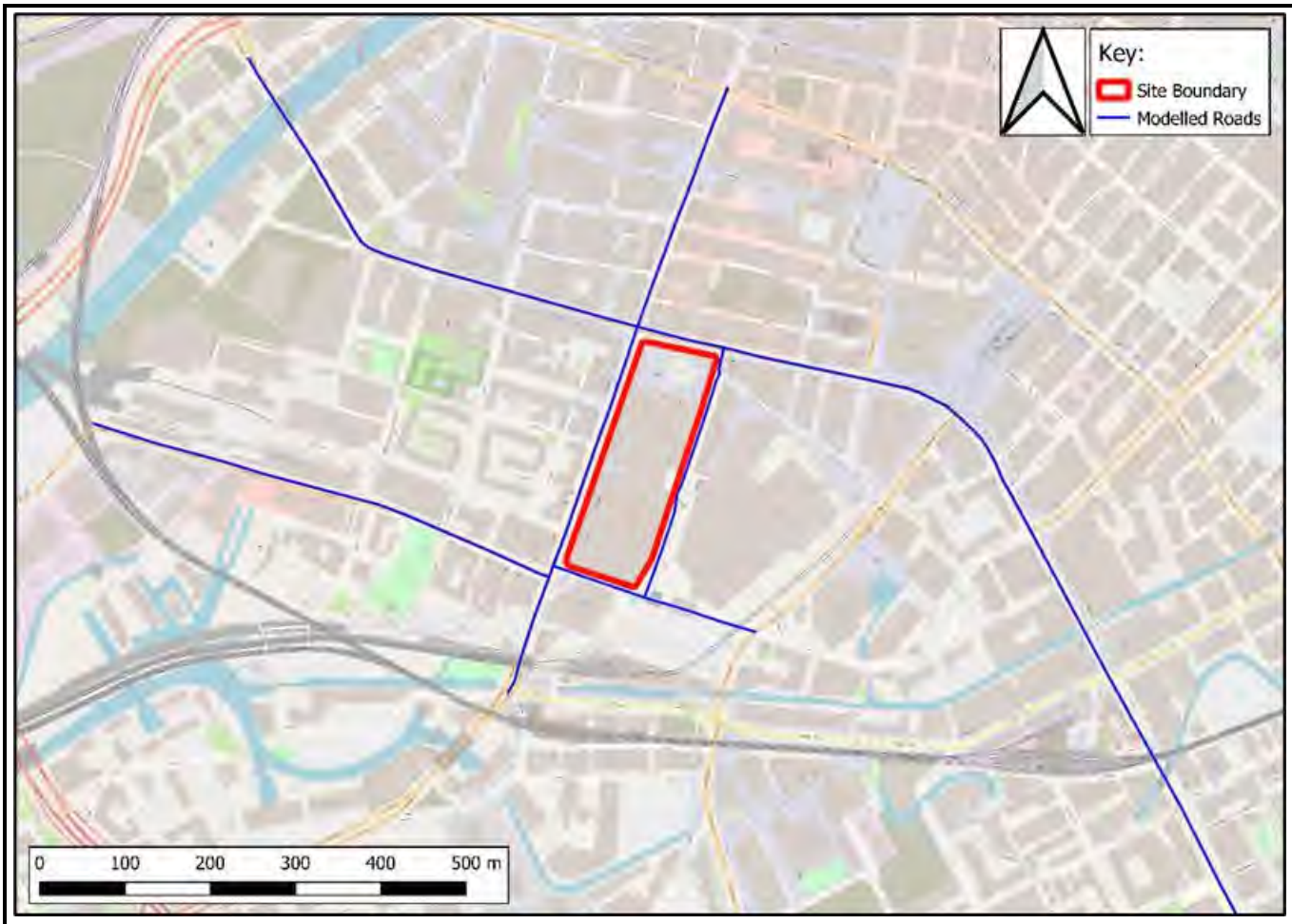


	Figure:	**8.1**		
	Title:	**Modelled Roads**		
	Project:	**Great Northern, Manchester**		
	Date:	**09/11/2022**	**Scale:**	**1:5000**

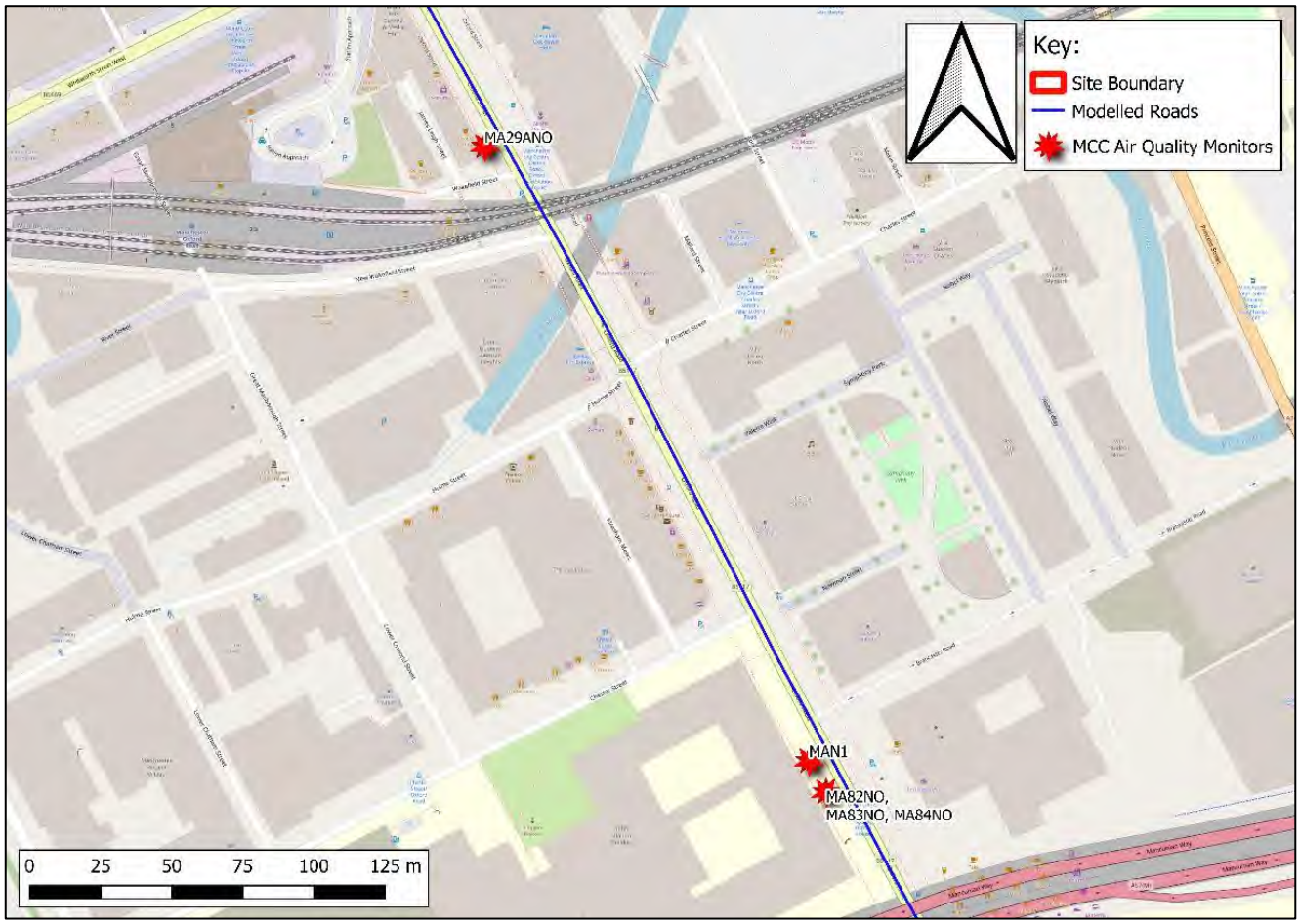


	Figure:	**8.2**		
	Title:	**Model Verification**		
	Project:	**Great Northern, Manchester**		
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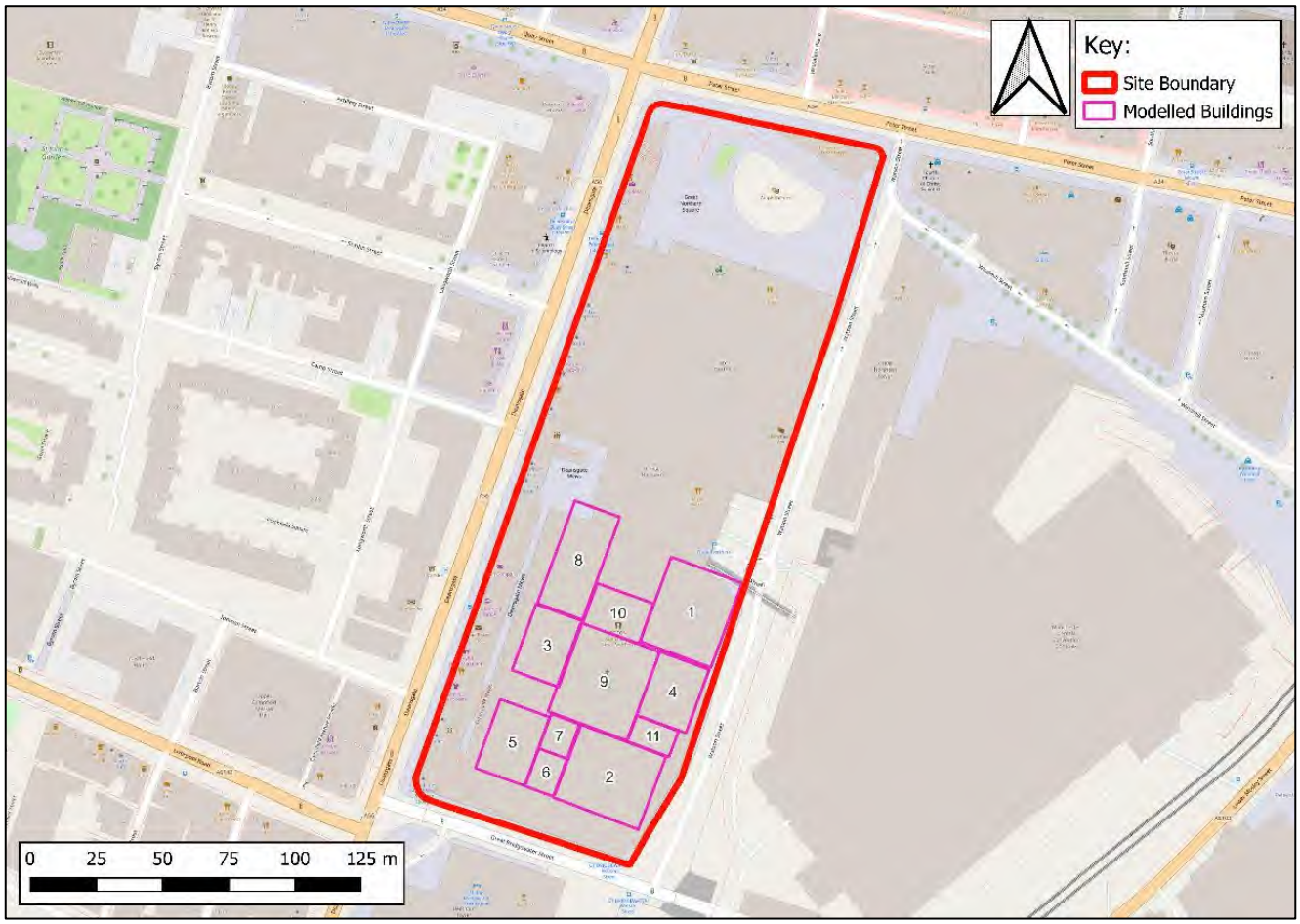


	Figure:	**8.3**		
	Title:	**Modelled Buildings**		
	Project:	**Great Northern, Manchester**		
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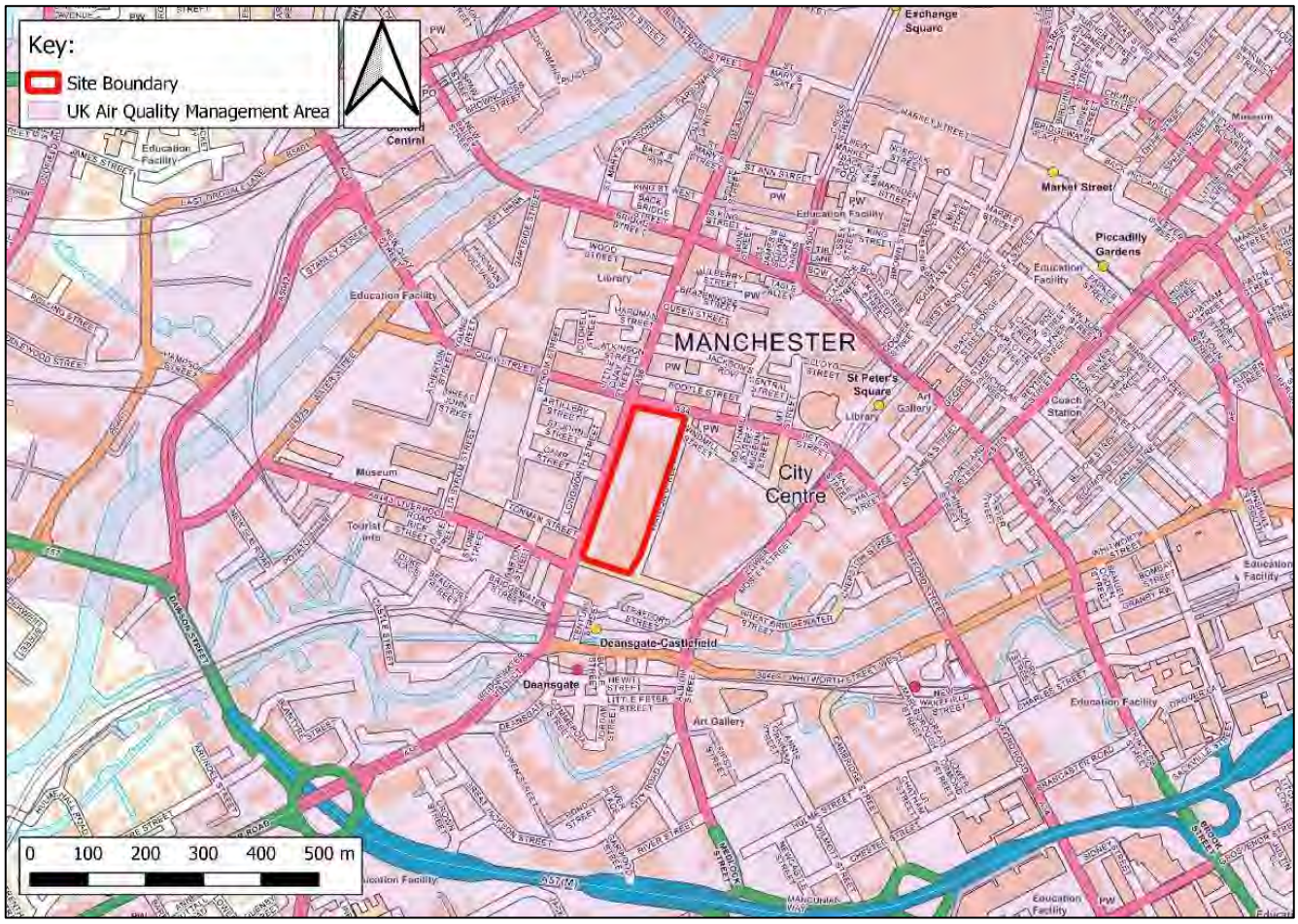


	Figure:	**8.4**		
	Title:	**Air Quality Management Areas**		
	Project:	**Great Northern, Manchester**		
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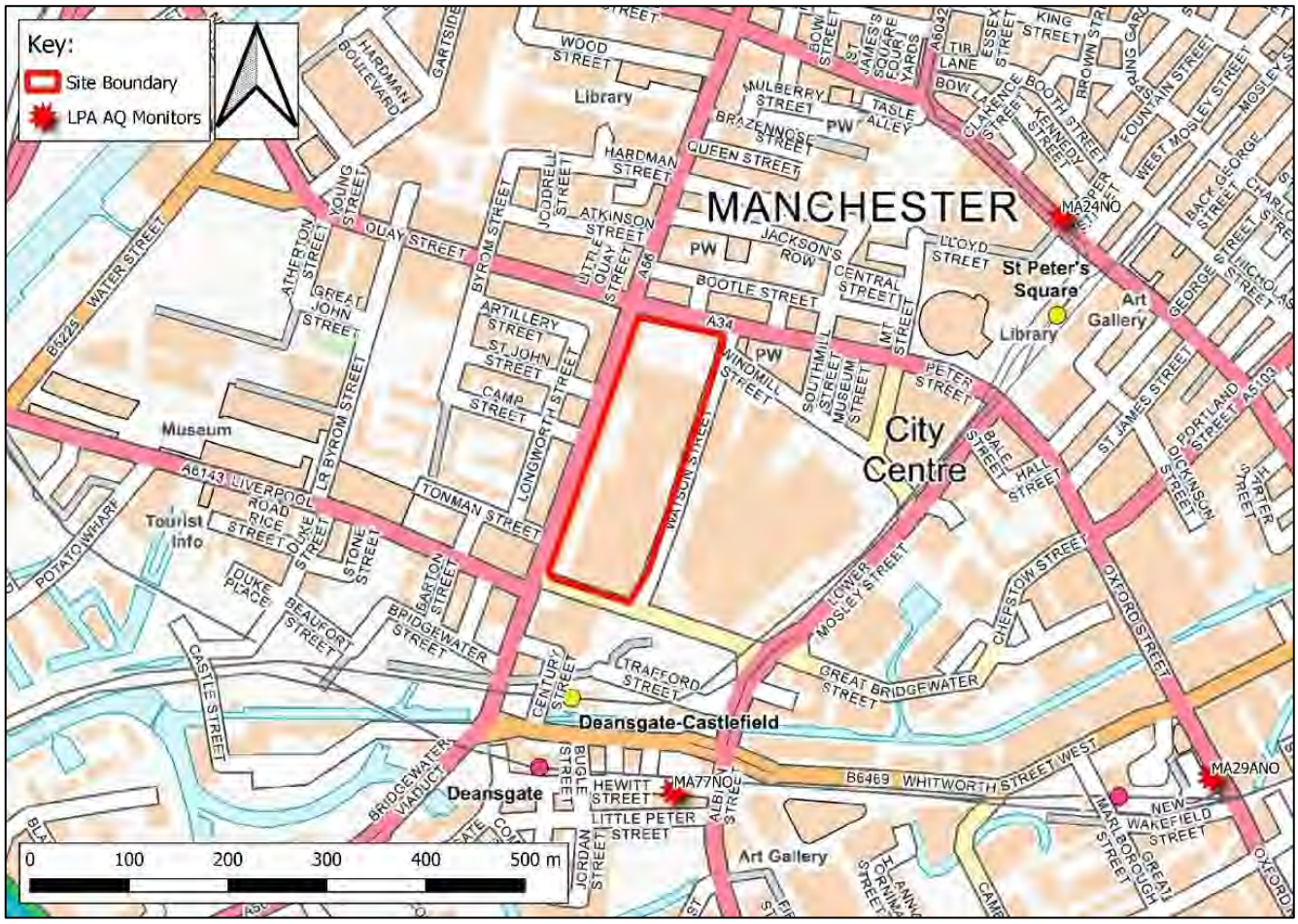


	Figure:	**8.5**		
	Title:	**Air Quality Monitoring Sites**		
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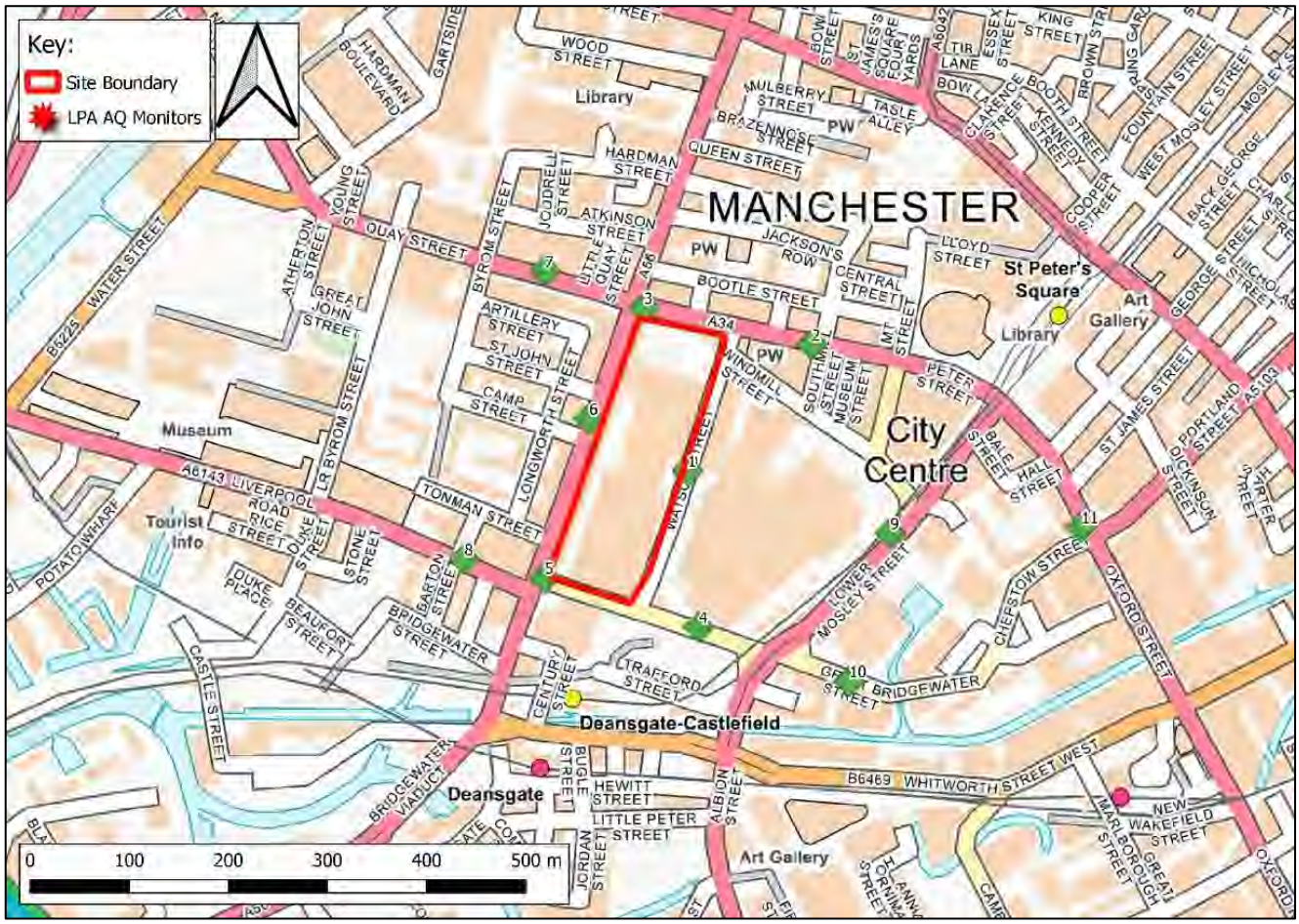


	Figure:	**8.6**		
	Title:	**Diffusion Tube Survey Locations**		
	Project:	**Great Northern, Manchester**		
	Date:	**09/11/2022**	**Scale:**	**1:5000**

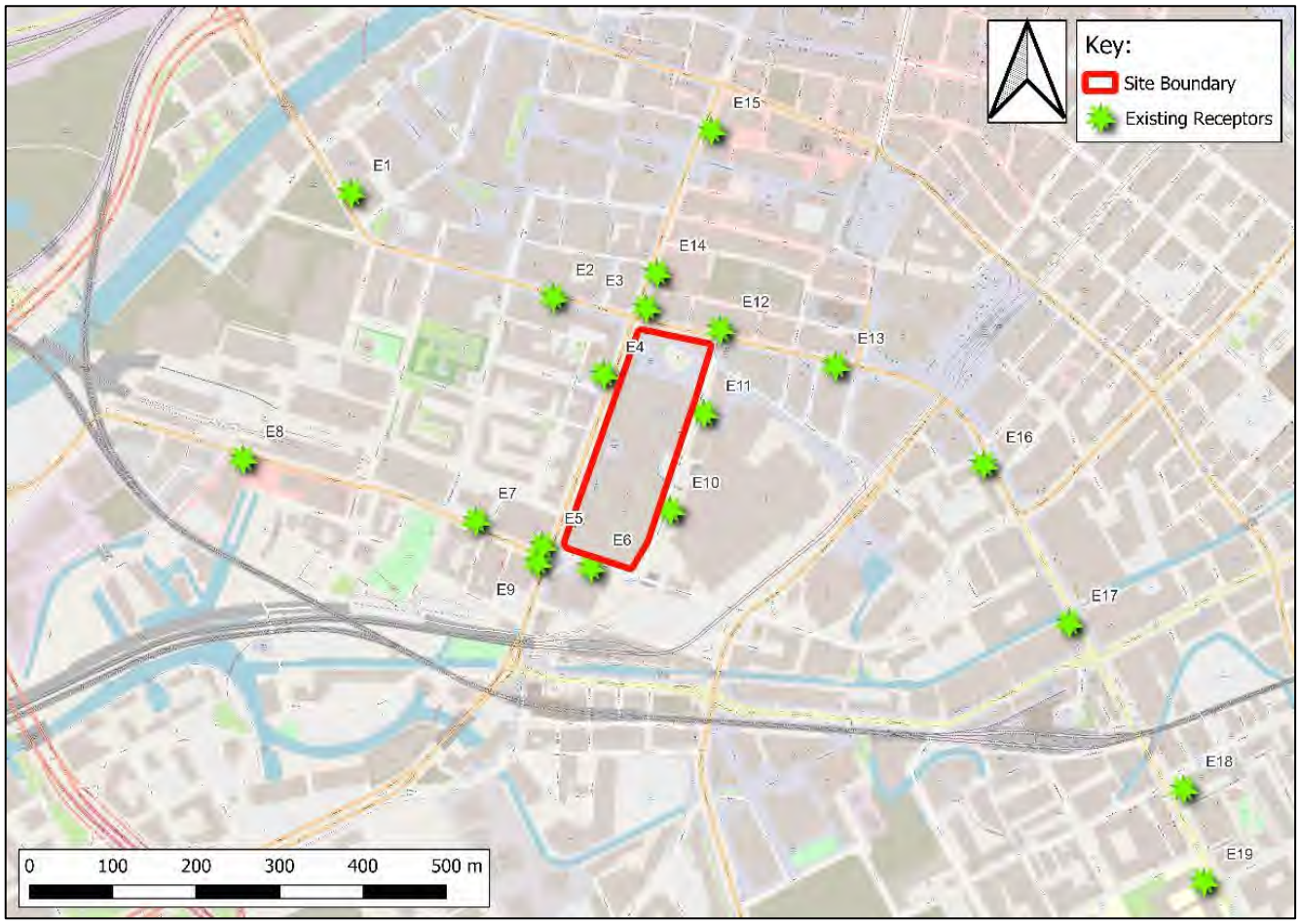


	Figure:	**8.6**		
	Title:	**Existing Receptors**		
	Project:	**Great Northern, Manchester**		
	Date:	**09/11/2022**	**Scale:**	**1:5000**

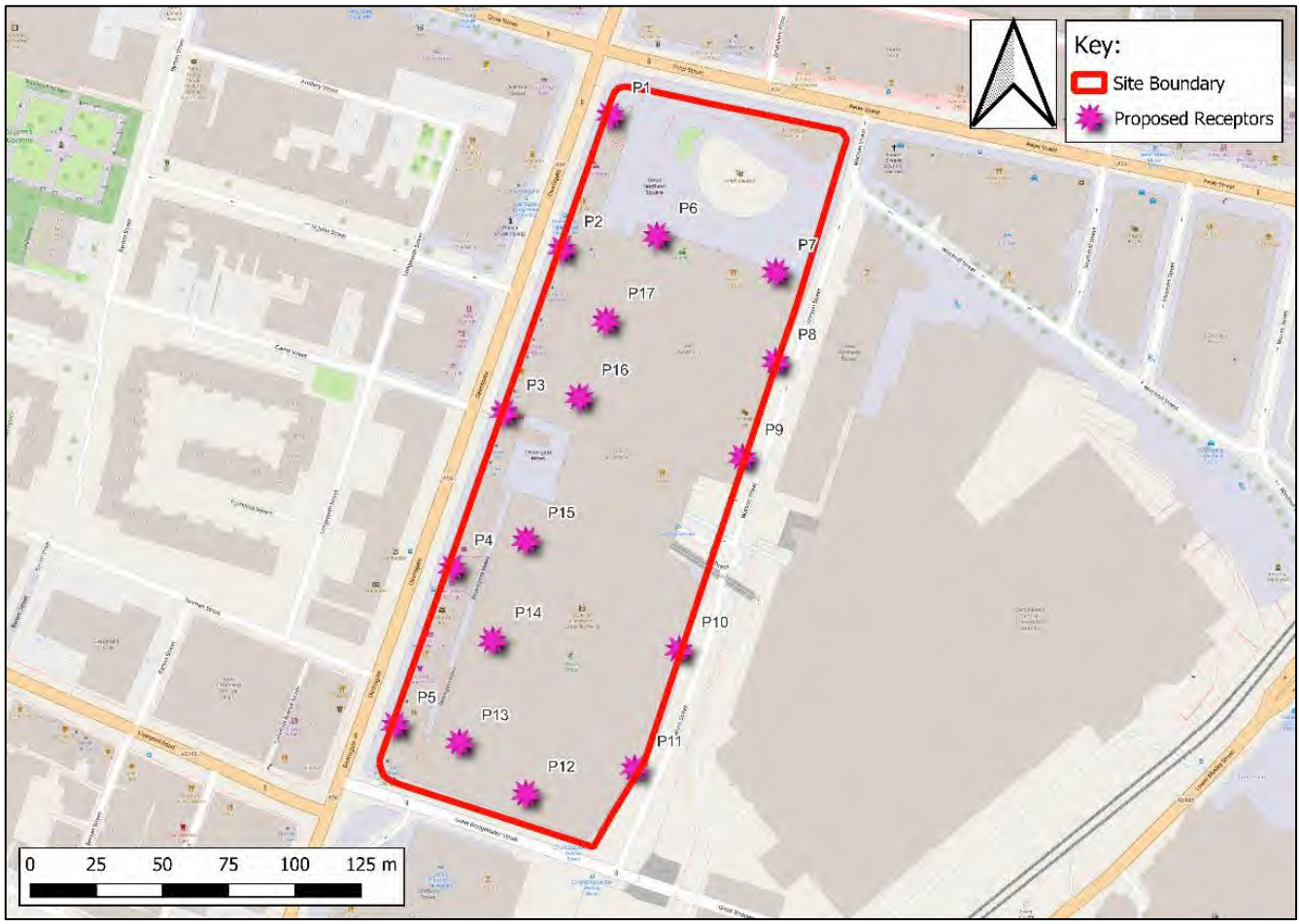


	Figure:	**8.7**		
	Title:	**Proposed Receptors**		
	Project:	**Great Northern, Manchester**		
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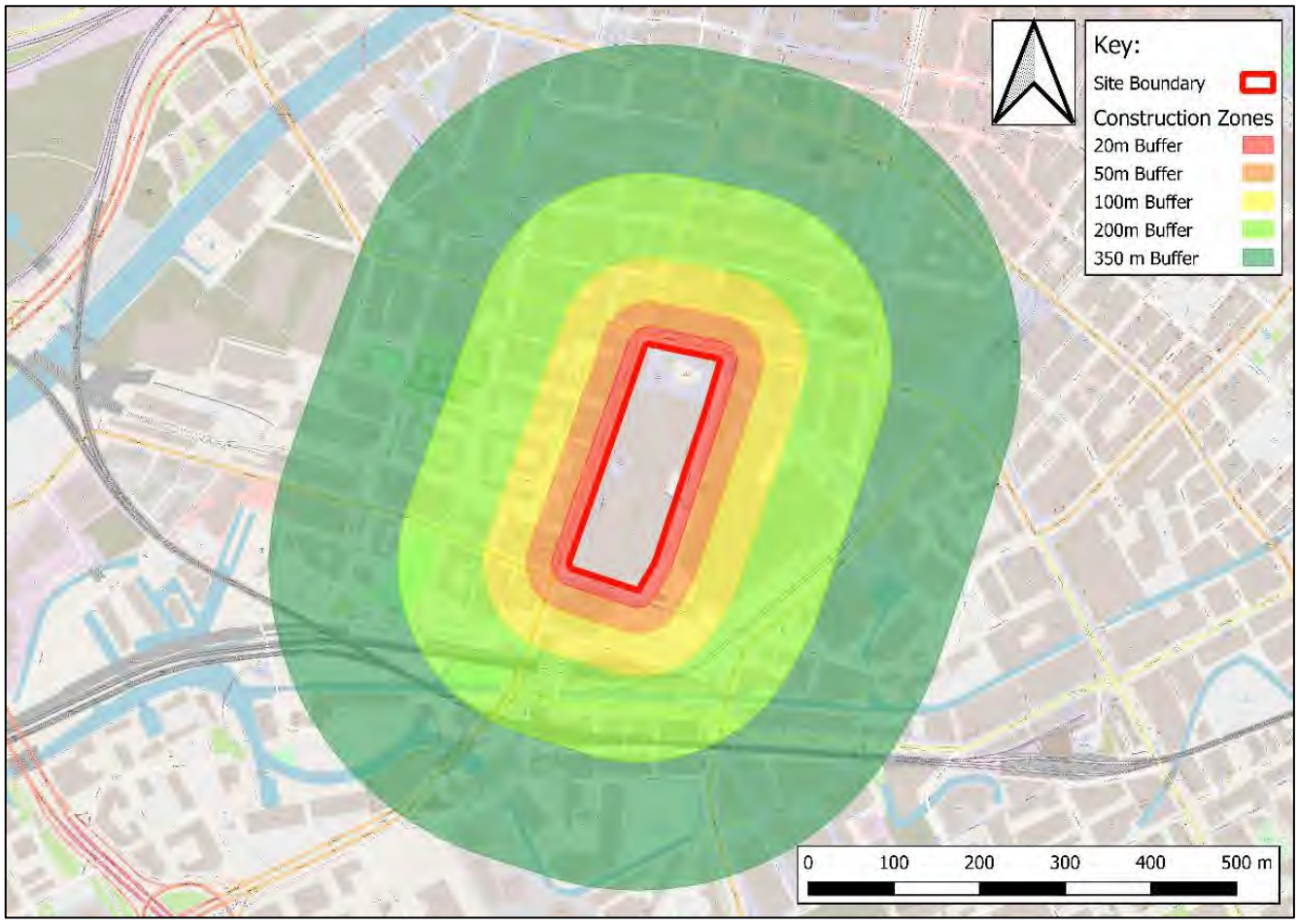


	Figure:	**8.8**		
	Title:	**Zone of Construction Influence**		
	Project:	**Great Northern, Manchester**		
	Date:	**09/11/2022**	**Scale:**	**1:5000**

9. Noise and Vibration

Introduction

9.1. This Chapter of the ES has been prepared by Alex Lees of WSP and assesses the likely noise and vibration impacts of the Proposed Development upon the site and surrounding area, and the suitability of the local noise environment for the proposals. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce, or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

9.2. This Chapter is accompanied by 5 Appendices

- Legislation and Policy (Appendix 9.1);
- Baseline Noise Survey Details (Appendix 9.2);
- Construction Noise Assessment (Appendix 9.3);
- Overheating and Noise Assessment (Appendix 9.4); and
- Gym Acoustic Treatment (Appendix 9.5).

9.3. Alex Lees is a Principal Acoustic Engineer at WSP and holds corporate membership of the Institute of Acoustics (MIOA). Alex has over 10 years' experience in acoustics and holds the Institute of Acoustics Diploma in Acoustics and Noise Control. WSP is a registered member of the Association of Noise Consultants (ANC).

Limitations and Assumptions

9.4. The various assessments within this report rely on the results of a baseline noise survey carried out at the site. Noise conditions could vary in future from those reported; however, the noise measurements cover daytime and night-time periods and industry best practice has been adopted in the use of the data. The data is therefore considered appropriate for the purposes of this ES chapter.

9.5. As is typical at the planning stage, the precise details of the construction plant, plant number, programme and working methodologies are unknown and will only be finalised once a contractor is appointed, post planning approval. The construction noise level predictions have therefore been undertaken based on upon WSP's experience of similar schemes. Whilst more detailed calculations may be required at a later stage, the completed calculations are considered appropriate to provide an appreciation of any potentially significant effects and identify measures to mitigate effects as far as is practicable.

9.6. The assessment of vibration from construction activities has been undertaken based on vibration levels associated with a small range of key ground borne vibration generative construction activities. It is possible that activities other than those presented may take place, whilst, similarly, some of those presented may not be applicable to the activities specific to the Site at the time of construction. The conclusions drawn from this assessment, however, provide an indication of the potential effects that could arise during the construction phase. This assessment has assumed that piled foundation works will be required.

9.7. At this stage, detailed information on fixed building services plant that may be introduced as a result of the Proposed Development, and future tenants of commercial units, is not available. The approach has therefore been to set noise level limits for existing and proposed sensitive receptors and demonstrate how those limits could be enforced by means of appropriately worded planning conditions to ensure a commensurate level of protection to nearby sensitive receivers, and avoid giving rise to any significant effect.

Consultation

9.8. To inform the completed assessment work, extensive consultation has been undertaken with Environmental Health Department of MCC. This has included agreement of the approach to and the extent of the required baseline noise survey, the scope of the assessment work to be undertaken and the assessment methodologies to be applied.

9.9. Table 9.1 provides a summary of the completed consultation activities and associated correspondence.

Table 9.1 – Summary of Completed Consultation with MCC

Consultee (Body/Organisation)	Role	Date and Form of Consultation	Summary and Outcome of Consultation
Environmental Health, Neighbourhoods Directorate, MCC	Environmental Protection	Email 24 March 2022	Agreement with noise and vibration impact assessment scope – to consider overheating, Manchester Central events, entertainment noise. Confirmation of noise survey monitoring locations.
Environmental Health, Neighbourhoods Directorate, MCC	Environmental Protection	Email 28 March 2022	Confirmation of noise and vibration impact assessment scope.
Environmental Health, Neighbourhoods Directorate, MCC	Environmental Protection	Email 15 June 2022	Discussion about Manchester Central noise survey scope/method. MCC suggested trying to obtain a previous noise assessment carried out by the venue – the venue subsequently declined to share this. MCC were asked to confirm the proposed assessment but are yet to respond.
Environmental Health, Neighbourhoods Directorate, MCC	Environmental Protection	Phone call and email 12 July 2022	Confirmation about construction noise and vibration assessment and discussion about Manchester Central noise assessment.

9.10. In addition to consultation with MCC, engagement was also undertaken with nearby landowners (e.g. Manchester Central and Low Four Studios), to obtain understanding their current operations and operational requirements and allow these to be accounted for within the completed assessment.

Legislative and Policy Context

9.11. Appendix 9.1 includes a summary of the noise and vibration legislation and policy which is relevant to this assessment. Policy and guidance from these, and other documents (such as relevant British Standards etc.) have been described at the appropriate points in this chapter.

Legislation

The Control of Pollution Act (1974)

9.12. The principal legislation covering demolition and construction noise is the Control of Pollution Act 1974 [1], Part III. Sections 60 and 61 of the Act give local authorities special powers for controlling noise arising from construction and demolition works, regardless of whether a statutory nuisance has been caused or is likely to be caused. Works within the scope of these provisions include repair and maintenance work and road works. These powers may be exercised either before works start or after they have started.

National Planning Policy

Noise Policy Statement for England (NPSE)

9.13. The NPSE [2] was published on 15th March 2010. It sets out the long-term vision for government noise policy, to promote good health and a good quality of life through the management of noise.

9.14. To assist in the understanding of the terms "significant adverse" and "adverse" effects, the NPSE acknowledges that there are three concepts being applied to noise impacts, they are:

- NOEL - No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
- LOAEL - Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL - Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur

National Planning Policy Framework

9.15. Last updated in July 2021, the NPPF [3] sets out the Government's planning policies for England and how these are expected to be applied. The NPPF superseded Planning Policy Guidance Note (PPG) 24: Planning and Noise [4] amongst other PPG's and Planning Policy Statements (PPS's). In contrast to PPG 24 [4], reference to noise is scant within the NPPF.

Planning Practice Guidance – Noise (PPG-N)

9.16. The Government launched the Planning Practice Guidance (PPG) [5] web-based resource in March 2014, the document is regularly updated and was most recently refreshed on 20 July 2021 in relation to noise. The section on noise provides tabulated descriptions of example outcomes of the 'effect level' categories introduced in the NPSE [2] based on the likely average response. It also adds a fourth category termed Unacceptable Adverse Effect (UAE).

Local Planning Policy

Manchester City Council Core Strategy

9.17. Manchester City Council's (MCC) Core Strategy Development Plan 2012-2027 (the Core Strategy) [Ref. 7] was adopted in July 2012 and is the key document in the Manchester Local Development Framework. It sets out the long term strategic policies for Manchester's future development and forms the framework that planning applications are assessed against.

9.18. Pertinent to this development, and with regards to noise and vibration, is Policy DM1 Development Management, which states the following: "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.

Unitary Development Plan: Citywide Development Control Policies

9.19. The Core Strategy [7] replaced significant elements of MCC's Unitary Development Plan (UDP) [8]; however, UDP policies DC26.1 – DC26.6 have been saved and are relevant to noise and vibration. These are reproduced in full in Appendix 9.1

Manchester City Council Planning and Noise Technical Guidance 2022

9.20. Supplementary detailed planning guidance regarding noise is provided by Manchester City Council (MCC) in its Technical Guidance note entitled 'Planning and Noise' [Ref. 9] published in July 2022.

9.21. The Technical Guidance states that it "aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected in relation to current guidance and policy with the aspiration that new developments achieve the highest possible standards without compromising the health and wellbeing of people that live and work within the City of Manchester."

Assessment Methodology and Significance Criteria

Scope of the Assessment

9.22. The scope of the assessment remains largely unchanged from that detailed within the EIA Scoping Report submitted to Manchester City Council, as provided in Appendix 2.1 of this Environmental Statement (ES) [9]. The Local Planning Authority's Scoping Opinion is contained in Appendix 2.2 [10] of the ES, which was received on 28 October 2022.

9.23. The only change to the scope is that construction traffic noise has been scoped out of the assessment, in light of information from the Transport consultant. General construction noise (including vehicles within the boundary of the Site itself) and vibration from the Site have been assessed.

9.24. The total construction programme will span a period of approximately five years and will be undertaken in two main construction Phases, as follows:

- Phase A - Great Northern Warehouse & The Northern Terraces
- Phase B and C - Leisure Box & The Southern Terraces

9.25. The noise and vibration assessments are based on construction and operation of both phases of the site to adequately capture all potential impacts.

9.26. The potential effects that have been scoped-in and scoped out of the assessment are detailed below, including the evidence base for those effects that are scoped-out.

Insignificant Effects

9.27. The following potential effects would not be significant and so have been scoped-out of the noise and vibration assessment:

- The impact of existing ground borne vibration on the Proposed Development. The nearest potentially significant sources of vibration to the site are elevated tram lines over 90m to the south, and an elevated train line over 170m to the south. These distances are such that vibration generated by passing trams or trains is not likely to lead to significant effects at the Proposed Development.

- Noise impacts at nearby sensitive receptors created by road traffic generated by Proposed Development. As detailed in the Transport Statement [11] there will be a net reduction of 311 parking spaces (from 1240 to 929 spaces, a circa 25% reduction) at the Site due to the Proposed Development. Therefore, the traffic generating potential will reduce compared to the baseline situation and the overall number of car movements is not predicted to increase. In addition, given the existing leisure use at the site, service vehicle movements are expected to be less or comparable to the baseline situation. Therefore, no significant effects are expected as a result of road traffic noise level changes as a result of the Proposed Development.
- It should be noted that the Transport Statement does discuss some minor trip generating potential associated with the Proposed Development based on the results of the car park access surveys. However, these trips are not strictly new and the conclusion is that the removal of circa 311 car parking spaces significantly reduces the trip generating potential of the Site.
- The impact of construction traffic noise on existing local receptors in the vicinity of existing roads that would be used by construction vehicles. Over the course of the build-out of the Proposed Development, typical daily construction traffic flows have been advised by the Transport consultant to be in the order of 50 light vehicles and 50 heavy vehicles per day (although heavy vehicle numbers are likely to be lower). Such low numbers of additional traffic on existing surrounding roads would have a negligible effect on noise emission levels. Therefore, no significant effects are expected as a result of construction traffic noise associated with the Proposed Development. Noise levels from construction vehicles within the site itself have been assessed within the main construction noise assessment.

Potentially Significant Effects

9.28. The following effects have the potential to be significant and have therefore been 'scoped-in' to the noise and vibration assessment:

- Site Preparation, Earthworks and Construction Phase
    - The impact of construction noise on existing local receptors in the vicinity of the Site.
    - The impact of construction vibration on existing local receptors including:
        - People; and
        - Buildings / structures.
    - The impact of construction traffic noise on existing local receptors in the vicinity of routes that would be used by construction vehicles.
- Operational Phase
    - The impact of the existing noise environment (road, rail, and commercial sources) on residential aspects of the Proposed Development.
    - The impact of new commercial units on existing local receptors including:
        - noise from new items of external building services plant; and
        - entertainment noise from within commercial units and from the rooftop terrace on the Deansgate Terrace.
    - The impact of proposed external building services plant noise on existing and proposed sensitive receptors.

Extent of the Study Area

9.29. The primary study area includes the Site itself as well as the closest existing noise and vibration sensitive receptors to the Site.

9.30. The sensitive receptors are detailed in Table 9.2 below and are also presented within Figure 9.1.

Table 9.2 – Noise Sensitive Receptors

Reference	Receptor description	Receptor type	Approx. distance / direction from red line boundary	Sensitivity
NSR 1	Great Northern Tower	Residential	15m to east	High
NSR 2	Manchester Central	Event Space	25m to east	High
NSR 3	Viadux, Residential	Residential	30m to southeast	High
NSR 4	Beetham Tower	Residential	15m to south	High
NSR 5	Area to west of Deansgate	Residential	60m to west	High
NSR 6	Proposed Development	Residential	n/a	High

9.31. All of the above receptors are classed as 'High' sensitivity as these are places of residential occupation or locations where a low noise environment is desirable.

Guidance

9.32. The adopted assessment methodologies have drawn upon applicable British Standards and best practice guidance documents. Key documents are listed below:

- British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings (BS 8233) [12];
- British Standard 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1) [13];
- British Standard 5228-2:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS 5228-2) [14];
- The noise section of the Planning Practice Guidance (06 March 2014) (PPG-N) [5];
- ProPG: Planning and noise - Professional practice guidance on planning and noise - New residential development, (May 2017) (ProPG) [15];
- World Health Organisation: Guidelines for community noise (WHO) [16];
- British Standard 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound (BS 4142) [17];
- Design Manual for Roads and Bridges (DMRB), LA 111 'Noise and vibration' Revision 2 (May 2020) [18];
- The Calculation of road traffic noise (CRTN) (1988) [19];
- Acoustics Ventilation and Overheating Residential Design Guide (AVO Guide), Institute of Acoustics and Association of Noise Consultants (January 2020) [20].

Site visit and baseline noise surveys

9.33. A series of baseline noise surveys have been undertaken on and in the vicinity of the Site. The purpose of these baseline noise surveys was:

- to determine the prevailing noise environment at sample locations across the Site;
- to determine the noise levels generated by key sources contributing to the on-site noise environment, and facilitate a detailed noise modelling exercise for the Site; and
- to determine the prevailing ambient and background noise levels at a sample of locations selected as representative of both noise sensitive aspects of the Proposed Development, and existing local sensitive receptors.

9.34. The noise survey measurement positions are shown in Figure 9.4 and described in Table 9 3 below. Full details of the baseline noise surveys including the obtained measurement results is provided in Appendix 9.2 of ES volume 2.

Table 9.3 – Noise Measurement Positions

Meas. Position	Start - End	Duration	Description	Purpose
MP1	04/04/2022 to 20/04/2022	~ 16 days	Outside 3rd floor conference room window facing Deansgate, approx.	Capture prevailing noise levels at the western boundary of the site dominated

Meas. Position	Start - End	Duration	Description	Purpose
			0.5m from the façade.	by road traffic on Deansgate.
MP2	04/04/2022 to 03/04/2022	~ 8.5 days	Footbridge over Watson Street.	Capture prevailing noise levels at the eastern boundary of the site.
MP3	13/04/2022	3 hours	Great Bridgewater Street on pavement approx. 4m from road edge.	Capture prevailing daytime and night-time noise levels at the southern boundary of the site dominated by road traffic on Great Bridgewater Street.
	15/04/2022	1 hour		
MP4a	13/04/2022	3 hours	Peter Street measurement, on junction by Watson Street approx. 4m from road edge.	Capture prevailing daytime noise levels at the northern boundary of the site dominated by road traffic.
MP4b	14/04/2022 23:09hrs - 15/04/2022 00:09hrs	1 hour	Position on Level 3 at north-eastern corner of the multi-storey car park	Capture prevailing night-time noise levels at the northern boundary of the site dominated by road traffic on Deansgate and noise from bars such as Albert Schloss.
MP5	03/04/2022	Various	Survey during an event in Exchange Hall at Manchester Central	Capture noise levels during a musical bingo event with a full speaker system and DJ. Sound limiter in place in this venue.
MP6	07/07/2022	Various	Survey during an event in Charter Suite at Manchester Central	Capture noise levels during a live music event in the venue space closest to the Proposed Development. This is the only event space with no sound limiting system.
MP7	16/08/2022	Various	Survey during an event in Exchange	Capture noise levels during a corporate afterparty event with a full speaker system.

Meas. Position	Start - End	Duration	Description	Purpose
			Hall at Manchester Central	Sound limiter in place in this venue space.
MP8	29/07/2022	Various	Survey outside the Lion's Den music bar during a music event.	Capture noise levels during a live music event from the music itself and patrons sat outside.
MP9	07/10/2022	31 secs	5m from the Low Four Studio window.	Capture noise levels during a live music event.
MP10	29/07/2022	5 mins	Great Northern Square next to Pong & Puck games bar outdoor area.	Measurement of noise from DJ music and patrons outside.
MP11	29/07/2022	2 mins	Great Northern Square outside Impossible club / bar.	Measurement of noise from music and patrons inside.
MP12	29/07/2022	5 mins	Great Northern Square outside Lane 7 bowling alley entrance.	Venue doors open, measurement of noise from music and people inside

Significance Criteria

9.35. The following terms have been used to define the noise and vibration impact magnitude:

Table 9 4 – Impact Magnitude Criteria

Impact Magnitude	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key element/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstance/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

9.36. Impacts can be beneficial or adverse. The various noise and vibration impact magnitudes have been determined drawing upon the applicable guidance in each case, as summarised in the relevant subsections of this chapter.

9.37. The significance of the resulting environmental effect is determined by the interaction of the impact magnitude and the receptor sensitivity. The matrix used to determine the significance of effects is set out in the table below.

Table 9 5 – Matrix for Determining the Significance of Effects

	Sensitivity		
Magnitude	**High**	**Moderate**	**Low**
Major	Major	Moderate	Minor-Moderate
Moderate	Moderate	Minor-Moderate	Minor
Minor	Minor	Minor	Negligible-Minor
Negligible	Negligible	Negligible	Negligible

9.38. An effect of Moderate or Major has been considered to be 'significant' in EIA terms, with effects of Minor and Negligible considered to be 'not significant'.

9.39. The scale of the effect will be further reviewed against a number of additional factors to assess the final scale and significance of any identified adverse effects. These additional factors will include:

- Number of receptors likely to be affected (e.g. the significance of an effect may increase if a large number of receptors are affected);
- Any specialist features of the receptor (e.g. some receptors may have specific features that alter the scale of an effect); and
- Duration of the adverse effect (e.g. effects that occur for an extended period of time may be more significant than short term effects of a similar impact magnitude).

9.40. Separate to the above, which covers the requirement of EIA to determine significant effects, as stipulated under the EIA Regulations, noise related planning policy also references the need to consider significance in terms of effect levels (the NOEL, LOAEL, and SOAEL descriptors). The impact magnitude scales presented in the following subsections also therefore detail how the NOEL, LOAEL and SOAEL descriptors have been determined within the assessment as part of testing against the policy requirements of the NPSE [Ref. 2].

Construction Phase

Construction Noise

9.41. For construction noise, the impact magnitude and effect level have been determined based upon the margin by which predicted construction noise levels will comply or exceed the receptor construction noise assessment criteria as determined following the ABC assessment method detailed within BS 5228-1 [Ref. 11].

9.42. Table 9.6 details the resulting impact magnitude and effect level criteria that have been applied.

Table 9.6 – Construction Noise - Impact Magnitude and Effect Level Criteria

Construction noise level 'x' (dB $L_{Aeq,T}$)	Impact Magnitude	Effect Level
x < Receptor ABC assessment criteria	Negligible	NOEL
Receptor ABC assessment criteria ≤ x < Receptor ABC assessment criteria +5 dB	Minor	LOAEL to SOAEL
Receptor ABC assessment criteria +5 dB ≤ x	Moderate to Major	Above SOAEL

Construction Vibration – Impact on People

9.43. For construction vibration, the impact magnitude and effect level have been determined according to the guidance contained within BS 5228-2 [Ref. 14] for human perception. Table 9 7 details the resulting impact magnitude and effect level criteria that have been applied.

Table 9.7 – Construction Vibration - Impact Magnitude and Effect Level Criteria – Impact on People

Vibration level 'x', Peak Particle Velocty (PPV), mm/s	Impact Magnitude	Effect Level
x < 0.3	Negligible	Below LOAEL
0.3 < x < 1.0	Minor	LOAEL to SOAEL
1.0 < x < 10.0	Moderate	Above SOAEL
10.0 > x	Major	Above SOAEL

9.44. When identifying if significant effects have occurred, it will also be necessary to consider the duration and frequency that vibration levels are likely to occur. It is unlikely that a short duration of exposure just above 1.0 mm/s is likely to result in significant adverse effects.

Construction Vibration – Impacts on Buildings

9.45. Construction activities that produce vibration may impact on adjacent structures. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration due to piling, which at this stage cannot be ruled out. Likely levels of vibration at given distances can be estimated from existing piling vibration data, as documented in BS 5228-2 [Ref. 12].

9.46. The following table, identifies transient vibration levels above which cosmetic damage to buildings may occur, and associated impact magnitudes, based on guidance in BS 5228-2 [Ref. 12]:

Table 9.8 – Construction Vibration - Impact Magnitude and Effect Level Criteria – Impact on Buildings

Peak component particle velocity in frequency range of predominant pulse		Impact Magnitude	Effect Level
4 Hz to 15 Hz	15-40 Hz		
< 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	< 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz +	Negligible	Below LOAEL
> 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	> 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz +	Minor	LOAEL to SOAEL
> 30 mm/s at 4 Hz increasing to 40 mm/s at 15 Hz	> 40 mm/s at 15 Hz increasing to 100 mm/s at 40 Hz +	Moderate	Above SOAEL
> 60 mm/s at 4 Hz increasing to 80 mm/s at 15 Hz	> 80 mm/s at 15 Hz increasing to 200 mm/s at 40 Hz +	Major	Above SOAEL

9.47. The above values relate to transient vibration. For continuous sources of vibration the values above may need to be reduced by 50%.

- Great Northern Warehouse - Grade II* listed building constructed circa 1900. Upper floors comprise of 9" inch brick jack arches spanning between mild steel riveted plated girders and mild steel stanchions. The brick arches are believed to be capped with concrete.
- Deansgate Terraces - Grade II listed buildings constructed circa 1900. Northern section comprises a series of brick arches with a modern steel framed extension constructed in 1999 to the rear, the extension provides a single storey over the arches. The southern section of the terrace comprises a three/four storey load bearing masonry structure with concrete floors.
- Pavilion – constructed 1999. Superstructure comprises a steel framed building with supporting in-situ concrete slabs on a composite metal deck. Stability is provided by a combination of frame action and a reinforced concrete stair and lift core. The internal steel columns extend to basement level and are supported by pad footings which are founded onto the underlying sandstone strata. The basement is formed using reinforced concrete walls.

9.48. For the purpose of this assessment, as a reasonable worst-case, it has been assumed that affected buildings are unreinforced or light framed structures. It should be noted that this assumption applies to the most sensitive buildings on-site, such as Deansgate Terraces; however, most other nearby buildings are more modern construction and are typically reinforced structures which are less sensitive to vibration.

Operational Phase

Transportation Noise – Typical Conditions

Internal Residential Spaces

9.49. The assessment of ambient noise impacts (primarily road traffic) on the proposed new residential dwellings has been carried out in light of the guidance provided in the ProPG [15] document. The ProPG outlines a two-stage approach to noise assessment on sites of proposed residential developments. MCC refer to this approach in their Noise and Planning Technical Guidance Document [Ref. 9].

9.50. The Stage 1 assessment of the ProPG [15] process aims to provide an indication of the likely risk of adverse effects on future residential development as a result of the existing baseline noise climate around the Proposed Development site. The ProPG states that this risk assessment should not include any subsequent mitigation to be included as part of the development proposal.

9.51. Where noise levels are assessed to be above a Negligible risk an Acoustic Design Statement (ADS) is produced as part of Stage 2 of the ProPG [15] assessment.

9.52. Figure 9.2 illustrates how the initial noise risk assessment in ProPG [15] is linked with an increasing risk of adverse effect from noise. This scale has been used to determine the impact magnitude criteria in **Error! Reference source not found.** below.

Table 9.9 – Transportation Noise - ProPG Stage 1 Risk Assessment - Impact Magnitude Criteria

Daytime External Noise Level, dB $L_{Aeq,16hr}$	Night-time External Noise Level, dB $L_{Aeq,8hr}$	Impact magnitude
< 50	< 40	Negligible
50-60	40-50	Minor
60-70	50-60	Moderate
> 70	> 60	Major

9.53. The ProPG guidance [15] states that "suitable guidance on internal noise levels can be found in BS 8233 'Guidance on sound insulation and noise reduction for buildings' 2014, which provides guidance on suitable noise levels inside dwellings. The normal method of avoiding significant noise effects on occupants of new residential buildings as a result of existing transportation noise is to achieve suitable noise levels inside habitable rooms proposed by BS 8233."

9.54. Through consultation with MCC Environmental Health Department, it has been identified that their key requirement for the residential aspects of the Proposed Development is also compliance with noise assessment criteria adopted from BS 8233 [12] and so is consistent with the ProPG guidance [15].

9.55. In accordance with these guidance documents, the following internal noise level assessment criteria have been adopted:

- Living rooms and bedrooms (daytime 07:00-23:00hrs): ≤ 35 dB $L_{Aeq,16hr}$
- Bedrooms (night-time 23:00-07:00hrs): ≤ 30 dB $L_{Aeq,8hr}$
- Bedrooms (night-time 23:00-07:00hrs): ≤ 45 dB L_{AFmax} (max. 10 events per night)

9.56. Compliance with these criteria will depend upon both the prevailing on-site noise levels and the layout and design of the Proposed Development including mitigation measures (e.g. layout design and building fabrication considerations etc.).

9.57. If the design ensures that the above internal ambient noise levels are achieved in new habitable rooms, this would result in a Negligible impact magnitude.

9.58. Internal ambient noise levels in excess of the above limits can be considered as a Minor to Major adverse impact magnitude. However, there is little guidance on how these levels would be defined and it is a planning requirement of MCC to meet the specific levels. Therefore, the assessment will focus on achieving Negligible effects on future occupants through appropriate design of the building envelope, in accordance with MCC's internal noise level requirements.

9.59. The table below shows NPSE effect levels defined in terms of the noise risk assessment procedure of ProPG.

Table 9.10 – Transportation Noise - Impact Magnitude Criteria and Effect Level

Daytime External Noise Level, dB $L_{Aeq,16hr}$	Night-time External Noise Level, dB $L_{Aeq,8hr}$	Impact magnitude	Effect Level
< 50	< 40	Negligible	Below LOAEL
50-60	40-50	Minor	LOAEL to SOAEL
60-70	50-60	Moderate	Above SOAEL
> 70	> 60	Major	Above SOAEL

External Amenity Spaces

9.60. BS 8233 [12] contains guidance relating to noise levels in external areas. The document states that 55 dB LAeq,T is the upper guideline for traditional private external amenity areas such as gardens and patios. The standard also states:

"These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited".

9.61. The ProPG [15] reflects and extends the advice contained in BS 8233: 2014 and states that:

"Developers are particularly encouraged to enter into pre-application discussions with the LPA where noise levels in proposed amenity spaces are likely to be above 55 dB LAeq,16hr during a reasonably foreseeable typical worst-case day. In particular, a professional judgement should be made on the need to provide access to a quiet or relatively quiet external amenity space as an intrinsic part of a good acoustic design process."

9.62. The proposed criteria for the assessment of the magnitude of impact of transportation noise emissions on external amenity spaces in residential sections of the Proposed Development are provided in the table below.

Table 9 11 – Transportation Noise - External Amenity Spaces - Impact Magnitude Criteria and Effect Level

Daytime External Noise Level, dB $L_{Aeq,16hr}$	Impact magnitude	Effect Level
< 50	Negligible	Below LOAEL
50 – 55	Minor	LOAEL to SOAEL
55 – 60	Moderate	Above SOAEL
> 60	Major	Above SOAEL

9.63. If and where significant adverse noise impacts are identified, the ProPG states that:

"impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."

Transportation Noise – Overheating Conditions

9.64. Under normal conditions it is usually possible to achieve appropriate internal ambient noise levels within a development using appropriately specified glazing. However, the Proposed Development is to rely on open rapid purge vents to provide relief from overheating during warmer months, and to allow for odours and fumes to be ventilated out of the flats. Therefore, noise impacts could occur, as internal noise levels will increase when the vents are open.

9.65. The Acoustics Ventilation and Overheating Residential Design Guide (the AVO Guide) [20] produced by the Institute of Acoustics and the Association of Noise Consultants proposes that, providing overheating only occurs part of the time, occupants may accept a trade-off between acoustic and thermal conditions if they have some control over their environment and level of comfort; i.e. they may be more willing to accept a short-term increase in noise levels in order to achieve better thermal comfort. In addition, the proposed rapid purge vents are considered a low-carbon solution compared with mechanical cooling systems.

9.66. Figure 9.3 illustrates how the initial overheating noise risk assessment in the AVO Guide is linked with an increasing risk of adverse effect from noise. These effects would be permanent. This scale has been used to determine the impact magnitude, as shown in the Table 9 12 below.

Table 9 12 – Transportation Noise – Overheating Conditions - Impact Magnitude Criteria and Effect Level

Daytime External Noise Level, dB $L_{Aeq,16hr}$	Night-time External Noise Level, dB $L_{Aeq,8hr}$	Impact magnitude	Effect Level
< 50	< 45	Negligible	Below LOAEL
50-60	40-50	Minor	LOAEL to SOAEL
60-65	50-55	Moderate	Above SOAEL
> 65	> 55	Major	Above SOAEL

Entertainment Noise Incident upon Proposed Residential Development

9.67. There are no current national standards that give mandatory noise limits for entertainment noise on new residential receptors. However, MCC's Noise and Planning Guidance document [8] sets the following criteria:

"Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively."

9.68. These criteria are intended to achieve a condition of 'inaudibility' or 'virtual inaudibility' and are therefore considered the LOAEL, below which impacts are judged to be Negligible.

9.69. It is a planning requirement of MCC to meet these specific levels. Therefore, the assessment will focus on achieving Negligible effects on future occupants through appropriate design and criteria have not been set for adverse impacts greater than this.

New sources of entertainment noise

9.70. MCC's Noise and Planning Guidance document [8] sets the following criteria for new developments which may generate entertainment noise:

"Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location."

9.71. These criteria are considered the LOAEL, below which impacts are judged to be Negligible.

9.72. It is a planning requirement of MCC to meet these specific levels. Therefore, the assessment will focus on achieving Negligible impacts on future occupants through appropriate design and criteria have not been set for adverse impacts greater than this. Adherence to the noise limits is expected to be enforced by MCC through an appropriate planning condition.

9.73. A flexible Use Class E space proposed in the Leisure Box has been earmarked for a gym and has residential apartments located directly above. To provide protection to future residents the noise limits mentioned above also apply to any future gym operations.

9.74. It is a planning requirement of MCC to meet the specific noise limits mentioned above, and it is expected that these will be enforced by MCC through an appropriate planning condition.

Proposed Building Services Plant

9.75. MCC's Noise and Planning Guidance document [8] requires that BS 4142 [17] be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises and sets the following planning criteria:

"Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (LA90) level at the nearest noise sensitive location."

9.76. In light of the guidance in BS 4142 [17], these criteria are considered the LOAEL below which impacts are judged to be Negligible.

9.77. It is a planning requirement of MCC to meet these specific levels. Therefore, the assessment will focus on achieving Negligible impacts on proposed and existing sensitive receptors through appropriate design, and criteria have not been set for adverse impacts greater than this.

Baseline Conditions

9.78. As agreed with MCC, several baseline noise surveys have been undertaken to inform the assessment work. These have included measurements both on, and in the vicinity of, the Site. The purpose of these surveys was to:

- to determine the prevailing noise environment at sample locations across the Site;

- to determine the noise levels generated by key sources contributing to the on-site noise environment, and facilitate a detailed noise modelling exercise for the Site; and
- to determine the prevailing ambient and background noise levels at a sample of locations selected as representative of both noise sensitive aspects of the Proposed Development, and existing local sensitive receptors.

9.79. The following subsections provide a summary of the baseline survey. Full details of the baseline survey measurements (including equipment details, single figure measurement results etc.) are detailed within Appendix 9.2.

General Ambient Noise Climate

Purpose and Measurement Locations

9.80. The existing noise climate at the development site and surrounding area is dominated by transport noise, with road traffic on all sides of the site. Additionally, commercial businesses located close to the site contribute to the noise climate.

9.81. Environmental noise surveys were undertaken at several unattended and attended locations around the site to determine the prevailing environmental noise climate. The data collected during the surveys has been used to inform assessments of potential noise impacts at both existing and new sensitive receptors which may be caused by the Proposed Development.

9.82. The measurement positions (MP) were agreed with a representative of Manchester City Council's Environmental Protection team in advance of the survey. All measurements of the general ambient noise climate were undertaken in the free field (i.e. away from reflective surfaces) except for MP1 which was carried out close to the building façade.

9.83. The adopted measurement locations are described in Table 9.13 and are depicted in Figure 9.4.

Table 9.13 – Noise Measurement Positions

Meas. Position	Start - End	Duration	Description	Purpose
MP1	04/04/2022 15:00 - 20/04/2022 15:45hrs	~ 16 days	Outside 3rd floor conference room window facing Deansgate, approx. 0.5m from the façade.	Capture prevailing noise levels at the western boundary of the site dominated by road traffic on Deansgate.
MP2	04/04/2022 14:15hrs - 13/04/2022 09:00hrs	~ 8.5 days	Footbridge over Watson Street.	Capture prevailing noise levels at the eastern boundary of the site.
MP3	13/04/2022 10:56 - 13:56hrs	3 hours	Great Bridgewater Street on pavement approx. 4m from road edge.	Capture prevailing daytime and night-time noise levels at the southern boundary of the site dominated by road traffic on
	15/04/2022 00:26 - 01:26hrs	1 hour		

Meas. Position	Start - End	Duration	Description	Purpose
				Great Bridgewater Street.
MP4a	13/04/2022 14:00 - 17:00hrs	3 hours	Peter street measurement, on junction by Watson Street approx. 4m from road edge	Capture prevailing daytime noise levels at the northern boundary of the site dominated by road traffic.
MP4b	14/04/2022 23:09hrs - 15/04/2022 00:09hrs	1 hour	Position on Level 3 at north-eastern corner of the multi-storey car park	Capture prevailing night-time noise levels at the northern boundary of the site dominated by road traffic on Deansgate and noise from bars such as Albert Schloss.

Ambient Noise Measurement Results

9.84. A detailed summary of the survey results is provided in Appendix 9.2.

9.85. Table 9-14 below provides a summary of the free-field noise levels used to calibrate the noise model for use in the assessment of potential noise impacts on the Proposed Development. The values presented are:

- The highest daytime $L_{Aeq,16hr}$ level measured i.e. typical 'worst case' daytime conditions.
- The highest night-time $L_{Aeq,8hr}$ level measured i.e. typical 'worst case' night-time conditions.
- For long-term measurement positions MP1 and MP2 - maximum $L_{AFmax,2min}$ exceeded up to 10 times in any one night is presented i.e. typical 'worst case' night-time conditions.
- For short-term measurement positions MP3 and MP4 - the highest $L_{AF,max,2min}$ is presented
- Measurement results at MP1 and MP4b have been corrected from façade levels to free-field levels by deducting 3 dB.

Table 9 14 – Summary of Ambient Noise Level Measurement Results, Free-Field

Meas. Position	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	
	Highest dB $L_{Aeq,16hr}$	Highest dB $L_{Aeq,8hr}$	Maximum Event Level, dB $L_{AFmax,2min}$
MP1	65	64	84

Meas. Position	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	
	Highest dB $L_{Aeq,16hr}$	Highest dB $L_{Aeq,8hr}$	Maximum Event Level, dB $L_{AFmax,2min}$
MP2	65	59	79
MP3	68 *	60 *	79
MP4a/b	66 *	57 *	73

Notes:

* Only short term measurements were possible in locations MP3 and MP4a, so the $L_{Aeq,T}$ noise levels above have been derived from the daytime $L_{A10,3hr}$ levels using methods from CRTN [19] and the TRL report [21] (see Appendix 9.2 for details).

Measured Noise Levels Used to Determine Construction Noise Assessment Criteria

9.86. MCC's Planning and Noise Technical Guidance [8] requires that all noisy construction works should be restricted to the following hours to minimise disruption:

- Monday - Friday: 7.30am - 6pm
- Saturday: 8.30am - 2pm
- Sunday / Bank holidays: No work

9.87. Therefore, average measured ambient noise levels are presented for the days above. At MP2 the measurement period only covered one Saturday.

9.88. The following levels have been used to determine construction noise assessment criteria.

Table 9.15 – Summary of Ambient Noise Level Used to Determine Construction Noise Assessment Criteria, Free-Field

Meas. Position	Assessment Period	Average daytime dB $L_{Aeq,16hr}$
MP1	Weekday	64
	Saturday	64
MP2	Weekday	63
	Saturday	61

9.89. Ambient noise levels for short-term measurement positions MP3 and MP4 have not been presented as these periods were considered too short to provide reliable data for the purposes of construction noise assessment. Ambient noise levels from long-term measurement positions MP1 and MP2 have been used for this instead and have broadly similar noise climates to the other two positions.

Background Sound Level Measurement Results

9.90. 'Typical' background sound levels have been determined in accordance with the methodology prescribed by MCC in Appendix A of the Noise and Planning Guide [8]. These noise levels have been used to set plant and entertainment noise limits and have been calculated as follows:

- Measured $LA_{90,15min}$ values tabulated for each 15 min period of each day in the survey.
- The average value is calculated for each time period across the full survey duration.
- The minimum value of the averages is taken as the 'typical' value.
- The above is completed separately for the daytime and night-time periods to help determine limits for plant noise.
- In addition, we have completed the above in individual octave bands from 31.5 Hz to 4 kHz, in order to determine limits for entertainment noise.

9.91. Background sound levels for short-term measurement positions MP3 and MP4 have not been presented as these periods were considered too short to provide reliable data for the purposes of setting plant noise limits. Background sound levels from long-term measurement positions MP1 and MP2 have been used for this instead and have broadly similar noise climates to the other two positions – primarily dominated by road traffic noise but with some contributions from commercial noise sources.

Table 9.16 – Summary of Typical Background Sound Levels, Free-Field

Meas. Pos.	Period	Typical Broadband $L_{A90,15min}$ (dB)	Typical Octave-Band $L_{90,15min}$ (dB)						
			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
MP1	Day	49	57	52	48	44	45	40	31
	Night	44	52	48	43	40	40	35	26
MP2	Day	53	58	55	51	50	48	44	35
	Night	51	54	52	50	49	46	43	35

Manchester Central Convention Centre

Purpose and Measurement Locations

9.92. Manchester City Council requested that event noise from Manchester Central be considered in the assessment. Based on discussions with the Manchester Central Facilities Management and their chosen sound system supplier (Sterling Event Group Ltd), the venue is understood to contain several event spaces which could potentially impact the Proposed Development.

9.93. The baseline noise survey carried out for Manchester Central is discussed in detail in Appendix 9.2.

9.94. The measurements / site visits undertaken at Manchester Central are summarised in the Table below.

Table 9.17 – Manchester Central Noise Survey Measurement Positions

Meas. Position	Date	Duration	Description	Purpose
MP5	03/04/2022	n/a	Survey during an event in Exchange Hall at Manchester Central at the Site	Capture noise levels during a musical bingo event with a full speaker system and DJ. Sound limiter in place in this venue space.
MP6a & MP6b	07/07/2022	Various	Survey during an event in Charter Suite at Manchester Central	Capture noise levels during a live music event in the venue space closest to the Proposed Development. This is the only event space with no sound limiting system.
MP7	16/08/2022	n/a	Survey during an event in Exchange Hall at Manchester Central	Capture noise levels during a corporate afterparty event with a full speaker system. Sound limiter in place in this venue space.

9.95. Noise from Exchange Hall events were noted to be virtually inaudible, both at the Site and even within other parts of the Manchester Central site itself. This space is also mostly screened from the Proposed Development and therefore has not been assessed further.

9.96. It was observed that the Charter Suite event space had two sets of poorly insulated external fire doors which leaked sound in the direction of the Proposed Development. Therefore, combined with the fact that no sound limiting system is in place here (unlike the other major events spaces) and it is the closest event space to the Proposed Development, it is expected that the Charter Suite has the greatest potential to generate significant effects at the Proposed Development.

Measurement Results

9.97. Table 9.18 below provides a summary of the results obtained from the noise measurement positions MP6a and MP6b, measurements were taken at 1m from the respective fire exit doors. During all measurements weather conditions were dry and conducive to noise monitoring.

Table 9.18 – Manchester Central Noise Survey Measurement Results, Free-Field

Meas. Pos.	Start time	Duration, *T*	Measured sound pressure level at 1m from doors, $L_{eq,T}$							
			Broadband level (dBA)	Octave-band level (dB)						
				63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
MP6a	22:01	5 min	71	94	82	69	65	64	61	57
	22:06	5 min	71	94	82	69	64	63	60	57

Meas. Pos.	Start time	Duration, *T*	Measured sound pressure level at 1m from doors, $L_{eq,T}$							
			Broadband level (dBA)	Octave-band level (dB)						
				63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
	22:11	5 min	71	93	81	71	66	64	61	57
MP6b	22:39	5 min	66	88	77	69	59	55	55	51
	22:44	5 min	66	89	79	68	59	54	54	49

Lion's Den Music Bar

Purpose and Measurement Locations

9.98. The Lion's Den is a music bar which hosts live music events in an upstairs room and has an outdoor seating area for customers. Noise from this source is likely to affect eastern and northern façades of the Proposed Development. The baseline noise survey carried out for the Lion's Den is discussed in detail in Appendix 9.2.

9.99. Noise surveys were carried out on Friday the 29th of July 2022 to capture noise levels during a live music event from the music venue itself and patrons sat outside. It was a warm and clear night at the time of the survey and so the outdoor seating area was busy.

9.100. The noise survey undertaken for this source is summarised in Table 9.19 below.

Table 9.19– Lion's Den Noise Survey Measurement Positions

Meas. Position	Date	Duration	Description	Purpose
MP8	29/07/2022	Various	Survey outside the Lion's Den music bar during a music event.	Capture noise levels during a live music event from the music itself and patrons sat outside.

9.101. The conditions during the measurements at position MP8 are described as follows:

- 21:06 hrs - live music upstairs with sash window open
- 22:24 hrs – no live music, noise from patrons in outside seating area
- 23:36 hrs - live music upstairs, windows closed but front door still open

Measurement Results

9.102. Table 9.20 below provides a summary of the results obtained from the noise measurement position MP8.

Table 9.20 – Lion's Den Noise Survey Measurement Results, Free-Field

Meas. Position	Start time	Duration, *T*	Measured sound pressure level, $L_{eq,T}$							
			Broadband level (dBA)	Octave-band level (dB)						
				63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz
MP8	21:06	3 mins	76	76	76	76	74	69	66	67
	22:24	5 mins	69	72	68	63	66	66	60	54
	23:36	5 mins	67	74	74	69	64	60	56	52

Low Four Studio

Purpose and Measurement Locations

9.103. Low Four Studio is a music venue and bar which hosts live music events in a downstairs studio. Noise from this source is likely to primarily affect eastern and northern façades of the Proposed Development.

9.104. A noise survey was carried out on Friday the 7th October 2022 to capture noise levels during a live music event from the music venue itself.

9.105. The baseline noise survey carried out for Low Four Studio is discussed in detail in Appendix 9.2.

9.106. A noise measurement was taken during a live music event at position MP9, 5m from the external studio window.

Measurement Locations

9.107. Table 9.21 below provides a summary of the results obtained from noise measurement position MP8.

Table 9.21 – Low Four Studio Noise Survey Measurement Results, Free-Field

Meas. Position	Start time	Duration *T*	Measured sound pressure level, $L_{eq,T}$							
			Broadband level (dBA)	Octave-band level (dB)						
				63Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz
MP9	23:02	31 secs	64	77	76	65	60	56	51	46

Great Northern Square

Purpose and Measurement Locations

9.108. Several potentially noisy entertainment premises are located around the Great Northern Square toward the northern end of the Site.

9.109. Noise surveys were carried out on Friday the 29th of July 2022 to capture noise from the various premises. It was a warm and clear night at the time of the survey and so the area was busy.

9.110. The measurements / site visits undertaken at the Great Northern Square are summarised in Table 9.22 below. The noise survey is discussed in detail in Appendix 9.2.

Table 9.22 – Great Northern Square Noise Survey Measurement Positions

Meas. Position	Date	Duration	Premises	Purpose
MP10	29/07/2022	5 mins	Pong & Puck	Games bar – measurement of noise from DJ music and patrons outside
MP11	29/07/2022	2 mins	Impossible	Club / bar / restaurant - measurement of noise from music and patrons inside
MP12	29/07/2022	5 mins	Lane 7	Bowling alley - doors open, measurement of noise from music and people inside

9.111. Table 9 23 below provides a summary of the results obtained from noise measurement positions MP10 – MP12.

Table 9 23 – Great Northern Square Noise Survey Measurement Results, Free-Field

Meas. Position	Start time	Duration *T*	Measured sound pressure level, $L_{eq,T}$							
			Broadband level (dBA)	Octave-band level (dB)						
				63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz
MP10	21:16	5 mins	67	71	71	63	65	63	57	51
MP11	22:47	2 mins	73	81	71	63	71	69	65	58
MP12	22:40	5 mins	69	76	70	66	67	65	61	56

Future Baseline

9.112. Where road traffic noise is a key contributor to the prevailing noise environment, it is anticipated that changes in the baseline conditions may arise as a result of fluctuations in traffic numbers over time (potential reductions in road traffic flows on surrounding roads due to the reduction in parking provided on the Site) or changes in vehicle types e.g. increasing numbers of electric cars on surrounding roads.

9.113. It is understood that plans to alter the section of Deansgate directly outside the Deansgate Terraces are under consideration by MCC at the time of writing. The proposals will prevent vehicles travelling north on Deansgate which could reduce noise levels incident upon the Proposed Development; however, it is not possible to quantify the degree of change at this point. Therefore, the scenario assessed in the road traffic noise assessment is a worst-case assessment in the long-term

9.114. The Lion's Den music bar and associated outdoor seating area will be removed as part of the Proposed Development. New seating areas will be created slightly further south between the Deansgate terraces and the proposed residential buildings. Therefore, the calculated sound output of the existing outdoor seating area (calibrated using measurements at MP8) has been spread over 5 new area sources in the noise model in the approximate position of the proposed outdoor seating areas, to approximate the potential future noise levels from similar uses. In addition, the current noise output from the Lion's Den has been assessed as a 'reasonable worst-case' proxy for a similar potential use in the Deansgate Terraces in future.

Identification and Evaluation of Significant Effects

Construction Phase

Construction Noise

9.115. It is inevitable with any proposed major development that there will be some disturbance caused to those nearby during the construction works. However, disruption due to construction is localised and temporary in nature. Nearby receptors sensitive to construction noise have been identified in Figure 9.1 and **Error! Reference source not found.**.

9.116. At this stage, full details of the plant associated with the works and potential phasing of construction are not yet known. Therefore, predictions of the likely noise levels and associated impacts from anticipated construction activities have been made based on WSP's experience of similar schemes elsewhere and ES Construction Chapter (Chapter 5) [22]. The results are considered indicative of the likely noise levels during the works.

9.117. A more detailed assessment will be undertaken at a later stage once the principal contractor has been appointed and detailed construction method statements are available. Detailed mitigation measures are to be included in a Construction Management Plan (CMP) to be submitted to and approved by MCC.

9.118. Standard working hours for the construction of the Proposed Development will be 07:30 to 18:00 hours, from Monday to Friday and 08:30 to 14:00 hours on Saturdays with no working on Sundays or bank holidays without prior agreement with MCC.

9.119. It is anticipated that noise emissions from the construction site will be highest during the site preparation and substructure phases of construction. Construction plant noise source data has been taken from BS 5228-1 [13]. Appendix 9.3 provides full details of the source data used in the noise level prediction process, as well as the adopted duration 'on-times' during a working day.

9.120. 'Worst' and 'average' case calculations have been undertaken for each receptor to cover the potential variation in construction noise levels:

- The worst case assumes all plant items for each construction working scenario are located at the closest point of the closest phase of development, likely to be representative of relatively short periods of time.

- The average case considers that all plant are located at the approximate centre of that phase of development, considered representative of longer construction periods.

9.121. Error! Reference source not found. presents a summary of the predicted worst-case construction noise impacts at each of the previously identified noise-sensitive receptors. Details of the full construction noise predictions at each noise-sensitive receptor for each scenario are presented in Appendix 9.3.

Table 9 24 – Predicted Construction Noise Impacts

Receptor	Site Preparation		Substructure works	
	Worst case	Average Case	Worst case	Average Case
Weekday				
NSR 1 Great Northern Tower	Major	Minor	Major	Negligible
NSR 2 Manchester Central	Major	Minor	Moderate	Negligible
NSR 3 Viadux, Residential	Moderate	Negligible	Minor	Negligible
NSR 4 Beetham Tower	Major	Minor	Major	Negligible
NSR 5 Area to west of Deansgate	Negligible	Negligible	Negligible	Negligible
Saturday				
NSR 1 Great Northern Tower	Major	Moderate	Major	Minor
NSR 2 Manchester Central	Major	Moderate	Major	Minor
NSR 3 Viadux, Residential	Major	Moderate	Moderate	Minor
NSR 4 Beetham Tower	Major	Minor	Major	Minor
NSR 5 Area to west of Deansgate	Negligible	Negligible	Negligible	Negligible

9.122. The Significance of Effect of Construction Noise is predicted to be:

- Negligible at noise sensitive receptors to the west of Deansgate (NSR 5) which is considered Not Significant in ES terms.
- At receptors NSR1 to NSR4 typically impacts would remain Minor adverse or Negligible during weekdays which is considered Not Significant in ES terms.
- At receptors NSR1 to NSR4 impacts during substructure works would also typically remain Minor adverse or Negligible during Saturdays which is considered Not Significant in ES terms.
- However, it is identified that impacts would increase to Moderate or Major adverse for limited periods, e.g. for some working operations undertaken in close proximity to receptors, or when site preparation is undertaken on a Saturday. These impacts are considered Significant in ES terms.

9.123. With respect to the NPSE, effects above the SOAEL have been identified for noise impacts generated by the Proposed Development during the construction phase.

9.124. It should be noted that the calculation predicted noise impact based upon fixed plant locations. In practice, much of the plant may be mobile, so the magnitude of construction noise impacts will be subject to change through the various phases of construction. The assessment undertaken has, however, been based on assumed typical 'worst-case' and 'average' scenarios for the closest receptors to the site boundary. It will be the responsibility of the main contractor on site to limit construction noise impact at nearby noise sensitive receptors using Best Practicable Means (BPM).

9.125. Examples of BPM, including the good practice guidance contained within BS5228-1, are presented in the mitigation section of this Chapter to reduce noise impacts. The calculation did not take account of the suggested BPM mitigation techniques when determining noise impact levels. Revised impacts taking account of the mitigation measures are presented in the corresponding section below. Regardless, noise effects associated with the construction phase will be temporary, and will be restricted to daytime hours only, thus avoiding the more sensitive evening and night-time periods.

Construction Vibration – Impact on People

9.126. The new structures will require piled foundations to transfer loads down the underlying sandstone. The impact of vibration on people depends on the type of piling, ground conditions, and receptor distance.

9.127. The closest located residential receptors to proposed new structures requiring piling (e.g. the Leisure Box) are flats at the Beetham Tower (NSR 4) on Great Bridgewater Street, approximately 15 m away.

9.128. The piles will be constructed using a bored / continuous flight auger (CFA) solution to minimise noise and vibration. BS 5228-2 [14] indicates that CFA injected piles or auger bored piles should be selected in preference to driven piles as they are least likely to give rise to unacceptable vibrations in 'particular circumstances'. BS 5228-2 also states that "the levels of vibration associated with continuous flight auger injected piling and pressed-in piling are minimal".

9.129. Ground conditions at the Site are expected to comprise made ground overlaying sandstone. The sandstone is believed to be approximately 6 m below proposed ground levels. Indicative vibration levels for CFA piling have been taken from case studies in BS 5288-2 [14] with similar ground conditions to the Site and are shown in Table 9 25 below.

Table 9 25 – Example Piling Vibration Levels

BS 5228 Reference	Soil Conditions	Mode	Plan distance (m)	PPV (mm/s)
Table D.6 Ref No. 106	6 m of soft ground over rock	Augering	5	0.54
		Surging casing	5	0.36

BS 5228 Reference	Soil Conditions	Mode	Plan distance (m)	PPV (mm/s)
		Twisting in casing	5	0.22
		Spinning off	5	0.42
		Boring with rock auger	5	0.43

9.130. Based on the highest piling PPV value of 0.54 mm/s measured at a distance of 5 m as presented above, it is reasonable to conclude that PPV values internally within a building are unlikely to exceed 0.3 mm/s at the closest buildings to piling activities (15m away).

9.131. With reference to the PPV magnitude criteria presented in Table 9 7, the magnitude of impact on human receptors closest to the Site is expected to be Negligible.

9.132. Considering the highly localised and temporary nature of any piling activity, the significance of effect is deemed Not Significant in ES terms.

9.133. With respect to the NPSE, potential effects below the LOAEL have been identified for vibration impacts on people generated by the Proposed Development during the construction phase.

9.134. It should be noted that the above assessment of potential construction vibration effects is based upon a theoretical worst-case assessment that piles will be required within 15 m of existing nearby sensitive receptors, adverse effects at more distant or less sensitive receptors will be further reduced. Any piling required will be carried out over as short a period of time as possible.

Construction Vibration – Impact on buildings and structures

9.135. Piling will be undertaken within 5 m of numerous existing structures (including the Deansgate Terraces and Leisure Box lower car park levels). Therefore, there is the potential for adverse effects in certain locations related to structure / building damage.

9.136. The exact magnitude of these effects cannot be accurately ascertained at this stage; however, some of the piles may be located very close to existing historic structures. Therefore, to present a worst-case assessment without mitigation, and offer sufficient protection, a potential permanent Major Adverse effect (damage to structural elements, loosening of joints, splaying of masonry cracks etc.) for adjacent buildings and on-site structures has been identified as a result of vibration generated by unmitigated piling (or other) activities. This effect is Significant in ES terms.

9.137. With respect to the NPSE, potential effects above the SOAEL have been identified for vibration impacts on buildings generated by the Proposed Development during the construction phase.

Operational Phase

9.138. Based on the architectural drawings and the results of the noise surveys, an indicative 3D environmental noise model has been created to predict noise levels that are likely to be incident on the façades of buildings within the Proposed Development. This information has been used to help identify whether adverse effects are likely to occur at future receptors.

9.139. The noise model has been created using the environmental noise modelling software CadnaA. The noise measurements undertaken have been used to calibrate the noise model.

Transportation Noise – Normal Conditions

Internal Residential Spaces

9.140. The results of the noise measurements undertaken adjacent to surrounding roads have been used to calibrate the noise model for use in this section, as previously presented in Table 9 14.

9.141. The assessment of ambient noise impacts (primarily road traffic) on the proposed new residential dwellings has been carried out in light of the guidance provided in the ProPG document [15]. The ProPG outlines a two-stage approach to noise assessment on sites of proposed residential development. MCC refer to this approach in their Noise and Planning Technical Guidance Document [8].

9.142. In accordance with Stage 1 of the process, the potential risk of adverse effects on residential sections of the development has been assessed according to the criteria set out in Table 9 9.

9.143. Figure 9.5 and Figure 9.6 show the noise levels predicted at the façades of the Proposed Development during the daytime and night time, in terms of $L_{Aeq,T}$. The noise levels have been grouped in ranges in accordance with the relevant effect risk criteria of the ProPG [15].

9.144. Due to their height and the screening provided by various buildings, the resultant noise levels are calculated to vary across the building façades. The associated risk of adverse effects is predicted to range from Negligible in areas screened from surrounding roads, to Moderate on the façades with a direct line of site to surrounding roads including Deansgate, Great Bridgewater Street and Watson Street.

9.145. In line with the guidance in the ProPG [15], where noise levels are assessed to be above a Negligible risk an Acoustic Design Statement (ADS) should be produced as part of Stage 2 of the ProPG assessment as evidence of a 'good acoustic design process'. The ADS should clearly demonstrate that a 'significant noise impact will be avoided in the Proposed Development'.

9.146. As part of the Stage 2 ProPG assessment, we have identified the level of sound reduction that building façades would need to provide to meet the design targets identified previously. The internal noise level design targets are as follows:

- Living rooms and bedrooms (daytime 07:00-23:00hrs): ≤ 35 dB $L_{Aeq,16hr}$
- Bedrooms (night-time 23:00-07:00hrs): ≤ 30 dB $L_{Aeq,8hr}$
- Bedrooms (night-time 23:00-07:00hrs): ≤ 45 dB L_{AFmax} (max. 10 events per night)

9.147. It is considered that a design to see that the above internal ambient noise levels are achieved in new habitable rooms would result in Negligible impacts.

9.148. To achieve the internal noise levels presented above, the external building fabric should provide a level of attenuation dependent upon the noise level incident upon it.

9.149. The proposed dwellings are to be mechanically ventilated and will have no requirement for trickle / through wall ventilators. The weakest point in the façade is likely to be the glazed elements under normal ventilation conditions. Therefore, attenuation requirements of glazed elements have been estimated in accordance with the methodology in BS 8233:2014 [12], based on the various predicted noise levels at the façade.

9.150. Table 9 26 sets out the sound insulation performance requirements for the glazing, closed rapid purge vents (which are glazed) and external door units for habitable rooms, based on road traffic noise levels. Both the LAeq and LAmax,F noise levels are considered. The calculations have adopted the BS 8233 [12] simple method but also including a +5 dB adjustment to allow for the frequency content of the noise source and the acoustics of habitable rooms.

9.151. The glazing, closed rapid purge vent and external door performance requirements (with regards to road traffic noise) are primarily dictated by the calculated night time maximum (LAF,max) noise levels. These noise levels are shown in Figure 9.8.

Table 9 26 – Sound Insulation Requirements for Glazing and External Doors (Based on Road Traffic Noise)

Ref	Period	External noise level, dB	Internal criteria, dB	Glazing sound insulation performance, dB $R_w + C_{tr}$
A	Day ($L_{Aeq,16hr}$)	< 55	35	25
	Night ($L_{Aeq,8hr}$)	< 50	30	
	Night ($L_{AF,max}$)	< 65	45	
B	Day ($L_{Aeq,16hr}$)	55 - 60	35	30

Ref	Period	External noise level, dB	Internal criteria, dB	Glazing sound insulation performance, dB $R_w + C_{tr}$
	Night ($L_{Aeq,8hr}$)	50 - 55	30	
	Night ($L_{AF,max}$)	65 - 70	45	
C	Day ($L_{Aeq,16hr}$)	60 - 65	35	35
	Night ($L_{Aeq,8hr}$)	55 - 60	30	
	Night ($L_{AF,max}$)	70 - 75	45	
D	Day ($L_{Aeq,16hr}$)	65 - 70	35	40
	Night ($L_{Aeq,8hr}$)	60 - 65	30	
	Night ($L_{AF,max}$)	75 - 80	45	

9.152. Example glazing configurations that would be expected to satisfy the sound insulation requirements are included in Table 9 27.

Table 9 27 – Indicative Glazing Specifications (Based on Road Traffic Noise)

Ref	Sound insulation performance, dB $R_w + C_{tr}$	Indicative glazing specification (pane / cavity / pane)
A	25	4 mm / (6 - 16 mm) / 4 mm
B	30	10 mm / (6 - 16 mm) / 4 mm
C	35	6 mm / (6 - 16 mm) / 6 mm Laminated
D	40	10 mm / 20 mm argon / 8.8 mm Pilkington Optiphon™

9.153. If the above recommendations are adopted in the Proposed Development it is considered that any impacts due to road traffic noise under normal conditions would be Negligible. The resultant effect is Negligible and Not Significant in ES terms.

9.154. With respect to the NPSE, potential effects below the LOAEL have been identified for noise impacts at the Proposed Development during the operational phase due to transportation noise, should an appropriate glazing specification be provided.

9.155. Compliance with the internal noise level criteria of MCC could be ensured through the use of an appropriate planning condition requiring the submission, written approval, and subsequent implementation of an appropriate glazing specification for the Proposed Development.

External Amenity Spaces

9.156. Figure 9.5 shows the noise levels predicted at the façades of the Proposed Development during the daytime, in terms of LAeq,16hr.

9.157. It can be seen from Figure 9.5 that noise levels calculated at internal façades of the proposed development, around the central shared garden, are below 50 dB LAeq,16hr. Residents will therefore have access to a quiet external space which is effectively screened from surrounding roads.

9.158. With regards to noise levels in private external amenity space the ProPG [15] states that:

"Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations."

9.159. In light of the guidance in the ProPG [15] it is considered that access to quieter external spaces will offset the potentially higher noise impacts on individual balconies elsewhere. According to the impact magnitude criteria in Table 9 11 noise levels below 50 dB LAeq,16hr the noise impact would be Negligible. The resultant effect is Negligible and Not Significant in ES terms.

9.160. With respect to the NPSE, potential effects below the LOAEL have been identified for noise impacts at the Proposed Development during the operational phase due to transportation noise in external areas

Transportation Noise – Overheating Conditions

9.161. Under normal conditions it is expected that it will be possible to achieve appropriate internal ambient noise levels within the development using appropriately specified glazing. However, the Proposed Development is to rely on open rapid purge vents to provide relief from overheating, so there is the potential for noise impacts to occur, as internal noise levels will increase when the vents are open.

9.162. The Acoustics Ventilation and Overheating Residential Design Guide (the AVO Guide) [20] produced by the Institute of Acoustics and the Association of Noise Consultants has been used to inform an initial assessment of noise and overheating. The AVO Guide [20] proposes that, providing overheating only occurs part of the time, occupants may accept a trade-off between acoustic and thermal conditions if that they have some control over their environment and own level of comfort, i.e. they may be more willing to accept a short-term increase in noise levels in order to achieve better thermal comfort.

9.163. Noise levels at the Site are generally in the medium to high-risk categories according to the methodology in the AVO Guide [20] presented in Figure 9.3.

9.164. Therefore, there is considered to be a potential pre-mitigation risk of permanent Major Adverse effects due to noise, should open vents be relied upon to provide relief from overheating. This effect is Significant in ES terms. Additional mitigation is considered in the corresponding section below to reduce effects to an acceptable level.

9.165. With respect to the NPSE, potential effects above the SOAEL have been identified for noise impacts at the Proposed Development during the operational phase, due to transportation noise.

Entertainment Noise upon new residential elements

9.166. As set out previously, MCC require noise levels within new residential premises to meet specific criteria at low frequencies. These criteria are considered the threshold at which impact magnitudes are judged to be Negligible.

9.167. It is a planning requirement of MCC to meet these specific levels. Therefore, this assessment is focused on achieving Negligible effects on future occupants through appropriate building design and criteria have not been set for adverse impacts greater than this.

9.168. Noise measurement results of nearby entertainment premises have been used to calibrate noise sources in the noise model and calculate potential future noise levels at residential façades of the Proposed Development.

9.169. The cumulative noise level from the following sources has been calculated at the Proposed Development, to represent a reasonable 'worst case' assessment:

- Manchester Central Charter Suite – corporate afterparty event (MP6a and MP6b)
- Lion's Den music bar – live music event in the upstairs gig room and patrons in the outdoor seating area (MP8)
- Low Four Studio - live music event (MP9)
- Pong & Puck games bar – live DJ in outdoor seating area (MP10)
- Impossible club / bar / restaurant - measurement of noise from music and patrons inside (MP11)
- Lane 7 bowling alley - measurement of noise from music and patrons inside (MP12)

9.170. The measurement at the Lion's Den with the gig room window closed (from Error! Reference source not found. @ 23:36) was selected for use in the assessment as this was the second highest level recorded in these octave bands. The highest levels were recorded with the gig room window open; however, these levels have not been used as this situation can easily be easily prevented in future by closing the windows during gigs – this is considered a reasonable step to be taken for a music venue and shouldn't adversely affect the business.

9.171. As noted previously in this chapter, The Lion's Den music bar will be removed as part of the Proposed Development. However, the current noise output from the Lion's Den has been assessed as a 'reasonable worst-case' proxy for a similar potential use in the Deansgate Terraces in future.

9.172. The Lion's Den outdoor seating area will be removed as part of the Proposed Development. New seating areas will be created slightly further south between the Deansgate terraces and the proposed residential buildings. Therefore, the calculated sound output of the existing outdoor seating area (calibrated using measurements at MP8) has been spread over 5 new area sources in the noise model in the approximate position of the proposed outdoor seating areas, to approximate the potential future noise levels from this area.

9.173. The location of the various entertainment noise sources in the noise model are illustrated in Figure 9.7.

9.174. The predicted worst-case cumulative entertainment noise levels are compared to the relevant criteria in the table below, to determine the required level of sound reduction which would need to be provided by the Proposed Development residential façades.

Table 9 28 – Proposed Development Glazing Sound Reduction Requirements in relation to Entertainment Noise

Facades affected	Noise level at proposed development, dB L_{eq}		Internal criteria, dB $L_{eq,5min}$		Required sound reduction, dB	
	63 Hz	125 Hz	63 Hz	125 Hz	63 Hz	125 Hz
West Façades facing Deansgate Terrace	67	66	47	42	20	24
East Façades facing Manchester Central	72	60	47	42	25	18

9.175. Standard double-glazing systems (e.g. 6 mm pane / 16 mm cavity / 6 mm pane) would be expected to provide around 15 dB sound reduction at 63 Hz and 20 dB at 125 Hz. Therefore, without further mitigation (e.g. an enhanced glazing specification at worst-affected flats of the Proposed Development) there is a risk of adverse impacts in many locations. Consideration to appropriate mitigation through adequate glazing specification has been provided in the Mitigation Measures section.

9.176. Due to the distinctive nature of the music noise to future residents, and potential implications for the existing businesses creating the noise as a result, without additional mitigation, this impact is likely to be Moderate or Major and is considered Significant in ES terms.

9.177. With respect to the NPSE, potential effects above the SOAEL have been identified for noise impacts at the Proposed Development during the operational phase, due to entertainment noise.

New Sources of Entertainment Noise

9.178. There are a number of food and beverage (F&B) units proposed across the Site which could potentially contain entertainment noise sources e.g. bars, restaurants etc. as well as external seating areas and an external rooftop terrace on the Deansgate Terraces for use by office tenants.

9.179. At this stage of the Proposed Development design, detailed information relating to noise levels generated by operation of commercial units and the rooftop terrace on the Deansgate Terraces is not available. However, noise surveys and assessment of the existing Lion's Den bar suggest that these proposed uses could potentially impact existing and future sensitive receptors.

9.180. In the absence of specific tenant information and to minimise the risk of adverse effects on new and existing sensitive receptors, it is recommended that the Proposed Development be designed so that entertainment noise levels do not exceed 5dB below the typical background noise level (LA90) in each octave band at surrounding existing noise sensitive receptors.

9.181. These criteria are considered the LOAEL, below which impact magnitudes are judged to be Negligible.

9.182. Based on relevant representative background noise levels during the daytime and night-time periods (as defined in Table 9 16) the noise limits to be achieved at 1 m from the nearest noise-sensitive receptor can be defined as follows.

Table 9.29 – Entertainment Noise Limits

Receptor	Period	Entertainment noise limit, dB $L_{eq,5min}$ /Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
NSR 1 Great Northern Tower NSR 2 Manchester Central NSR 3 Viadux, Residential NSR 6 Proposed Development	Day	53	50	46	45	43	39	30
	Night	49	47	45	44	41	38	30
NSR 4 Beetham Tower NSR 5 Area to west of Deansgate	Day	52	47	43	39	40	35	26
	Night	47	43	38	35	35	30	21

9.183. If these requirements are met, noise effects should be Negligible at existing and proposed sensitive receptors. This effect is Not Significant in ES terms.

9.184. With respect to the NPSE, potential effects due to entertainment noise from the Proposed Development would be below the LOAEL at surrounding receptors.

9.185. The control and mitigation of noise from entertainment sources is discussed in more detail later in the Mitigation Measures section.

9.186. Adequate control of noise emissions could be ensured through the use of an appropriate planning conditions requiring the submission, written approval, and subsequent implementation of a detailed noise mitigation scheme for proposed entertainment uses.

Gym Noise

9.187. A flexible Use Class E shell and core space proposed in the Leisure Box has been earmarked for a gym and has residential apartments located above. To provide protection to future residents, MCC's noise limits also apply to any future gym operations:

"Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively."

9.188. The criteria above are considered the LOAEL, below which impacts are judged to be Negligible.

9.189. The noise levels produced by the future gym/leisure uses will depend on the tenant activities, which are unknown at this stage. Certain gym activities can generate high noise levels from sound systems and dropping weights etc. This could create noise issues for adjacent apartments above through two main paths:

- Airborne sound breaking through the floor; and
- Structure-borne noise and vibration generated by impacts on the gym floor e.g. free weights.

9.190. Suitable acoustic treatments to any future gym will be activity-specific. As future tenant activities and noise levels are not known, the provision of suitable acoustic treatments for the fit-out of the space will be the responsibility of the tenant.

9.191. Appendix 9.5 provides indicative treatments for typical gym spaces which may be adopted by future tenants.

9.192. The provision of suitable acoustic treatments to the gym space will be controlled through appropriate clauses in tenancy agreements. Any installed upgrades to the base build will undergo acoustic testing before the tenant commences operations, to provide evidence that they are adequate.

9.193. It is a planning requirement of MCC to meet the specific noise limits mentioned above, and it is expected that these will be enforced by MCC through an appropriate planning condition.

9.194. If MCC's entertainment noise limits are met in adjacent apartments, noise effects should be Negligible at adjacent sensitive receptors. This effect is Not Significant in ES terms.

9.195. With respect to the NPSE, potential effects due to gym noise would be below the LOAEL

Proposed External Building Services Plant

9.196. At this stage of the Proposed Development design, detailed information relating to noise levels generated by new items of external building services plant and equipment, or operation of commercial units is not available.

9.197. Therefore, in the absence of specific plant data, and to minimise the risk of adverse effects on new and existing sensitive receptors, it is recommended that all new items of plant and equipment be selected, designed, located, and, where appropriate, mitigated so that plant noise rating levels do not exceed 5 dB below existing typical background levels. This is in accordance with MCC's planning criteria.

9.198. In light of the guidance in BS 4142 [17], if these requirements are met noise effects should be Negligible at existing and proposed sensitive receptors. This effect is Not Significant in ES terms.

9.199. Based on relevant representative background noise levels during the daytime and night-time periods (as defined in Table 9 16) the noise limits to be achieved at 1 m from the nearest noise-sensitive receptor can be defined as follows:

Table 9.30 –External Plant Noise Limits

Receptor	Period	Typical background sound level, dB $L_{A90,T}$	Plant rating limit, dB $L_{Ar,Tr}$
NSR 1 Great Northern Tower NSR 2 Manchester Central NSR 3 Viadux, Residential NSR 6 Proposed Development	Day (07.00–23.00 hrs)	53	48
	Night (23.00-07.00 hrs)	51	46
NSR 4 Beetham Tower NSR 5 Area to west of Deansgate	Day (07.00–23.00 hrs)	49	44
	Night (23.00-07.00 hrs)	44	39

9.200. Limiting levels apply to the cumulative level of impact from all items of new building services plant when operating at their design duty under 'normal' conditions as well as typical operations at commercial units.

9.201. If these requirements are met, noise effects should be Negligible at existing and proposed sensitive receptors. This effect is Not Significant in ES terms.

9.202. With respect to the NPSE, potential effects due to plant noise from the Proposed Development would be below the LOAEL at surrounding receptors.

9.203. The control and mitigation of noise from plant and equipment is discussed in more detail later in the Mitigation Measures section.

Mitigation Measures

Construction Phase

Construction Noise

9.204. A number of safeguards exist to minimise the effects of construction noise, these include:

- Various UK Statutory Instruments [23] that limit noise emissions of a variety of construction plant; and
- The powers that exist for local authorities under Sections 60 and 61 of the Control of Pollution Act [1] to control noise from construction Sites.

9.205. The adoption of Best Practicable Means (BPM), as defined in Section 72 of the Control of Pollution Act 1974 [1], is usually the most effective means of controlling noise from construction Sites. Such measures would be included within the Construction Management Plan (CMP) required by MCC (discussed in greater detail in ES Construction Chapter 5), to which the appointed contractor will be required to comply. This will include the following:

- The contractor and their sub-contractors will at all times apply the principle of BPM as defined in Section 72 of the Control of Pollution Act 1974 [1] and carry out all work in such a manner as to avoid or reduce any disturbance from noise (and vibration) as far as is practicable.
- Guidance given in BS 5228-1 [13] (Section 8: Control of noise and Annex B: Noise sources, remedies and their effectiveness) will be followed as far as is practicable and advice and training on noise minimisation given to staff during Site induction procedures.
- All plant brought on to Site will comply with the relevant EC/UK noise limits applicable to that equipment or should be no noisier than would be expected based on the noise levels quoted in BS 5228-1 [13] . Each plant item will be well maintained and operated in accordance with manufacturers' recommendations and in such a manner as to minimise noise emissions.
- Electrically powered plant will be preferred, where practicable, to mechanically powered alternatives.
- The use of sound reduced plant fitted with suitable silencers or operated within enclosures will be preferred.
- Pneumatic tools will be fitted with silencers or mufflers.
- Deliveries to Site will be programmed and routed to minimise disturbance to local residents.
- Items of plant operating intermittently will be shut down in the periods between use.
- Where feasible, all stationary plant will be located so that the noise effect at receptors is minimised and, if practicable, every item of static plant, when in operation, will be noise attenuated using methods based on the guidance and advice given in BS 5228-1 [13].
- Careful selection of construction methods and plant will be implemented and utilised, for example, breaking-out of concrete structures using, where possible, low noise methods such as munching or similar, rather than percussion breaking.

- Temporary acoustic barriers and other noise containment measures such as screens, sheeting, and acoustic hoarding at the Site boundary (and where required around individual plant) will be erected where appropriate to minimise noise breakout and reduce noise levels at potentially affected receptors.
- There will be a considerate and neighbourly approach to relations with local residents.
- The site manager, or other appointed site representative, will be responsible for logging all received environmental noise and vibration comments/complaints, as well as the action that is taken in response to each point raised, and whether this was successful. Where not successful, supplementary actions will be carried out and resulting effects logged. The contact details for the site representative will be openly advertised so that local residents have a point of contact in case of any issues arising. The site representative will be responsible for keeping an open line of contact with local residents and advising the timing and programming of potentially noisy works.

9.206. All of the above measures would be implemented through the CMP which would be prepared and submitted to MCC for approval. This would also include a requirement for the undertaking of a revised construction noise assessment once the construction contractor has been appointed and the final confirmed construction working methods and programme are known. The results of this re-assessment would be used to identify any areas where construction noise has the potential to give rise to significant effects.

9.207. The need for noise monitoring and the setting of noise action levels to assist in controlling noise at potentially sensitive receptor locations would be identified during the preparation of the CMP, based on the revised construction noise assessment, and would also form a committed mitigation measure, where identified as being necessary.

9.208. In addition to the general mitigation measures outlined above, the contractor (or developer) responsible for the construction works could make an application to the Local Authority for consent to work under Section 61 of the Control of Pollution Act (1974) [1]. A Section 61 consent to work application would allow the Local Authority to review the contractor's proposals in advance and would also require that best practicable means are employed to control and minimise noise and vibration effects.

9.209. Through the application of best practicable means to control and minimise noise and vibration, it is expected that significant adverse noise effects could be avoided at the majority of nearby receptors during the construction stages of the Development.

Construction Vibration

9.210. Whilst construction vibration effects at nearby residential buildings / inhabitants are expected to be Negligible (not significant), potential Major Adverse Effects could occur for structure / building damage at adjacent on-site existing buildings (such as the Deansgate Terraces) as a result of unmitigated piling. Available mitigation measures include the following:

- During the initial CFA piling process, controlled trials test could be undertaken to establish a safe method of working based on observations of vibration intensity, the onset of local distress to the soil face and of changes in line and level;
- Removal of obstructions to piling. Where an unexpected obstruction is encountered, it might be preferable for piling to be halted at that position until the obstruction can be dealt with, rather than attempting prolonged works;
- Where reasonably practicable, plant and/or methods of work causing significant levels of vibration at sensitive premises should be replaced by other less intrusive plant and/or methods of working;
- To minimize any potential adverse impacts as a result of vibration from stationary plant, equipment immediately adjacent to sensitive receptors could be relocated or isolated using resilient mountings; and

- The characteristics of vibration emissions from each item of plant, and their collective effect, should be assessed during the selection process for the acquisition of plant. Where practicable, plant should be selected which will have the least impact in terms of vibration.

9.211. It is also recommended that a scheme of vibration monitoring, including vibration alerts, is implemented during works that have the potential to result in damage to the existing structures. The scope of this monitoring should be agreed between the contractor and the appointed project acoustic consultant; appropriate vibration PPV limits have been suggested in Table 9.6.

9.212. Provided CFA piling is adopted, and the suggested mitigation methods are utilised (including continuous vibration monitoring), potential impacts can be substantially reduced. The residual effect with the above mitigation measures in place would be Negligible to Minor at worst (Not Significant).

Transportation Noise – Normal Conditions

Internal Amenity Spaces

9.213. A glazing specification has been provided to see that acceptable internal noise levels are provided in residential spaces in the Proposed Development, in line with the guidance in BS 8233 [12] and ProPG [15] and the planning requirements of MCC [8].

9.214. The glazing specification is considered Primary Mitigation inherent in the design of the Proposed Development and is embedded within the assessment.

9.215. The implementation of an adequate glazing specification can be ensured by MCC through the use of an appropriate planning condition requiring the submission, written approval, and subsequent implementation of an appropriate glazing specification for the Proposed Development.

9.216. The resultant noise impact due to road traffic noise under normal conditions is therefore considered to be Negligible. The resultant effect is Negligible and Not Significant in ES terms.

9.217. With respect to the NPSE, potential effects below the LOAEL have been identified for noise impacts at the Proposed Development during the operational phase due to transportation noise, should an appropriate glazing specification be provided. Further mitigation is therefore not required.

External Amenity Spaces

9.218. In light of the guidance in the ProPG [15] it is considered that access to quiet external spaces in the centre of the site, which are effectively screened from surrounding roads, will offset the potentially higher noise impacts on individual balconies elsewhere. The overall noise impact is therefore calculated to be Negligible. The resultant effect is Negligible and Not Significant in ES terms.

9.219. With respect to the NPSE, potential effects below the LOAEL have been identified for noise impacts at the Proposed Development during the operational phase due to transportation noise in external areas, and further mitigation is not required.

Transport Noise – Overheating Conditions

9.220. A detailed noise and overheating assessment has been carried out to assess the potential impact on the Proposed Development and propose suitable mitigation methods, as detailed in Appendix 9.4.

9.221. The noise and overheating assessment has been carried out in accordance with the methodology of the AVO Guide [20] and was based on the results from the overheating modelling [24].

9.222. The AVO Guide [20] proposes that, providing overheating only occurs part of the time, occupants may accept a trade-off between acoustic and thermal conditions if they have some control over their environment and own level of comfort; i.e. they may be more willing to accept a short-term increase in noise levels in order to achieve better thermal comfort.

9.223. In the case of the overheating condition, the effect of increased internal ambient noise from external noise sources will depend both on the absolute noise level and the amount of time for which the overheating condition occurs.

9.224. The AVO Guide [20] recommends that priority is given to minimising heat gains via the building design, in order to reduce the amount and duration of ventilation required to control overheating and the consequential effect from increased ingress of noise.

9.225. The overheating assessment [24] has demonstrated that it will not be necessary for the purge vent to be open during the night time (23:00-07:00hrs) whilst providing acceptable thermal conditions internally. Therefore, any adverse impacts due to noise ingress during overheating conditions will be limited to the daytime. This is in line with the planning requirements of MCC (assuming the façade with closed windows provides sufficient level of sound insulation). This applies to all façades of the proposed residential buildings.

9.226. The noise and overheating assessment detailed in Appendix 9.4 shows that there are significant proportions of the Proposed Development where the rapid purge vents is suitable for providing relief from overheating according to the AVO Guide [20] and portions of the façade where it is not. In some portions of the façade, use of the vents to mitigate overheating could give rise to significant adverse noise effects to future occupants during the day.

9.227. Assuming the calculated sound reductions provided when the vent is open, and the opening durations provided by the overheating modelling [24], the suitability of the proposed rapid purge vent has been determined for three different categories of external noise levels (based on the SOAEL graphs from the AVO guide). The assessment breaks the Proposed Development down into three categories (green, red and purple) shown graphically on the 3D noise maps in Appendix 9.4.

9.228. Based on each noise level category, as shown on the 3D noise maps in Appendix 9.4, the following mitigation methods are proposed to ensure compliance with the AVO Guide [20].

- In areas (shown in green on the figures in Appendix 9.4) the rapid purge vent is suitable during the day, based on the external noise levels predicted using the noise model at the residential façades of the Proposed Development. Therefore, no further mitigation is required in these areas.
- In marginal areas (shown in red on the figures in Appendix 9.4) enhanced mechanical ventilation rates (over standard whole-dwelling rates) are to be provided by an additional mechanical fan so that the required purge vent opening times are reduced. Indicative thermal modelling has suggested that increasing ventilation rates in bedrooms could reduce required vent opening durations substantially, reducing the applicable SOAEL. This would mean that the purge vent is suitable in a greater number of locations because it does not need to be opened as often to provide acceptable thermal conditions internally.
- In the most affected areas (shown in purple on the figures in Appendix 9.4) other methods of providing relief from overheating will be investigated during the detailed design phase. 'Trim cooling' units or 'comfort cooling' are examples of solutions which would enable acceptable thermal conditions to be provided without opening purge vents, resulting in acceptable internal noise levels throughout the year.

9.229. The implementation of the adequate mitigation methods (such as those above) could be ensured using an appropriate planning condition requiring the submission, written approval, and subsequent implementation of a detailed overheating/noise mitigation scheme.

9.230. Through the adoption of the mitigation methods above, internal noise levels will be below the SOAEL in the AVO Guide [20]. According to the impact magnitude criteria in Table 9 12 this corresponds to impacts ranging from Negligible to Minor Adverse.

9.231. Effects will therefore range from Negligible to Minor Adverse. These effects will only occur occasionally during the warmer months and are not Significant in ES terms

Entertainment Noise upon the Proposed Residential Development

9.232. At stated previously, standard thermal double-glazing systems would provide an inadequate level of sound insulation to flats in the Proposed Development which are affected by entertainment noise from Manchester Central and the Lion's Den. Resultant internal noise levels could result in Significant effects.

9.233. Façades facing existing (and proposed) entertainment uses will require an enhanced glazing specification to meet the low frequency noise criteria of MCC within new dwellings.

9.234. However, the required glazing sound reduction performance (see Table.9 29) can be provided by the following enhanced glazing configurations:

Table 9 32 – Indicative Glazing Specifications (Based on Entertainment Noise)

Development façades affected	Required sound reduction, dB		Sound insulation performance of glazing system, dB R		Indicative glazing specification
	63Hz*	125Hz	63Hz*	125Hz	
West Façades facing Deansgate Terrace	20	24	25	25	6 mm pane / 16 mm argon / 8.8 mm Pilkington Optiphon™
East Façades facing Manchester Central	25	18			
Notes: * Glazing sound insulation values at 63 Hz are not typically provided in manufacturer's test data and have been estimated using the Insul acoustic software program.					

9.235. Façades facing the Lion's Den music venue and proposed outdoor seating areas to the rear of Deansgate Terraces are going to require a particularly high specification of glazing to meet MCC's planning criteria. However, as part of the Proposed Development the Client is considering improving the glazing at the Lion's Den.

9.236. The Lion's Den gig room currently has what appear to be single glazed sash windows which are likely to provide low levels of sound insulation. If a robust secondary glazing system was installed with acoustic laminated glass, the level of noise breaking out could be substantially reduced at low frequencies - in the order of 5-10 dB. This would then reduce the glazing sound insulation requirements of a significant portion of the Proposed Development. The performance of the secondary glazing system could be optimised by lining the reveals between the panes of glass with absorbent material and maintaining as a wide a cavity as possible.

9.237. Whilst the Lion's Den music bar and associated outdoor seating area will be removed as part of the Proposed Development, the current noise output from the Lion's Den has been assessed as a 'reasonable worst-case' proxy for a similar potential use in the Deansgate Terraces in future.

9.238. Considering the various options available to the reduce internal noise levels from entertainment sources within the Proposed Development, either through enhanced glazing specifications to flats or through upgrading the entertainment venue itself (in the case of the Lion's Den), it has been demonstrated that achieving MCC's low frequency criteria is feasible. In which case noise levels are expected to be virtually inaudible and result in Negligible effects. This is Not Significant in ES terms.

9.239. With respect to the NPSE, potential effects due to existing entertainment noise would be below the LOAEL at the Proposed Development.

New sources of Entertainment Noise

9.240. Methods for seeing that the external noise limits in Table 9.30 are met at existing surrounding receptors should be investigated at a later stage prior to commencement or occupation of development when details of specific entertainment noise sources are known e.g. tenant details, loudspeaker positions, etc. This could be ensured through the use of an appropriate planning conditions requiring the submission, written approval, and subsequent implementation of a detailed noise mitigation scheme.

9.241. The measures available for inclusion in such a scheme include:

- All amplified music should be brought under control of an automatic volume control system to see that the noise limits identified in Table 9 30 are not exceeded. The installed noise limiter should be capable of limiting noise at 1/1-octave band frequencies. An example system that may be appropriate is the Cesva LF010.
- To see that any noise limiting equipment operates effectively, it is advised that the installation of such equipment should be overseen by an appropriately experienced noise consultant. Furthermore, due to the uncertainty of factors such as on-site workmanship, it is advised that the process of establishing acceptable limiting values for the system (i.e. values compliant with the Local Authority criteria) should be determined via in-situ testing of any PA systems.
- Due to the proximity of commercial outdoor seating areas to flats in the Proposed Development, they should not be used regularly for entertainment purposes e.g. music events and should not be provided with amplified sound systems.
- Inclusion of lobbied doors to exit / entrance doorways used by patrons.
- Adoption of managerial and operational practices to help minimise the potential of noise disturbance. Examples of such practices include:
- Noise from litter / bottle disposal – Bottle disposal should not be carried out after 10pm or before 7am;

- Un-lobbied external doors - All external fire doors should remain closed when not in use and should not be wedged open; and
- Operational Management Reviews - building management meetings should be held regularly to discuss any noise-related comments received or review any potential improvements / amendments required to the noise management plan due to unforeseen circumstances.

Deansgate Rooftop Terrace

9.242. The nearest existing noise-sensitive receptor with a direct line of sight to the Deansgate Terrace rooftop terrace is the Great Northern Tower (NSR 1) located approximately 90m away to the east. Based on the expected reduction in sound level over this distance (circa 39 dB) the maximum entertainment noise level which could be produced on the terrace is shown in Table 9 33.

Table 9 33 – Calculated Maximum Entertainment Noise Level Permissible on Deansgate Rooftop Terrace

Description	Period	Entertainment noise limit, dB $L_{eq,5min}$ /Octave Band Centre Frequency (Hz)							Broadband level dB $L_{Aeq,5min}$
		63	125	250	500	1k	2k	4k	
Entertainment noise limit at Great Northen Tower	Day	53	50	46	45	43	39	30	47
	Night	49	47	45	44	41	38	30	46
Sound reduction over 90m	39 dB								
Maximum entertainment noise level on Deansgate rooftop terrace	Day	92	89	85	84	82	78	69	87
	Night	88	86	84	83	80	77	69	85

9.243. The above noise level calculated at Deansgate rooftop terrace could be considered representative of a busy restaurant, pub or bar and so should permit typical corporate/social events to take place without exceeding MCC's noise limits. However, these noise levels are below those which would be expected in spaces intended for dancing like music bars and clubs.

9.244. It should be noted that the above calculation assumes no screening between the receptor and the Deansgate Terrace, which may not be the case, depending on where the noise sources (sound system loudspeakers or people etc.) are placed on the rooftop terrace. If screening is present, noise levels on the terrace could potentially be increased without exceeding the noise limits at the receptor. In addition, loudspeakers are highly directional and could be pointed away from the sensitive receptor to further reduce sound transmission.

9.245. Assuming the relevant noise limits in Table 9 30 are met, noise effects should be Negligible at existing sensitive receptors. This effect is Not Significant in ES terms.

9.246. With respect to the NPSE, potential effects due to entertainment noise from the Proposed Development would be below the LOAEL at surrounding sensitive receptors.

Gym Noise

9.247. Methods for seeing that the MCC's entertainment noise limits are met in adjacent apartments should be investigated at a later stage prior to commencement or occupation of development when details of the gym tenant activities are available.

9.248. Indicative measures available for inclusion in such a scheme are provided in Appendix 9.5.

9.249. The provision of suitable acoustic treatments to the gym space will be controlled through appropriate clauses in tenancy agreements. Any installed upgrades to the base build will undergo acoustic testing before the tenant commences operations, to provide evidence that they are adequate.

9.250. It is a planning requirement of MCC to meet MCC's entertainment noise limits mentioned above, and it is expected that these will be enforced by MCC through an appropriate planning condition.

9.251. If MCC's entertainment noise limits are met in adjacent apartments, noise effects should be Negligible at adjacent sensitive receptors. This effect is Not Significant in ES terms.

9.252. With respect to the NPSE, potential effects due to gym noise would be below the LOAEL.

Proposed External Building Services Plant

9.253. Compliance with the plant noise level limits detailed in Table 9.23 can be ensured through the use of an appropriate planning condition requiring the submission, written approval, and subsequent implementation of a detailed noise mitigation scheme. The measures available for inclusion in such a scheme include the following:

- selection of quiet items of plant and equipment;
- locating plant and equipment away from sensitive receptors;
- utilising specially designed acoustic enclosures / attenuators for noisy items of plant;
- locating plant and equipment in plant rooms or behind noise screens;
- locating plant in positions which maximise available noise screening from existing and proposed structures in and around the Site; and
- switching plant off or reducing operating levels (and subsequent noise output) when not required (e.g. at night).

9.254. Assuming the relevant plant noise limits are met, noise effects should be Negligible at existing and proposed sensitive receptors. This effect is Not Significant in ES terms.

9.255. With respect to the NPSE, potential effects due to plant noise from the Proposed Development would be below the LOAEL at surrounding sensitive receptors.

Cumulative Effects

9.256. Committed developments within 500m of the Site have been reviewed and are not expected to result in any cumulative impacts or effects beyond those associated with the Proposed Development itself.

Residual Effects

9.257. Table 9 34 summarises the identified noise and vibration effects through the operational phase.

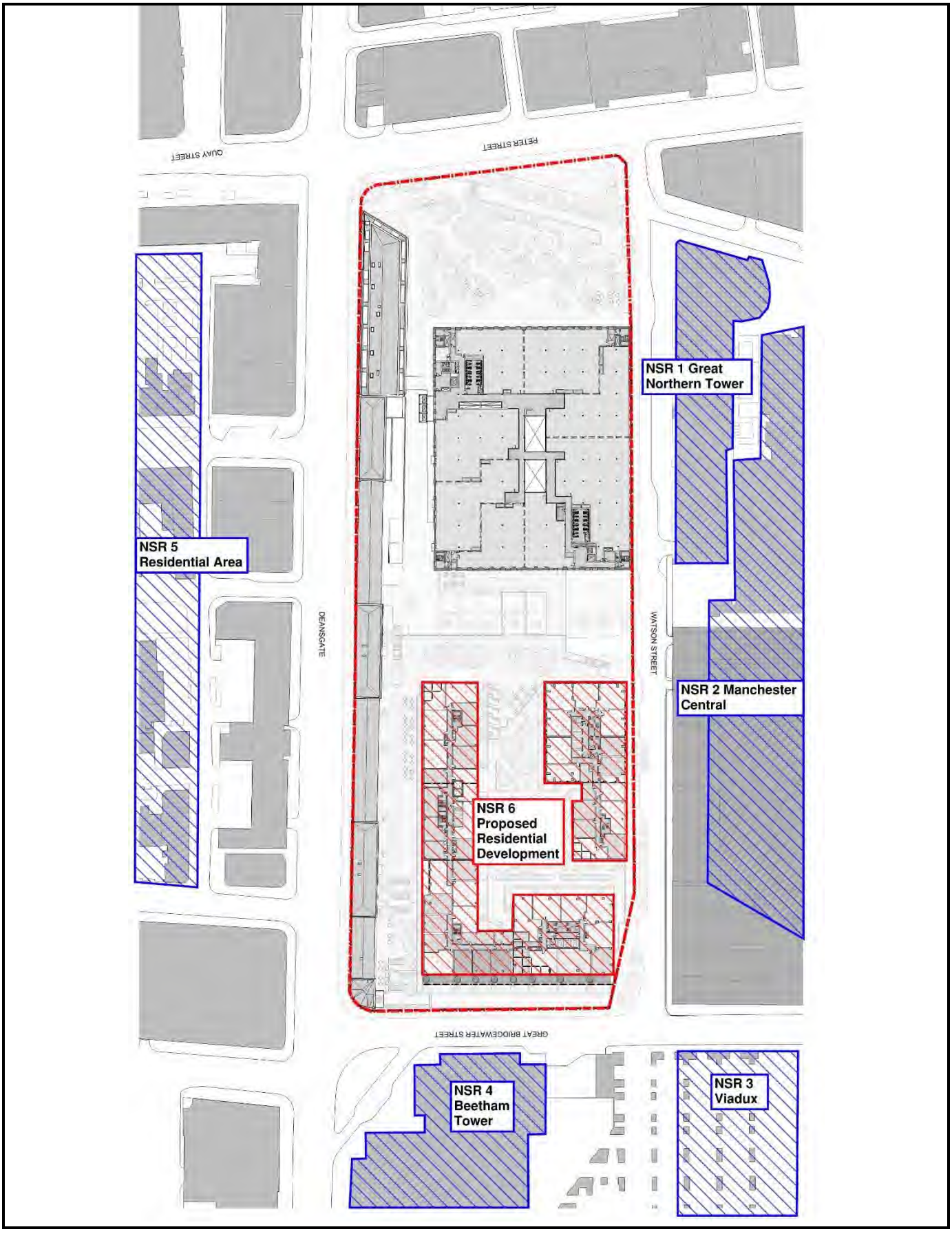
Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Construction			
NSR 1-5	Construction Noise - Negligible to Major Adverse	BPM of noise control / CMP / Section 61 Agreement	Negligible to Minor Adverse
NSR 1-5	Vibration effects on people – Negligible	Utilise low vibration piling techniques / implement vibration monitoring / CMP	Negligible
Existing buildings on and off site	Vibration effects on buildings – Major Adverse		Negligible
Operational			
Proposed Development	Transportation noise (normal conditions) – Negligible	None	Negligible
Proposed Development	Transportation noise (overheating conditions) – Negligible to Moderate Adverse	Provide relief from overheating with means other than open purge vents for most impacted façades	Negligible to Minor Adverse
Proposed Development	Entertainment noise – Moderate to Major Adverse	Enhanced acoustic glazing specification at receptors, appropriate acoustic treatment of gym.	Negligible
NSR 1-5	Entertainment noise – N/A	None – effects controlled through appropriate noise limits	Negligible
NSR 1-5	Fixed Plant noise – N/A	None – effects controlled through appropriate noise limits	Negligible

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10) Great Northern Environmental Impact Assessment (EIA) Appendix 2.2 - Scoping Opinion, 2022.
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13) Subcommittee B/564/1, "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise," BSi, London, 2009.
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24) WSP, "GNW-WSP-Z0-XX-RP-M-500502 Great Northern Warehouse – Leisure Box Apartments - TM59 & AVO Considerations Rev 01," 2022.
Defra, Noise Policy Statement for England Explanatory Note, 2010.
25) Technical Committee GME/21/3, Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration, London: BSi, 1993.

Figures


QUAY STREET
PETER STREET
NSR 1 Great Northern Tower
NSR 5 Residential Area
DEANSGATE
WATSON STREET
NSR 2 Manchester Central
NSR 6 Proposed Residential Development
GREAT BRIDGEWATER STREET
NSR 4 Beetham Tower
NSR 3 Viadux

North	Figure:	9.1		
	Title:	Noise sensitive receptor (NSR) plan		
	Project:	Great Northern, Manchester		
	Date:	13/09/2022	Scale:	NTS

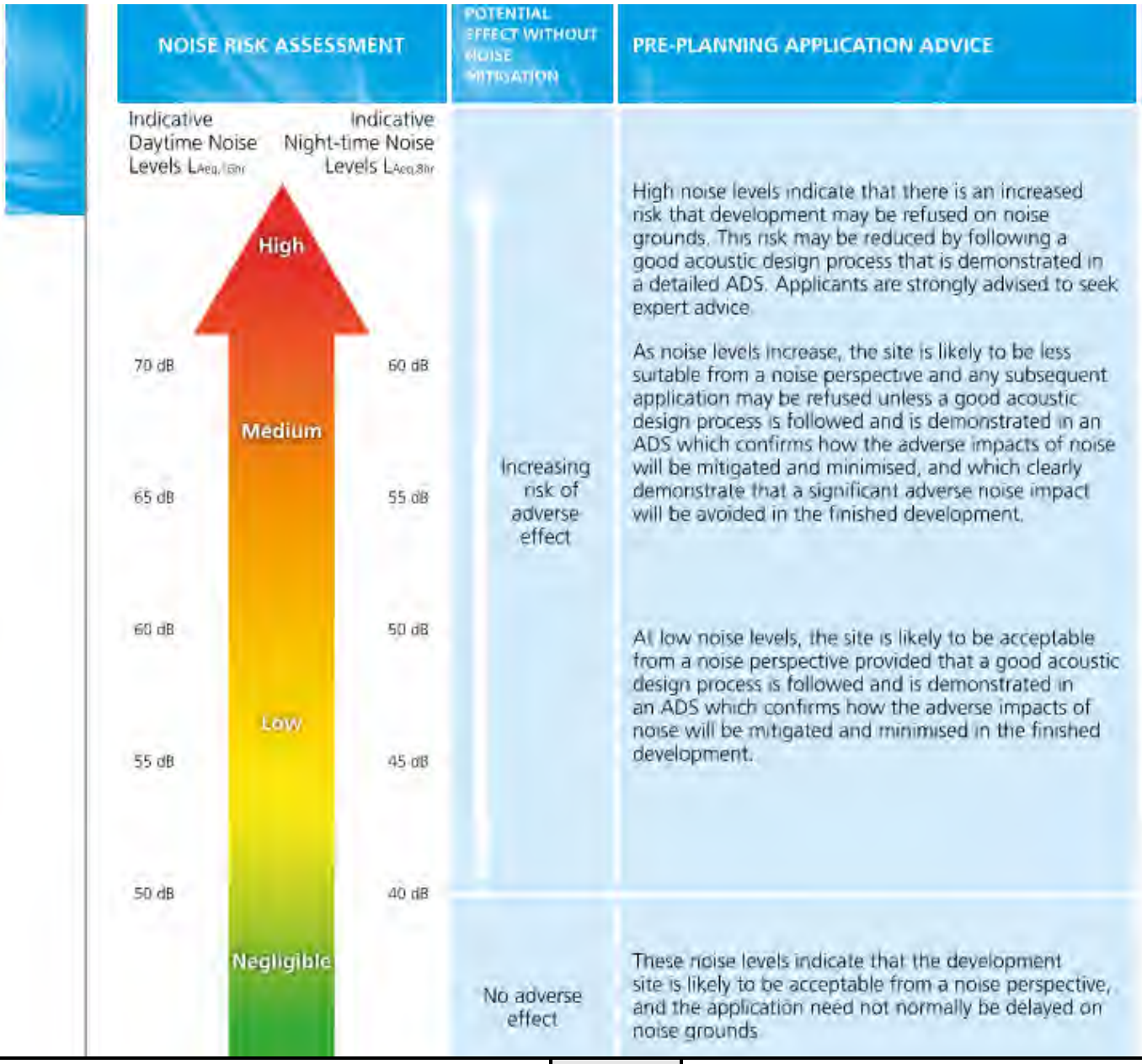


	Figure:	9.2		
	Title:	ProPG Stage 1 Initial Site Noise Risk Assessment		
	Project:	Great Northern, Manchester		
	Date:	13/09/2022	Scale:	NTS

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources [Note 1] relating to overheating condition

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,T}$ [Note 3] during 07:00 - 23:00 / $L_{Aeq,8h}$ during 23:00 - 07:00		
High: 65 dB / 55 dB	Increasing risk of adverse effect	Recommended
Medium: 60 dB / 50 dB		Optional
Low: 55 dB / 45 dB		
Negligible: 50 dB	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect

	Figure:	**9.3**		
	Title:	**AVO Guide Level 1 Risk Assessment of Noise Relating to Overheating Condition**		
	Project:	**Great Northern, Manchester**		
	Date:	**13/09/2022**	**Scale:**	**NTS**

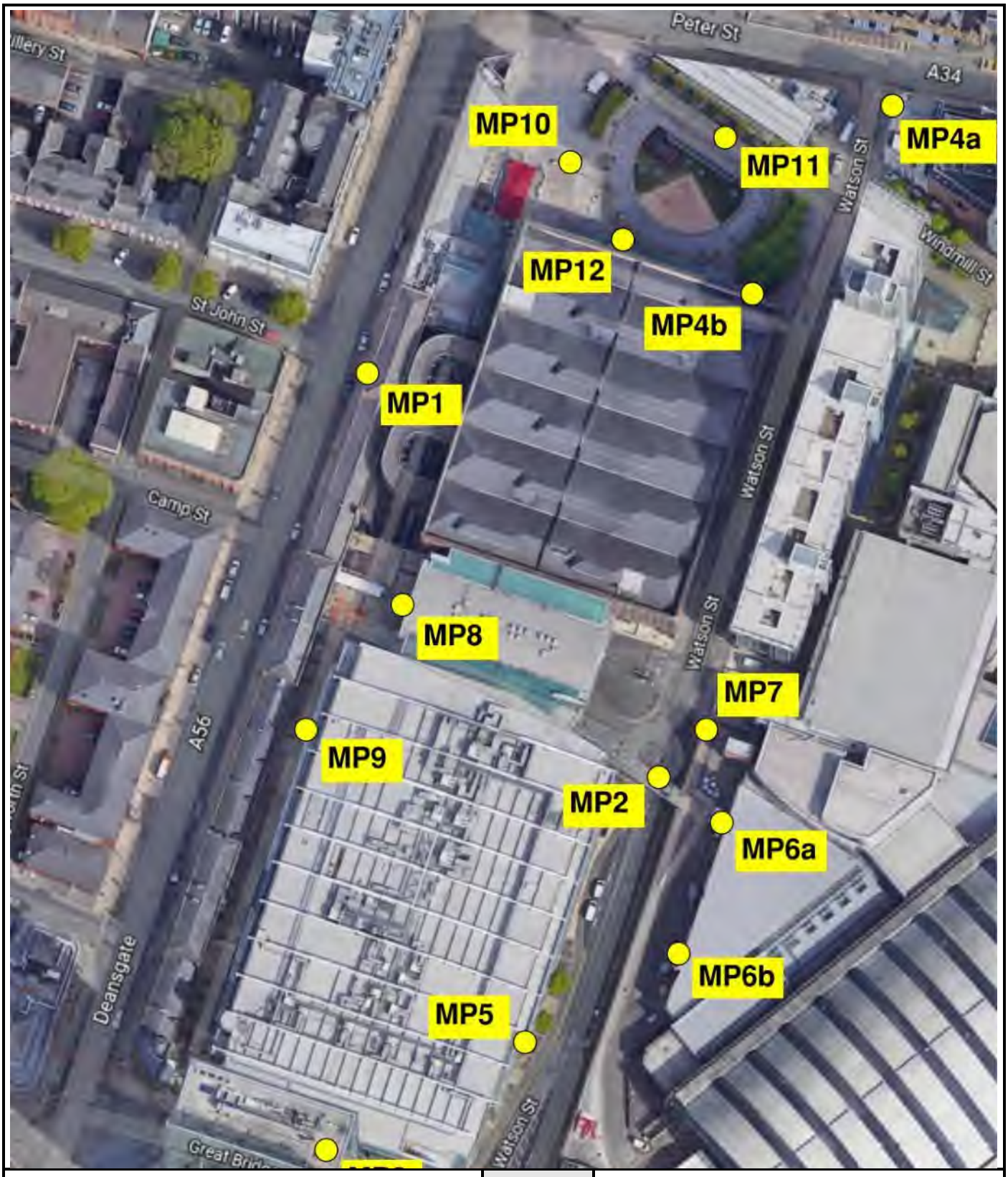
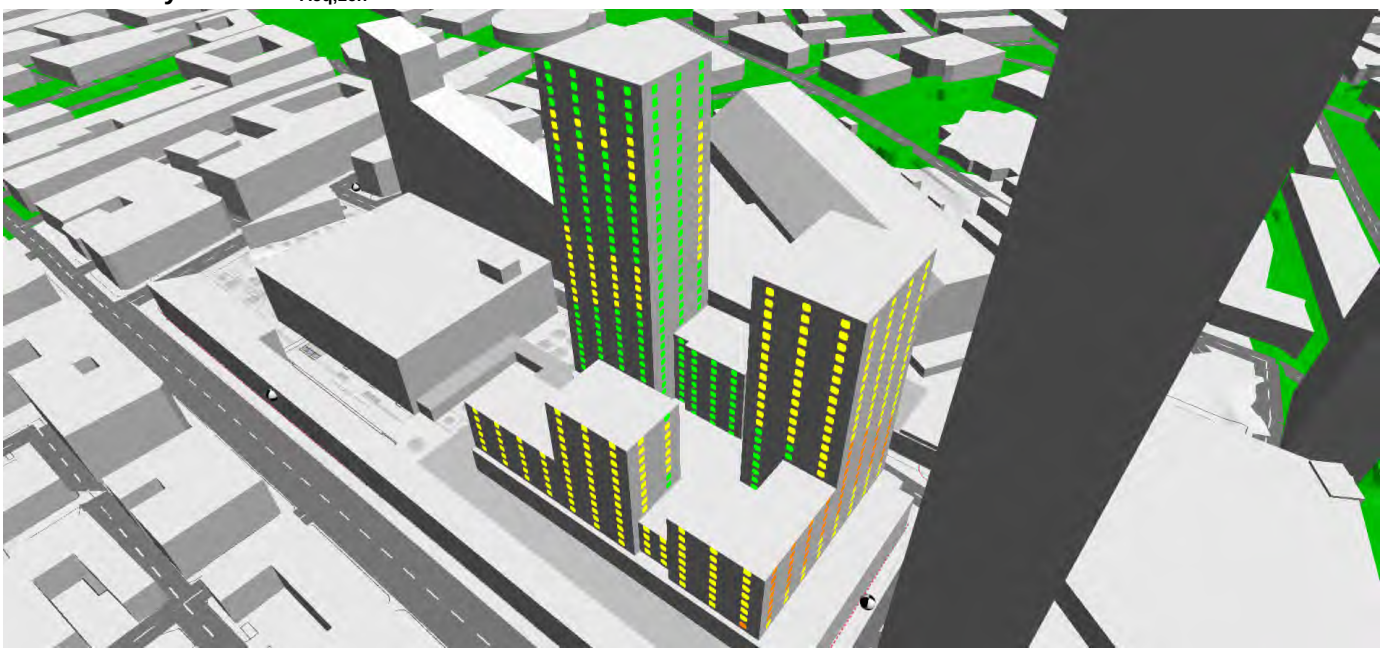
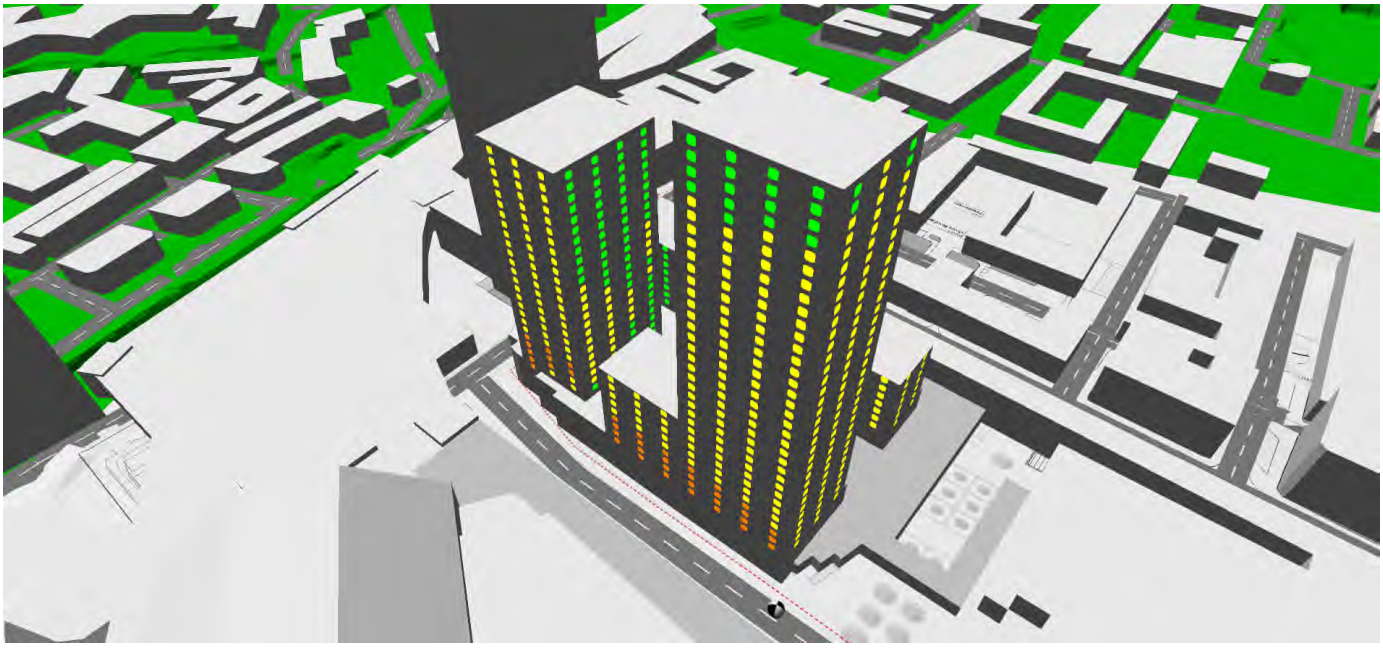


	Figure:	**9.4**		
	Title:	**Noise survey measurement locations**		
	Project:	**Great Northern, Manchester**		
	Date:	**20/10/2022**	**Scale:**	**NTS**

Predicted daytime dB $L_{Aeq,16h}$ noise levels from road traffic – view from northeast



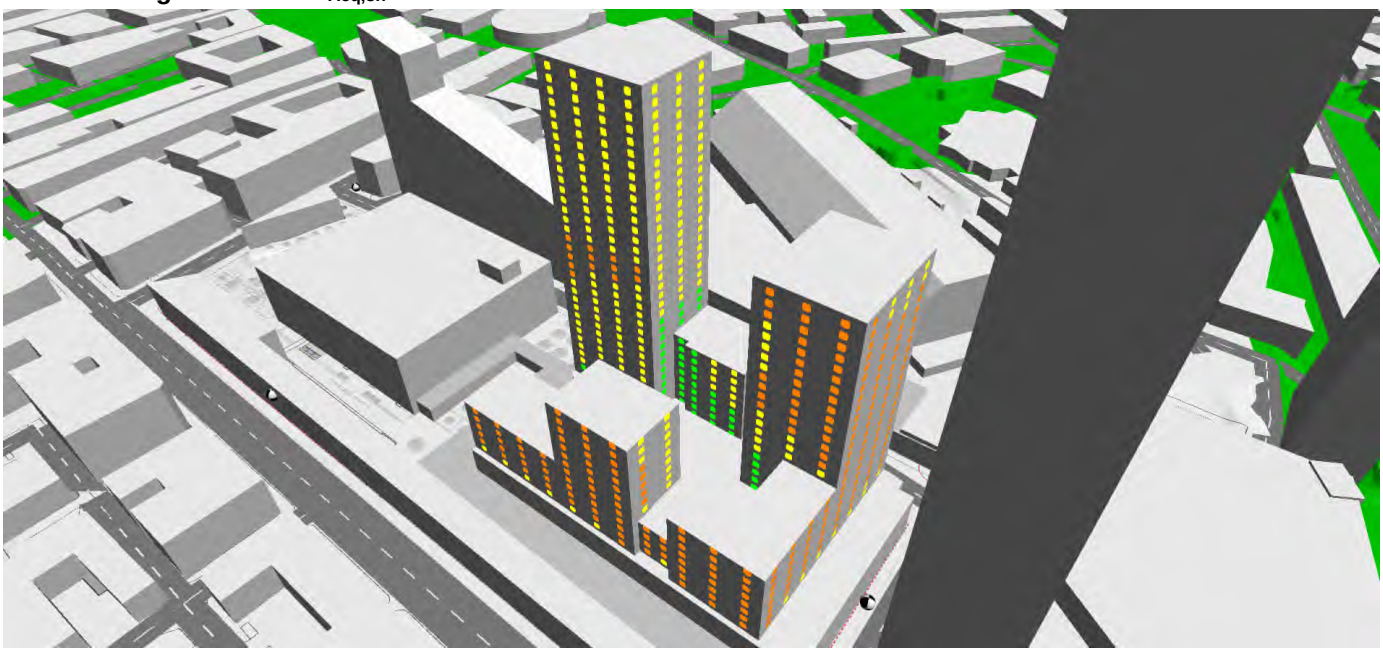
Predicted daytime dB $L_{Aeq,16h}$ noise levels from road traffic – view from southwest



Daytime dB	Impact	Colour

	Figure:	**9.5**		
	Title:	**Predicted daytime road traffic noise impact**		
	Project:	**Great Northern, Manchester**		
	Date:	**20/10/2022**	**Scale:**	**NTS**

Predicted night-time dB $L_{Aeq,8h}$ noise levels from road traffic – view from northeast



Predicted night-time dB $L_{Aeq,8h}$ noise levels from road traffic – view from southwest

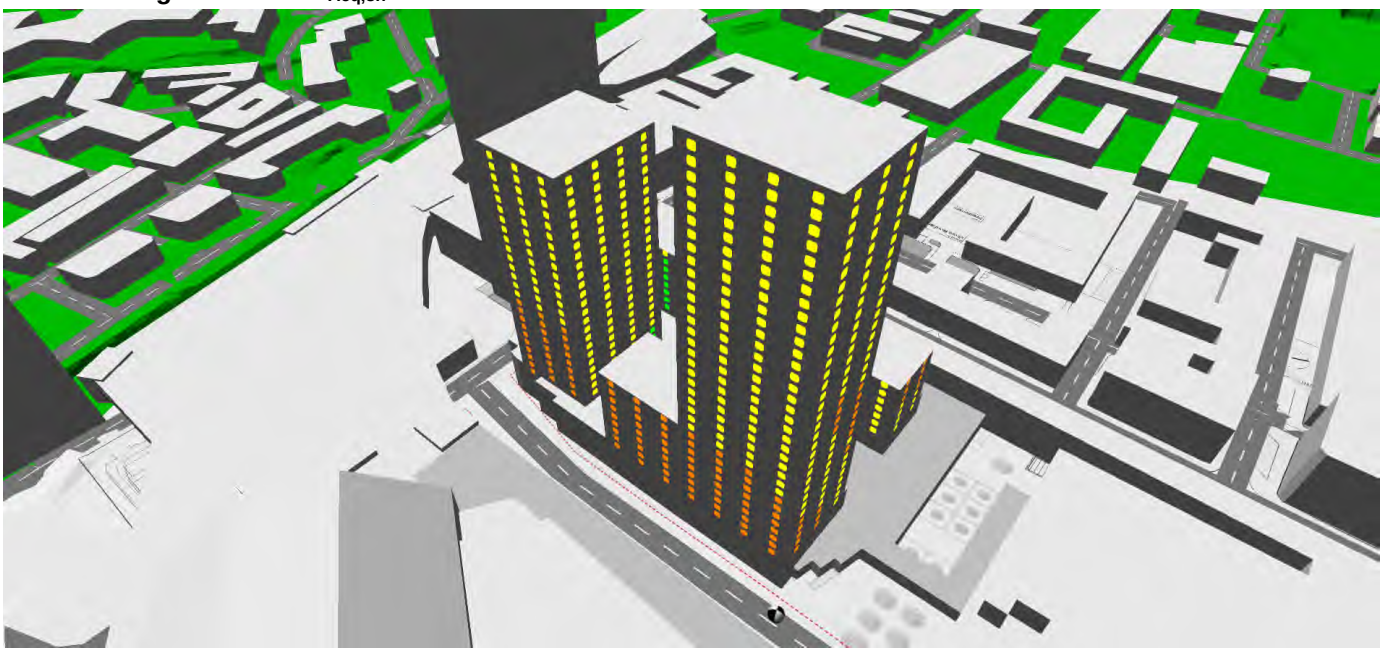


	Figure:	**9.6**		
	Title:	**Predicted Night-Time Road Traffic Noise Impact**		
	Project:	**Great Northern, Manchester**		
	Date:	**20/10/2022**	**Scale:**	**NTS**

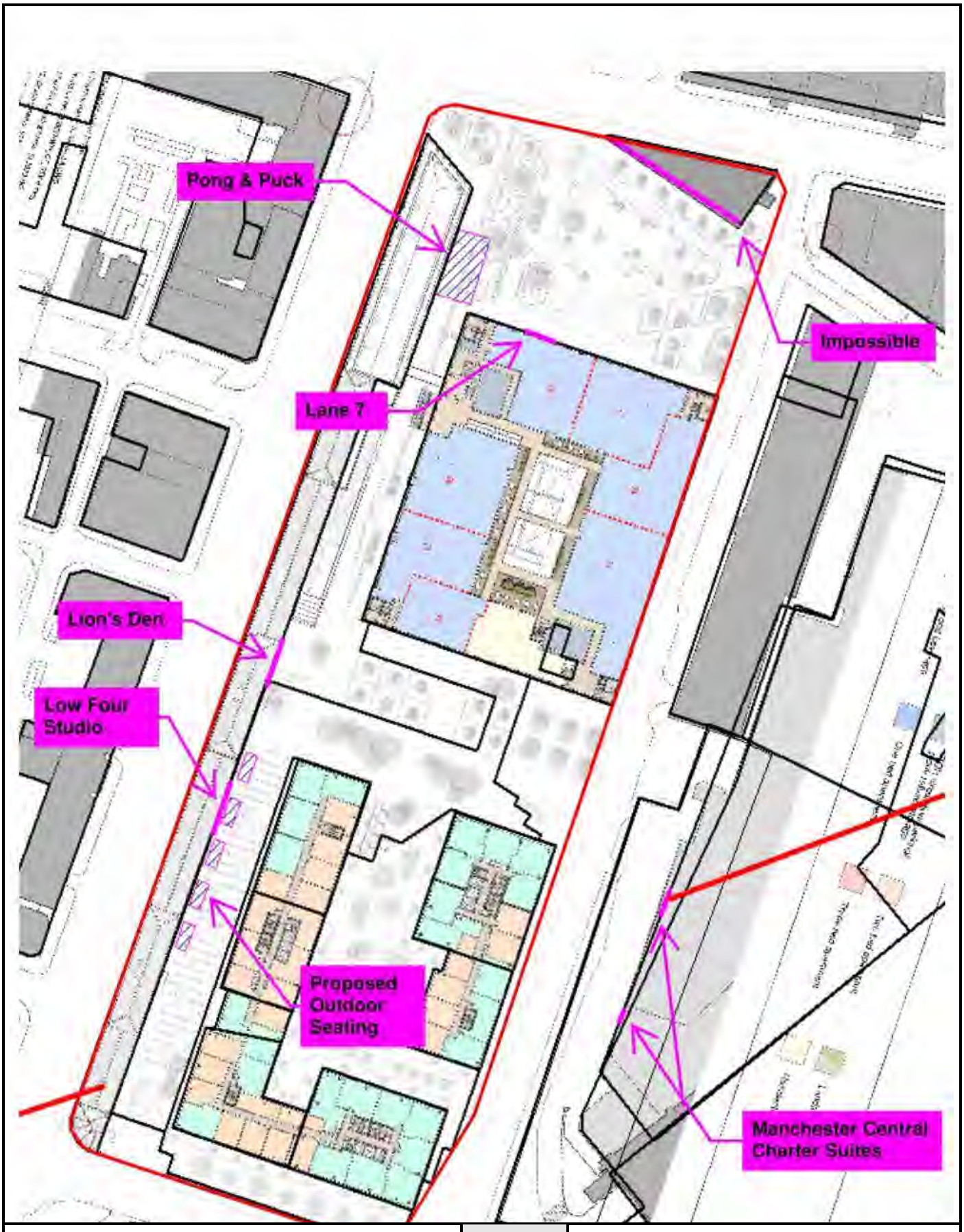
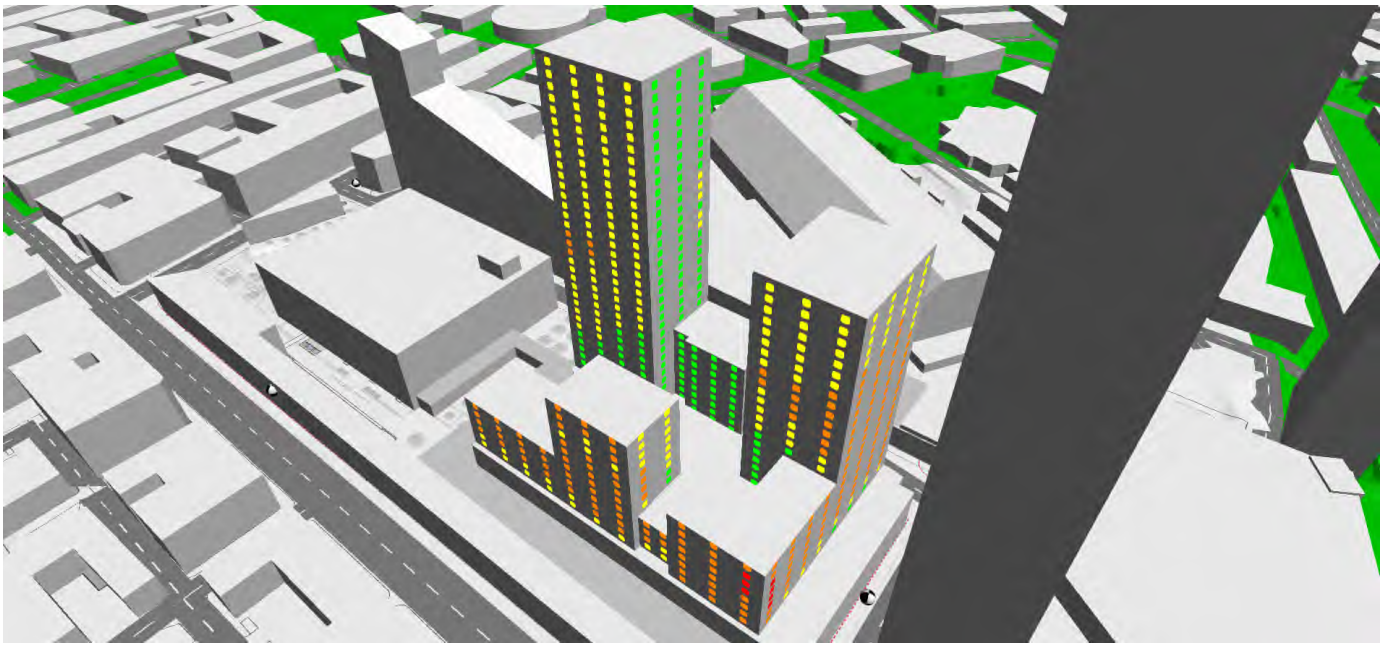


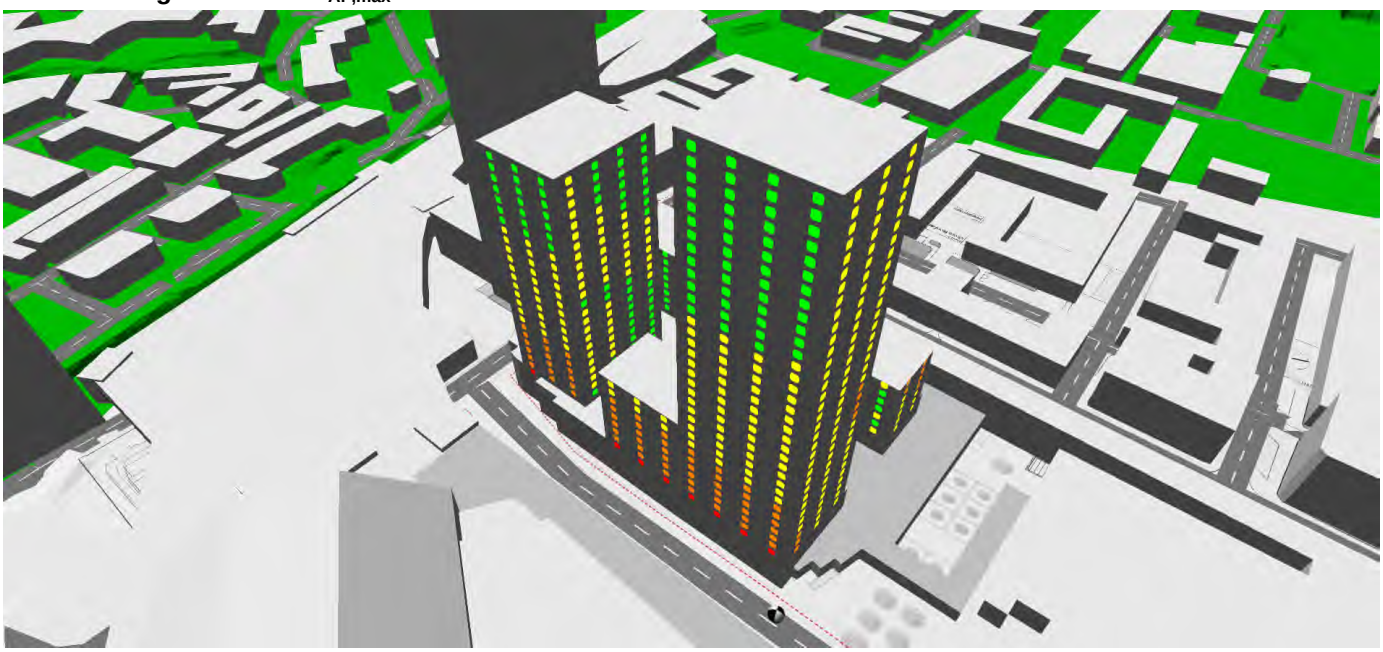
	Figure:	**9.7**
	Title:	**Noise Model Entertainment Noise Sources**

	Project:	**Great Northern, Manchester**		
	Date:	**24/10/2022**	**Scale:**	**NTS**

Predicted night-time dB $L_{AF,max}$ noise levels from road traffic – view from northeast



Predicted night-time dB $L_{AF,max}$ noise levels from road traffic – view from southwest



Night-time dB $L_{AF,max}$	Colour Key
< 65	
65-70	
70-75	
75-80	

	Figure:	**9.8**

	Title:	**Predicted Night-Time Road Traffic Noise Levels**		
	Project:	**Great Northern, Manchester**		
	Date:	**20/10/2022**	**Scale:**	**NTS**

10. Wind Microclimate

Introduction

10.1. This Chapter of the ES has been prepared by WSP UK Ltd. and assesses the likely Wind Microclimate impacts of the proposals upon the site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

10.2. This Chapter is accompanied by Appendix 10.1 – Wind Microclimate Technical Report.

10.3. The authors of this Chapter are Stefano Cammelli (Technical Director – Wind Engineering at WSP) and Elvin Hii (Associate – Wind Engineering at WSP). Stefano Cammelli is a wind engineering specialist with 19 years' experience in the provision of wind engineering consultancy services. He has an active professional involvement in the global wind engineering community through participation in committees, working groups and peer reviews and he is also a regular presenter at international conferences, with more than 50 publications in technical and industry journals. Stefano is a Fellow of the Institute of Civil Engineers and the current Vice-Chair of the UK Wind Engineering Society. Elvin is a wind engineering specialist with 7 years' experience in the wind engineering industry, during which he has been responsible for the delivery of many consultancy projects worldwide. He has been an active participant of local and international wind engineering conferences and has co-authored several technical publications. Elvin is a Member of the Institution of Mechanical Engineers and a Member of the UK Wind Engineering Society.

Limitations and Assumptions

10.4. The following assumptions and limitations have been made when completing this ES Chapter:

- The models and calculations for the wind assessment have been based on the drawings and models of proposed and existing properties provided by the project design team and supplemented with the available satellite images of the existing surroundings
- The LDDC Lawson Criteria, used to assess the impact of the Proposed Development with respect to pedestrian comfort, focuses on the effect of wind force on people's activities but do not factor in other environmental variables such as air temperature, solar radiation and relative humidity, which also affect people's perception of comfort
- Outdoor seating amenities are to be in use primarily during the summer season. During the windier times of the year, it would be expected that these spaces would be suitable for standing use as usability is lower during these seasons (also due to other factors such as temperature and precipitation)
- Conservatively, off-site cumulative landscaping schemes were not explicitly modelled in the CFD simulations
- The wind study focused on pedestrian level wind environment and excluded façade pressure, wind loads, inputs to structural engineering; internal airflows within buildings or impacts on vehicles or waterways

Legislative and Policy Context

Legislation

10.5. There is no specific national legislation or planning policy guidance dealing with wind microclimate in terms of pedestrian comfort. However, the Lawson Criteria – which is used to benchmark the pedestrian wind microclimate - are well-established in the UK.

National Planning Policy

10.6. The National Planning Policy Framework was revised on the 20th July 2021 by the Ministry of Housing, Communities & Local Government. The relevant paragraphs are as follows:

10.7. Paragraph 130 of the National Planning Policy Framework states that:

"Planning policies and decisions should ensure that developments:

a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;

b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;

c) are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);

d) establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;

e) optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and

f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience."

Local Planning Policy

10.8. Manchester's Local Development Framework – Core Strategy Development Plan was adopted by Manchester City Council on the 11th July 2012. It is the key document in Manchester's Local Development Framework and covers a period of 15 years from 2012 to 2027. It describes Manchester today and outlines the Council's vision for Manchester in 2027 along with the planning policies which will be used to deliver that vision.

10.9. 'Policy EN 2' on Tall Buildings states that:

"By their very size tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment."

Assessment Methodology and Significance Criteria

Defining the Baseline

10.10. An assessment of the baseline conditions has been carried out as part of the wind microclimate assessment. For the purpose of the wind microclimate assessment, the existing baseline conditions have been assumed to be the area within the Site boundary and the existing properties surrounding the Site which might be affected by the Proposed Development. The baseline model as shown in Figure 10.1 includes the existing Site and all the existing buildings within an approximate 500m radius of the Site.

10.11. Results of the assessment of the baseline conditions are presented in Section 3 of the Wind Microclimate Technical Report (Appendix 10.1) and are also discussed in Paragraphs 10.28 to 10.30 further on in this document.

Impact Assessment Methodology

Enabling and Construction

10.12. A quantified assessment of the impacts of the Proposed Development during enabling and construction has not been included in this ES Chapter. This is because wind effects at pedestrian level are closely associated with the size and shape of the massing of buildings and during the enabling and construction stage this condition will be continuously changing. Therefore, during the enabling and construction stages the effects will be both varying and temporary. However, using professional experience, a qualitative assessment has been undertaken and is included in the Identification and Evaluation of Significant Effects section.

10.13. Cranes will be used on-site during construction; however, it can be noted that these are typically slender and relatively "open" structures. They would therefore not be expected to introduce any material microclimate effects to the Site or surrounding area that would require assessment in this ES.

Completed Development

10.14. The pedestrian-level wind environment in an urban setting will depend on the general wind conditions, as well as on the effects of the urban environment itself. Therefore, the assessment consists of three main parts: calculation of the urban environment's aerodynamic effect on the wind; which is then combined with historical wind data; and, finally, compared against criteria to quantify the discomfort and/or level of distress caused by the wind.

10.15. Computational Fluid Dynamics (CFD) simulations were used to quantify the local wind speeds within and in the vicinity of the Site of the Proposed Development at various street locations (e.g., pedestrian access routes, building entrances, outdoor seating areas) for a comprehensive range of wind directions. CFD, as a tool for pedestrian wind modelling, is well validated against wind tunnel tests and real-world data and is often considered advantageous due to its advanced visualisation and domain wide measurement capabilities. Also, CFD is performed at full scale with wind speeds calculated at tens of millions of discrete points, allowing for large amount of data to be used for the assessment of the wind microclimate conditions. Like any other tool, it has its own limitations - however - good quality CFD is increasingly becoming an accepted tool in modern standards and guidance documents.

10.16. The results presented within this ES Chapter make use of the wind statistics obtained from the meteorological station at Manchester Airport, corrected for the Site (accounting for upwind terrain and reference height at the Site), to determine the probability of local wind speeds exceeding comfort and safety thresholds for a range of common pedestrian activities.

10.17. The assessment of the wind microclimate impacts comprised the following four (4) scenarios:

- Scenario 1: Baseline (i.e., existing site conditions)
- Scenario 2: Future baseline (i.e., existing site within the context of future/consented schemes)
- Scenario 3: Proposed (i.e., proposed development within the context of existing surrounds)
- Scenario 4: Cumulative (i.e., proposed development within the context of future/consented schemes)

10.18. A list of the cumulative schemes assessed within the study area of the wind assessment is provided later in this ES Chapter.

Assessment Criteria

10.19. The criteria used in this study were based on the LDDC version of the Lawson Criteria (henceforth referred to as 'LDDC Lawson Criteria') and have been reproduced in Table 10.1. Like most criteria used in assessments of pedestrian wind conditions, they relate a threshold wind speed and a threshold frequency to the suitability of an activity.

10.20. The frequency threshold for each criterion is 5% - or about two weeks and a half per year. It is also useful to assess frequency on a seasonal basis. For example, an outdoor seating area may require wind conditions suitable for sitting or standing in summer, but not in winter when the seating is unlikely to be used due to other factors, e.g., ambient temperature and precipitation. For season-specific results, the criteria are based on 5% of hours across the months in that season.

Table 10.1 – LDDC Lawson Criteria for Pedestrian Wind Comfort

Comfort category	Wind speeds not to be exceeded by more than 5% of the time	Description
Sitting	4 m/s	Acceptable for frequent outdoor sitting use, e.g., restaurant, café.
Pedestrian Standing	6 m/s	Acceptable for occasional outdoor seating, e.g., general public outdoor spaces, balconies and terraces intended for occasional use, entrances, bus stops, covered walkways or passageways beneath buildings, etc.
Pedestrian Leisure Walking	8 m/s	Acceptable for strolling and general thoroughfare usage.
Business Walking	10 m/s	Can be tolerated if one's objective is to walk, run or cycle without lingering, e.g., external pavements, walkways.
Uncomfortable	>10 m/s	Not comfortable for regular pedestrian access.

10.21. Additionally, criteria for safety have been defined based on 0.025% exceedance (~2.2 hours) per year. These are areas where someone could find walking difficult or even lose their footing. The criterion is reproduced in Table 10.2 below.

Table 10.2 – LDDC Lawson Criteria for Pedestrian Safety

Safety rating	Threshold mean-hourly wind speed exceeded once per annum (0.025%)	Description
S15 - Unsuitable for the general public	>15 m/s	Presents a safety risk for pedestrians, especially to more vulnerable members of the public.
S20 - Unsuitable for able-bodied	>20 m/s	Presents a safety risk for all pedestrians.

Wind Climate Analysis

10.22. The wind frequency statistics applied in this assessment were based on data obtained from the meteorological station at Manchester Airport and corrected for the Site. A detailed description of the wind climate analysis has been included in Section 2.4 of the Wind Microclimate Technical Report (Appendix 10.1).

Methodology for Defining Effects

Reporting of the Environmental Effect and Significance Criteria

10.23. The magnitude of impact of existing / off-Site receptors has been categorised using professional judgement based on the change in velocity observed from the 'Baseline'. The criteria for determining the magnitude of impact for the pedestrian comfort and safety assessments is summarised in Table 10.3.

Table 10.3 – Matrix for Determining the Existing / Off-Site Receptors Magnitude of Impact for Pedestrian Comfort

Significance	Trigger	Mitigation required?
Major Adverse	Conditions that were 'safe' in the baseline scenario become 'unsafe' as a result of the Proposed Development OR conditions that were 'suitable' in terms of comfort in the baseline scenario become 'unsuitable' as a result of the Proposed Development.	Yes
Moderate Adverse	Conditions that were 'suitable' in terms of comfort in the baseline scenario are made windier (by at least one comfort category) as a result of the Proposed Development but remain 'suitable' for the intended pedestrian activity.	No
Negligible	Conditions remain the same as in the baseline scenario.	No
Moderate Beneficial	Conditions that were 'unsuitable' in terms of comfort in the baseline scenario become 'suitable' as a result of the Proposed Development.	No
Major Beneficial	Conditions that were 'unsafe' in the baseline scenario become 'safe' as a result of the Proposed Development.	No

10.24. The wind microclimate conditions of on-site receptors introduced as part of the Proposed Development has been assessed based on their level of adherence to the LDDC Lawson Criteria only. This is because the magnitude of change from a baseline position does not apply, as it does to an existing receptor since there is no true baseline. The criteria for determining the impact of the proposed Development on the new receptors both for pedestrian comfort and safety within the Site are listed in Table 10.4.

Table 10.4 – Matrix for Determining the Introduced / On-Site Receptors Magnitude of Impact for Pedestrian Comfort

Significance	Trigger	Mitigation required?
Major Adverse	Conditions are 'unsafe'.	Yes
Moderate Adverse	Conditions are 'unsuitable' (in terms of comfort) for the intended pedestrian use.	Yes
Negligible	Conditions are 'suitable' for the intended pedestrian use.	No
Moderate Beneficial	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	No

Sensitive Receptors

10.25. The following sensitive receptors have been identified and assessed within the ES:

- All pedestrian circulation routes, building entrances, waiting areas (e.g., bus stops and pick-up/drop off points) and leisure open areas in the surrounding vicinity
- All pedestrian circulation routes, building entrances, waiting areas (e.g., bus stops and pick-up/drop off points), leisure open areas and outdoor seating spaces within the Site

Categorising Likely Significant Effects

10.26. For on-site receptors, any adverse effect is a 'significant effect' because it implies that a location, or area, has a wind microclimate that is unsuitable in terms of pedestrian safety and / or comfort for the desired use of that area. On this basis, effects that are adverse need mitigating.

10.27. For off-site receptors, a major adverse effect is a 'significant effect' because it implies that a location, or area, which was previously suitable in terms of pedestrian comfort and / or safety, has become unsuitable for the desired use of that area. On this basis, only effects that are major adverse need mitigating.

10.28. Beneficial effects that are moderate or major in scale are not considered to be 'significant' or a material consideration for planning.

Receptors and Sensitivity

10.29. The wind assessment has been undertaken for a number of existing and introduced receptors at street level. The location of these receptors is shown in Figure 10.2 to Figure 10.5. The full list of receptors is included in Table 10.5.

Table 10.5 – List of Receptors for The Assessment

Receptor number	Description	Use	On-Site / Off-Site
1	Entrance (South)	Entrance	On-site
2	Entrance (South-East)	Entrance	On-site
3	Entrance (South-East)	Entrance	On-site
4	Walkway (Watson St.)	Thoroughfare	On-site
5	Entrance (Watson St.)	Entrance	On-site
6	Entrance (Watson St.)	Entrance	On-site
7	Entrance (Watson St.)	Entrance	On-site
8	Entrance (Watson St.)	Entrance	On-site
9	Entrance (walkway within the development)	Entrance	On-site
10	Entrance (walkway within the development)	Entrance	On-site
11	Entrance (West)	Entrance	On-site
12	Entrance (West)	Entrance	On-site
13	Entrance (West)	Entrance	On-site
14	Entrance (North-West)	Entrance	On-site
15	Playground / outdoor seating area	Outdoor seating	On-site
16	Pavement (Watson St. to Deansgate)	Thoroughfare	On-site
17	Pavement (Great Bridgwater St.)	Thoroughfare	Off-site
18	Pedestrian crossing (Great Bridgwater St.)	Thoroughfare	Off-site
19	Pedestrian crossing (Watson St.)	Thoroughfare	Off-site
20	Pavement (Watson St.)	Thoroughfare	Off-site
21	Pedestrian crossing (Watson St.)	Thoroughfare	Off-site
22	Pavement (Watson St./Windmill St.)	Thoroughfare	Off-site
23	Pavement (Watson St.)	Thoroughfare	On-site
24	Entrance (Watson St.)	Entrance	On-site
25	Entrance to Great Northern Tower	Entrance	Off-site
26	Entrance (Watson St.)	Entrance	On-site
27	Entrance (North-East corner)	Entrance	On-site
28	Entrance (North)	Entrance	On-site
29	Entrance (North)	Entrance	On-site
30	Entrance (North)	Entrance	On-site
31	Entrance (North-West corner)	Entrance	On-site
32	Entrance Alex`s bakery	Entrance	On-site
33	Pavement (Deansgate)	Thoroughfare	Off-site
34	Pavement (Deansgate)	Thoroughfare	Off-site
35	Pavement (Deansgate)	Thoroughfare	Off-site
36	Main Entrance (West)	Entrance	On-site

Receptor number	Description	Use	On-Site / Off-Site
37	Entrance (Sainsbury)	Entrance	Off-site
38	Pedestrian crossing (Deansgate)	Thoroughfare	Off-site
39	Pavement (Peter St.)	Thoroughfare	Off-site
40	Pavement (Watson St.)	Thoroughfare	Off-site
41	Pavement (Jerusalem St.)	Thoroughfare	Off-site
42	Entrance Edwardian hotel	Entrance	Off-site
43	Pavement (Great Bridgwater St.)	Thoroughfare	Off-site
44	Pedestrian crossing (Great Bridgwater St.)	Thoroughfare	Off-site
45	Pavement (Deansgate)	Thoroughfare	Off-site
46	Entrance Hilton hotel	Entrance	Off-site
47	Pedestrian crossing (Deansgate)	Thoroughfare	Off-site
48	Entrances (Cervantes school & Home4U)	Entrance	Off-site
49	Pavement (Deansgate)	Thoroughfare	Off-site
50	Entrance (the Deansgate & Dimitri`s)	Entrance	Off-site
51	Pavement (Camp St.)	Thoroughfare	Off-site
52	Pavement (St Jhon St.)	Thoroughfare	Off-site
53	Pavement (Watson St.)	Thoroughfare	Off-site
54	Entrance Albert School	Entrance	Off-site
55	Pavement (Deansgate South-West corner)	Thoroughfare	Off-site
56	Pavement (Beetham tower corner)	Thoroughfare	Off-site
57	Pavement (Peter St.)	Thoroughfare	Off-site
58	Outdoor seating area	Outdoor seating	On-site
59	Pavement (Watson St.)	Thoroughfare	Off-site
60	Pavement (Peter St.)	Thoroughfare	Off-site
61	Pavement (Trafford St.)	Thoroughfare	Off-site
62	Entrance (Pinarello & Richer Sound)	Entrance	Off-site
63	Entrance (Scientology)	Entrance	Off-site
64	Walkway (South Gateway)	Thoroughfare	On-Site
65	Entrance	Entrance	Off-Site
A	Recreational space / Terrace	Recreational space	On-site
B	Podium / Outdoor seating area	Outdoor seating	On-site
C	Podium / Terrace	Recreational space	On-site
D	Podium / Terrace	Recreational space	On-site
E	Podium / Outdoor seating area	Outdoor seating	On-site
F	Podium / Outdoor seating area	Outdoor seating	On-site
G	Podium / Entrance (West)	Entrance	On-site

Receptor number	Description	Use	On-Site / Off-Site
H	Podium / Outdoor seating area	Outdoor seating	On-site
I	Podium / Main entrance (South)	Entrance	On-site
L	Terrace L2	Recreational space	On-site
M	Terrace L2	Recreational space	On-site
N	Terrace L2	Recreational space	On-site
O	Outdoor seating area L10	Outdoor seating	On-site
P	Outdoor seating area L10	Outdoor seating	On-site
Q	Outdoor seating area L12	Outdoor seating	On-site
R	Outdoor seating area L12	Outdoor seating	On-site
S	Podium / Outdoor seating area	Outdoor seating	On-site
T	Podium / Entrance (Odeon)	Entrance	On-site
U	Podium / Entrance (Great Northern warehouse)	Entrance	On-site

Baseline Conditions

10.30. The Baseline has been modelled to represent the conditions in and around the Site within the existing context, prior to the introduction of the Proposed Development. The results are discussed below and further detail of the quantification of the results is provided in Section 3 of the Wind Microclimate Technical Report (Appendix 10.1).

Pedestrian Safety Assessment

10.31. In the Baseline scenario, wind conditions at most locations are rated as safe for all users, except at receptors 56 (corner of Beetham Tower on Great Bridgewater Street) and 22 (Watson St./Windmill St.).

Pedestrian Comfort Assessment

10.32. In the Baseline scenario, wind comfort ratings across the majority of the receptors are suitable for the intended pedestrian uses. The only exceedance of the pedestrian comfort criteria occurs at receptor 54 (entrance – Albert School).

Identification and Evaluation of Significant Effects

Demolition and Construction

10.33. A quantified assessment of the impacts of the Proposed Development scheme during demolition and construction has not been included in this Chapter addendum to the ES. This is because wind effects at pedestrian level are closely associated with the size and shape of the massing of buildings and during the demolition and construction stage this condition will be continuously changing. However, from professional judgement, it can be stated that as demolition and construction works progress, the conditions on and around the Site would be expected to gradually transition between those of the baseline and the final completed Proposed Development. Therefore, any effects on pedestrians arising from changes in the local wind environment as a result of progressive changes to the massing of the built form on-site during the demolition and construction works are expected to be temporary. In the case that Phase 1 of the proposed development is completed but the demolition and construction of Phase 2 is not brought forward, it is expected that the wind conditions across the site will be similar to the Baseline scenario (detailed in 10.30 to 10.32), due to the similarity in massing.

10.34. The potential effects during various stages of construction will vary and are likely to be of lesser magnitude than those that will be experienced once the Proposed Development has been completed. Additionally, demolition and enabling activities are less sensitive to wind conditions and a Construction Environment Management Plan (CEMP) would be used to protect construction workers. Access to the Site will also be restricted via perimeter hoardings. The presence of cranes on-site is unlikely to present a significant impact on wind conditions at the Site due to the typical open-truss type construction of the frame used, which is relatively 'transparent' to wind and thus unlikely to generate downdrafts. Any undesirable wind conditions during construction are temporary and as construction of the Proposed Development proceeds, the wind conditions at the Site would gradually vary, approaching those of the completed Proposed Development, the assessment of which is covered in the next section. The demolition and construction effects are not discussed further in this Chapter addendum to the ES.

Completed Development

10.35. The completed Proposed Development has been modelled to represent the conditions in and around the Site within the existing context, with the introduction of the completed Proposed Development. The results are discussed below and further detail of the quantification of the results is provided in Section 4 of the Wind Microclimate Technical Report (Appendix 10.1). The 3D model of the completed Proposed Development in the context of the existing surroundings is shown in Figure 10.6 below.

Pedestrian Safety Assessment

10.36. With the introduction of the Proposed Development, inherent exceedances of the pedestrian safety criteria from the Baseline configuration persist. The nature and scale of the effects are **Negligible** and are therefore considered **Not Significant**.

Pedestrian Comfort Assessment

10.37. With the introduction of the Proposed Development, wind comfort ratings across the majority of the receptors are suitable for the intended pedestrian uses. The Inherent exceedance of the pedestrian comfort criteria from the Baseline configuration persist. The nature and scale of the effects primarily range between **Moderate Adverse** (Off-Site Receptors) and **Moderate Beneficial** and therefore considered **Not Significant**.

10.38. At the elevated levels of the Proposed Development, all areas are generally suitable for intended uses. All balconies across the Proposed Development are suitable for short periods of sitting in summer. Wind conditions across the podium terraces are predominantly rated as suitable for standing/sitting in summer – where outdoor seating areas are intended, additional localised shelter could be implemented to maximise the usage of these spaces.

Mitigation Measures

10.39. As detailed in the Wind Microclimate Technical Report (Appendix 10.1), the following wind mitigation measures were included in the assessment, and are shown in Figure 10.7:

- On the south-east corner of the development:
  - 1x 2m deep, 11m tall, 50% porous façade fin (~3m clearance from the ground).
  - 2x 1m wide, 1.5m tall, 50% porous screens above/within the planters.
  - 2x freestanding 1.5m wide, 2m tall, 50% porous screens along the pavement on Watson Street.

10.40. Trees as per the proposed landscaping scheme. No trees in other areas have been included in the computational model.

10.41. On the private balconies within the Proposed Development, the following mitigation measures were included (Figure 10.8).

- 1.1m tall solid balustrades with an additional 0.4m 50% porous balustrade on the western-facing balconies on the tower
- 1.5m tall, 50% porous balustrades on north- and south-facing balconies on the towers
- 1.1m tall, 50% porous balustrades on all other private balconies

10.42. The wind mitigation measures listed above were developed in conjunction with the wider design team. It is understood that the these will be integrated as part of the design of the proposed development.

10.43. The following wind mitigation measures were also developed in conjunction with the wider design team and included in the assessment (at the south-east corner of the development); however, it is understood that these are not located within the site boundary and therefore must be delivered as s.278 works.

- 2x 1m wide, 1.5m tall, 50% porous screens above/within the planters.
- 2x freestanding 1.5m wide, 2m tall, 50% porous screens along the pavement on Watson Street.
- 3x trees on top of planters.

10.44. The wind mitigation measures included in the assessment are shown in Figure 10.7 and 10.8

Cumulative Effects

10.45. In the cumulative assessment, the following cumulative schemes within a 500m radius of the Site were modelled based on information from the design team and that is publicly available:

- 274 Deansgate – 132376/FO/2021
- 3 St John's – 120062/FO/2018
- 325-327 Deansgate – 125804/FO/2019
- Travelodge Deansgate Locks – 126308/FO/2020
- Freetrade Exchange – 133282/LO/2022
- One Commercial Street – 128433/FO/2020
- 79 Moseley Street – 118398/FO/2017
- Beetham Tower (office building) – 068662/FO/2003//C3
- 44-48 Bridge Street – 115200/FO/2017
- Great Jackson Street – 132199/FO/2021
- Deansgate South – 129406/FO/2021
- One City Road – 128002/FO/2020

10.46. In this scenario, the completed Proposed Development has been modelled to represent the conditions in and around the Site within the context of existing and cumulative surroundings. The results are discussed below and further detail of the quantification of the results is provided in Section 5 of the Wind Microclimate Technical Report (Appendix 10.1).

Pedestrian Safety Assessment

10.47. With the introduction of the cumulative surroundings, the inherent exceedance at receptor 56 persist. The nature and scale of the effects are Negligible and are therefore considered Not Significant. Wind conditions at receptor 22 improve, such that the inherent safety exceedance is alleviated. At this location, the nature and scale of the effects are Major Beneficial and therefore considered Not Significant.

Pedestrian Comfort Assessment

10.48. With the introduction of the cumulative surroundings, wind comfort ratings across the majority of the receptors are suitable for the intended pedestrian uses. The Inherent exceedance of the pedestrian comfort criteria from the Baseline configuration persist. The nature and scale of the effects primarily range between **Moderate Adverse** (Off-Site Receptors) and **Moderate Beneficial** and therefore considered **Not Significant**.

10.49. At the elevated levels of the Proposed Development, all areas are generally suitable for intended uses. All balconies across the Proposed Development are suitable for short periods of sitting in summer. Wind conditions across the podium terraces are predominantly rated as suitable for standing/sitting – where outdoor seating areas are intended, additional localised shelter could be implemented to maximise the usage of these spaces.

Residual Effects

10.50. The completed Proposed Development in the context of existing surrounds – with the inclusion of wind mitigation measures – results in residual effects primarily ranging between Moderate Adverse (Off-Site Receptors) and Moderate Beneficial and are Not Significant.

10.51. The completed Proposed Development in the context of cumulative surrounds – with the inclusion of wind mitigation measures – results in residual effects primarily ranging between Moderate Adverse (Off-Site Receptors) and Major Beneficial and are Not Significant.

10.52. The wind mitigation measures listed in 10.39 and 10.40 were developed in conjunction with the wider design team and it is understood that these will be integrated as part of the design of the proposed development. Additionally, the wind mitigation measures listed in 10.42 are to be delivered as s.278 works. Consequently, in Table 10.6, the likely significant effects and the residual effects, before and after mitigation, are the same.

Table 10.6 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Construction Phase			
-	Negligible	None	Negligible
Operational Phase			
All receptors	Ranging between Moderate Adverse and Major Beneficial and are Not Significant	Embedded within the design of the proposed development (as indicated in 10.39 to 10.40 above) and delivered as s.278 works (as indicated in 10.42)	Ranging between Moderate Adverse and Major Beneficial and are Not Significant

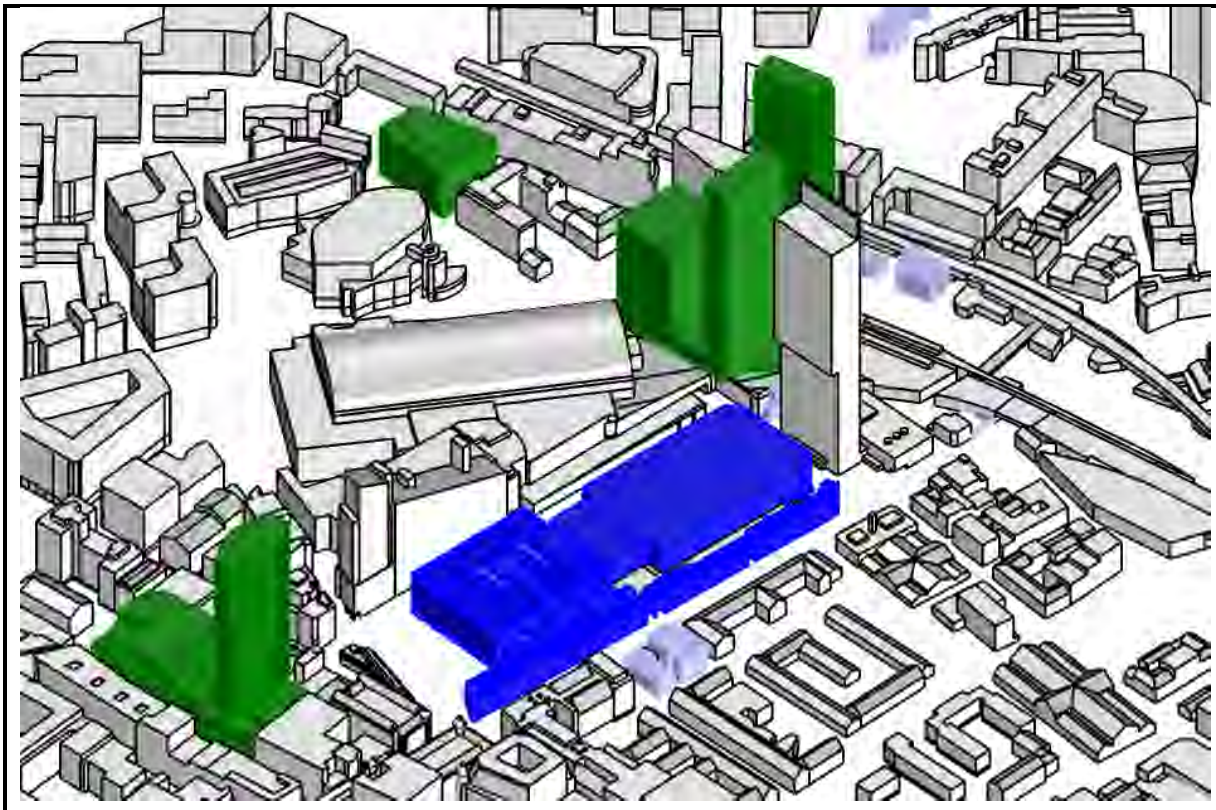
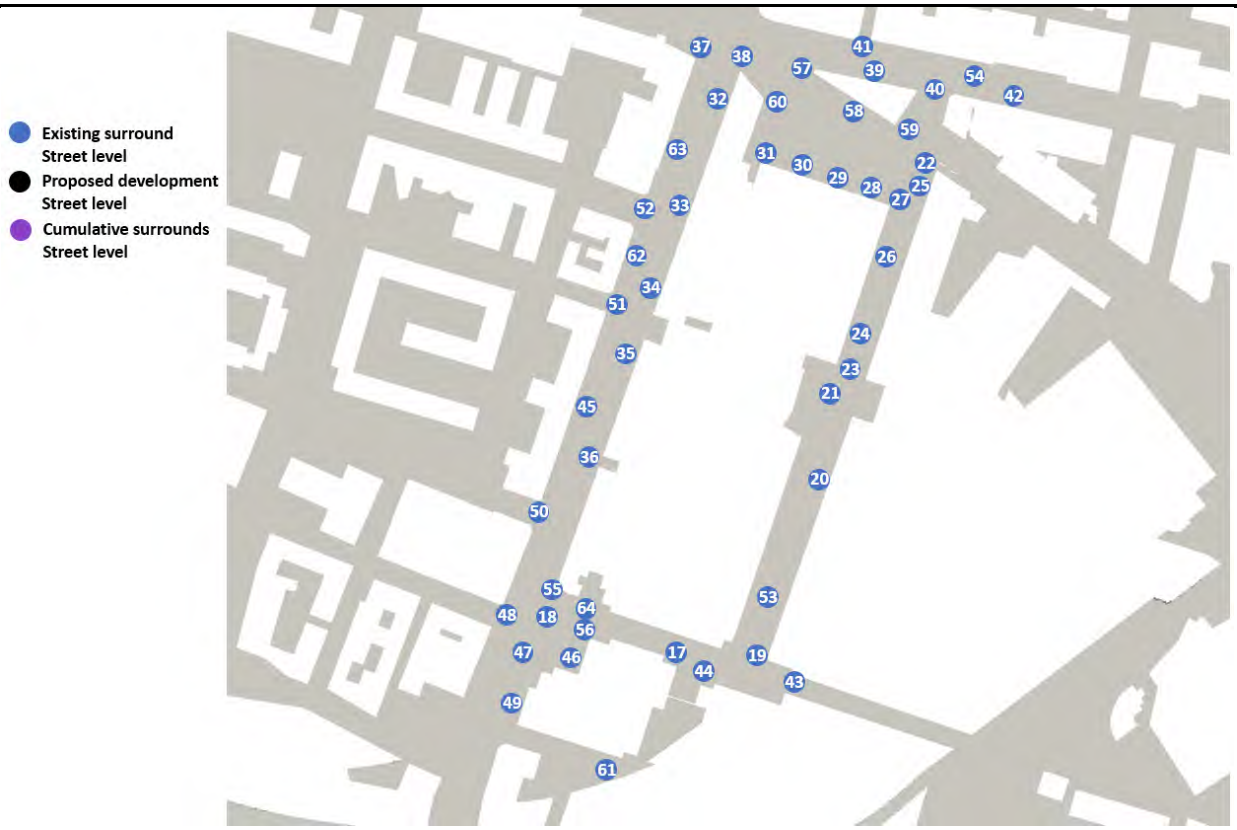


	Figure:	**10.1**		
	Title:	**Baseline Model**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**



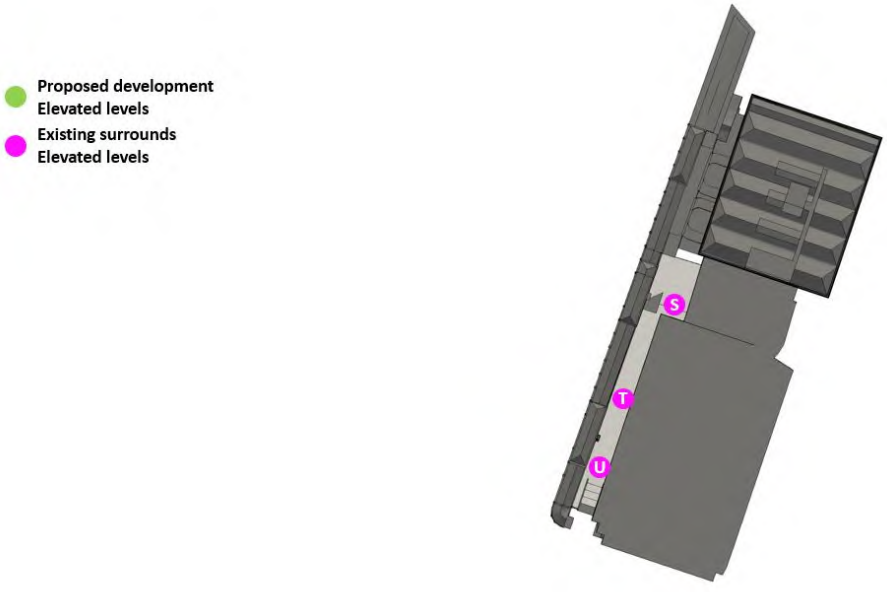


	Figure:	10.2		
	Title:	Receptors for Assessment – Scenario 1		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



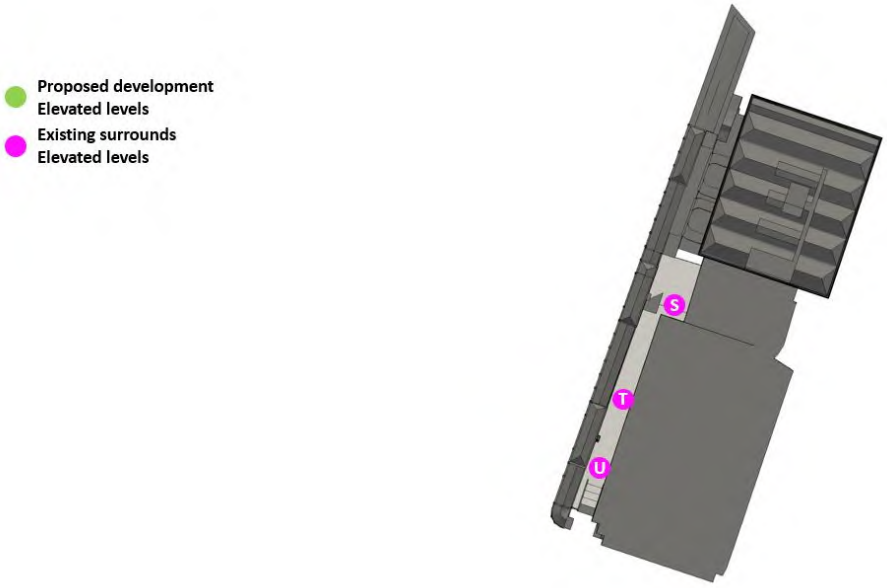
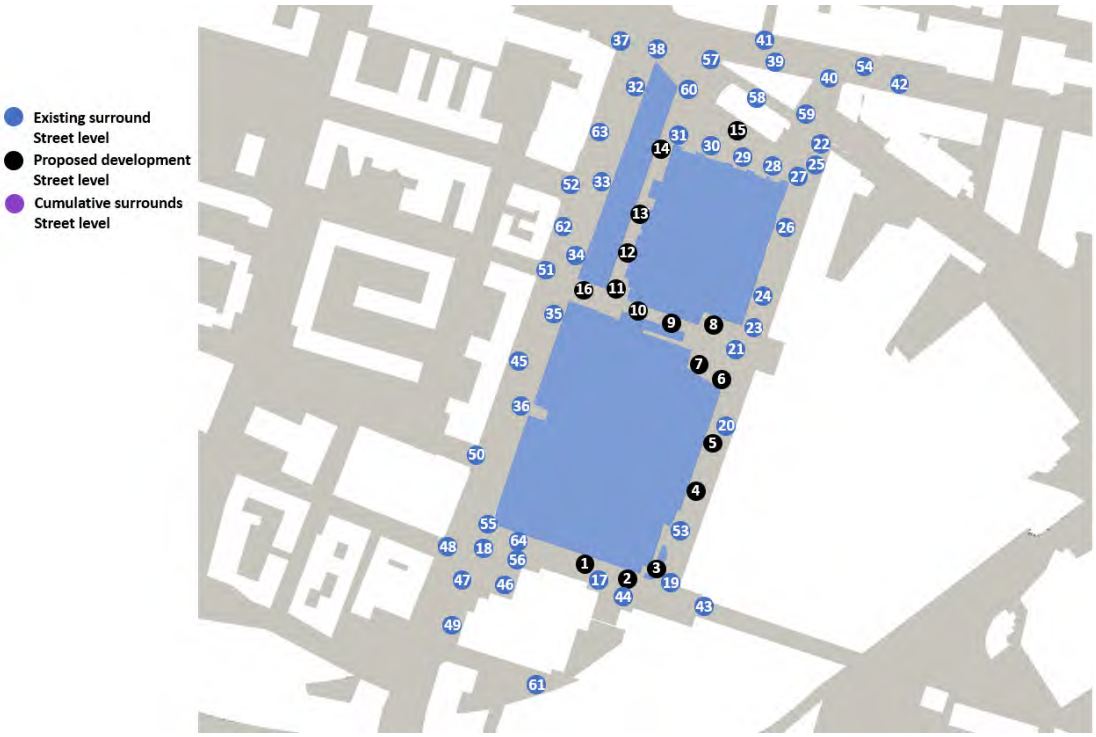


	Figure:	10.3		
	Title:	Receptors for Assessment – Scenario 2 (First Floor and Ground Floor)		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



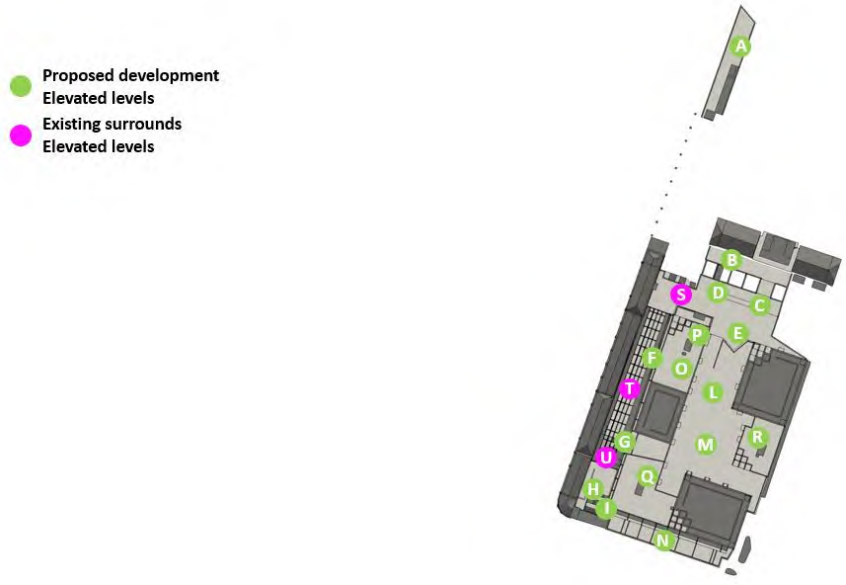
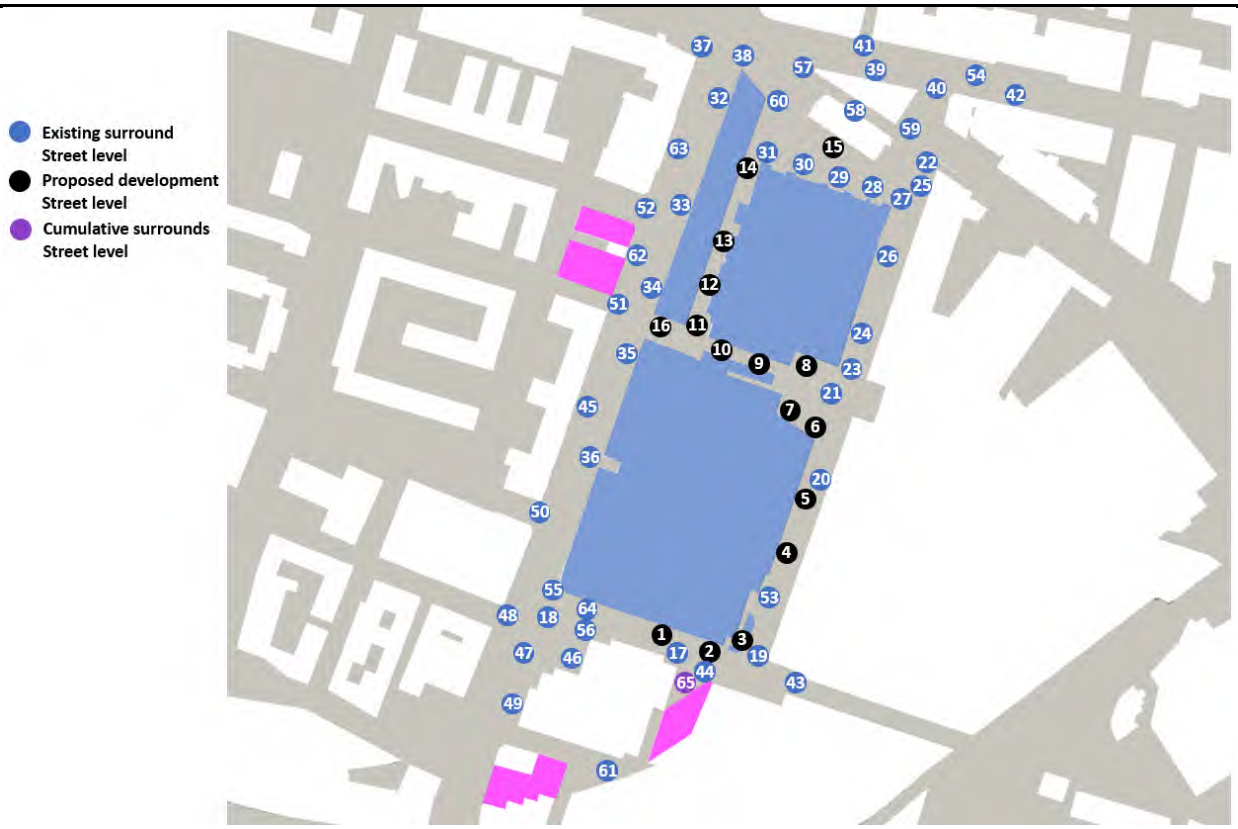


	Figure:	10.4		
	Title:	Receptors for Assessment – Scenario 3		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



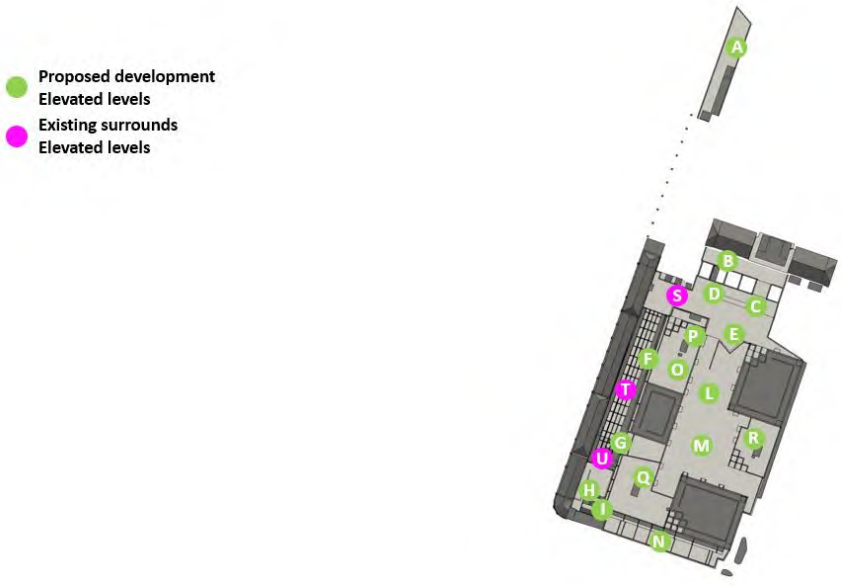


	Figure:	**10.5**		
	Title:	**Receptors for Assessment – Scenario 4**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

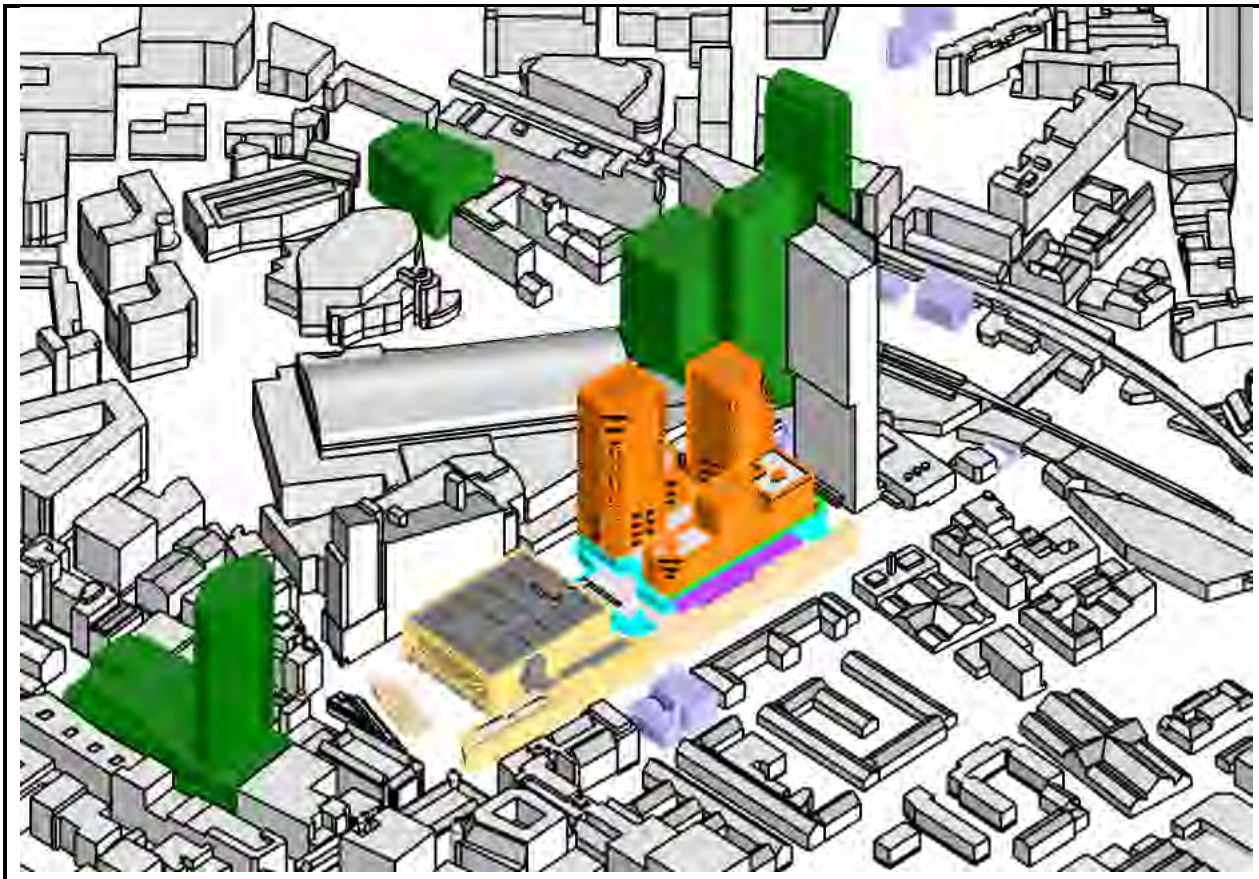


	Figure:	**10.6**		
	Title:	**View of the Completed Development**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

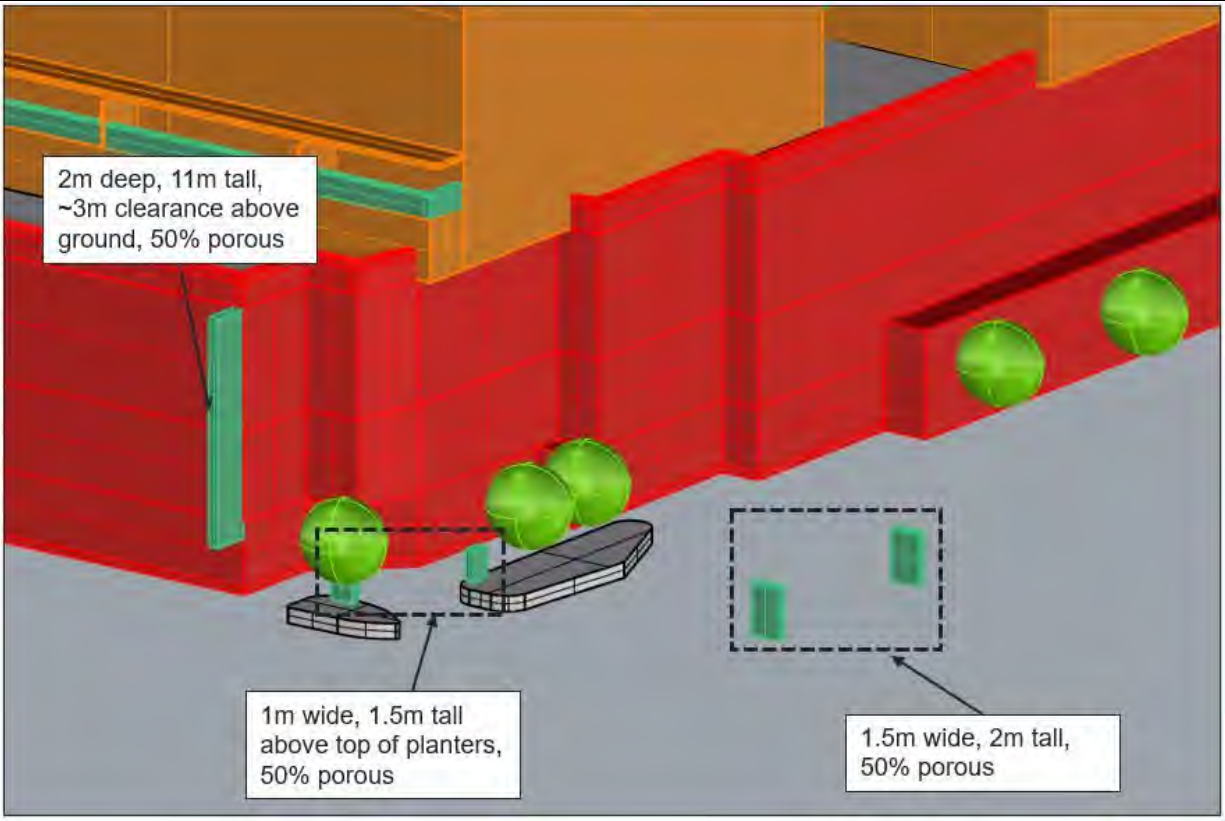


	Figure:	**10.7**		
	Title:	**Wind mitigation measures at street level**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**



	Figure:	**10.8**		
	Title:	**Balustrade designs on the private balconies**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

11. Sunlight, Daylight Overshadowing and Glare Study

Introduction

11.1. This Chapter of the ES has been prepared by AA Projects Ltd and assesses the likely Daylight Sunlight, Overshadowing and Glare impacts of the proposals upon the site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

11.2. This Chapter is accompanied by three technical appendices, a Daylight Sunlight Report (complete with all detailed calculations and light contours) (appendix 11.1), an Overshadowing Report (complete with detailed calculations and sun path images) (appendix 11.2) and a Glare Report (complete with detailed calculations and glare images) (appendix 11.3).

11.3. The author of this report, David G Radcliffe, has worked in Private Practice as a Building Surveyor specialising in daylight and sunlight issues since June 1989 and is now a Director at AA Projects Ltd, Chartered Building Surveyors of Sale, Manchester.

11.4. David was elected a Member (MRICS) of the Royal Institution of Chartered Surveyors (RICS) in 1990 and has therefore been professionally qualified for approximately 32 years.

11.5. During the thirty two years of his career as a Chartered Building Surveyor, David has extensively been involved in the assessment of light within a proposed development or the developments impact on surrounding buildings, using both planning Daylight Sunlight criteria and British / European standard calculations and in the preparation of associated Expert reports.

Limitations and Assumptions

Daylight and Sunlight

11.6. We have not gained access into any of the surrounding properties and were unable to obtain floor plans for some of the surrounding buildings from the planning portal or other online sources. Some of the floor plans and floor levels for the surrounding buildings have therefore been assumed / determined using the architectural form of the building.

11.7. We have assumed that the surrounding properties will be double glazed with a window transmittance of 0.64 and rooms with an average internal surface reflectance of 0.6. These typical values are provided in both the BRE and the British Standard publications. VSC values were calculated on the outer plane of the windows, while APSH values were calculated on the inner plane.

Overshadowing

11.8. Since the sun rises in the East, and sets in the West, and is at its highest around midday to the South, for the purposes of examining overshadowing, only amenity spaces to the West of the site, through North, and round to East are relevant

Glare

11.9. When undertaking the site survey to construct the 3D model, it is not always possible to access all areas to get a full understanding of all the potentially sensitive locations, particularly where railway lines are involved. During this assessment we were unable to fully access the railway tracks.

11.10. In this instance, we have viewed aerial images and photographs to check for sensitive viewpoint locations but these were not fully clear and we have had to make some approximations. It is therefore possible that not all sensitive positions have been included and the results should be treated as approximate until full access is available.

11.11. This assessment is limited to the adjacent road junctions and railway line. Other more distant areas and roads have not been included.

11.12. Whilst we have provided general guidance on the location and duration of glare that will be experienced at each viewpoint in this report, it does not provide detailed advice on how to determine the severity of a potential instance of glare based on its duration. It will be the Planning Authority responsibility to consider the level of risk related to the particular instance assessed.

11.13. Normal direct sunlight and glare associated with other existing properties that would be experienced by the adjacent road and railway line users have been excluded from this assessment.

11.14. The methodology noted and used is not suitable to quantify the intensity of reflected solar glare. Wherever the potential for reflected solar glare is identified it should be assumed that its intensity is sufficient to cause nuisance and thus mitigating measures should be investigated.

11.15. Although care has been taken in identifying typical viewpoints, this does not guarantee that there are no further sensitive locations where reflected solar glare could present a particular risk.

11.16. This assessment is based on the assumption that in an urban environment moving traffic represents the biggest risk factor and so viewpoints and focus points are selected accordingly.

11.17. The area of the assessment is limited to the vicinity of a new development. Due to the size of the development, solar glare could potentially occur at greater distances from the Development but these are excluded at present.

11.18. The hours shown in the diagrams and described below do not take Daylight Saving Hours into account.

Legislative and Policy Context

Legislation and Guidance

11.19. The daylight sunlight, overshadowing and glare reviews in this report has been based on the methodologies set out in the Building Research Establishment (BRE) report 'Site layout planning for daylight and sunlight - A guide to good practice 2022' by P. J. Littlefair, The primary sources for the BRE document is the more detailed guidance contained within BS EN 17037 Daylight in buildings, in the CIBSE publication LG 10 Daylighting – a guide for designers and the BRE Information Paper IP 3/87, a methodology for the measurement of the occurrence and duration of Reflected Disability Glare, which might be caused by proposed buildings.

11.20. The criteria contained in the BRE document are provided for guidance and should be interpreted flexibly. In its introduction the BRE guide states “The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings.’’

11.21. The BRE guidelines are therefore not mandatory and state that they should not be used as an instrument of Planning Policy, but they provide a good guide to the approach, methodology and evaluation of daylight and sunlight impacts, including overshadowing.

11.22. The BRE guide also notes in section 3.1.2 that "In housing, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon." Other areas such as bedrooms are therefore to be treated as less important and this is backed up by a recent Planning appeal decision, which is discussed in more detail in the Alternative Daylight and Sunlight Targets section at paragraph 11.80 below. During our assessment, we have therefore reviewed and tabulated which adjacent rooms are bedrooms and taken that into account when assigning significance criteria.

11.23. The Daylighting and window design: Lighting Guide LG10 (CIBSE) states "When daylighting decisions are made, however, they will have implications for other, interrelated aspects of window performance such as solar heat gain, winter heat loss, provision of view, acoustic performance, privacy, security and protection from fire."

11.24. IP 3/87 states "Glare or dazzle can occur when sunlight is reflected from a glazed facade. For vertical facades this problem usually occurs only when the sun is low in the sky; but some types of modern design incorporate sloping glazed facades which can, under certain circumstances, reflect unwanted high-altitude sunlight into the eyes of motorists, pedestrians and people in nearby buildings

National Planning Policy

11.25. The National Planning Policy Framework (NPPF) updated in 2021 stipulates in section 123. C that: ''A flexible approach should be taken in applying policies relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site.''

11.26. National Planning Guidance Launched a few years ago. The National Planning Practice Guidance (NPPG) does not include any further provisions in terms of daylight and sunlight beyond that stated for the NPPF.

Local Planning Policy

11.27. Manchester City Council's ("the Council") Core Strategy was adopted in July 2012 and is the key development plan document in the Local Development Framework ("LDF").

11.28. The Council will promote the construction of tall buildings – Policy EN2 of the Core Strategy refers. Tall buildings, in the context of that Policy, are defined as buildings which are substantially taller than their neighbourhoods and / or which significantly change the skyline. Proposals for tall buildings will be supported if certain design criteria are met.

11.29. It is acknowledged as part of Policy EN2 that tall buildings can have a significant impact on the local environment and the Council expect that its impact be modelled.

11.30. The Council do, however, also acknowledge in Policy CC6 of the Core Strategy that development in the City Centre will generally be "high density" and that the scale, massing and height of development in the City Centre will exceed what is appropriate elsewhere in the City.

11.31. The Core Strategy confirms that all new developments should follow certain "development principles". Policy DM1 – Development Management – confirms that all developments should have regard to a number of issues, such as the effects on amenity, including light.

11.32. The Guide to Development in Manchester Supplementary Planning Document ("SPD") confirms that consideration should be given to issues including overshadowing to hard landscaping areas within the public realm.

11.33. On 27 July 2016, Manchester's Executive Committee endorsed the 'Great Northern Complex, Manchester Central and Castlefield Quay Strategic Regeneration Framework' ('SRF'), which sets out a clear ambition to guide the redevelopment, re-modelling and refurbishment of the site within SRF boundary.

Assessment Methodology and Significance Criteria

Daylight / Sunlight

Guidance and Properties Assessed

11.34. A daylight and sunlight report has been prepared to examine the impact of the Development on the daylight and sunlight enjoyed by the principal neighbouring residential properties and amenity spaces, this report is supported by Appendix E (Vertical Sky Component Calculation Table), Appendix F (No Sky Line Calculation Table & Contour), Appendix G (Annual Probable Sunlight Hours Calculation Table), Appendix H (Summary Spreadsheets) and Appendix I (Proposed Development Drawings).

11.35. The demolition of the existing properties and construction phase do not have any bearing on a daylight and sunlight study and the detailed impacts have therefore been scoped out of the assessment presented in this chapter. During the demolition phase daylight and sunlight will temporarily improve and during construction it will gradually move towards the figures for the final completed scheme covered by this chapter.

11.36. The daylight and sunlight analysis focuses on the nearest sensitive receptors, which are the residential properties in the immediate vicinity of the site. These have been determined in line with the reasonable expectation of daylight and sunlight as per the BRE guidelines. The properties assessed are therefore listed and referenced as follows:

- B1: 303 Deansgate and Land at Great Bridgewater Street and Trafford Street (Beetham Tower)
- B2: 321 Deansgate, Manchester
- B6: 332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road
- B11: Porchfield Square and Rozel Square, Byrom Street, Manchester
- B38: Free Trade Hall, Peter Street, Manchester
- B44: Land on the East side of Watson Street, Manchester

11.37. The location of the above properties are noted in Figure 11.1.

11.38. All other surrounding properties are of commercial/retail use or are considered to be too distant from the proposed development and as such have not been included in this assessment.

11.39. It is usual to assess daylight/sunlight in relation to the guidelines set out in the Building Research Establishment (BRE) report 'Site layout planning for daylight and sunlight - A guide to good practice' by P. J. Littlefair. We shall refer to this report throughout as the 'BRE'. One of the primary sources for the BRE document is the more detailed guidance contained within 'British Standard Code of Practice for Daylighting, BS8206 Part 2', and we shall also refer to this document.

11.40. The BRE Guidelines note that "In housing, the main requirement for sunlight is in living rooms, where it is valued at any time of day, but especially in the afternoon." Other areas such as bedrooms are therefore to be treated as less important and this is backed up by a recent Planning appeal decision, which is discussed in more detail in the Alternative Daylight and Sunlight Targets section at paragraph 11.80 below. During our assessment, we have therefore reviewed and tabulated which adjacent rooms are bedrooms and taken that into account when assigning significance criteria.

11.41. In terms of daylight sunlight, we have examined 2 measures of diffuse daylight in this study, namely Vertical Sky Component (VSC) and No-Sky Line (NSL). In terms of sunlight, we examine the BRE Annual Probable sunlight Hours (APSH).

11.42. The criteria contained in the BRE document are provided for guidance and should be interpreted flexibly. In its introduction the BRE report states "The advice given here is not mandatory. Although it gives numerical guidelines, these should be interpreted flexibly……For example, in an historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable….".

11.43. The Development in question is in a built-up high-rise, inner-city area and in developing the site to a greater extent, some windows in the immediately adjacent properties may inevitably fail to meet the strict interpretation of some of the guidelines. A reasonable approach in this case is, rather than to apply strict numerical comparisons, to consider whether the daylight and sunlight levels enjoyed after development are reasonable for the location and in accordance with precedents set by other nearby recently consented schemes.

11.44. The various measures and appropriateness of diffuse daylight (VSC, NSL and ADF) and sunlight (APSH) to windows and rooms are discussed and set out below.

Vertical Sky Component ("VSC")

11.45. The Vertical Sky Component (VSC) is a measure of the amount of skylight incident on a vertical plane (i.e. the sky factor on a Vertical Plane). It is most commonly applied to the light incident at the centre of a window and in this sense is a measure of the potential for good daylighting. The VSC is calculated by taking the ratio of the skylight incident at a point to the unobstructed skylight available on a horizontal plane. For a uniform sky, the maximum value is 50% (since the point is on a vertical plane, clearly only the half of the hemisphere which is in front of the plane can contribute). For a CIE sky, the maximum value is 39.6%.

11.46. A simple VSC example is shown in the frames in figure 11.2. These show 2 different ways of demonstrating how the VSC varies across the face of a building.

11.47. Clearly in this case, the further down the windows are, the less light they receive, and therefore the lower the value of the VSC.

11.48. The guidelines state that if the VSC at the centre of a window is less than 27% and less than 0.8 times its former value, the diffuse daylighting of the existing building will be adversely affected. A value of 27% corresponds to an obstruction angle of 25 degrees over an infinite extent in plan.

11.49. This guideline (as with all the BRE guidelines) can be interpreted flexibly. The above criterion was developed in the case of suburban development where existing development was 2 storeys across an average street width. In city centre locations, the target VSC can be reduced to allow proposed buildings to match the height of other buildings in the neighbourhood.

11.50. VSC is a measure of the light reaching a point at the centre of a window, and the BRE guideline is based on the loss of VSC at a single window. It is therefore not appropriate in cases where rooms are served by multiple windows and in particular when a room is dual or multi-aspect. If one window fails the criterion, in reality the daylight to the room would not necessarily be seriously impacted, and the daylight within the room would in all probability remain good. In addition, VSC takes no account of the size of a window. The VSC at the centre of a very small window is identical to VSC at the centre of a large window. Clearly a measure of daylight which accounts for the size and number of windows is therefore more appropriate. This is accomplished by NSL

No Sky Line ("NSL")

11.51. The No-Sky Line is a measure of the impact of development on the daylight distribution in a room. The No-Sky Line can be determined by examining a grid of points on the working plane of the room. Those from which the sky is visible lie within the No-Sky Line, and those from which it is not, lie outside. For a fine enough grid, the boundary between the two is the No-Sky Line. The BRE guide states that for residential properties, the working plane is to be taken at 850mm above floor level, and for commercial properties, 700mm above floor level.

11.52. The BRE guide states the following for the criterion to be used in comparing the No-Sky Line for the existing buildings with that for proposed development ''If, following construction of a new development, the no-sky line moves so that the area of the existing room which does receive direct skylight is reduced to less than 0.8 times its former value, then this will be noticeable to the occupants, and more of the room will appear poorly lit. This is also true if the no-sky line encroaches on key areas like kitchen sinks and worktops.''

11.53. The BRE guide goes on to state that the guidelines need to be applied sensibly and flexibly. For instance, there is no point designing a proposed scheme with tiny gaps in it in order to safeguard the No-Sky line.

11.54. The above highlights a potential weakness in the method—in principle a point lies within the No-Sky Line no matter how small a patch of sky it can see—even if for instance there is only a keyhole allowing light in to the room. Clearly the method is intended to map out areas within a room which receive a significant amount of direct daylight from the sky, so that it would be better if a small but finite amount of direct daylight were used to divide the two regions. This would also reduce the tendency for the No-Sky Line position to vary wildly at the rear of a room, rather like when small variations in tidal height cause the tide line to move by large distances on a virtually level beach.

11.55. That said, the No-Sky line takes into account multiple windows serving the same room, which the VSC criterion does not. It also takes account of the size of the windows, and the size and layout of the room being served by the window(s). These two factors are also not accounted for in a VSC analysis.

11.56. VSC and No-Sky Line are, in a sense, complementary. VSC is a measure of the potential for good daylighting i.e. does the front face of a window receive adequate daylight and by how much is it reduced?

11.57. No-Sky Line (NSL) on the other hand, by examining what happens to daylight when it enters a room through the windows serving it, attempts to answer the question, how is the daylight and its distribution impacted within a room. A simple NSL example is shown in Figure 11.3.

11.58. In the example shown in figure 11.3, a room served by 2 windows is shown, in front of which a two-storey building is having an additional storey added. The area of the room is 25 sqm, the area enclosed by the existing No-Sky Line is 15 sqm, and that enclosed by the proposed No-Sky Line is 9.4 sqm. The proposed area is 0.63 times its former value (37% reduction), and therefore this room would fail the BRE No-Sky Line test.

11.59. The BRE Guide states that “For houses this would include living rooms, dining rooms and kitchens, bedrooms should also be analysed although they are less important.” Therefore, any reduction in NSL to bedrooms should be deemed as less significant than reductions to rooms of greater importance.

Average Daylight Factor (“ADF”)

11.60. The Average Daylight Factor (ADF) is a measure of interior daylight. It can be used to establish whether a room will have a predominantly daylit appearance and if not, and it can provide levels below which a room should not fall even if supplementary electric lighting is provided.

11.61. ADF values can be calculated for rooms within a proposed development and checked against the recommended value. Existing and proposed ADF values can also be calculated for properties which overlook a site.

11.62. Factors on which the ADF depend are: VSC at the face of each window, the Total Window Area, Total Wall Area, Wall Reflectivity and Window Transmission.

11.63. There are no specific BRE criteria for reduction in ADF if a proposed development were to be implemented, but in Appendix C in Appendix 11.1 it states that ‘if the VSC is reduced from 30% to 24% (0.8 times its former value)…the ADF is reduced to 0.86 times its former value’. This implies that if up to a 20% reduction in VSC is acceptable, then up to a 14% reduction in ADF is also acceptable. In practice, the relationship between VSC and ADF is more complicated but the above holds to be approximately true over a range of values.

11.64. The BRE states that for a predominantly daylit appearance the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if there is supplementary electric lighting. There are additional recommendations for dwellings. These are: 2.0% - Kitchens, 1.5% - Living Rooms, 1.0% - Bedrooms.

11.65. These figures are also recommended in BS 8206 Part 2 1992 entitled 'Code of Practice for Daylighting'. There are no specific guidelines for comparing figures before and after development, but it is possible to infer that a reduction in ADF of over 14% would constitute a material loss, corresponding to a 20% loss of VSC.

11.66. Whilst the BRE guide recommends that ADF is mainly used to assess daylight within a proposed development (as the developer has control of the design), it is still a very useful measure of actual daylight within a room based on room volume, glazing ration and use, particularly where the other measures (VSC and NSL) are not conclusive.

Annual Probable Sunlight Hours ("APSH")

11.67. Annual probable sunlight hours (APSH) is a measure of the average number of hours of sunlight one would expect to receive at a given position, as a fraction of the unobstructed total number of hours at the same location. The BRE have compiled data sets consisting of a statistical sample of solar positions convolved with local meteorological data. Using these to calculate APSH, one would simply calculate the number of solar positions visible from a point, compared to the total number, expressed as a percentage. The diagram below, taken from the BRE report, shows the solar positions, relative to a reference point, used to calculate Sunlight Availability for London (51.5°N).

11.68. The BRE report states that for windows within a new development, if a point at the centre of a window on the plane of the inside surface of the wall "can receive more than one quarter of annual probable sunlight hours, including at least 5% of annual probable hours during the winter months between 21st September and 21st March, then the room should still receive enough sunlight."

11.69. For windows in surrounding properties which experience a change in APSH, it goes on to say that, "Any reduction in sunlight access below this level should be kept to a minimum. If the available sunlight hours are both less than the amount given and less than 0.8 times their former value, either over the whole year or just during the winter months, then the occupants will notice the loss of sunlight".

11.70. In relation to sunlight, the BRE recommends that the Annual Probable Sunlight Hours (APSH) received at a given window in the proposed case should be at least 25% of the total available including at least 5% in winter. Only those residential windows that face within 90 degrees of south should be considered.

11.71. The BRE guide states that "For houses this would include living rooms, dining rooms and kitchens, bedrooms should also be analysed although they are less important." Therefore, any reduction in APSH to windows that serve bedrooms should be deemed as less significant than reduction to windows that serve rooms of greater importance.

11.72. The BRE guide provides a series of progressive tests and it is only necessary to progress to the next test if the window/room does not pass the test being applied to it. Thus, where a window does not pass the VSC test, the BRE guide suggest that the ADF of the room behind it should be considered.

11.73. ADF is a measure of the daylight within a room and accounts for factors such as the number of windows and their size in relation to the size of the room. Clearly a small room with a large window will be better illuminated by daylight than a large room with a small window. It also accounts for the above-mentioned window transmittance and internal reflectance.

11.74. The general idea is that one calculates the daylight which reaches each of the windows, and allowing for the window size, the light which then enters the room through all of the windows. The light is then imagined to bounce around within the room, controlled by the reflectance of the internal surfaces.

Alternative Daylight and Sunlight Targets and Scenario Assessed

11.75. It is of special note that the BRE assessment is guidance only and it is widely recognised that in assessing dense urban schemes, including tall buildings, it has a number of shortcomings. This is because the BRE tests used are based on a typical (two storey) suburban model of development and expectations of levels of daylight sunlight are different in larger developments such as this in a built-up, high-rise city centre area.

11.76. The guidance is, therefore, to be applied with some flexibility when assessing such schemes as that at Leisure Box. The principles of how the BRE guide should be interpreted flexibly and in context are exemplified in various decisions on major urban developments. Notably in the appeal case for a dense scheme at the Whitechapel Estate (appeal decision ref APP/E5900/W/17/3171437). The following findings are informative:

- Paragraph 107 - It was agreed that the starting point in the assessment of the effect on residents' living conditions arising from daylight and sunlight should be the Building Research Establishment 2011 publication Site layout planning for daylight and sunlight: A guide to good practice, ('the BRE guide'). Note, this guide was updated in 2022 but remains in essence the same as the 2011 version for assessing adjacent properties
- Paragraph 108 - It was confirmed that the BRE document offers guidance on generally acceptable standards of daylight and sunlight, but advises that numerical values are not to be rigidly applied and recognises the importance of the specific circumstances of each case
- Paragraph 109 - It was agreed that daylight impact on adjacent properties should be assessed drawing on broadly comparable residential typologies within the area

11.77. Notably, the Inspector concluded, against the above backdrop, that:

- Paragraph 112 - Residual vertical sky component (VSC) values in the mid-teens (as opposed to the BRE target value of 27%) are appropriate and have been accepted on many schemes
- Paragraph 116 - It was acknowledged that light to bedrooms is less important
- Paragraph 128 - That using a target value ADF of 1.5% for mixed use living / dining/ kitchens within a proposed development is reasonable (where the BRE targets are 2% for kitchens and 1.5% for living rooms)
- Paragraph 125 - Comparing the daylight sunlight results for impact on adjacent properties or within the proposed development by reference to other approved similar schemes either by looking at an approved schemes daylight sunlight report or undertaking calculations where that report is missing (or was not requested) was reasonable

11.78. The above decision recognised that while the BRE guide requirements are based on a two-storey suburban model, more appropriate values and measures should be used when evaluating tall multi block developments in a city centre area, which by definition will naturally have different conditions to properties in a suburban area.

11.79. Due to the above, we have run two sets of results for VSC, one based on the BRE target of 27% (or 20% reduction) and a second based on the more flexible and appropriate target of 16% (or 20% reduction) advocated above.

11.80. In addition, the BRE guide also states that an adjacent building's windows may experience large and unavoidable relative reductions in sky visibility (VSC) if they are located below a balcony (as the balcony cuts out light from the top part of the sky) or the window has projecting wings on one or both sides. Section 2.2.13 specifically states: *''Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC, and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and area receiving direct skylight, for both the existing and proposed situations, without the balcony in place.''*

11.81. Any impact caused by a development on daylight sunlight results to adjacent properties with balconies or recessed windows should therefore be reviewed accordingly.

Significance Criteria

11.82. Table 11.1 summarises the BRE guideline Method of Assessment regarding criteria for daylight and sunlight assessment

Table 11.1 – Daylight Sunlight Criteria

Method	BRE Criteria
VSC	A window may be adversely affected if its VSC measured at the centre of the window is less than 27% and less than 0.8 times it former value. Note that a second set of results have been run with a target of VSC 16% and 20% reduction as advocated by the more flexible approach for an inner-city area.
NSL	A room may be adversely affected if the daylight distribution (NSL) is reduced beyond 0.8 times its existing area.
ADF	Rooms within a proposed development should achieve ADF values of 2% (Kitchens), 1.5% (Living Rooms) and 1% (Bedrooms). Where used to assess losses to adjacent properties, the reduction should be less than 14% as noted in AppendixC8 of the BRE Guide.
APSH	A window may be adversely affected if a point at the centre of the window received for the whole year, less than 25% of the APSH including at least 5% of the APSH during the winter months (21st September to 21st of March) and less than 0.8 times its former sunlight hours during either period, and for existing neighbouring buildings, if there a reduction in total APSH which is greater than 4%.

11.83. Where the BRE guidelines are met (based on a less than 20% reduction), the effects of the proposed development will be considered negligible.

11.84. With regard to the BRE guidelines, professional judgement has been used to determine whether the potential effects will result in adverse or beneficial effects.

11.85. Beneficial effects are experienced when the massing/design of a new building results in improved BRE guideline results to the adjacent properties when compared to the results obtained from the previous building on the site. Alternatively, beneficial effects can often be seen when the analysis shows that the proposed development design would return better BRE results than would be obtained from a previous extant Planning Permission.

11.86. The initial numerical criteria for determining the category of an adverse effect is based on percentage alterations, as follows:

- 20-29.9% alteration = minor adverse;
- 30-39.9% alteration = moderate adverse; and
- 40% alteration = major adverse.

11.87. In respect of ADF the numerical criteria for determining the category of effect is based on percentage alterations, as follows:

- 0-14% alteration = negligible;
- 15-21% alteration = minor adverse;
- 22-28% alteration = moderate adverse; and
- 29% and above alteration = major adverse.

11.88. Other factors tending towards a minor impact are:

- Only a small number of windows are affected;
- The loss of light is only marginally outside the guidelines;
- An affected room has other sources of skylight or sunlight; and
- The affected building only has a low level of requirement for skylight or sunlight.

11.89. Other factors tending towards a major adverse impact are:

- A large number of windows are affected;
- The loss of light is substantially outside the guidelines;
- All the windows in a particular property are affected; and
- The affected indoor spaces have a particular strong requirement for skylight or sunlight, e.g. a living room in a dwelling.

11.90. However, when assigning criteria per property, consideration has been given to the proportion of rooms/windows affected, as well as the percentage alterations, absolute changes, and any other relevant factors, such as there may be mitigating factors such as balconies, overhangs or design features which may also affect the determination of assigning the criteria.

11.91. For example, where an adjacent property has overhanging balconies, the windows below them will be very reliant on horizontal light/sky visibility. Any development near to those windows may therefore return poor BRE guideline daylight sunlight results but this would be largely due to the adjoining buildings own design rather than the size and massing of the new development. The same principal applies to adjacent recessed windows. The BRE guide goes further to say that the daylight sunlight analysis can be undertaken without the adjacent building balconies in place if the results are overly affected by them.

11.92. In addition, where a room in an adjacent building is served by more than one window, the BRE guide states that it is acceptable to aggregate the VSC results. Thus, the room may have one window that passes the BRE VSC test and one that fails but when aggregated, the results may very well mean the room passes VSC as a whole.

Overshadowing

Guidance

11.93. The BRE Guidelines acknowledge that, together with the provision of good natural light inside buildings, the natural lighting of the space surrounding the buildings is also important. There are two types of overshadowing that were considered in the assessment: Permanent Overshadowing and Transient Overshadowing as described below.

Permanent Overshadowing

11.94. The method for assessing permanent shadow on the ground is the sun path indicator (or sunlight availability protractor). This maps the obstructions to the path of the sun and compares them to the known sun paths to determine where the sun would reach the ground and where it would not. A 3D computer model and light analysis software can also be used.

11.95. The worst situation is to have significant areas on which the sun does not shine for a large part of the year. Such areas would be dark, cold and uninviting. The method used for calculating the impacts of any shadowing was as set out in the BRE guidance ‘’*It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area that can receive two hours of sun on 21 March is less than 0.80 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March*’’.

Transient Overshadowing

11.96. The BRE Guidelines suggest that where large buildings are proposed which may affect a number of gardens or open spaces, it is useful and illustrative to plot a shadow plan to show the location of shadows at different times of the day and year. This can be plotted using 3D computer imagery and specialist shadowing software.

11.97. For this assessment, the overshadowing has been mapped at two-hour intervals between 10.00am and 4.00pm in March, June and December (September is assumed to be the same as March as per the BRE guide)

Area of Assessment

11.98. There are various amenity spaces near the development site that have been assessed as follows:

- Grass / tree areas within and around Porchfield Square (B11 - to the Northwest of the development site) – labelled A121 – A123
- Amenity space to North of the Great Northern building (B44 - near Peter Street) – A113
- Balcony / rooftop amenity spaces to the Great Northern Tower on Watson Street – A1 – A112

Glare

Guidelines

11.99. The glare review in this report has been based on the methodologies set out in the Building Research Establishment (BRE) report 'Site layout planning for daylight and sunlight - A guide to good practice 2022' by P. J. Littlefair and the BRE Information Paper IP 3/87, a methodology for the measurement of the occurrence and duration of Reflected Disability Glare, which might be caused by proposed buildings.

11.100. The BRE guide states: ''Glare or dazzle can occur when sunlight is reflected from a glazed façade or area of metal cladding. There are two types of reflected glare problem that can occur. Discomfort glare causes visual discomfort without necessarily affecting the ability to see. Disability glare happens when a bright source of light (such as the reflected sun) impairs the vision of other objects. The bright light is scattered in the eye, making it harder to see everything else. Outdoors, disability glare is easily the more serious problem, as it can affect motorists' and train drivers' ability to drive safely.''

11.101. It is likely that a building may cause solar dazzle the exact scale of the problem should be evaluated. This is done by identifying key locations such as road junctions and windows of nearby buildings and working out the number of hours of the year that sunlight can be reflected to these points. BRE information Paper 3/87 gives details.

11.102. Where solar reflection can happen, the next step is to calculate the angle between the driver's line of view and the reflected sun. For vertically mounted clear double glazing facing a driver on a level road, solar dazzle could be a significant issue if this angle is less than 10°.

11.103. IP 3/87 states: "Glare or dazzle can occur when sunlight is reflected from a glazed facade. For vertical facades this problem usually occurs only when the sun is low in the sky; but some types of modern design incorporate sloping glazed facades which can, under certain circumstances, reflect unwanted high-altitude sunlight into the eyes of motorists, pedestrians and people in nearby buildings."

11.104. Guidance on how to assess glare is also set out in the CIE 146:2002 Collection, which states: "Disability glare is glare that impairs vision (CIE, 1987). It is caused by scattering of light inside the eye [...]. The veiling luminance of scattered light will have a significant effect on visibility when intense light sources are present in the peripheral visual field and the contrast of objects to be seen is low."

11.105. "Disability glare is most often of importance at night when contrast sensitivity is low and there may well be one or more bright light sources near to the line of sight, such as car headlights, streetlights or floodlights. But even in daylight conditions disability glare may be of practical significance: think of traffic lights when the sun is close to them, or the difficulty viewing paintings hanging next to windows."

11.106. "The magnitude of the veiling luminance depends on the intensity and distance of the glare source which together determine the relevant parameter Eglare, the illuminance at the eye caused by the glare source, and the angle between the glare source and the line of sight Q."

11.107. "Many investigators (see Vos, 1984) have determined Lveil/Eglare as a function of Q in various parts of the angular domain, using photometric techniques."

11.108. Q in the above CIE description is the angle of view point and is split into three categories:

- Q3 for angles between 0.1 and 1.0 degrees
- Q2 for angles between 1 and 30 degrees
- Q for angles beyond 30 degrees

11.109. The CIE 146:2002 concludes from this that glare at angles beyond 30 degrees would not be significant, unless there were exceptional circumstances.

Methodology

11.110. To ensure absolute accuracy, a 3D laser scan was carried to form the basis of our 3D computer model, which includes the existing local area, roads, train track and signals. This was then run through proprietary software to calculate the proposed glare levels at each sensitive view point area chosen.

11.111. Two images are produced for each selected view point, one showing a 90 degree field of view which provides contextual information and the other showing a 30 degree field of view to identify any significant areas of glare. Both images show the area that sees the reflection of the sun path at any point during a year.

11.112. A diagram portraying a standardised extent of human vision is overlaid onto the image, which highlights the degrees of vision corresponding to the foveal view. A 3 degree of angle circle identifies the area most sensitive to reflected solar glare and a 30 degrees circle indicates our typical field of view (which is a secondary area of sensitivity to potential reflected glare).

11.113. As stated in the CIE 146:2002 occurrences at angles beyond 30 degrees would be of little significance in most situations because when seated in a driving seat of a typical car the limits of the windscreen would obstruct the driver's view at angles beyond 30 degrees from the line of sight.

Viewpoint Locations / Heights

11.114. This report focuses on the nearest sensitive view point areas, which are road junctions / traffic lights and train signals which a train driver will need to see clearly whilst operating the train. To assist, we have obtained from Metrolink a guide to the positions of all train line signals, which is attached at appendix C of the report attached at appendix 11.3.

11.115. These viewpoints represent locations where reflected solar glare may cause adverse impacts to those travelling towards the development, such as road users or train drivers. The viewpoints on roads are generally located 23m back from signals (typical stopping distance of a car at 30mph).

11.116. It is considered that trains approaching the proposed development would be travelling at a range of speeds, trains stopping / leaving the nearby train station for example are likely to be traveling at a significantly lower speed than those that do not stop at the station. It is therefore not appropriate to provide view point locations based upon stopping distances.

11.117. Viewpoints are located at 2.5m above the train rails and at 1.25m above road level for drivers at junctions or traffic lights.

11.118. The main view point areas identified and assessed are therefore:

- C1 – Traffic lights, Liverpool Road, facing development
- C2 – T-Junction, Tonman St, facing development
- C3 – Round-about Junction, Watson St, facing development
- C4 - Eastbound track, approaching signal
- C5 - Eastbound track, approaching signal
- C6 - Traffic lights, Whitworth St, facing development
- C7 – T-Junction, Camp St, facing development
- C8 - Traffic lights, Junction of Deansgate and Quay St, facing development
- C9 - Traffic lights, Great Bridgewater St, facing development
- C10 - Traffic lights, Junction Deansgate and Whitworth St, facing development

11.119. Alternative view point heights and distances can be selected and assessed should it be deemed necessary after consideration of the findings of this report.

11.120. A plan showing the site, surrounding area, train track, signals, road Junctions and selected viewpoints locations is included in figure 11.5.

Baseline Conditions

Daylight / Sunlight

11.121. In order to assess the potential impacts of the Development, it is necessary to determine the environmental conditions, resources and receptors that currently exist on the site and in the surrounding area.

11.122. Table 11.2 - Committed Developments attached at appendix 11.4 indicates that there are twenty-five consented / completed developments in the vicinity of this Development which could be considered by this assessment. Eighteen of the twenty-five developments are considered to be too distant to be impacted in regard to daylight and sunlight and in addition, any additional massing would not impact on any results to those properties which have been assessed.

11.123. Five of the remaining seven developments have been included as a baseline cumulative massing as they are near to the proposed Development. However, they have not been assessed for Daylight Sunlight as they are either commercial or do not directly face the Development.

11.124. Finally, two properties in the table have been included in the baseline massing and assessed. These are noted as B1 (Beetham Tower) and B46 (Viadux).

Baseline Results

11.125. The full Baseline Daylight and Sunlight results can be found in the detailed report attached at appendix 11.1, and summarised in tables 11.3, 11.4 and 11.5. These results indicate how the current daylight and sunlight levels enjoyed by the adjacent properties compare with the levels recommended in the BRE guide.

Table 11.3 – Vertical Sky Component (VSC) Calculation Table

		VSC				
		VSC - Existing Site as Baseline				
		Meet or Exceed BRE Guidelines (greater than 27% VSC or less than 20% reduction)			Below BRE	
Building No.	Address	Total no. of Windows	No. Windows that Meet or Exceed BRE Guidelines		No. Windows that Do Not Meet or Exceed BRE Guidelines	
B1	303 Deansgate and Land at Great Bridgewater Street and Trafford Street (Beetham Tower)	270	254	94%	16	6%
B2	321 Deansgate, Manchester	17	7	41%	10	59%
B6	332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road	14	1	7%	13	93%
B11	Porchfield Square and Rozel Square, Byrom Street, Manchester	56	12	21%	44	79%
B38	Free Trade Hall, Peter Street, Manchester	80	49	61%	31	39%
B44	Land on the east side of Watson Street, Manchester.	288	148	51%	140	49%
B46	Viadux (Salboy Development)	760	689	91%	71	9%
	Total	**1485**	**1160**	**78%**	**325**	**22%**

11.126. The table above indicates that 1160 out of 1485 (78%) windows assessed pass the current BRE guide target level of 27% and thus receive good levels of daylight.

Table 11.4 – Annual Probable Sunlight Hours (APSH) Calculation Table

		Summer APSH - Existing Site as Baseline				Winter APSH - Existing Site as Baseline			
Building No.	Address	Total no. of Windows	No. Windows that Pass BRE Criteria			Total no. of Windows	No. Windows that Pass BRE Criteria		
			Not Within 90 Degrees of South	Pass	%		Not Within 90 Degrees of South	Pass	%
B1	303 Deansgate and Land at Great Bridgewater Street and Trafford Street	270	270	0	100%	270	270	0	100%
B2	321 Deansgate, Manchester	17	17	0	100%	17	17	0	100%
B6	332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road	14	14	0	100%	14	14	0	100%
B11	Porchfield Square and Rozel Square, Byrom Street, Manchester	56	0	46	82%	56	0	19	34%
B38	Free Trade Hall, Peter Street, Manchester	80	0	80	100%	80	0	80	Fig
B44	Land on the east side of Watson Street, Manchester.	288	243	45	100%	288	243	44	100%
B46	Viadux	760	646	82	96%	760	646	79	95%
	Total	**1485**	**1190**	**253**	**97%**	**1485**	**1190**	**222**	**95%**

11.127. Table 11.4 indicates that 1443 out of 1485 (97%) windows assessed pass the current BRE guide target level of 25% APSH in summer and thus receive good levels of sunlight in the summer months.

11.128. In winter, table 11.4 indicates that 1412 out of 1485 (95%) windows assessed pass the current BRE guide target level of 5% APSH in winter and thus receive good levels of sunlight in the winter.

Overshadowing

Table 11.5 – Existing Overshadowing to Amenity Spaces Calculation Table

Project Name: Great Northern Development - Overshadowing					
Project No.: 18775					
Report Title: Two hours Sunlight to Amenity - Neighbour Analysis					
Floor Ref.	Amenity Ref. (see fig 11.4 Amenity Space ID Plan)		Amenity Area	Lit Area Existing	Meets BRE Criteria
Amenity					

Ground	A113	Area m2	837.73	167.67	NO
		Percentage		20%	
Ground	A120	Area m2	56.76	56.76	YES
		Percentage		100%	
Ground	A121	Area m2	183.14	183.04	YES
		Percentage		100%	
Ground	A122	Area m2	287.93	126.30	NO
		Percentage		44%	
Ground	A123	Area m2	164.84	164.84	YES
		Percentage		100%	
First	A1	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A2	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A3	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A4	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A5	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A6	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A7	Area m2	2.64	0.00	NO
		Percentage		0%	
First	A8	Area m2	2.64	1.80	YES
		Percentage		68%	
Second	A9	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A10	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A11	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A12	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A13	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A14	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A15	Area m2	2.64	0.00	NO
		Percentage		0%	
Second	A16	Area m2	2.64	1.97	YES
		Percentage		75%	
Second	A17	Area m2	1.55	1.53	YES

		Percentage		98%	
Second	A18	Area m2	1.55	1.55	YES
		Percentage		100%	
Third	A19	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A20	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A21	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A22	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A23	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A24	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A25	Area m2	2.64	0.00	NO
		Percentage		0%	
Third	A26	Area m2	2.64	1.96	YES
		Percentage		74%	
Third	A27	Area m2	1.55	1.53	YES
		Percentage		98%	
Third	A28	Area m2	1.55	1.55	YES
		Percentage		100%	
Fourth	A29	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A30	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A31	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A32	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A33	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A34	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A35	Area m2	2.64	0.00	NO
		Percentage		0%	
Fourth	A36	Area m2	2.64	1.97	YES
		Percentage		75%	
Fourth	A37	Area m2	1.55	1.53	YES
		Percentage		98%	
Fourth	A38	Area m2	1.55	1.55	YES
		Percentage		100%	
Fourth	A115	Area m2	2033.86	2033.86	YES
		Percentage		100%	
Fourth	A116	Area m2	660.69	660.69	YES

		Percentage		100%	
Fifth	A39	Area m2	2.64	0.44	NO
		Percentage		17%	
Fifth	A40	Area m2	2.64	0.57	NO
		Percentage		21%	
Fifth	A41	Area m2	2.64	0.45	NO
		Percentage		17%	
Fifth	A42	Area m2	2.64	0.00	NO
		Percentage		0%	
Fifth	A43	Area m2	2.64	0.00	NO
		Percentage		0%	
Fifth	A44	Area m2	2.64	0.04	NO
		Percentage		1%	
Fifth	A45	Area m2	2.64	0.00	NO
		Percentage		0%	
Fifth	A46	Area m2	2.64	1.96	YES
		Percentage		74%	
Fifth	A47	Area m2	1.55	1.53	YES
		Percentage		98%	
Fifth	A48	Area m2	1.55	1.55	YES
		Percentage		100%	
Sixth	A49	Area m2	2.64	1.20	NO
		Percentage		46%	
Sixth	A50	Area m2	2.64	1.16	NO
		Percentage		44%	
Sixth	A51	Area m2	2.64	1.39	YES
		Percentage		53%	
Sixth	A52	Area m2	2.64	1.12	NO
		Percentage		42%	
Sixth	A53	Area m2	2.64	0.71	NO
		Percentage		27%	
Sixth	A54	Area m2	2.64	0.27	NO
		Percentage		10%	
Sixth	A55	Area m2	2.64	1.33	YES
		Percentage		50%	
Sixth	A56	Area m2	2.64	1.97	YES
		Percentage		75%	
Sixth	A57	Area m2	1.55	1.53	YES
		Percentage		98%	
Sixth	A58	Area m2	1.55	1.55	YES
		Percentage		100%	
Seventh	A59	Area m2	2.64	1.85	YES
		Percentage		70%	
Seventh	A60	Area m2	2.64	1.84	YES
		Percentage		70%	
Seventh	A61	Area m2	2.64	1.86	YES

		Percentage		70%	
Seventh	A62	Area m2	2.64	1.89	YES
		Percentage		72%	
Seventh	A63	Area m2	2.64	1.87	YES
		Percentage		71%	
Seventh	A64	Area m2	2.64	1.81	YES
		Percentage		69%	
Seventh	A65	Area m2	2.64	1.83	YES
		Percentage		69%	
Seventh	A66	Area m2	2.64	1.96	YES
		Percentage		74%	
Seventh	A67	Area m2	1.55	1.53	YES
		Percentage		98%	
Seventh	A68	Area m2	1.55	1.55	YES
		Percentage		100%	
Eighth	A69	Area m2	2.64	1.86	YES
		Percentage		71%	
Eighth	A70	Area m2	2.64	1.84	YES
		Percentage		70%	
Eighth	A71	Area m2	2.64	1.83	YES
		Percentage		69%	
Eighth	A72	Area m2	2.64	1.86	YES
		Percentage		70%	
Eighth	A73	Area m2	2.64	1.93	YES
		Percentage		73%	
Eighth	A74	Area m2	2.64	1.80	YES
		Percentage		68%	
Eighth	A75	Area m2	2.64	1.83	YES
		Percentage		69%	
Eighth	A76	Area m2	2.64	1.78	YES
		Percentage		67%	
Eighth	A77	Area m2	1.55	1.53	YES
		Percentage		98%	
Eighth	A78	Area m2	1.55	1.55	YES
		Percentage		100%	
Ninth	A79	Area m2	2.64	1.85	YES
		Percentage		70%	
Ninth	A80	Area m2	2.64	1.93	YES
		Percentage		73%	
Ninth	A81	Area m2	2.64	1.82	YES
		Percentage		69%	
Ninth	A82	Area m2	2.64	1.85	YES
		Percentage		70%	
Ninth	A83	Area m2	2.64	1.86	YES
		Percentage		71%	
Ninth	A84	Area m2	2.64	1.84	YES

		Percentage		70%	
Ninth	A85	Area m2	2.64	1.83	YES
		Percentage		69%	
Ninth	A86	Area m2	27.64	22.30	YES
		Percentage		81%	
Ninth	A117	Area m2	569.99	569.99	YES
		Percentage		100%	
Ninth	A118	Area m2	395.70	395.70	YES
		Percentage		100%	
Ninth	A119	Area m2	694.13	694.13	YES
		Percentage		100%	
Ninth	A124	Area m2	160.37	160.37	YES
		Percentage		100%	
Ninth	A125	Area m2	479.51	479.51	YES
		Percentage		100%	
Tenth	A87	Area m2	2.64	1.99	YES
		Percentage		75%	
Tenth	A88	Area m2	2.64	2.00	YES
		Percentage		76%	
Tenth	A89	Area m2	2.64	2.08	YES
		Percentage		79%	
Tenth	A90	Area m2	2.64	1.82	YES
		Percentage		69%	
Tenth	A91	Area m2	2.64	1.82	YES
		Percentage		69%	
Tenth	A92	Area m2	2.64	1.81	YES
		Percentage		69%	
Tenth	A93	Area m2	43.94	43.46	YES
		Percentage		99%	
Eleventh	A94	Area m2	2.64	1.85	YES
		Percentage		70%	
Eleventh	A95	Area m2	2.64	2.00	YES
		Percentage		76%	
Eleventh	A96	Area m2	2.64	1.86	YES
		Percentage		71%	
Eleventh	A97	Area m2	2.64	1.98	YES
		Percentage		75%	
Eleventh	A98	Area m2	2.64	1.82	YES
		Percentage		69%	
Eleventh	A99	Area m2	40.25	37.12	YES
		Percentage		92%	
Twelfth	A100	Area m2	2.64	2.02	YES
		Percentage		77%	
Twelfth	A101	Area m2	2.64	1.84	YES
		Percentage		70%	
Twelfth	A102	Area m2	2.64	1.99	YES

		Percentage		75%	
Twelfth	A103	Area m2	2.64	1.83	YES
		Percentage		69%	
Thirteenth	A104	Area m2	2.64	2.09	YES
		Percentage		79%	
Thirteenth	A105	Area m2	2.64	1.84	YES
		Percentage		70%	
Thirteenth	A106	Area m2	2.64	1.83	YES
		Percentage		69%	
Thirteenth	A107	Area m2	45.64	45.39	YES
		Percentage		99%	
Fourteenth	A108	Area m2	2.64	2.17	YES
		Percentage		82%	
Fourteenth	A109	Area m2	2.64	1.99	YES
		Percentage		76%	
Fourteenth	A110	Area m2	44.92	44.74	YES
		Percentage		100%	
Fifteenth	A111	Area m2	2.64	2.15	YES
		Percentage		82%	
Fifteenth	A112	Area m2	38.75	35.27	YES
		Percentage		91%	
No of Amenity Areas	124		Not compliant with BRE		42
			% Not compliant with BRE		33.87%

11.129. Table 11.5 indicates that 82 out of 124 (66%) of the amenity spaces assessed pass the current BRE guide target level of 2 hours of direct sunlight on 21st March across 50% of the area assessed and thus receive good levels of direct sunlight across the year.

Glare

11.130. Baseline calculations are not possible for glare as it assesses glare issues caused by the proposed development only.

Identification and Evaluation of Significant Effects

Daylight/Sunlight

11.131. It should be noted that our assessment only relates to the Phase B and C construction of the towers / additional massing part of the development. Phase A (conversion of the Warehouse / Terrace does not include any additional building massing and, as such, there would not be any Daylight / Sunlight impacts.

11.132. Please refer to the detailed report in appendix 11.1 for full details. The main findings of the report are included below:

Vertical Sky Component

11.133. In respect of VSC (a measure of daylight from the sky reaching windows), the results against the BRE criteria demonstrate 100% compliance except for B1, B11, B44 and B46.

11.134. To B1, 99% of windows assessed fully pass the BRE criteria and the remaining 1% experience a minor adverse reduction in daylight. To B11, 93% of windows assessed (i.e. windows that could be affected by the development) and the remaining 7% (all bedrooms to be treated with less importance) experience a minor adverse reduction in daylight. To B44, 88% of windows assessed fully pass the BRE criteria and a further 12% experience a minor adverse reduction in light. To B46 (Viadux, the not yet constructed property), 92% of windows assessed fully pass the BRE criteria, a further 6% experience a minor adverse reduction in light and 2% would experience a moderate adverse reduction.

11.135. If we look more closely at the VSC results and set a VSC target to be in the mid-teens (as per the interpreting the results flexibly and appeal decision discussed above), the VSC results are tabulated in Table 11.6.

Table 11.6 – Vertical Sky Component (VSC) - Target Figure at 27% (BRE)

VSC														
		VSC - Existing Site as Baseline												
		Meet or Exceed BRE Guidelines (greater than 27% VSC or less than 20% reduction)	Below BRE Guidelines											
Building No.	Address	Total no. of Windows	No. Windows that Meet or Exceed BRE Guidelines		21-30% Reduction - Minor			31-40% Reduction - Moderate			>40% Reduction - Major			Significance
							Which are Bedrooms			Which are Bedrooms			Which are Bedrooms	
B1	303 Deansgate and Land at Great Bridgewater Street and Trafford Street (Beetham Tower)	270	269	99%	1	1%	0	0	0%	0	0	0%	0	Minor Adverse
B2	321 Deansgate, Manchester	17	17	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B6	332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road	14	14	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B11	Porchfield Square and Rozel Square, Byrom Street, Manchester	56	52	93%	4	7%	4	0	0%	0	0	0%	0	Minor Adverse
B38	Free Trade Hall, Peter Street, Manchester	80	80	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B44	Land on the east side of Watson Street, Manchester	288	254	88%	34	12%	2	0	0%	0	0	0%	0	Minor Adverse
B46	Viadux (Salboy Development)	760	701	92%	48	6%	22	11	2%	0	0	0%		Moderate Adverse
	Total	1485	1387	93%	87	6%	28	11	1%	0	0	0%	0	0

VSC Target at 16%

11.136. In respect of VSC (a measure of daylight from the sky reaching windows), the results against the BRE criteria demonstrate 100% compliance except for B11 & B44.

11.137. To B11, 93% of windows assessed (i.e. windows that could be affected by the development) and the remaining 7% (all bedrooms to be treated with less importance) experience a minor adverse reduction in light. To B44, 97% of windows assessed fully pass the BRE criteria with the remaining 3% experience a minor adverse reduction in light.

Table 11.7 Vertical Sky Component (VSC) Target Figure at 16%

VSC														
		VSC - Existing Site as Baseline												
		Meet or Exceed BRE Guidelines (greater than 27% VSC or less than 20% reduction)			Below BRE Guidelines									
Building No.	Address	Total no. of Windows	No. Windows that Meet or Exceed BRE Guidelines		21-30% Reduction - Minor			31-40% Reduction - Moderate			>40% Reduction - Major			Significance
							Which are Bedrooms			Which are Bedrooms			Which are Bedrooms	
B1	303 Deansgate and Land at Great Bridgewater Street and Trafford Street (Beetham Tower)	270	270	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B2	321 Deansgate, Manchester	17	17	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B6	332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road	14	14	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B11	Porchfield Square and Rozel Square, Byrom Street, Manchester	56	52	93%	4	7%	4	0	0%	0	0	0%	0	Minor Adverse
B38	Free Trade Hall, Peter Street, Manchester	80	80	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B44	Land on the east side of Watson Street, Manchester.	288	279	97%	9	3%	2	0	0%	0	0	0%	0	Minor Adverse
B46	Viadux (Salboy Development)	760	760	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
	Total	1485	1472	99%	13	1%	6	0	0%	0	0	0%	0	0

No Sky Line (or Daylight Distribution) (NSL)

11.138. In respect of NSL (the measure of how daylight (VSC) is then distributed around a room), the results against the BRE criteria demonstrate 100% compliance except for B11, B44 and B46.

11.139. To B11, 75% of rooms assessed fully pass the BRE criteria, 20% experience a minor adverse and 5% a moderate adverse reduction in light distribution. All of the moderate impacts are to bedrooms to be treated with less importance and as such are also considered minor adverse.

11.140. To B44, 96% of rooms assessed fully pass the BRE criteria and a further 0.5% experience a minor, 3% a moderate and 1 room (0.5%) a major adverse reduction in light distribution. Whilst there are five rooms to B44 that are technically noted as experiencing a moderate / major impact from the development, on closer examination of the results, these rooms face the existing Great Northern building (at low level) and currently receive very poor levels of sky visibility and would not in reality be impacted by the proposed development.

11.141. To B46, 98% of windows assessed fully pass the BRE criteria and a further 0.5% experience a minor adverse reduction, leaving just over 1% of windows that would have any moderate / major adverse impact. All the moderate / major adverse results are to bedrooms to be treated with less importance and can also overall be considered minor adverse.

Table 11.8 – No Sky Line (or Daylight Distribution) ("NSL")

NSL - Existing Site as Baseline														
		Meet or Exceed BRE Guidelines (less than 20% reduction)			Below BRE Guidelines									
Building No.	Address	Total no. of Rooms	No. Rooms that Meet or Exceed BRE Guidelines		21%-30% Reduction - Minor			31%-40% Reduction - Moderate			>40% Reduction - Major			Significance
							Which are Bedrooms			Which are Bedrooms			Which are Bedrooms	
B1	303 Deansgate and Land at Great Bridgewater Street and Trafford Street (Beetham Tower)	126	126	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B2	321 Deansgate, Manchester	5	5	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B6	332 & 334 Deansgate and 1A, 3, 7, 9 and 11 Liverpool Road	7	7	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B11	Porchfield Square and Rozel Square, Byrom Street, Manchester	56	42	75%	11	20%	11	3	5%	3	0	0%	0	Minor Adverse
B38	Free Trade Hall, Peter Street, Manchester	70	70	100%	0	0%	0	0	0%	0	0	0%	0	Negligible
B44	Land on the east side of Watson Street, Manchester	159	152	96%	1	0.5%	0	5	3%	0	1	0.5%	0	Minor Adverse
B46	Viadux	570	556	98%	2	0.5%	2	3	0.5%	3	9	1%	9	Minor Adverse
	Total	993	958	96%	14	1%	13	11	1%	6	10	1%	9	0

Annual Probable Sunlight Hours (APSH)

11.142. In respect of APSH (a measure of direct sunlight from the sky reaching windows), the results against the BRE criteria demonstrate 100% compliance in summer and winter except for B11.

11.143. To B11, 64% of windows assessed fully pass the BRE summer criteria and 30% experience a minor adverse reduction in direct sunlight. The remainder experience a moderate adverse reduction but these are all bedrooms (which the guide states are to be treated with less importance) and can again overall be considered minor adverse.

11.144. In winter, 57% fully pass and 43% experience moderate to major adverse impacts. However, there are no real expectations of direct sunlight in winter are all the moderate / moderate impacts are to bedrooms, which can again overall be considered minor adverse.

Summary

11.145. In summary, the daylight sunlight assessment ultimately demonstrates that the Development will not cause any materially unacceptable effects in terms of neighbouring properties' ambient daylight conditions. The results also compare favourably to those for other similar schemes that have recently been granted planning approval in the Manchester city centre.

- On this basis and having regard to the urban high-rise character of the site and the flexible suburban basis of the BRE guidance, the development's effects on neighbouring properties are considered acceptable.
- Where there are deviations from the BRE guidelines, their significance is also offset by the following:
- It is inevitable when constructing buildings in an urban environment that alterations in daylight and sunlight to adjoining properties can occur
- Deviations from the BRE baseline are generally extremely marginal
- The BRE guidelines indicate that in interpreting the results of an assessment, a degree of flexibility is required, especially in a dense urban environment where neighbouring properties are located within narrow streetscapes and with design obstructions restricting the availability of daylight or sunlight
- The new NPPF states that ''a flexible approach should be taken in applying policies relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site''
- The BRE tests are based on a typical (two storey) suburban model of development and it is reasonable to assume that expectations of levels of daylight sunlight will be different in developing larger properties such as this. This is noted in the guide itself

Overshadowing

11.146. Please refer to the detailed report in appendix 11.2 for full details. The main findings of the report are summarised below.

Permanent Overshadowing

11.147. The path of the sun and the shadow created by the new development has been analysed by creating a sun path tracking 3D computer model of the site/proposed and surrounding buildings and the results at two hour intervals for 21 March are attached at appendix C of appendix 11.2.

11.148. Contour drawings and a results spreadsheet of the amenity areas receiving 2 hours of sun on 21 March are attached at appendices A and B of the report at appendix 11.2.

<u>Adjacent Amenity Area A113 (Great Northern)</u>

11.149. Amenity area A113 is located to the North of the proposed development and forms a public space to the Great Northern building.

11.150. A113 fully passes the BRE criteria due to the sunlight received generally throughout the day.

Adjacent Amenity Areas A1 to A112 (B44 Great Northern Tower)

11.151. Amenity areas A1 to A112 are located generally to Northeast of the Development, and are balconies and roof top terraces to the Great North Tower building (B44). Many of these areas are already poorly sunlit due to their orientation and close proximity to B42, especially on floors first to fifth.

11.152. The Development only impacts on amenity spaces at the lower levels of the sloping section and as a result 86 of 112 areas (76%) pass the BRE criteria due to the sunlight received throughout the day.

Adjacent Amenity Areas A120 to A123 – (B11 Porchfield Square)

11.153. Amenity areas A120 & A123 are located generally to Northwest of the proposed development and are garden / amenity areas to B11 – Porchfield Square.

11.154. Amenity areas A120, A121, A123, all fully pass the BRE criteria, are largely unaffected by the proposed development and receive very good levels of sunlight.

11.155. Amenity area A122 currently does not receive much sunlight on 21st March (as it is a narrow area to the North of the existing houses) and this is reduced to a degree by the Development in the early part of the day. However, all other areas pass the BRE criteria as noted above.

11.156. The permanent overshadowing effect of the Development on adjacent areas is therefore considered acceptable.

Transient Overshadowing

11.157. The BRE guidelines do not provide criteria pertaining to the significance of transitory overshadowing. The guidelines simply suggest that by establishing the different times of day and year when shadow would be cast over surrounding areas, an indication is given as to the significance of the development's impact.

Adjacent Amenity Area A113 (B42 – Great Northern)

11.158. Amenity space A113 does not have any additional overshadowing due to the proposed development.

Adjacent Amenity Areas A1 to A112 (B44 Great Northern Tower (GNT))

11.159. Amenity spaces A1 to A112 are located to the Northeast of the development site and are balconies and roof top terraces to the Great North Tower building (B44). Many of these areas are already poorly sunlit due to their orientation and close proximity to Great Northern building, especially on floors first to fifth.

11.160. The June 21st images show overshadowing for the summer equinox when the sun is of course at its highest and shadows are short. In June, the images show some additional overshadowing at the Southern end of the GNT from 1.30pm to 2.30pm (1 hour).

11.161. Either side of June, shadows do of course become longer as the sun is lower in the sky and are at their longest in December:

- In May / July – there is again overshadowing for a short period between 1.30pm and 2.30pm but the shadows are longer
- In April / August - there is overshadowing between 1.30pm and 3.30pm and the shadows are much longer and cover most of the GNT amenity areas
- In March / Sept - there is overshadowing between 1.30pm and 4.00pm and the shadows are cover most of the GNT amenity areas

11.162. Overall, we can see that in the main spring / summer periods, any additional overshadowing is for a very short period of between 1 and 2 hours, which is reasonable for an inner-city built-up environment and considered minor adverse.

Adjacent Amenity Areas A120 to A123 – (B11 Porchfield Square)

11.163. Amenity spaces A120 to A123 are located far to the Northwest of the proposed development, therefore the Development does not have any significant overshadowing effect on these amenity spaces after 10am. There is a slight shadow cast on the amenity spaces at 10am on 21st March, however the amenity spaces are not affected during June / summer, as the shadows are shorter. As a result, the area receives consistent good levels of sunlight.

Summary

11.164. Overall, the sun path images show that the amenity areas to the adjacent properties are not substantially affected by transient overshadowing.

Glare

11.165. Please refer to the detailed report in appendix 11.3 for full details. The main findings of the report are included below.

11.166. The detailed assessment of the 10 viewpoints C1 – C10 shows that in 7 of the chosen locations there is no additional glare in the field of view. At viewpoints C2, C5 and C9 there is potential additional glare as discussed below:

- Some glare is indicated by the 90 degree field of view image at this position from 7am to 9am between April to September. Also, between 3pm to 5pm April to August.
- Some small areas of glare are also indicated by the 30 degree field of view image from 7am to 9am March through to May, and August to September, also at 4pm to 5pm May through to August.

11.167. Overall, due to the position of the potential reflection (remote from the points of interest which would be the road at low level as the junction is approached and oncoming traffic facing away from the Development) and on the periphery of the 30-degree field of view the effect of solar glare at this position is not considered to be significant and negligibly adverse.

View C5 - Eastbound track, approaching signal, facing development

11.168. With regard to views shown in Figure 11.8 and Figure 11.9, the Proposed Development is shown in the background to the left of centre in the image and signal positions (yellow) are shown to the centre of the image.

11.169. Some glare is indicated by the 90-degree field of view image at this position at 5am between April and September, 9am in January, November, and December and at 4pm to 6pm between January to March and September to November.

11.170. Small areas of glare are indicated by the 30-degree field of view image at the same times and months.

11.171. Overall, due to the position of the potential reflection (remote from the point of interest which is the train signals) and on the periphery of the 30-degree field of view, the effect of solar glare at this position is not considered to be significant.

View C9 - Traffic lights, Great Bridgewater St, facing development

11.172. This position shows traffic lights at the traffic light-junction of Great Bridgewater St and Lower Mosley Street just the before the bridge / arches. The proposed development is in the right-hand side field of view. See images below in Figure 11.10 and 11.11.

11.173. Some glare is indicated by the 90-degree field of view image at this position from 6am to 10am between February and October and 4pm to 7pm between April through August. The 30-degree field of view does also indicate glare between 7am and 9am in March to April and August to October and at very small angular amount at 6pm May to July.

11.174. Due to the position of the potential reflection and its position in the 30-degree field of view behind one of the traffic lights, the solar glare at this position has been investigated further. However, there are alternative traffic lights to the left-hand side lane and across the junction outside of the main glare position that offer options when approaching the junction / lights.

11.175. We have performed a glare check at 23m, 10m and 5m distances in both lanes as looking at all three sets of traffic lights to assess the overall glare position. The viewpoints are noted in figure 11.12.

11.176. These test results and images from the above additional viewpoints are all included in appendix B of the report at appendix 11.3. The main points to note are:

- The Manchester Central (previously known as GMEX) building blocks a substantial amount of potential glare at road / street level
- The sun visor of a car would shield any high-level glare above the Manchester Central building
- The traffic light across the junction is generally outside of the field of glare and any high-level glare at the top of the field of vision is easily shielded by a sun visor for users of both
- In addition, road users in the left-hand lane can see the left hand set of lights at 23m, 10m and 5m without any significant glare in the 30 degree field of view. The right-hand side lights are also visible with minimal glare impact at all distances and any high-level glare (over the top of Manchester Central) can be shieled by a sun visor
- Road users in the right-hand lane can see the left hand set of lights at 23m, 10m and 5m without any significant glare in the 30 degree field of view. The right-hand side lights also visible with minimal glare impact at 23m and 10m and any high-level glare (over the top of Manchester Central) can be shieled by a sun visor

11.177. In summary, there are no significant glare issues at viewpoint 9 due to the number of traffic lights available without any significant glare impact and where there is minor glare, it is to the top of the field of vision and can be shielded by a sun visor. The overall glare effect at this position is therefore minor adverse

Mitigation Measures

Daylight / Sunlight / Overshadowing / Solar Glare

11.178. AA Projects Ltd were engaged during the early design stages of the development to carry out initial daylight sunlight, overshadowing and glare studies to feed into the design process and help inform the optimum size and positioning of each of the towers to minimise the impact on adjacent amenity spaces, properties and glare.

11.179. The current size / position and staggered height tower proposal avoids a wide solid continuous mass when viewed from any of the potentially sensitive receptors and thus maintains good levels of daylight and sunlight as discussed above. In addition, the towers have been positioned to sit between the existing adjacent tall buildings (Beetham Tower / Viadux) and potentially sensitive receptors to the North to ensure that any additional overshadowing is kept to a minimum. Therefore, no further mitigation beyond that embedded in the design is required.

Cumulative Effects

Daylight / Sunlight / Overshadowing / Solar Glare

11.180. Table 11.2 Cumulative Site Search at appendix 11.4 indicates that there are twenty-five consented / committed / completed developments in the vicinity of this Development which could be considered by for inclusion in the cumulative massing or for detailed assessment if they do / will contain residential units.

11.181. Please refer to detailed commentary against each property identified in the cumulative site search table noted above. The main points of the table are summarised below.

11.182. Following a desk top assessment, it was found that eighteen of the twenty-five developments are considered to be too distant to be impacted in regard to daylight and sunlight and in addition, any additional massing would not impact on any results to those properties which have been assessed.

11.183. Five of the remaining seven developments have been included as the cumulative massing as they are near to the proposed Development. However, they have not been assessed for Daylight Sunlight as they are either commercial or do not directly face the Development.

11.184. Finally, two properties in the table have been included in the baseline massing and assessed. These are noted as B1 (Beetham Tower) and B46 (Viadux).

Residual Effects

11.185. Again, it should be noted that AA Project's assessment only relates to the Phase B and C construction of the towers / additional massing part of the development. Phase A (conversion of the Warehouse / Terrace does not include any additional building massing and, as such, there would not be any Daylight / Sunlight impacts.

11.186. In addition, AA Projects have only assessed the overall impact of the Phase B and C completed development. As the Phase B and C development proceeds (and thus massing is built / gets taller), daylight sunlight levels would gradually progress to the levels reported in this assessment.

11.187. The daylight sunlight study concludes that the development would largely fully meet the levels or flexible approaches suggested in the BRE guide / recent Planning appeals and where those levels are not met, they are of minor adverse significance due to the minor amount the results are below the suggested levels or due to the room type affected (i.e. bedrooms). The development would therefore have negligible or minor adverse impact on the surrounding residential properties and amenity spaces.

11.188. The glare study demonstrates that there would be no additional glare effects in the majority of the key road junctions and train signal positions tested. Where some potential glare was noted, it was of minor adverse significance as it was either outside the main field of view, not aligned with important viewpoints (traffic lights / signals), blocked at low level by other adjacent buildings or could easily be shielded by a sun visor. There would therefore be negligible or minor adverse glare issues caused by the Development.

Table 11.11 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Completed Development			
Daylight	Surrounding Residential Properties	None required	Negligible / minor adverse – see summary
Sunlight	Surrounding Residential Properties	None required	Negligible / minor adverse – see summary
Overshadowing	Surrounding Residential Amenity Spaces	None required	Negligible / minor adverse – see summary

Glare	Traffic and Train signal locations Transport	None required	Negligible / minor adverse – see summary

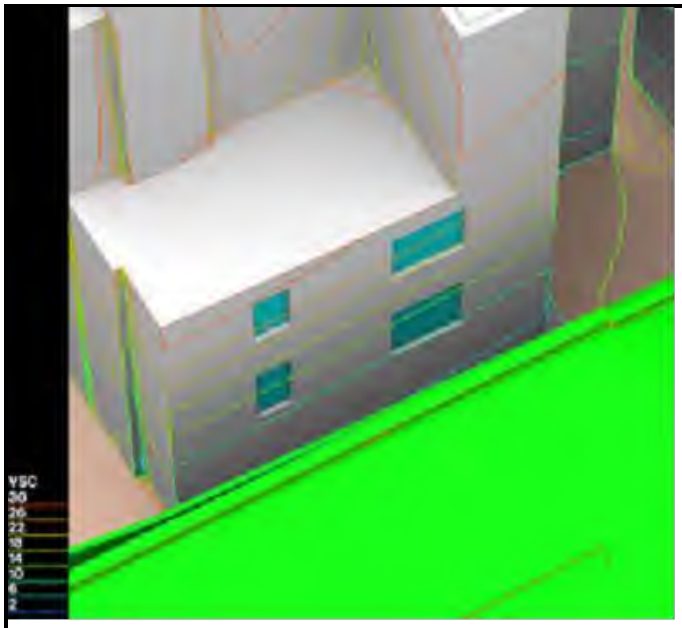
Reference List

1. Site layout planning for daylight and sunlight - A guide to good practice 2022 by P. J. Littlefair
2. CIBSE publication LG 10 Daylighting – a guide for designers
3. BS EN 17037
4. British Standard 8206 Part 2
5. National Planning Policy Framework (NPPF) amended 2021
6. Whitechapel Estate (appeal decision ref APP/E5900/W/17/3171437)
7. BRE Information Paper IP 3/87, a methodology for the measurement of the occurrence and duration of Reflected Disability Glare, which might be caused by proposed buildings
8. CIE 146:2002 Collection

Figures



	Figure:	11.1		
	Title:	Building Identification Plan		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



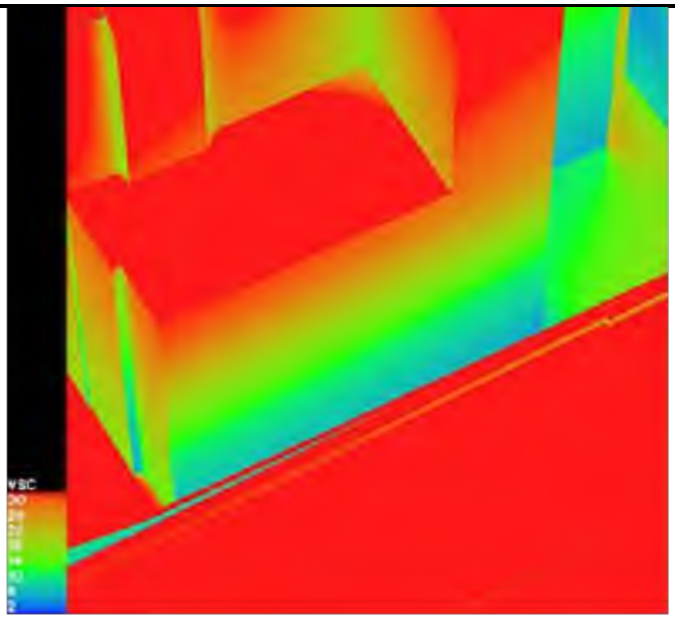


	Figure:	11.2	
	Title:	VSC Examples	
	Project:	Great Northern, Manchester	
	Date:	November 2022	Scale: NTS

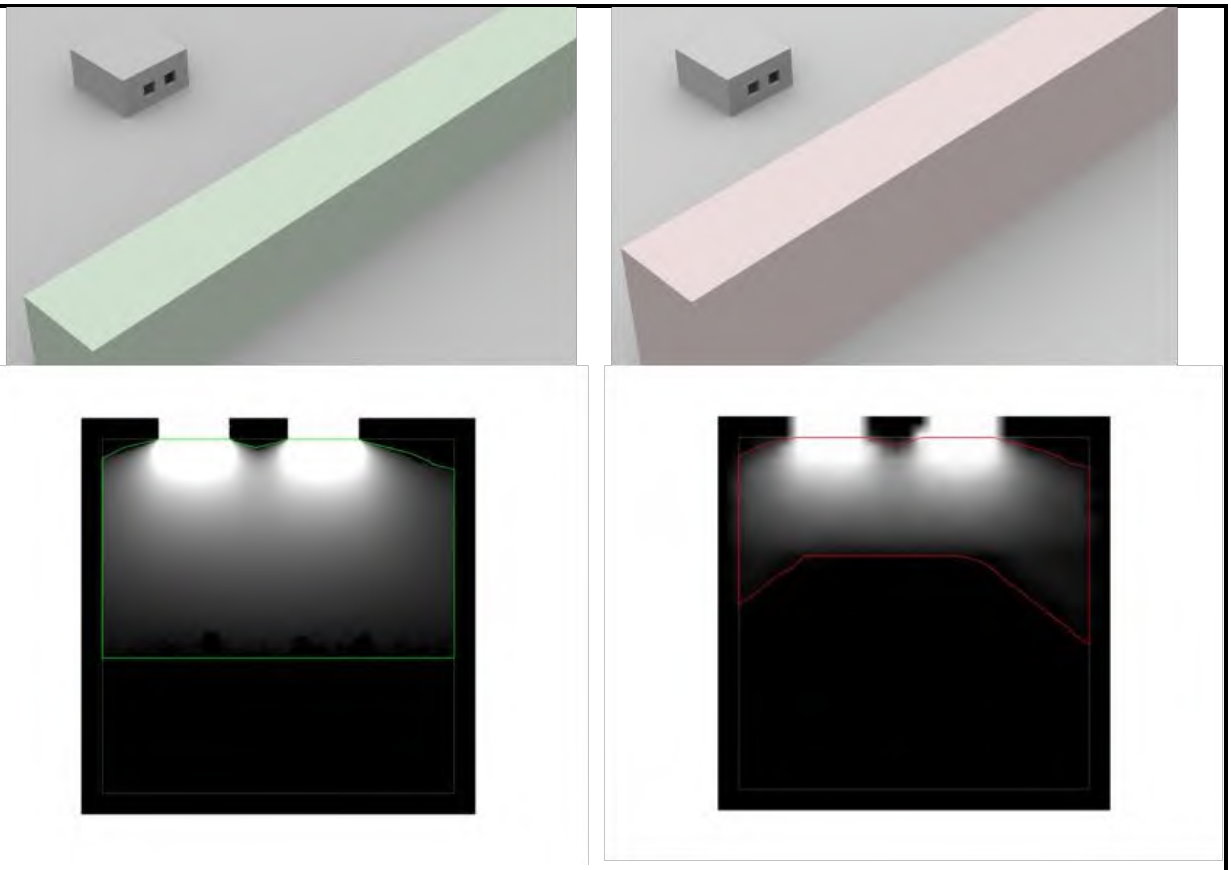


	Figure:	11.3		
	Title:	NSL example images		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



	Figure:	11.4		
	Title:	Amenity Space Identification Plan		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS

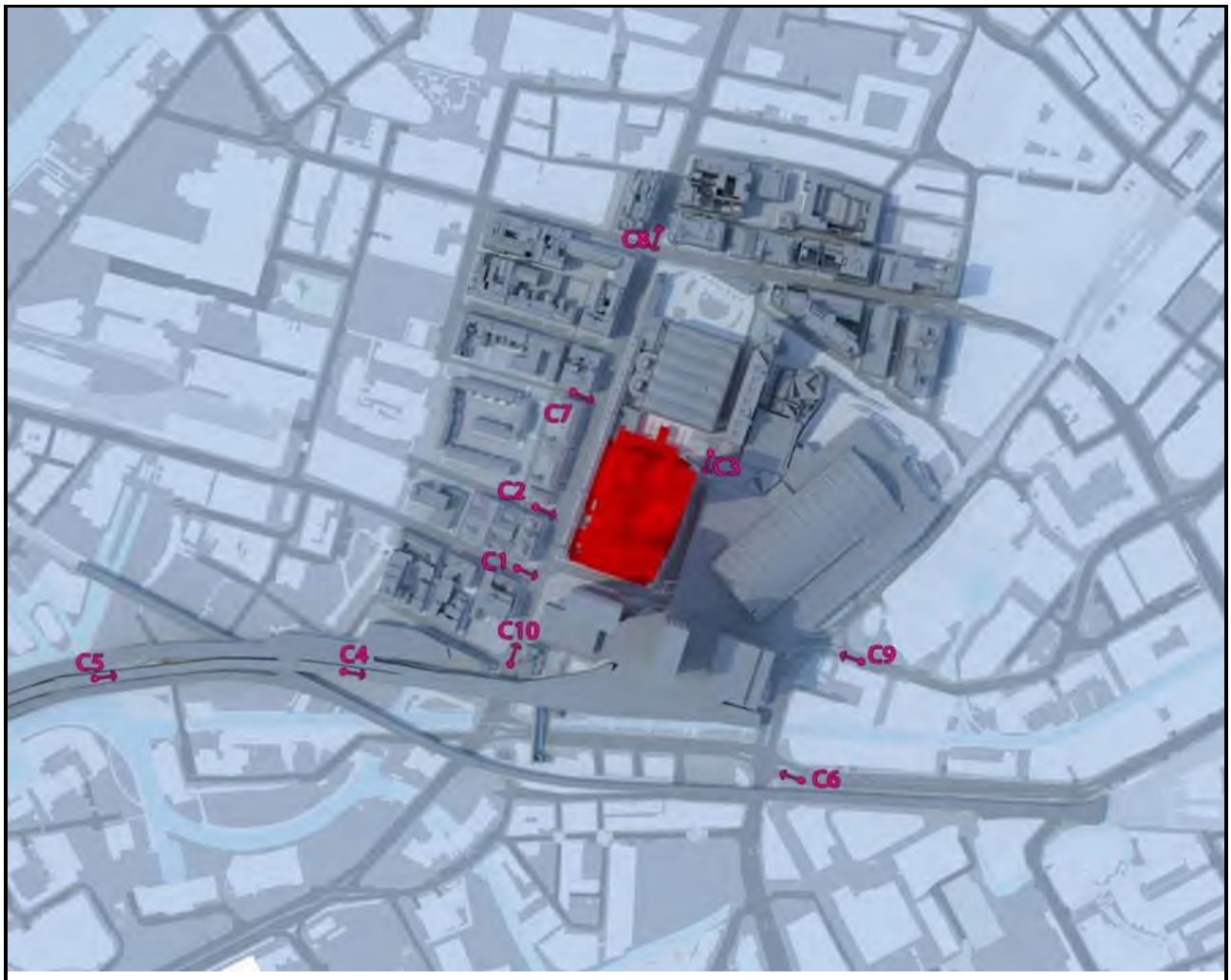
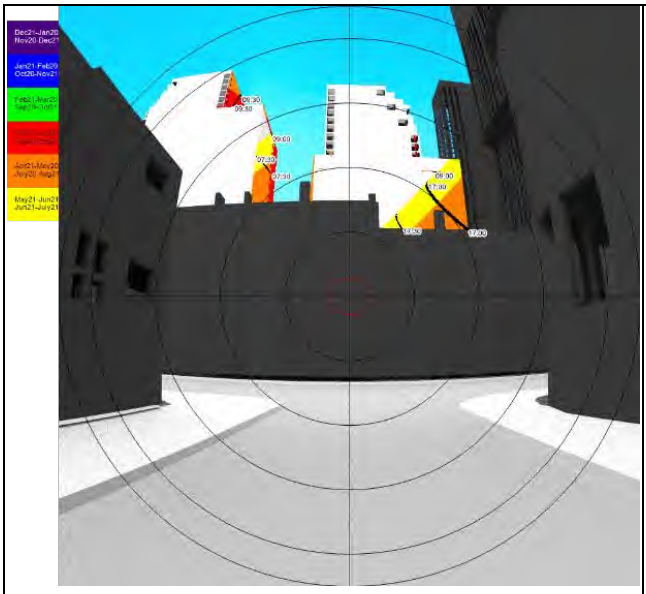
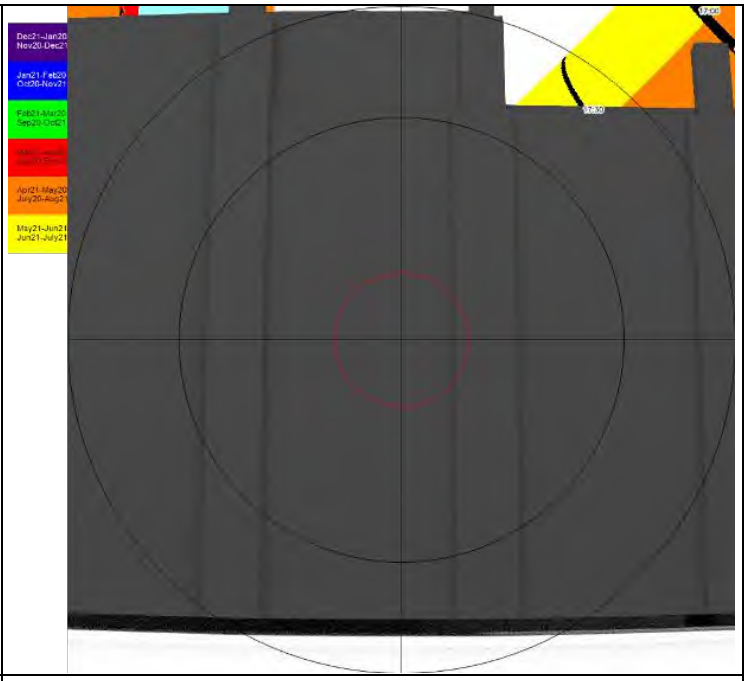


	Figure:	11.5	
	Title:	Glare View Points Plan	
	Project:	Great Northern, Manchester	
	Date:	November 2022	Scale: NTS



90° field of view from Viewpoint C2

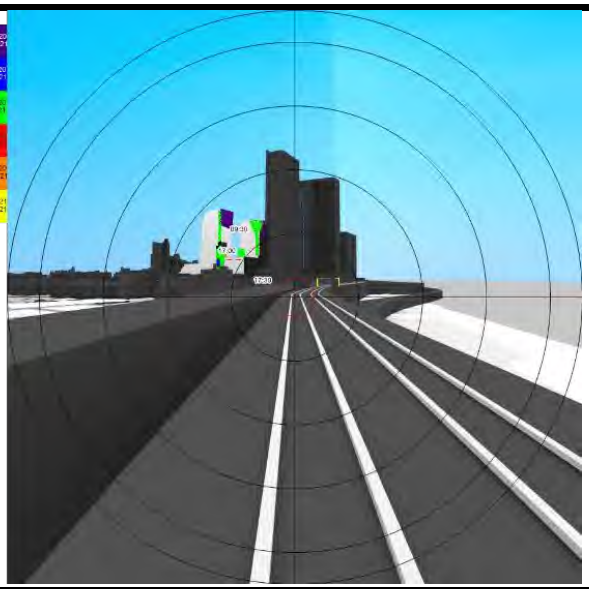


30° field of view from Viewpoint C2

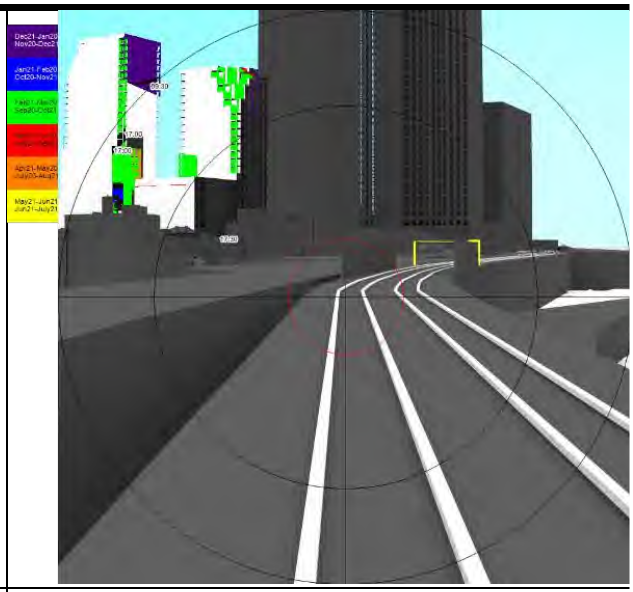
	Figure:	11.6		
	Title:	Field of View from Viewpoint C2		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



	Figure:	11.7		
	Title:	Photo View from Viewpoint C2		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



90° field of view from Viewpoint C5



30° field of view from Viewpoint C5

	Figure:	11.8		
	Title:	Field of View from Viewpoint C5		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS

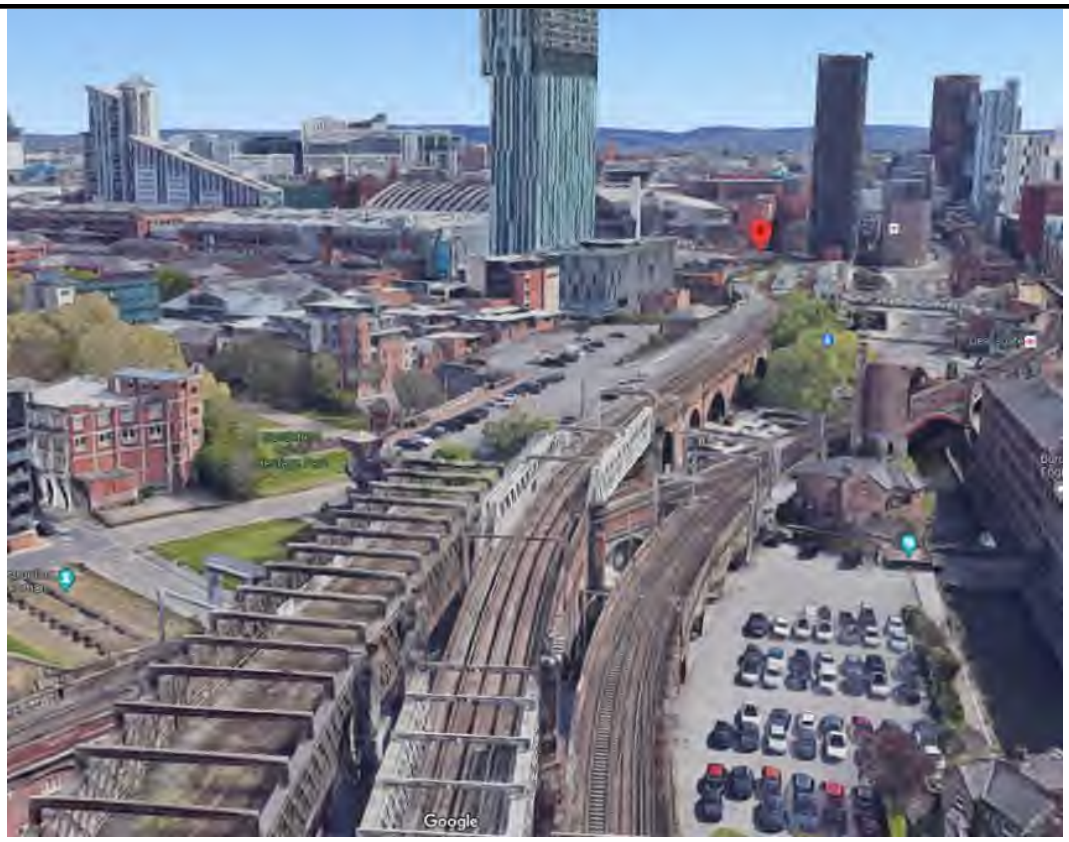
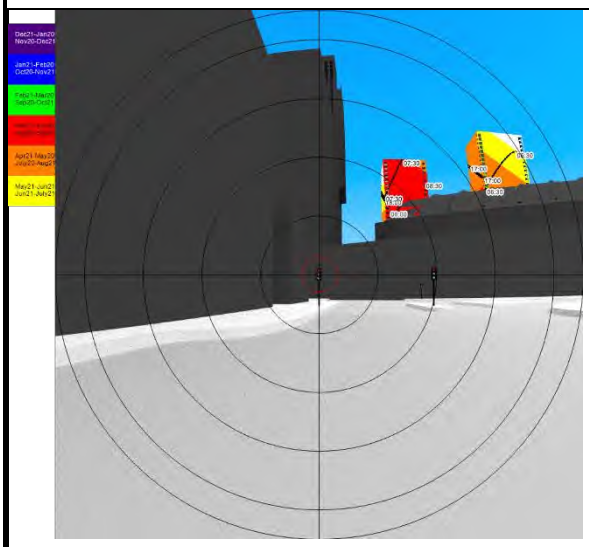
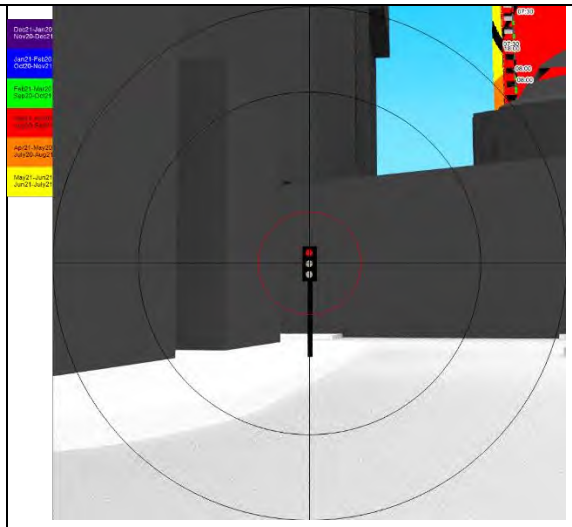


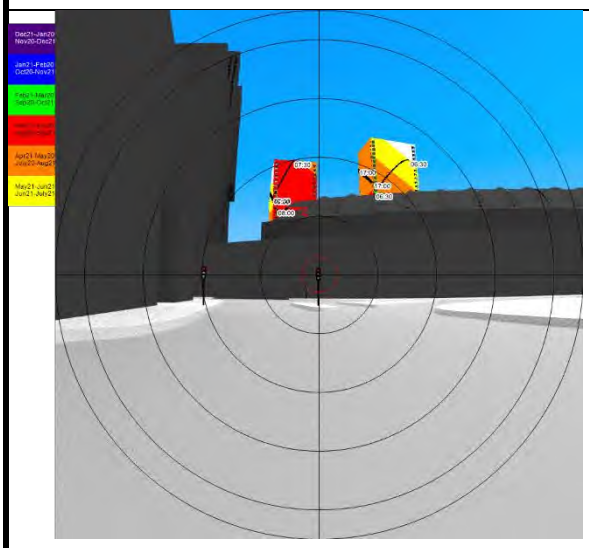
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	Title:	Photo View from Viewpoint C5		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS



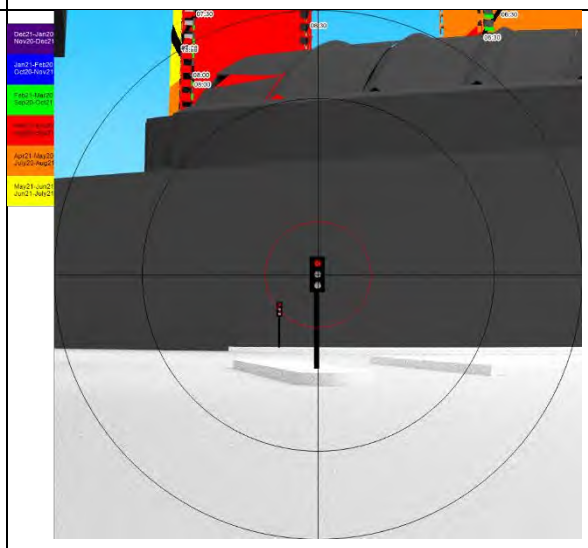
90° field of view from Viewpoint C9 @ 23m left lane



30° field of view from Viewpoint C9 @ 23m left lane



90° field of view from Viewpoint C9 @ 23m right lane



30° field of view from Viewpoint C9 @ 23m right lane

Figure:	11.10		
Title:	Field of View from Viewpoint C9		
Project:	**Great Northern, Manchester**		
Date:	**November 2022**	**Scale:**	**Scale /NTS**



	Figure:	11.11		
	Title:	Photo View from Viewpoint C9		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

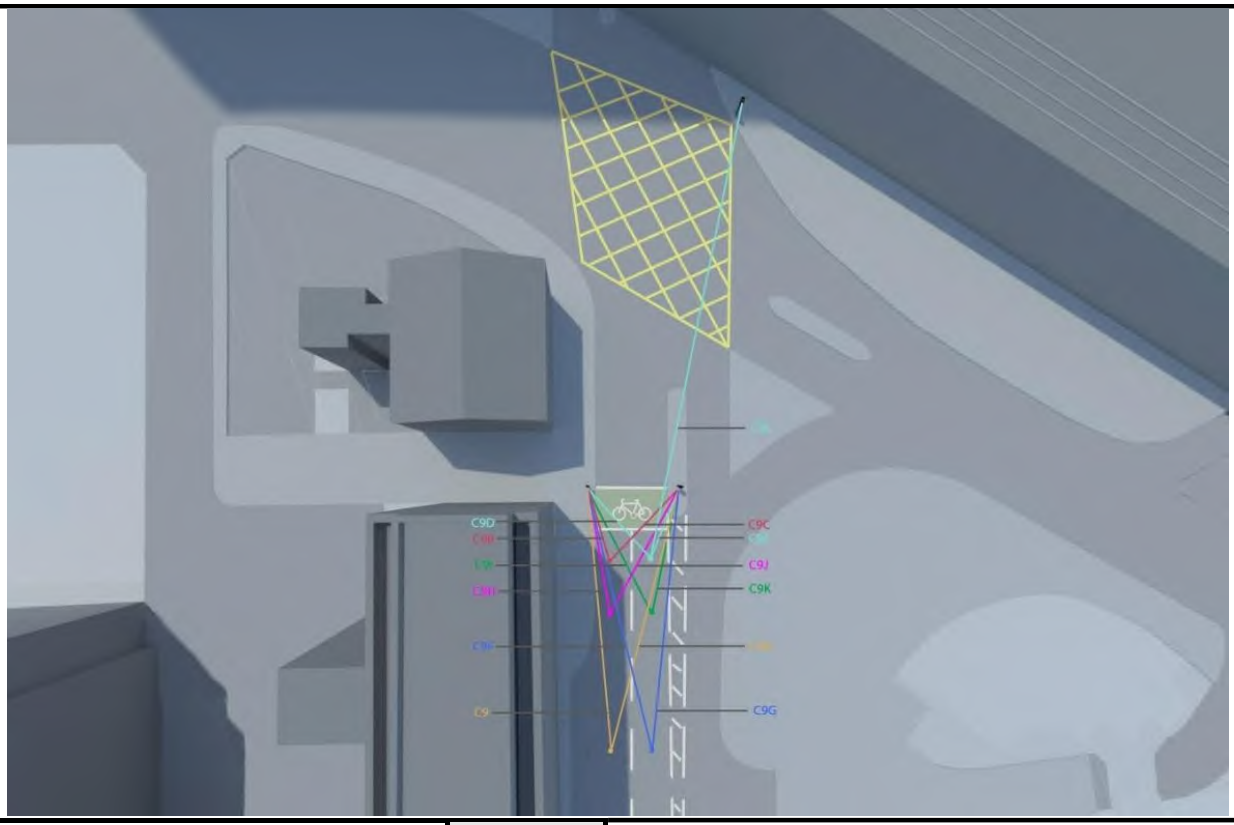


	Figure:	11.12		
	Title:	Additional Viewpoint 9 Locations		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS

12. Socio-Economic

Introduction

12.1. This Chapter of the ES has been prepared by Forever Consulting and assesses the likely socio-economic impacts of the proposals upon the site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

12.2. The lead consultant, responsible for assessing the likely socio-economic impact is Kev Duxbury, Director of Forever Consulting. Kev has more than 20 years technical experience in socio-economic impact assessments.

Limitations and Assumptions

12.3. There are no recognised definitive criteria for the assessment of socio-economic impacts. We have therefore quantified the scale and nature of potential impacts relative to baseline conditions based on relevant technical guidance and experience of working in the subject area. A qualitative judgement on significance and magnitude has been made drawing on professional experience.

12.4. The socio-economic assessment is based on the following assumptions:

- The assessment is based on the latest scheme information, including the proposed use class schedule and construction costs.
- The assessment has been undertaken in line with latest technical guidance and industry best practice on socio-economic impact assessment.
- Environmental impacts possibly affecting communities, businesses and workers nearby such as light, wind, traffic, crime, are covered by other chapters of this EIA.
- The impact case assessment is based on the scheme being complete and fully occupied.
- The socio-economic impacts are assessed for the whole scheme, broken down into construction and operational phases of the development.
- All impacts have been assessed and valued in 2022 prices.

Legislative and Policy Context

12.5. The Proposed Development supports several key policy and regeneration objectives across Manchester and Greater Manchester as set out below.

Legislation

12.6. There is no legislation relevant to the socio-economic impact assessment.

National Planning Policy

12.7. The National Planning Policy Framework (2021) sets out the Government's planning policies and how these should be applied to ensure effective use of land and infrastructure to help build a strong, responsive and competitive economy, as well as supporting strong, vibrant and healthy communities. The NPPF has three overarching objectives, which need to be pursued mutually: economic, social and environmental.

12.8. The economic objective should be to contribute to sustainable development by building a strong, responsive and competitive economy, and ensuring a sufficient amount and right type of development to support growth. The social role is required to support communities by creating a high-quality built environment with accessible local services to reflect the needs of the community. The environmental objective is to protect and enhance the natural, built and historic environment.

Sub-Regional Planning Policy

12.9. The Places for Everyone Plan (2022) is a long-term plan of nine Greater Manchester districts, including Manchester, for jobs, new homes, and sustainable growth. It has been published in draft by the Greater Manchester Combined Authority (GMCA) on behalf of the nine districts.

12.10. The Proposed Development aligns with the Plan's strategic objectives to increase net additional dwellings, focus new homes in the Core Growth Area and the town centres, focus new homes within 800m of public transport hubs, enhance our cultural, heritage and educational assets, ensure new development is designed to encourage and enable active and sustainable travel, facilitate provision of infrastructure for cleaner vehicles, and improve access to the natural environment and green spaces, including parks.

12.11. The Greater Manchester Strategy 2021-2031 'Good lives for all' sets out a strategic framework for policy development across Greater Manchester with a vision for "Greater Manchester to be a place where everyone can live a good life, growing up, getting on and growing old in a greener, fairer more prosperous city region." The Proposed Development aligns with the strategy's 'place priorities' to:

- Drive investment into our growth locations, and use that to create opportunities in adjacent town and local centres
- Deliver resilient, safe and vibrant communities where everyone has access to essential services, local centres and high streets which are successful and reflective of their populations, and access to high quality culture and leisure spaces.
- Ensure local communities, neighbourhoods, villages, towns, cities and districts are protected and strengthened through the Places for Everyone Plan, with new homes delivered in line with net zero carbon commitments and the GM Housing Strategy.
- Realise the opportunities from our world-class growth and innovation assets, driven by our Places for Everyone Plan, Local Growth Plans and Industrial Strategy to open up opportunities in all parts of the city-region.
- Support businesses to grow sustainably, to become as prosperous as they can be.

Local Planning Policy

12.12. Manchester's Core Strategy was adopted on the 11 July 2012 and is the key document in the Manchester Local Plan. It sets out the long-term strategic policies for Manchester's future development and forms the framework that planning applications are assessed against. Key spatial principles are that, "*The Regional Centre will be the focus for economic and commercial development, retail, leisure and cultural activity, alongside high quality city living"* – this reflects the established commercial core of the City Region – and "New development will maximise the potential of the City's transport infrastructure, in particular promoting walking, cycling and use of the public transport." The strategy states that the city centre is a key location for major employment growth, and priorities for ensuring continued economic growth include:

- Improving access to jobs for all via public transport, walking and cycling.
- Improving the portfolio of employment premises.
- Creating business destinations by enhancing the primary business use with ancillary commercial facilities.
- Ensuring the continued social, economic and environmental regeneration of the city.

12.13. A city centre development principle is for city centre development to generally be high-density, as it is a location where land should be used to maximise its efficiency. The strategy states that the appropriate scale, massing and height of development in the city centre will significantly exceed what is appropriate elsewhere in the city.

12.14. A mixed-use development principle states that the city centre presents the most viable opportunities for mixed-use development, and in general these will be promoted as a means of using land as efficiently as possible. Furthermore, residential development will be supported as part of schemes which include employment, and active ground floor uses (shops, food and drink and leisure) will be appropriate in locations which have an established public function, or as part of a development which will create such an environment.

12.15. Our Manchester Strategy 2016-2025 details plans for Manchester to be in the top-flight of world cities by 2025 with a strong economy and highly skilled people. The Proposed Development supports the council's priorities of making Manchester a thriving, sustainable city, a liveable and zero-carbon city, and a connected city.

12.16. Developing a More Inclusive Economy – Our Manchester Industrial Strategy 2019 sets out Manchester's vision and delivery plan for developing a more inclusive economy and ensuring that all residents can participate in and benefit from Manchester's economic growth. Key aims are to:

- Support Manchester's key growth sectors.
- Increase the number of business start-ups.
- Connect people to good employment through social value.

12.17. Whilst not strictly policy, site-specific guidance and a material consideration for the Site is the Great Northern, Manchester Centre and Castlefield Quay Spatial Regeneration Framework (SRF), which was endorsed in February 2017 by Manchester Council Executive Committee and updated in March 2019.

12.18. The Proposed Development seeks to address many of the issues highlighted in the SRF, particularly around the view that the Great Northern site has broadly underperformed and represents an underutilised part of the city given its location. This is particularly marked in terms of the quality and appropriateness of some of its uses, namely the car park, the quality and vitality of the environment within and around the site, and challenges it presents in terms of both physical and functional connections to its surroundings.

Assessment Methodology and Significance Criteria

12.19. The assessment has determined the baseline position for intervention, considering the local demographic, social and economic characteristics of the defined Study Area. It evaluates the potential social and economic effects of the Proposed Development, and their significance from a socio-economic perspective.

12.20. The assessment considers the following scenarios:

- The baseline position: measuring the socio-economic value of the site in its current state.
- The impact scenario: measuring the socio-economic value of the Proposed Development, considering both construction and operation phases.

12.21. The socio-economic impact assessment does not consider the impacts against phased scenarios because it will make no material difference to the analysis of impacts or significance of effects.

12.22. The methodology for Determining Impact Magnitude is based on the following criteria set out in Table 12.1.

Table 12.1: Criteria for Determining Impact Magnitude

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key element/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character / composition / attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstance/situation.
Negligible	No change from the baseline conditions.

12.23. The sensitivity of a receptor is based on relative importance of the receptor using the scale in Table 12.2.

Table 12.2: Criteria to determine sensitivity of receptors

Sensitivity	Examples of receptor
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or no local importance.

12.24. The significance of an environmental impact is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The Impact Significance Matrix is set out in Table 12.3.

Table 12.3: Impact significance matrix

	Sensitivity		
Magnitude	High	Moderate	Low
Major	Major Adverse/Beneficial	Major - Moderate Adverse - Beneficial	Moderate - Minor Adverse - Beneficial
Moderate	Major Adverse/Beneficial	Moderate Adverse – Beneficial	Minor Adverse/Beneficial
Minor	Minor Adverse/Beneficial	Minor Adverse/Beneficial	Negligible
Negligible	Negligible	Negligible	Negligible

Baseline Conditions

Local Contextual Conditions

12.25. The Proposed Development responds to local contextual conditions. A summary of socio-economic baseline conditions is provided below. It includes:

- Population
- Employment
- Local expenditure
- Local service provision
- Open space, recreation and amenity
- Crime

12.26. A range of published data sources has been drawn upon to understand both the social and economic characteristics of the area as a starting point for the assessment, this includes for example, ONS Annual Population Survey, Business Register and Employment Survey, the 2011 Census and the 2021 Census – where data is available.

Defining the Study Area

12.27. For the socio-economic impact assessment, the Study Area includes receptors which will be most directly impacted by the proposals, i.e. the surrounding neighbourhood. This includes residents, businesses and employees nearby. The surrounding neighbourhood is defined using the five Lower Super Output Areas (LSOAs) where the Proposed Development sits (See Figure 12.1). We also consider impacts on the wider Manchester area. Therefore, baseline data is provided for the Study Area and Manchester, with England provided for comparison. This is referenced throughout.

Population

12.28. There are around 9,238 people living in the Study Area, equating to 1.7% of the City of Manchester . within this population, immediate local residents include:

- Residents of Great Northern Tower
- Residents of Beetham Tower
- Residents of St John Street

12.29. The majority (81.5%) of the Study Area's population are aged between 20-49, compared to 51.9% in Manchester and 38.8% in England. The most notable difference is among those aged 25-29. The Study Area has more than double the proportion of people in this age group (25.3%) compared to Manchester (11.7%), and almost four times that of England (6.7%).

12.30. Households are commonly one person or households with no children. The majority (89.3%) of the population in the Study Area live in either 'one person' households (aged 65 and under) (45.7%), 'households with no children' (26.6%), or 'multi-group' households (17.1%). This compares to 47.3% of households in Manchester and 38.3% of households in England falling within these three household structures. Only 3.9% of the Study Area live in households with one or more dependent children, this is much lower than Manchester (30.1%) and England (28.5%) There are very low levels of disability in the local resident community. Based on the proportion of people who have a health problem which limits day-to-day activities (either a little or a lot), disability is much lower in the Study Area (4.1%) than Manchester (17.8%) and nationally (17.6%).

12.31. The neighbourhood is ethnically diverse, although less so than Manchester generally. The proportion of ethnic minorities (including White minorities) in the Study Area (37.2%) is lower than Manchester (40.7%), but higher than the national average (20.2%). The groups 'Asian/Asian British' (14.0%) and 'Other White' (12.8%) make up most of the ethnic minorities across the Study Area. This data has been sourced from the 2011 Census. Data from 2019 shows that the ethnic minority population (including White minorities) has grown across Manchester up to 42.4% and is still much higher than nationally (21.3%).

12.32. The community is digitally well connected. Manchester overall is digitally well connected with 93.9% of residents having used the internet in the last three months. This compares to 92.2% across the UK. The Internet User Classification shows that 'E-professionals' are the most dominant user group in the Study Area. These are people with high levels of Internet engagement, particularly regarding social networks, communication, streaming and gaming, but relatively low levels of online shopping, besides groceries. They are new but very active users, with a very high proportion of the population engaging daily. Their online behaviour may be explained by a demographic base that suggests a transitionary nature.

Visitors

12.33. Manchester is the second most visited local authority for tourism day visits in England (after London), with 29.7m tourism day visits. Previous footfall studies estimate c900 people access the Great Northern Square per day, equating to over 320,000 visits per annum. Undoubtedly, a portion of these visitors will be tourism day visits.

12.34. Visitors will be negatively impacted by construction in the short term, but positively impacted on completion due to improved amenity, public realm and goods and services. The Proposed Development is also likely to increase the number of visitors to the Study Area, who are likely to spend money on goods and services, which will support local businesses.

Employment

12.35. Most employment in the study area is in professional services, administration and retail. There are 2,200 businesses and 97,000 people estimated to be working in the Study Area who are likely to access services and amenities within the Proposed Development. In 2021, the most common sectors, accounting for over half (53.2%) of employment in the Study Area, included:

- Professional, scientific, and technical activities (25.8%). This is higher than the proportion of employment in this sector in Manchester (14%), and more than double the national proportion (9.3%).
- Administrative and support services (19%). This is higher than the proportion employed in Manchester (11.1%) and nationally (8.9%).
- Wholesale and retail (8.5%). This is lower than the proportion employed in this sector in Manchester (10.4%) and nationally (14.4%).

12.36. There has been significant growth in employment in Manchester, which will impact demand for commercial and employment land uses.

12.37. Similarly, residents commonly work in professional services, financial services & retail. In 2011, the most common sectors, accounting for over two-fifths (43.2%) of employed residents, included:

- Professional, scientific, and technical activities (22.6%). There is a much higher proportion employed in the Study Area than in Manchester (7.5%) and nationally (6.7%).
- Wholesale and retail trade (10.6%). There is a lower proportion employed here than in Manchester (15.7%) and nationally (15.9%).
- Financial and insurance activities (10.0%). There is more than double the proportion employed here compared to Manchester (4.2%) and nationally (4.4%).

12.38. Overall low unemployment, but with higher youth unemployment in this community. The Claimant Count is used as a measure of unemployment. It measures the number of people claiming benefits mainly for the reason of being unemployed. It also includes Universal Credit (UC) claimants including people on a low income, out of work or cannot work. Overall, the Claimant Count in the Study Area (1.83%) is much lower than in Manchester (5.88%) and England (3.3%).

12.39. However, the proportion of claimants who are young (16 to 24) is notably higher in the Study Area (25.0%) than Manchester (16.9%) and England (15.9%). This means there could be an issue with youth unemployment within the local neighbourhood.

Local Expenditure

12.40. Average household expenditure is lower in the North West compared to England. Total average weekly household expenditure in the North West (£508) is 11% lower than the national average (£567). Average weekly expenditure per person is 8% lower in the North West (£220) than in England (£238)

12.41. Over half (51.6%) of average weekly household expenditure in the North West is on four main commodities or services: 'Housing (net), fuel and power' (14.4%), 'Transport' (13.4%), 'Food & non-alcoholic drinks (11.9%), and 'Recreation and culture' (11.9%). This compares to 52.1% of average weekly household expenditure spent on these four categories in England.

Local Service Provision

Health

12.42. There are currently four GP practices within one mile of the Proposed Development. Each practice is accepting new patients. See Table 12.4 below.

Table 12.4: Nearby GP practices (September 2022)

Name	Distance (miles)	Accepting new patients
The Docs	0.5	Yes
City Health Centre	0.5	Yes
The Arch Medical Practice	0.7	Yes
Cornbrook Medical Practice	0.8	Yes

12.43. There are seven dental practices identified within one mile of the Proposed Development, although it appears that no practices are taking on new patients at this time.

Table 12.5: Nearby dental practices (September 2022)

Name	Distance (miles)	Accepting new NHS patients
207 Dental Care	0.1	No
City Centre Dentists (private only)	0.4	No
Bupa Dental Care, Manchester	0.4	Referrals only
Manchester DP Ltd	0.4	No

Name	Distance (miles)	Accepting new NHS patients
Ocean Dental	0.5	Referrals only
Revive Dental Care	0.6	Not known
mydentist, Stevenson Square, Manchester	0.8	No

Education

12.44. There are three primary schools within one mile of the Proposed Development. Only one school has unfilled places. There are a further 26 primary schools within two miles of the Proposed Development, and collectively they have 371 unfilled places.

Table 12.6: Nearby primary schools

Name	Distance (miles)	Unfilled places
St Philip's CofE Primary School	0.62	5
St Wilfrid's RC Primary School (Hulme)	0.65	0
Rolls Crescent Primary School	0.87	0
New Islington Free School	1.07	0
Medlock Primary School	1.12	15
Holy Name RC Primary School	1.24	0
Cheetwood Primary School	1.26	17
Abbott Community Primary School	1.32	0
St Patrick's RC Primary School	1.32	13
Webster Primary School	1.33	51
St Anne's RC Primary School (Ancoats)	1.38	0
St Mary's CofE Primary School (Moss Side)	1.44	14
St Chrysostom's CofE Primary School	1.63	0
Unity Community Primary	1.63	28
St Chad's RC Primary School	1.66	4
Our Lady's RC Primary School	1.73	5

Claremont Primary School	1.77	24
Park View Community School	1.77	18
St Malachy's RC Primary School	1.78	6
Ashbury Meadow Primary School	1.83	0
Saviour CofE Primary School	1.84	22
St Luke's CofE Primary School	1.86	37
Armitage CofE Primary School	1.92	0
Plymouth Grove Primary School	1.92	31
Manley Park Primary School - Infants	1.93	4
Heald Place Primary School	1.94	31
St Margaret's CofE Primary School (Whalley Range)	1.96	39
The Divine Mercy RC Primary School	1.96	8
Manley Park Primary School - Juniors	1.98	4

12.45. School students are likely to travel further and more independently for secondary school places. There are four secondary schools within a two mile radius of the Proposed Development. All schools have unfilled spaces.

Table 12.7: Nearby secondary schools

Name	Distance (miles)	Unfilled places
Trinity CofE	0.96	24
Manchester Academy	1.48	20
Eden boys leadership academy	1.54	38
Eden girls	1.65	38
Dean Trust Ardwick	1.93	6

Quality of Life

12.46. Evidence suggests the local community face barriers to housing and local services. The Index of Multiple Deprivation (IMD) provides an overall rank of deprivation, made up of seven domains. Table 12.8 shows the Index of Multiple Deprivation for the Study Area. It shows that the Study Area experiences relatively low levels of deprivation overall.

12.47. However, 'Barriers to Housing and Services' is its poorest performing domains. This domain measures two sub-domains: 'geographical barriers', which relate to the physical proximity of local services, and 'wider barriers' which includes issues relating to access to housing such as affordability. Three of the five LSOAs fall within the 20% most deprived areas in the country against this domain and the entire Study Area falls within the 50% most deprived.

Table 12.8: Index of Multiple Deprivation by Domain, Rank, where 1 is most deprived and 32,844 is least deprived

Domain	Study Area				
	Manchester 054C	Manchester 060A	Manchester 060B	Manchester 060C	Manchester 060D
Income	32,178th	32,750th	32,781st	32,563rd	32,821st
Employment	31,913th	32,812th	32,788th	32,716th	32,799th
Education, Skills and Training	10,822nd	25,225th	16,794th	26,935th	15,555th
Health Deprivation and Disability	12,474th	11,054th	12,246th	13,808th	9,079th
Crime	2,310th	1,183rd	11,766th	7,824th	409th
Barriers to Housing and Services	2,810th	4,957th	13,690th	10,671st	2,181st
Living Environment	1,423rd	922nd	3,780th	686th	82nd
IMD overall rank	**12,008th**	**13,269th**	**20,539th**	**18,034th**	**8,808th**

Open Space, recreation and amenity

12.48. There are eight outdoor spaces within 0.5km of the proposed development: Saint John's Gardens, Castlefield Urban Heritage Park, Hardman Square, Parsonage Gardens, St Peter's Square, Albert Square, Lincoln Square and Great Jackson Street. Whilst open space is often scarce in city centre locations, it reinforces the social value and local importance of the public realm offer within the Proposed Development.

12.49. There are a relatively high number of recreational facilities including bars and restaurants in the local area surrounding the site, however access to some amenities, such as supermarkets, is somewhat limited.

12.50. There is evidence of poor-quality living environments in the local area. The quality of living environment is low in the Study Area according to the IMD. The Living Environment Deprivation Domain measures the 'indoors' living environment i.e. the quality of housing; while the 'outdoors' living environment contains measures of air quality and road traffic accidents.

12.51. Overall, the Study Area falls within the 20% most deprived areas in the country against this domain, with four of the five LSOAs falling within the 10% most deprived in the country. Whilst this is a likely feature of city centre locations, there is potential for the Proposed Development to improve the quality of the local living environment.

Crime

12.52. The Study Area performs poorly against the crime domain of the IMD (Table 12.4). The total crime rate per 1,000 people in the study area (1,392 crimes per 1,000 people) is much higher than in Manchester Local Authority Area (196 crimes per 1,000 people). Most common, is theft against the person and antisocial behaviour. The proposed development is likely to reduce opportunity for crime in the immediate study area through increased occupancy and use, increased natural surveillance and implementing secure by design principles.

Baseline of the current site

12.53. The Great Northern site is currently in use and delivering social and economic benefits in the city, although it is currently underused given its position as a key strategic site in the city. Employment on site tends to be concentrated in lower value and lower density employment uses, such as leisure and retail.

12.54. Based on the existing uses on site, the site can support up to 384 jobs and equating to a GVA of £16m per annum. That said, this is a best case scenario, assuming that existing units are fully occupied and does not account for the vacant units, which were not possible to quantify for this assessment. The economic impact of the site is therefore likely to be less than this.

Table 12.9 – Existing onsite employment and GVA

	Leisure	Retail	Office
Commercial floorspace (sqm)	23,080	8,371	621
Employment density (FTE per sqm)	70	17.5	11.6
Gross operational jobs (FTE)	330	478	54
Net additional operational jobs	147	213	24
GVA per job (2022 prices)	£40,945	£40,287	£60,083
Total GVA pa	£6,014,304	£8,585,369	£1,433,900

12.55. The existing site does not include residential accommodation.

12.56. The existing public realm on site is estimated at 9,079 sqm. It is reasonably well used, and the social value of amenity benefits provided is estimated at £116,095.

Identification and Evaluation of Potentially Significant Effects

12.57. As noted earlier, there are no recognised definitive criteria for the assessment of socio-economic impacts. We have therefore made judgements on significance based on professional experience.

Economic Uplift from Construction

12.58. The Proposed Development will result in temporary economic uplift through the construction and its supply chain. By applying construction job coefficients to gross construction cost, the Proposed Development will support 1,625 FTE construction jobs, generating £94m in GVA during the construction period. We assess this benefit as minor beneficial.

Social value from construction apprenticeships

12.59. Apprenticeships will also be supported during the construction phase. Based on average industry benchmarks, approximately 96 apprenticeships will be supported by a scheme of this scale. We assess this benefit as minor beneficial.

Additional demand for social infrastructure

12.60. The Proposed Development is expected to accommodate 1,222 new residents on site. Residents are likely to require access to core public services such as GPs and dentists. We have assumed that approximately 25% of residents will already be registered with a GP elsewhere or nearby. By applying the national benchmark ratio of GPs per patient to resident numbers (1800:1), we estimate the Proposed Development will create additional demand for 0.5 GPs. We assess this impact as negligible.

12.61. We have applied the same methodology to determine the additional number of dentists required, using a ratio for dentistry (1200:1), which show the Proposed Development will create additional demand for 0.8 dentists. We assess this impact as negligible.

12.62. The local demographic is predominantly single households or couples without children. Whilst there will still be some households with small children, the proposed Crown Street Primary School is expected to provide 210 spaces for primary age children and 26 spaces for those in nursery. Therefore, we judge impact on education to be negligible.

Income from new residents

12.63. Following completion of the Proposed Development, there will be an estimated 746 households onsite, with an average household expenditure of £29,046 per annum. Households are expected to spend a portion of their income on goods and services locally (£11,618 pa), estimated local spend of £8.7m per annum. We estimate this benefit as minor beneficial.

Economic uplift from additional employment and GVA

12.64. As noted above, the Proposed Development will result in a higher density and higher value employment mix on site than currently. The Proposed Development includes new office space, reducing the lower density employment uses such as leisure. We have estimated the number of jobs created by the Proposed Development by applying average employment densities to leisure, retail and F&B useuse, and upper range employment density for office use. We have adjusted the gross job creation to reflect additionality. We have applied GVA per job by sector to estimate the economic value of the scheme in GVA.

Table 12.10 – Annual net additional employment and GVA

	Leisure	Retail	Office	F&B	Total
Commercial floorspace (NIA, sqm)	6811	3681	13308	4735	
Employment density (FTE per sqm)	70	17.5	10	17.5	
Net additional operational jobs	43	94	593	121	850
GVA per job (2022 prices)[1]	£40,944.77	£40,287	£60,083.10	£13,785	
Total GVA pa	£1,774,891	£3,775,320	£35,621,552	£1,661,560	£42,833,323

12.65. This suggests there will 850 FTE jobs supported onsite, creating a total of £42.8m GVA per annum. This is significantly higher than the economic value of the site in its current uses (estimated at 384 jobs and £16m of GVA) We assess this benefit as minor beneficial.

Social value from additional and improved open space

12.66. The existing open space, the Great Northern Square, is already well used by the local community, workers and visitors and provides attractive amenity locally. However, the area is not well used out of daytime hours and the site lacks permeability, which also reduces footfall and natural surveillance.

12.67. The Proposed Development increases the area of open space and public realm from 9,079 sqm to over 12,076 sqm, as well as improving the exiting open space with lighting, planting and more accessibility. The number of trees onsite will increase from 27 to 156. This is likely to increase the number of people using the site and improve its amenity. It will also create biodiversity gains and provide eco-systems services benefits from additional trees and planting.

Additional income to the public purse

12.68. The Proposed Development will create further cash releasing benefits to the Local Authority by way of:

- Additional 746 households paying Council Tax, (assumed Band D), equating to £1.4m per annum
- Income from New Homes Bonus, estimated at £46k using New Homes Bonus Calculator 2022/23
- Business Rates estimated using latest VOA data at £2.3m per annum
- Delivering areas of new highways works/ improvements on behalf of MCC.

Assessment of Significance Summary

Table 12.11 – Assessment of Significance

Impact	Current Site	Proposed Development	Magnitude	Sensitivity	Significance
Jobs and GVA created from construction (temporary during construction)	£0	£93.7m	Minor	Moderate	Minor beneficial

[1]Source: BRES 2020 and Regional GVA (balanced) by industry 2020, ONS, inflated to 2022 prices

Impact	Current Site	Proposed Development	Magnitude	Sensitivity	Significance
Construction apprenticeships (temporary during construction)	0	96	Minor	Low	Minor beneficial
Increased residents placing additional burden on local social infrastructure (i.e. GPs, dentists, etc)	0	1,222	Negligible	Medium	Negligible
Increased household expenditure of new residents suporting local jobs (operational phase)	£0	£8.7m pa	Minor	Low	Minor beneficial
FTE employees and GVA onsite (operational phase)	£16m pa	£42.8m pa	Minor	Low	Minor beneficial
Increased quantity and social value of public open space/ public realm (operational phase)	9,07900 sqm £116,095	12,076300 sqm £154,419	Moderate	Moderate	Moderate/ minor beneficial
Increased rates generated from business onsite (operational phase)		£2.3m pa	Minor	Low	Minor beneficial
Increased income from council tax from new residents (operational phase)	£0	£1.4m pa	Minor	Low	Minor beneficial
Income to the public purse from new homes bonus (operational phase)	£0	£46k	Minor	Low	Minor beneficial

Mitigation Measures

12.69. This socio-economic impact assessment highlights moderate and minor beneficial impacts. Opportunities for enhancement are suggested against each impact below.

Table 12.12: summary of opportunities for enhancement via mitigation

Impact	Opportunities for enhancement
Jobs and GVA created from construction (temporary during construction)	• Working with contractors to provide jobs for workless people • Working with contractors to provide jobs for people facing barriers to employment e.g. ex-offenders • Working with young people to raise awareness of careers in construction and STEM subjects, work experience and other support.
Construction apprenticeships	• Working with contractors to encourage take-up of local apprentices

Impact	Opportunities for enhancement
Increased household expenditure suporting local jobs (operational phase)	• Ensuring local retail and leisure provision aligns with the scheme vision and lifestyle offer and local need
Increased FTE employees and GVA onsite (operational phase)	• Prioritising higher value and growth sectors as tenants
Increased quantity and value of public open space/ public realm (operational phase)	• Creating year-round animation and events • Embed arts and culture in public spaces • Engaging local people in use and maintenance of spaces • Effective site management strategy
Increased rates generated from business onsite (operational phase)	N/a – this is determined by Local Authority
Increased income from council tax from new residents (operational phase)	N/a – this is determined by Local Authority
Income to the public purse from new homes bonus (operational phase)	N/a – this is determined by Local Authority
Income to the public purse from S106	N/a – this is determined by Local Authority

Cumulative Effects

12.70. Socio-economic impacts should be considered alongside the delivery of other proposed schemes in the surrounding area. There are 12 schemes within a 500m radius of the site which create cumulative socio-economic impacts. These are:

- 274 Deansgate - additional office floorspace (Use Class E (g), along with ancillary works to the ground floor and basement levels, and removal and replacement of plant (132376/FO/2021) (Approved)
- 3 St John's - Change of use to create no.11 residential apartments (Class C3), with storage provision at basement level. (120062/FO/2018) (Approved)
- 325 – 327 Deansgate - 22-storey building comprising apart-hotel (Use Class C1) with flexible commercial uses at ground floor and within existing viaduct arches (Use Class A1, A2, A3, A4, D2), (125804/FO/2019). (Approved)
- Travelodge Deansgate Locks - a mixed-use building, comprising flexible units for retail, food and drink use at ground floor level with a hotel at upper storeys. (126308/FO/2020) (Approved)
- Freetrade Exchange - Refurbishment and alteration works to office building (creating 37 sqm Use Class E(g)(i) office space). (133282/LO/2022) (Awaiting Determination)
- One Commercial Street - Proposed development of seven townhouses on current brownfield site (128433/FO/2020) (Approved)
- 79 Moseley Street - Creation of 1 x basement unit for A1 (retail), A3 (restaurants/cafes), A4 (drinking establishments), B1 (offices) and 1 x ground floor unit for A1 (retail), A3 (restaurants/cafes), A4 (drinking establishments) with offices (Class B1) above (floors 1 to 5). (118398/FO/2017) (Approved)
- Beetham Tower - The construction of an office building, (Class B1). (068662/FO/2003/C3) (Approved)
- 44-48 Bridge Street - Erection of an 8-storey building to form ground floor commercial (619 sqm) (Use Classes A1, A2, A3, A4 or A5) and upper offices (4055 sqm) (Use Class B1) (115200/FO/2017) (Approved)
- Great Jackson Street - Two 51-storey residential buildings (Use Class C3). (132199/FO/2021) (Approved)
- Deansgate South - Full planning permission for a 28-storey purpose-built student accommodation (129406/FO/2021) (Approved)
- One City Road - 11-storey office building (Use Class E) and one 14-storey office building with ground floor commercial unit (Use Class E)(128002/FO/2020) (Approved)

12.71. The table below summarises the scale and mix of schemes to inform an overall assessment of the cumulative significance of the Proposed Development together with wider schemes.

Table 12.13 – Summary of cumulative schemes

Scheme	Office (sqm)	Retail/ leisure (sqm)	Dwellings	Other
274 Deansgate	2839	~	~	
3 St John's	~	~	11	
325 – 327 Deansgate	~	657	~	Aparthotel – 279 bed spaces

Scheme	Office (sqm)	Retail/ leisure (sqm)	Dwellings	Other
Travelodge Deansgate Locks	~	718	461	
Freetrade Exchange	37	408	~	
One Commercial Street	~	~	7	
79 Moseley Street	1765	733	~	
Beetham Tower (office)	?	~	~	not confirmed
44-48 Bridge Street	4055	619	~	
Great Jackson Street (Plot F)	?	?	988	0.5ha public realm
Deansgate South	~	15011	?	
One City Road	48514	56	~	
Total	57210	18202	1467	~

12.72. The total value of construction costs for these schemes is likely to create a significant but temporary boost in the construction sector and its supply chain. Assuming the phasing and delivery of schemes is in line with the construction labour supply, then the impacts will be positive. The cumulative impact of the schemes on construction jobs and GVA is likely to be moderate beneficial. The number of apprentices is likely to be minor beneficial.

12.73. The total number of additional new homes is estimated to be 1,467 based on the information provided above, and this is estimated to result in a further 2,347 new residents living in the city centre. This is likely to produce positive benefits by way of additional household spend in the local economy. The cumulative impact is likely to be moderate.

12.74. Increasing the volume and quality of employment uses in the city centre is likely to have a significant cumulative impact on the employment mix, particularly office use, which tends to support higher value and higher density employment uses, such as professional services. The wider local developments are expected to create over 57,000 sqm of office space in the city and over 18,000 sqm retail or leisure uses. The cumulative impact on increased jobs and GVA is likely to be moderate beneficial.

12.75. There are further benefits to the Local Authority, through the New Homes Bonus and Council Tax, and this is considered to be a minor beneficial. Benefits from business rates have not been possible to assess for the cumulative schemes and we assume this is minor beneficial, when taking into account that some existing properties may already pay business rates.

Residual Effects

12.76. There are several beneficial residual effects on socio-economic receptors expected to arise from the Proposed Development. The residual effects are summarised in Table 12.14 below.

Table 12.14: Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Construction			
Employment & GVA	Jobs and GVA created from construction (temporary during construction)	None	Minor beneficial
Skills/ employment	Construction apprenticeships (temporary during construction)	None	Minor beneficial
Operational			
Local services	Increased residents placing additional burden on local social infrastructure (i.e. GPs, dentists, etc)	Opportunity to provide space for GP / dentist	Negligible
Employment and GVA	Increased household expenditure of new residents supporting local jobs (operational phase) Increased FTE employees and GVA onsite (operational phase)	None	Minor beneficial
Open space	Increased quantity and value of public open space/ public realm (operational phase)	None	Moderate/ minor beneficial
Local Authority Income	Increased rates generated from business onsite (operational phase)	None	Minor beneficial
Local Authority Income	Increased income from council tax from new residents (operational phase)	None	Minor beneficial
Local Authority Income	Income to the public purse from new homes bonus (operational phase)	None	Minor beneficial

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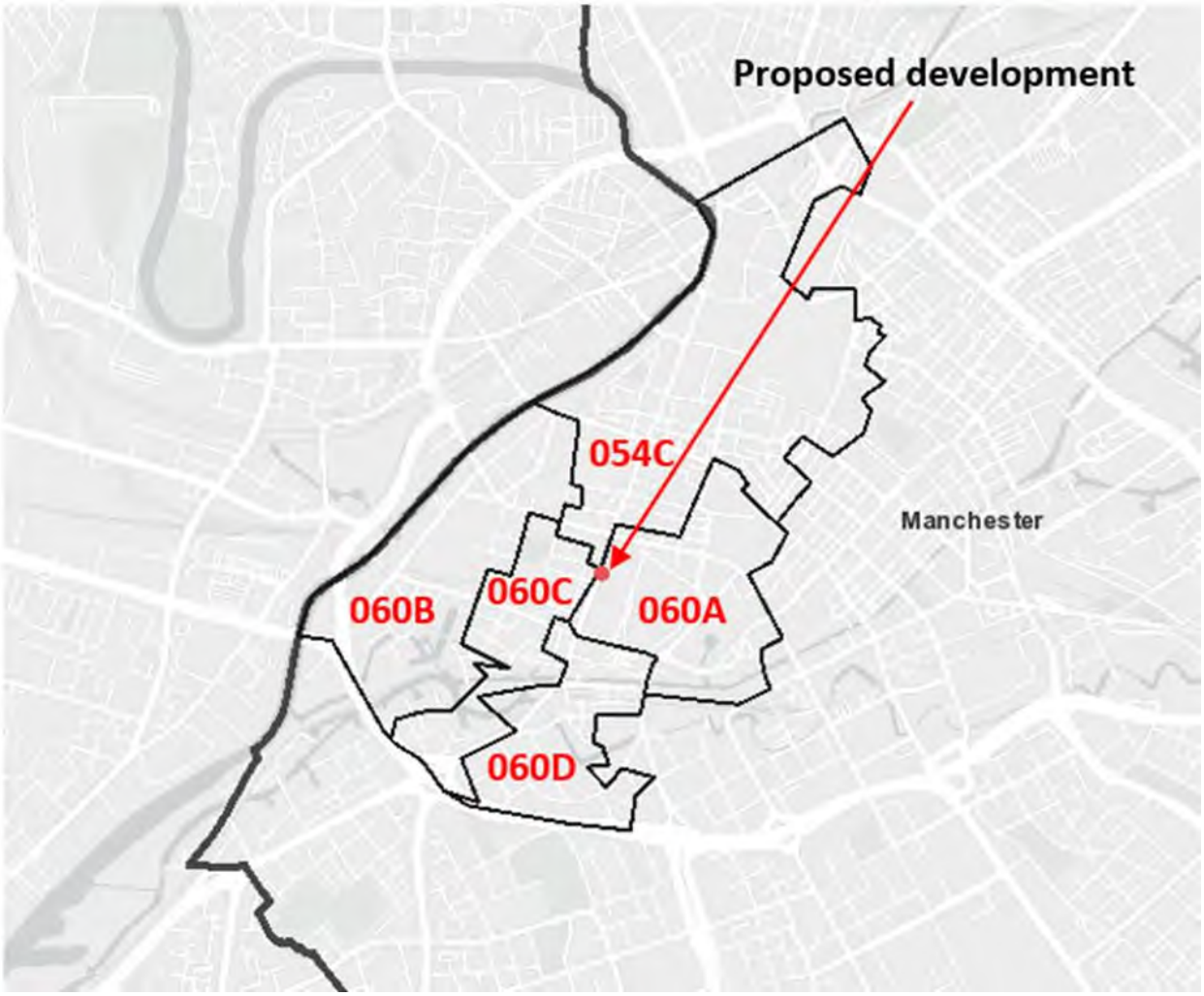


	Figure:	12.1		
	Title:	LSOA – Study Area		
	Project:	Great Northern, Manchester		
	Date:	November 2022	Scale:	Scale /NTS

13. Human Health

Introduction

13.1. This Chapter of the ES has been prepared by Enfusion and assesses the likely impacts of the proposals upon human health for the site and surrounding area. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

13.2. The chapter has been prepared by Barbara Carroll BSc MSc CEnv FIEMA with over 25 years' experience of assessing plans and projects for their impacts on the environment, including effects on human health and wellbeing. She has prepared health chapters for other Environmental Statements supporting various development project proposals in Manchester and other urban locations. She is a co-author of the practical guide - The EIA Handbook (Telfords, Third Edition, November 2019).

Legislative and Policy Context

National Planning Policy

National Planning Policy Framework (NPPF 2012, updated 2019, and revised 2021)

13.3. The revised NPPF acknowledges the importance of considering health impacts during the planning process and covers many issues that are directly related to the determinants of health. The NPPF identifies the three overarching objectives – economic, social, and environmental – that are interdependent and need to be pursued in mutually supportive ways in order to achieve sustainable development (paragraph 8). The social objective should support "strong, vibrant and healthy communities… by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being.'

13.4. Chapter 8 covers promoting healthy and safe communities, acknowledging that planning policies and decisions should aim to achieve healthy, inclusive, and safe places which:

"a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through mixed-use developments, strong neighbourhood centres, street layouts that allow for easy pedestrian and cycle connections within and between neighbourhoods, and active street frontages.

"b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example through the use of clear and legible pedestrian routes, and high quality public space, which encourage the active and continual use of public areas; and

"c) enable and support healthy lifestyles, especially where this would address identified local health and well-being needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling." (paragraph 92).

13.5. Social, recreational, and cultural facilities and services should 'support the delivery of local strategies to improve health, social and cultural wellbeing for all sections of the community (paragraph 93). It is important that sufficient choice of school places is available to meet the needs of existing and new communities (paragraph 95). Public safety should be promoted and "take into account wider security and defence requirements" (paragraph 97).

13.6. "Access to a network of high quality open spaces and opportunities for sport and physical activity is important for the health and wellbeing of communities" (paragraph 98). Sustainable transport should be promoted and this "can help improve air quality and public health" (paragraph 105). "An effective use of land should be promoted in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions" (paragraph 119). "Developments should create places that are safe, inclusive, and accessible and which promote health and wellbeing…" (paragraph 130). "New development must be appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health…" (paragraph 185).

Public Health England (PHE) Strategy (2019)

13.7. Sets out how PHE intends to protect and improve the public's health and reduce inequalities during 2020 to 2025. The Strategy recognises that the longer term, societal drivers of change represent the principal challenge facing the public's health. However, there are opportunities now, including "place-based approaches". The ten priorities include healthier diets, healthier weight; cleaner air; and better mental health" with the aim to incorporate the reduction of health inequalities into each of the ten priorities. The purpose of PHE is to protect and improve the nation's health and reduce health inequalities. This is guided by aims – "to keep people safe; to prevent poor health; to narrow the health gap; and the support a strong economy".

Local Planning Policy

Manchester City Council (MCC) Core Strategy (adopted 2012)

13.8. MCC's Core Strategy is the key document in Manchester's Local Development Plan. It is founded on a Vision to 2027 that includes "an increased and sustainable healthy population…". Policies relevant to health are as follows:

- Policy SP1 Spatial Principles includes requirement that development should make a positive contribution to neighbourhoods including "making a positive contribution to the health, safety and wellbeing of residents'
- Policy EC1 Employment and Economic Growth in Manchester requires development proposals to make the best possible use of a site in terms of efficient use of space and including application of best practice in security design.
- Policy EN4 seeks to reduce CO2 emission and reduce fuel poverty by enabling low and zero carbon development.
- Policy EN8 Adaptation to Climate Change includes requirements to minimise flood risk and reduce urban overheating.
- Policy EN9 Green Infrastructure provides guidance on provision of new, and improvements to, the quality and accessibility of existing green infrastructure assets.
- Policies EN10 and EN11 safeguard and create new open space, sport and recreation facilities.
- Health is further protected through Policies EN14 Flood Risk, EN16 Air Quality, EN17 Water Quality, and EN18 Contaminated Land & Ground Stability
- Policy T1 Sustainable Transport requires "delivery of a sustainable, high quality, integrated transport system to encourage modal shift away from car travel… and to prepare for carbon free modes of transport".
- Policy T2 will actively manage the pattern of development to ensure that there are accessible areas of opportunity and need.

- Policy T3 supports proposals that contribute to an economically and environmentally sustainable transport network through strategic integration of strategic transport projects. Progression towards sustainable transport will promote healthier living and well-being.
- Policy DM1 Development Management requires that all development should have regard to specific issues including "Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation"; Accessibility: buildings and neighbourhoods fully accessible to disabled people, access to new development by sustainable transport modes"; "Community safety & crime prevention"; and "Design for Health.

The Great Northern Warehouse Strategic Regeneration Framework (SRF) (Manchester City Council 2017, updated March 2019)

13.9. The Great Northern complex is a major site, in a prime location in the Civic Quarter, that is strategically important and historically significant. The SRF was updated to respond to changing market conditions and the surrounding development context. The site can be described as being in a pivotal location in the context of the city centre's economic growth and regeneration strategies.

Places for Everyone – Joint Development Plan (Greater Manchester Councils Publication Draft, 2021)

13.10. The Greater Manchester Spatial Framework (GMSF, Publication Draft, 2020) was withdrawn but nine of the previous ten Councils have agreed to progress with a Joint Plan that will build upon the evidence base already collected. The Publication Draft of the Manchester Plan has been submitted to the Secretary of State for independent examination. The Vision for Greater Manchester (GM) includes to make Greater Manchester as "a place where people live healthy lives"; and Strategic Objectives include No 10 "to promote the health and wellbeing of communities".

13.11. The overall draft Strategy and many of the policies in the plan support improvements in health and wellbeing, and reductions in health inequalities, such as by "promoting a successful economy; increasing supply of high quality and affordable homes; enabling people to adopt healthier lifestyles; and reducing risks to human health". The JDP recognises that addressing health inequalities will require a diverse range of coordinated measures. The JDP supports improvements in health and wellbeing including through promoting a successful economy, enabling people to adopt healthier lifestyles, and reducing the risks to human health.

Other Relevant Policy, Strategy & Guidance

Public Health England (PHE) Spatial Planning for Health (2017)

13.12. Provides evidence of links between spatial planning and health, focusing on five key built environment topics – neighbourhood design, housing, healthier food, natural and sustainable environment, and transport.

Public Health England (PHE) Health Impact Assessment in Spatial Planning (2020)

13.13. Provides a guide for local authority public health and planning teams setting out process and practice with regard to the wider determinants of health and wellbeing for plan-making and the planning application process. It identifies eight categories of health and wellbeing outcomes in planning: reduce health inequalities; improve mental health & wellbeing; improve diet & weight; improve musculoskeletal health; improve respiratory health; improve cardiovascular health; protect environmental health; and provide access to health & care infrastructure and services. The guide is mostly associated with the plan-making and associated strategic environmental assessment processes. However, it does include an annex on integrating HIA in EIA and it does confirm the importance of a "proportionate and justified approach".

The Manchester Strategy - Our Manchester (2016)

13.14. The Manchester Strategy to 2025 comprises the Vision and five themes for the strategy including a progressive and equitable city where "health will improve…".

Assessment Methodology and Significance Criteria

13.15. Health Impact Assessment (HIA) and health in EIA are separate processes, and there is no standard methodology for assessing health in EIA. The coverage of health in EIA need not be so comprehensive as the HIA that is used to inform detailed project design, but guidance documents for good practice in HIA can inform EIA practice in relation to human health and well-being. It is important that health in EIA is proportionate, balanced, and relevant. The approach here is proportionate - based on consultation responses, the Scoping Opinion, professional experience, and assessment of impacts against relevant baseline information.

13.16. The Scoping Opinion received from MCC on 28 October 2022 advised that the comments within the Scoping Report on Human Health are noted and are acceptable in terms of their consideration in the ES.

13.17. Shaping Neighbourhoods: For Local Health and Global Sustainability (2003, 2010 & 2021) sets out the complexities of planning for health due to the multiple determinants and the need for cross-sectoral understanding and collaboration. This guide established a health map demonstrating the linkages between the global ecosystem, the natural and built environments, the local economy with communities, people, and their lifestyles. It explains the likely interactions between different sectors and seeks a common language for spatial planning and public health practitioners.

13.18. The complexities of investigating health impacts are recognised by Public Health England (PHE) and the Wider Determinants of Health tool is an ongoing project that provides resources for categories of factors that affect health, as follows: built & natural environment; work & the labour market; vulnerability; income; crime; education.

13.19. The London Healthy Urban Development Unit (HUDU) 'Healthy Urban Planning Checklist' (2017) provides a useful checklist that was developed for London but is applicable to development proposals in urban city centres elsewhere in the UK. The checklist aims to promote healthy urban planning by ensuring that the health and wellbeing implications of major planning applications are consistently taken into account, through providing a set of themes and planning issues that can be used to assess development proposals.

13.20. This HUDU checklist recognises that health and wellbeing can be affected by multiple determinants as shown in Figure 13.1.

13.21. The checklist is divided into four themes - healthy housing/building; active travel; healthy environment; and vibrant neighbourhoods – and each theme contains a number of questions focused on a planning issue with related health and wellbeing issues. Changes in certain determinants caused by development may affect the health and wellbeing of existing and new residents. The HUDU has further developed a rapid HIA tool (London HUDU, 2019) that uses existing evidence to quickly assess the impacts of a development plan or proposal and recommend measures to address any negative impacts and maximise benefits. The tool is based on eleven topics or broad determinants of health and wellbeing focused on the built environment and issues influenced by planning decisions.

13.22. For the purposes of this health impact assessment, we have applied the HUDU checklist and eleven topics to the proposals in order to help determine the scope of the assessment by identifying the relevant topics. Applicable criteria/questions for each of the scoped topics were considered at the assessment stage in order to identify potential health impacts and the need for any mitigation or enhancement. Existing information and evidence were used, and impact assessment undertaken using professional judgment.

13.23. Housing/building design and affordability are key factors – provision of good quality residential development is known to have positive effects on health and wellbeing. Access to health and social care services and other social infrastructure is directly important for health. This health assessment considers the proximity, accessibility, and capacity (where possible) of health and medical centres and dentists in the vicinity of the proposed development. It considers the proximity and accessibility of gyms, leisure centres, sports/recreational and cultural facilities nearby since such activities are important contributors to health and wellbeing. Searches were made through web-based sources and using Google Maps to measure approximate distances by walking and/or public transport from the centre of the development area to the facility.

13.24. Access to open space and nature is a key factor. The proximity of open spaces and walking/cycling routes is investigated since access to open space and healthy modes of transport also contributes to healthier lifestyles and wellbeing.

13.25. Air quality, noise and neighbourhood amenity are important factors for health and wellbeing. Summary findings from the technical studies for air quality and noise in the EIA are considered and their implications for health and wellbeing incorporated into this HIA.

13.26. Accessibility and active travel are well established as factors in health and wellbeing. Summary findings from the technical studies for transport in the EIA are considered and their implications for health and wellbeing incorporated into this health impact assessment.

13.27. Crime reduction and community safety is a key factor in health and wellbeing of communities and this health impact assessment considers those elements of the development proposals that contribute to safety.

13.28. Access to healthy food is a direct factor in health and consideration is given to accessibility to a range of food stores with a mix of affordable shops. Provision of allotments or community gardens for growing food is beyond the scope of the development proposal.

13.29. Access to work and training is known to affect health and wellbeing. Whilst provision of training is beyond the scope of the development proposals, the renovation of office spaces and ground floor retail and leisure uses will enhance employment possibilities in the city centre.

13.30. Social cohesion and inclusive design are key factors for health and wellbeing. This HIA considers the implications of the design and project proposals in this respect, including connectivity with existing communities and the wider context of the regeneration priority area.

13.31. Minimising use of resources and addressing the effects of climate change are key factors in considering environmental sustainability and a healthy environment – and consequently, health and wellbeing for people and communities. Risks associated with flooding and ground contamination have been determined to be very low and were scoped out of the EIA and therefore are not considered to be significant for health and wellbeing. Risks associated with extreme weather conditions and climate change are considered within this health impact assessment.

13.32. Overall, the HIA aims to consider impacts associated with the construction and the occupational phases. It considers embedded mitigation provided through the design of the project – such as layout, building standards, and provision of new public realm, together with specific mitigation for potential negative effects – such as the commitment to a Construction Environmental Management Plan (CEMP) to control and minimise any effects associated with nuisance noise and dust.

13.33. The complexities of investigating health impacts are appreciated, including the multifunctionalities and interconnectedness of factors. Therefore, the key factors are considered within the four themes for healthy urban living, as follows:

- Healthy Housing/Buildings
- Active Travel

- Healthy Environment
- Vibrant Neighbourhoods

13.34. Provision of good quality residential development, access to employment and social infrastructure, with access to open/green space are known to have positive effects on health and wellbeing. The Proposed Development includes the renovation of the Great Northern Warehouse to provide 150,000 sq ft of office space and ground floor retail and leisure uses. It includes the conversion and alterations to Deansgate Terrace to provide a further 40,000 sq ft of office with ground floor retail and leisure space. The redevelopment of Great Northern Square seeks to provide new public realm and ancillary facilities, along with the creation of new pedestrianised areas.

13.35. The existing Odeon Cinema will be demolished with the car parking retained followed by the development of approximately 746 residential apartments on top of the retained structure. The whole site will be complemented by new high quality public realm. The summary findings of the socioeconomic (Chapter 12) and townscape/visual impact (Chapter 6) studies will be integrated into the implications for the four themes for healthy urban living since these topics are key contributors to improvements in health and wellbeing.

13.36. The key findings from the Air Quality (Chapter 8); Noise & Vibration (Chapter 9); Wind Microclimate (Chapter 10); Sunlight, Daylight & Solar Glare (Chapter 11); and Climate Change (Chapter 14) assessments are considered in order to integrate within this Health chapter the key impacts associated with any pollution and future climate change effects that can affect human health and wellbeing. Access to sustainable modes of transport is a key contributor to improvements in health and wellbeing. Risk and vulnerabilities to pollution and/or the effects of climate change, are key factors for human health and wellbeing. It was agreed through the EIA scoping process that significant adverse environmental effects were unlikely for flood risk and ground conditions and these topics were scoped out of the EIA process. However, studies were undertaken to inform the project design process and their findings are referred to in the themes for healthy urban living since these factors are important with regard to risks for health and wellbeing.

13.37. Each technical impact assessment is subject to its own standards, regulations, and methods of assessment. The key findings from each are considered and integrated into the four themes of - Healthy Housing; Active Travel; Heathy Environment; and Vibrant Neighbourhoods. Thus, any significant impacts for human health are clearly presented in a separate chapter.

13.38. This chapter on health is not a Health Needs Assessment and does not attempt to quantify health care contributions. The geographical scope is determined by receptor groups that are likely to be significantly affected by the proposed development. The scope of the Health Chapter is in part dependent upon the study areas and potential receptors identified in the other technical assessments (air quality, noise, wind, sunlight, socio-economic, climate change). Thus, the study area comprises the proposed development site with local surrounds and the wider study area of Manchester City – as applicable to each of the factors relevant to human health and wellbeing for the proposed project. The scope of the human health impact assessment chapter is as outlined above and is undertaken in consideration of the proposed development as part of a wider regeneration priority area.

13.39. Receptors were identified, as follows:

- construction workers
- existing residents, businesses, communities around the site, and including any sensitive receptors such as hospitals, nurseries, schools, care homes identified by the technical assessments
- future users and visitors of the site
- pedestrians in the vicinity of the site

13.40. The baseline informing the assessment draws upon local health and wellbeing information and priorities, such as those set out in the Manchester City Joint Strategic Needs Assessment (JSNA 2021), published local authority health profiles through Public Health England (PHE, 2018-2020), and as reported by Manchester City Council, for example, through the MCC Intelligence Hub. The key baseline from the other technical topics is considered, including risks to health/wellbeing such as from air quality, noise, and risks associated with the effects of climate change. The key baseline information from the townscape and socio-economic studies has been considered. It has not been necessary for this assessment to undertake primary research or surveys and this desk-based approach using published information and professional judgment provides an appropriate level of detail.

13.41. The Institute of Environmental Management & Assessment (IEMA) paper on Health in EIA (2017) explains the complexities associated with defining significance for population and human health. This guidance notes that there is an absence of specific significance criteria or defined thresholds for determining significance for population and health in UK EIA practice. Given the multitude of factors that contribute to an individual's health outcomes, it is difficult to draw a quantified conclusion regarding the contribution of a particular development to an increase or decrease in the number of additional cases of a particular physical or mental health outcome.

13.42. Therefore, a significant effect is reported in this assessment where, based on professional judgment, the proposed development is likely to contribute to a material change in health outcomes associated with the health issue being assessed and, in determining this, the following questions have been considered:

- Have significant effects been identified in other assessments undertaken as part of the EIA that are linked to human health (i.e. are environmental or health standards threatened)?
- Are vulnerable groups affected?
- Is the effect reversible or irreversible?
- Does the effect occur over the short (less than one year), medium (one to five years) or long (over five years) term?
- Is the effect permanent or temporary?
- Does it increase or decrease with time?
- Is the effect at an individual or population level?
- Are mitigating measures available and is it reasonable to require these?

13.43. Effects that are described as 'minor' or 'negligible' are determined to be 'Not Significant' and effects that are described as 'moderate' or 'major' are determined to be 'Significant'. This considers the sensitivities of receptors (high, moderate, low) and as set out previously in Table 2.4 in the EIA Methodology (Chapter 2). The criteria and categories of significance applied in the health impact assessment are, as follows:

- Major Adverse/Beneficial – important considerations at local or district scale; if adverse, are potential concerns to the project and may become key factors in the decision-making process
- Moderate Adverse/Beneficial – modest important local effects that, if adverse, are not likely to be key issues for decision-making
- Minor Adverse/Beneficial – Slight, short, or highly localised effects that, if adverse, are unlikely to be important in the decision-making process
- Negligible – no appreciable effects on health factors

13.44. Standardised sectoral thresholds and significance criteria have been used for each of the relevant technical factors that contribute to health and well-being, according to recognised guidance, standards, and assessment methods for climate change; sunlight, daylight & solar glare; wind; noise & vibration; transport; and air quality. Then, the overall likely significant effects on health have been determined in a qualitative way using professional judgment.

Limitations and Assumptions

13.45. This Health Chapter considers the findings relevant to human health of each technical impact assessment scoped into the Environmental Statement – Townscape/Visual Impact Chapter 6); Historic Environment (Chapter 7); Air Quality (Chapter 8); Noise & Vibration (Chapter 9); Wind Microclimate (Chapter 10); Sunlight, Daylight & Solar Glare (Chapter 11); Socioeconomics (Chapter 12); and Climate Change (Chapter 14) – and, as such, any key assumptions or limitations associated with each technical impact assessment are addressed within the individual chapters. The overall approach for collating, assessing, and reporting impacts on human health and well-being is considered to be appropriate and proportionate such that there are no limitations. The assessment, set out in this ES Chapter, is desk-based and with professional judgment using published information.

Baseline Conditions

13.46. The Site is located in the Deansgate Ward, adjacent to Deansgate to the west, Peter Street to the north, Watson Street to the east, and Great Bridgewater Street to the south. The Site currently comprises the Great Northern Square (public realm), the Great Northern Warehouse (retail, commercial & car parking), Deansgate Terrace (commercial, retail and food & drink), and Leisure Box (the Odeon Cinema, the Gym and car parking).

13.47. Population: In 2020, the total population of Manchester was 555,741 people, an increase of 10.51% since 2011. This growth exceeded the levels of population in Greater Manchester at 6.07% and nationally in Great Britain at 6.04% during the same period. The rate of city population growth is likely to increase to over 627,000 by 2025. The Manchester State of the City Report (2021) notes that Manchester has a much younger age profile than England with an annual growth of twice the national population for residents aged 20-39. The Report summarises that despite recent improvements, Manchester still has some of the worst health outcomes in the country and there are significant inequalities within the city (health and unemployment). The population of Deansgate Ward (2020) was 10,291 males and 8,499 females, with 17,777 of working age and 364 people aged over 65 years. 8,432 people are white ethnicity according to the 2011 census, proportionately lower than other adjacent Wards.

13.48. The surrounding neighbourhood was defined as the five Lower Super Output Areas (LSOAs) where the Proposed Development is situated. The local community is relatively young and mostly working age. The majority (81.5%) of the Study Area's population are aged between 20-49, compared to 51.9% in Manchester and 38.8% in England. The Study Area has more than double the proportion of people in the age group 25-29 (25.3%) compared to Manchester (11.7%). Households are commonly one person or households with no children. There are very low levels of disability in the local resident community. The neighbourhood is ethnically diverse, although less than Manchester generally, and the community is digitally well connected. Manchester is the second most visited local authority for tourism day visits in England (after London) and the number of visitors is likely to increase to the Study Area.

13.49. Health Profiles: According to PHE data (2018-2020), life expectancy at birth for Manchester is 75.5 (males) & 79.9 (females) compared with 79.4 (males) & 83.1 (females) averaged for England. Physically active adults (2019-20) are recorded at 62.4% for Manchester, lower than that averaged for England at 66.4%. Percentage of adults classified as overweight or obese are recorded at 61.0%, slightly lower than the 62.8% averaged for England. The excess winter deaths index (2019-20) at 18.3% was slightly higher than the averaged value of 17.4% for England.

13.50. The proposed development is in the Deansgate Ward. According to MCC Intelligence Hub information using Ward profiles, the Deansgate Ward has very good health (2011 self-assessment from residents of the state of their general health), within the medium range for the City. Emergency hospital admissions for all causes are low at 36.3, compared with other Wards, and at the lowest of the range 36.3-186.7 for all Wards – indicating less poor health. The Index of Multiple deprivation (IMD) is an overall relative measure of deprivation constructed by combining seven domains of deprivation – Income; Employment; Education; Skills & Training; Health & Disability; Crime; Barriers to Housing Services and Living Environment. The Deansgate Ward has a IMD score (2019) of 24.14, (the least deprived is in the range 15.5-31.1 with 48.4-62.7 indicating the most deprived) indicating that Deansgate is one of the least deprived Wards in the City. For the Study Area with its five LSOAs, the IMD overall reports relatively low levels of deprivation. However, 'Barriers to Housing and Services' is its poorest performing domain – three of the five LSOAs fall within the 50% most deprived areas in the country against this domain.

13.51. The Deansgate Ward also shows good health when other indicators are considered. The number of estimated households in fuel poverty (2020) was 604 which is within the lowest range for the City. The number of residents claiming benefits (Feb 2022) is the lowest in the City at 1,009 for a range of 1,009-8,254 for all Wards. Incidence of all cancer (2014-18) is 72.5 and at the lower end of the range 70.8-142.1 for MCC. The total reported street crimes for 2018 was 14,172, similar to adjacent Wards, and at the higher end of the range from 1,343 – 16,552 for all Wards.

13.52. Housing: Currently, there are no people living at the Site. Following completion of the Proposed Development, there will be an estimated 1,222 residents living at the Site.

13.53. Employment: The Site is currently in use and delivering social and economic benefits in the city, although it is currently underused given its position as a key strategic site in the city.

13.54. Healthcare Facilities: There are four GP practices within 1 mile of the Proposed Development, and each is accepting new patients. There are seven dental practices within 1 mile, and it appears that none are taking on new patients.

13.55. Educational Facilities: There are three primary schools nearby within 1 mile, of which one school has unfilled places. There are four secondary schools within a two mile radius of the Proposed Development and all have unfilled places.

13.56. Crime: The total reported street crimes for 2018 was 14,172, similar to adjacent Wards, and at the higher end of the range from 1,343 – 16,552 reported within Manchester. The Study Area performs poorly against the crime domain of the IMD. The total crime rate per 1,000 people in the study area (1,392 crimes per 1,000 people) is much higher than in Manchester Local Authority Area (196 crimes per 1,000 people). Most common, is theft against the person and antisocial behaviour.

13.57. Open Space, Recreation & Amenity: There are four outdoor spaces within 0.5 miles of the Proposed Development. There are various gyms and leisure/sports centres within 2 miles of the Site. There are a relatively high number of recreational facilities including bars and restaurants in the local area surrounding the site.

13.58. Townscape & Visual Impact: The baseline conditions recognised 23 viewpoints across 12 city neighbourhood areas/townscape zones that have the potential to be significantly affected by the Proposed Development.

13.59. Air Quality: The Greater Manchester Combined Authority (GMCA) declared an Air Quality Management Area (AQMA) across the ten local districts and the Site is located within this AQMA. The Defra background concentrations in between 2019-2028 for NO2, PM10 and PM2.5 are well below the relevant AQS objectives (40µg/m3 for NO2 and PM10, and 25µg/m3 for PM2.5). GMCA operate a network of automated and non-automated air quality monitoring stations.

13.60. Air Quality has been gradually improving (2020) but roadside locations concentrations remain above the relevant AQS objective for NO2. Monitoring data (2019-2016) indicate that particulate matter PM10 levels were compliant with the annual mean PM10 objective. The baseline studies identified 19 existing sensitive receptor locations – 3 medical; 2 educational; 6 office/workplace; 4 restaurant/bar; and 5 hotel/residential. A further 17 proposed receptor locations (outer façade of each new development block) are introduced to the Site as a result of the Proposed Development – 11 office/commercial and 6 residential/commercial.

13.61. Noise & Vibration: The existing noise climate is dominated by transport noise with road traffic on all sides of the Site. Commercial businesses located close to the site also contribute to the noise climate. The nearest sources of vibration are the elevated train and tram lines, but these are such a distance away as to not lead to significant effects on the Proposed Development. The baseline identified six sensitive receptors – five are residential buildings and the sixth is Manchester Central, an event space where a low noise environment is desirable.

13.62. Wind Microclimate: The existing baseline conditions were assumed to be the area within the Site boundary and the existing properties surrounding the Site which might be affected by the Proposed Development. The studies identified 1-65 receptors (on-site and off0site) variously entrances and thoroughfares, and A-U (on-site) receptors for recreational spaces and outdoor seating. Wind conditions at most locations are rated as safe for all users, except at receptors 56 (corner of Beetham Tower on Great Bridgewater Street) and 22 (Watson Street/Windmill Street). Wind comfort ratings across the majority of the receptors are suitable for the intended pedestrian uses. The only exceedance of the pedestrian comfort criteria occurs at receptor 54 (entrance – Albert School).

13.63. Sunlight, Daylight & Solar Glare: The baseline studies identified six residential properties in the immediate vicinity of the Site as receptors potentially sensitive to daylight and sunlight. All other surrounding properties are of commercial and/or retail use and were not considered in the assessment. The Site is in a built-up high-rise inner-city area and therefore, the assessment considered whether the daylight and sunlight levels enjoyed after development are reasonable for the location.

13.64. Climate Change: Greenhouse gas (GHG) emissions occur constantly and widely as a result of human and natural activity. The existing baseline will include operational emissions from heating, cooling, lighting and electricity for the existing buildings on site. However, data are not available and operational carbon emissions for the existing baseline were not taken into account in the assessment. The site currently comprises 1,240 publicly available car parking spaces and the carbon emissions associated with this transport was estimated for the baseline.

Identification and Evaluation of Significant Effects; Mitigation Measures

13.65. The proposed development comprises phased redevelopment of the Great Northern Warehouse, Deansgate Terrace and Leisure Box, including areas of public realm. Overall, the refurbishment, restoration and re-use or extension will provide additional restaurant and/or retail and office spaces, together with associated public realm (hard and soft landscaping), highways works and associated works. Conversion, reconfiguration and extension of existing car parking facility to provide 929 parking places (net additional 20811 spaces). Construction is proposed in phases – Phase A: Warehouse conversion and Deansgate Terrace North plus Northern Square; Phase B and C: demolition of Leisure Box, delivery of towers and conversion of southern end of Deansgate Terrace.

13.66. Thus, five scenarios were investigated through the EIA to consider the phasing and committed developments. Overall, the health impact assessment considered Scenario 5 (worst/best case) – existing site (baseline) + Proposed Development Phase A + Phase B and C + committed developments.

13.67. Housing: There are no people currently living at the Site. It was noted that the Study Area performed poorly regarding the quality of the indoors living environment – the quality of housing – and overall, the Study Area falls within the 20% most deprived areas of the country for this domain. The Proposed Development is expected to accommodate 1,222 new residents on site within high quality units and this is considered to have a Moderate Beneficial impact on housing.

13.68. Employment: The Proposed Development will result in temporary economic uplift through the construction, its supply chain, and its support for approximately 96 apprenticeships, and assessed as Minor Beneficial. Upon completion of the Proposed Development, households are expected to spend locally, and this is estimated as Minor Beneficial. The Proposed Development will result in a higher density and higher value employment mix on site than currently, with 763 FTE jobs supported on site indicating Minor Beneficial impacts.

13.69. Healthcare Facilities: The Proposed Development will create additional demand for 0.5 GPs and 0.8 dentists – these are considered to be Negligible impacts.

13.70. Educational Facilities: The local demographic is predominantly single households or couples without children. There are spaces available at local primary schools and impacts are considered Negligible.

13.71. Crime: The Proposed Development is likely to reduce opportunity for crime in the immediate study area through increased occupancy and use, increased natural surveillance and implementing secure by design principles. Overall, likely to be Minor Beneficial effects.

13.72. Open Space, Recreation & Amenity: The existing Great Northern Square is well used by the local community, workers and visitors but not so well used out of daytime hours. The Proposed Development increases the area of open space and public realm as well as improving the existing space with lighting, planting and more accessibility. The number of trees increases from 27 to 160 and with further planting, the amenity value will be enhanced and the number of people using the site will increase with Moderate/Minor Beneficial impacts.

13.73. Townscape & Visual Impact: The Site is located within the city centre and is characterised with other tall buildings nearby. The townscape areas most affected by the demolition and construction phases are those in and around the Site – Castlefield, Petersfield, St Johns and Civic Quarter. These effects are predicted to be Moderate Adverse, although they will be relatively localised and temporary. Mitigation will involve high quality hoardings to screen the visual impacts at street level.

13.74. For the operational phase, the Proposed Development will have effects on views, visual and townscape receptors. Of the 23 viewpoints investigated, effects were found to be Not Significant in EIA terms for 16 viewpoints. Effects ranged from Major/Moderate to Moderate and Minor Beneficial for the other 7 viewpoints. There were no adverse effects identified. The embedded mitigation through the design process has improved the visual interest by varying height and form and ensuring a better relationship with taller neighbouring buildings. As cumulative schemes come forward, effects may change as sensitivities may increase through more residents, but the magnitude is likely to decline as the Proposed Development is seen in the context of more similar buildings of equivalent scale such that the net effects tend to reduce in cumulative significance. For 19 of the viewpoints there was no change or negligible cumulative change. For the other 4 viewpoints cumulative effects ranged from Minor to Major/Moderate Beneficial changes.

13.75. Air Quality: There is a risk to human health and wellbeing from dust and vehicle emissions. During the construction phase, AQ modelling on emissions from construction road traffic is predicted to be Not Significant. Dust and vehicle emissions will be controlled through the CEMP, including communication and management of activities, traffic and waste. For the occupational phase, it was found that development-generated traffic PM10 and PM25 concentrations would be Negligible for all existing and proposed receptor locations. AQ modelling indicated that there were some adverse effects at one of the existing receptor locations for annual mean NO2, but concentrations remain well below the relevant 1-hour NO2 mean. Therefore, overall, the effects on AQ are Not Significant. The Proposed Development will encourage sustainable travel and reduce reliance on road vehicles surrounding the site to improve local air quality conditions. There is a significant amount of new public realm and tree planting being brought forward as part of the Proposed Development.

13.76. Noise & Vibration: During the construction phase there is the potential for noise and vibration effects on people and buildings nearby, and noise from construction vehicles. These effects are reduced to Negligible to Minor Adverse for noise and Negligible for vibration through implementation of the CEMP, including limiting certain times of working, use of noise containment measures and use of low vibration plant techniques.

13.77. For the occupational phase, there will be a net reduction in car parking spaces such that the traffic generating potential will reduce compared to the baseline and therefore, no significant effects are expected as a result of road traffic changes. There is the potential for noise from external building services plant and from entertainment noise from within the commercial units. The Proposed Development is to rely on open rapid purge vents to provide relief from overheating, so there is the potential for noise impacts to occur, as internal noise levels will increase when the vents are open. Effects will be reduced to Negligible – Minor Adverse through provision of relief from overheating with means other than open purge vents for most impacted facades. The new residential buildings will be provided with glazing and ventilation systems which reduce the level of noise breaking in to Negligible. The level of noise that can be emitted by the Proposed Development will be restricted by noise limits such that effects on nearby receptors will be Negligible.

13.78. Wind Microclimate: Wind effects are closely at pedestrian level are closely associated with the size and shape of the massing of buildings and during the demolition and construction stage this condition will be continuously changing. As the works progress, the conditions on and around the Site would be expected to gradually transition to those for the final completed Proposed Development. During construction, the potential effects will vary and be less than the completed development. With the introduction of the Proposed Development, inherent exceedances of the pedestrian safety criteria from the baseline persist and effects are Negligible with is Not Significant. Wind comfort ratings across the majority of the receptors are suitable for the intended pedestrian uses. The inherent exceedance of the pedestrian comfort criteria from the baseline persist and effects are Negligible which is Not Significant. At the elevated levels of the Proposed Development, all areas are generally suitable for intended uses.

13.79. Sunlight, Daylight & Solar Glare: During the demolition phase daylight and sunlight will temporarily improve and during construction it will gradually move towards the figures for the final completed scheme. For the occupational phase, ten viewpoints at nearby roads and railway tracks were identified to investigate the potential for glare with discomfort or disability effects. For consideration of daylight and sunlight effects, six residential properties in the immediate vicinity of the site were identified as potential sensitive receptors. Amenity spaces also were assessed for potential overshadowing effects. The sunlight, daylight and overshadowing studies found that the Proposed Development would have Negligible or Minor Adverse effects on the surrounding residential properties and amenity spaces. The glare studies found that effects for road and train drivers would be Negligible or Minor Adverse, which is Not Significant in EIA terms.

13.80. Climate Change: Activities during the construction phase would generate GHG emissions, particularly from the manufacture of construction materials, but also from transport to the construction site and from on-site works. Effects were estimated to be Minor Adverse which is Not Significant in EIA terms. Activities during the operational phase would generate GHG emissions, particularly from the replacement and/or refurbishment of building elements. Activities during the end-of-life phase of the Proposed Development would generate GHG emissions, particularly from the demolition, waste processing and the disposal of building elements. Over the 60-year lifespan of the Proposed Development, the transport carbon emissions constitute about 60%, the whole life embodied carbon emissions and end of life are estimated to be about 37%, whilst carbon emissions from operational energy use are only about 3% of the total carbon emissions. Embodied carbon (operational & end-of-life), energy emissions, and operational transport emissions are predicted to be Minor Adverse which is Not significant in EIA terms.

13.81. Extreme weather events are predicted with flooding, high temperatures, drought, wind and humidity for the 2050s and the 2080s with risks to health and wellbeing for residents and visitors – directly such as through overheating and indirectly such as through damage to buildings, for example damp, deterioration from increased UV radiation, and the public realm, for example destabilised vegetation, subsidence. The resilience of the Proposed Development to such weather changes was assessed and potential adverse effects were found to be Not Significant. Cooling provisions for temperatures beyond the predicted 41.8oC, use of materials that can withstand thermal expansion and contraction and UV degradation, provision to prevent damp, consideration of wind forces in durability of design and materials, and implementation of fire management and evacuation plans are various embedded mitigation measures that have been included through the design process to enable adaptation to climate change for the Proposed Development.

Cumulative Effects:

Temporary during Construction Phase

13.82. Each separate technical topic has considered the relevant effects for health and wellbeing that could be cumulative with other nearby development projects. Each development project is designed and constructed with ways of working that are approved according to regulatory requirements that aim to protect human health and wellbeing. The implementation of such mitigation measures to reduce impacts to acceptable levels is ensured through the Construction Health & Safety Plan (HSP) and Environmental Management Plan (CEMP), and such Plans are applied to the construction of each development project.

13.83. During the approximately five-year construction time period, there are the possibilities for cumulative adverse impacts on air quality - dust soiling from activities and emissions from transport; transport disturbance; and loss of amenity for pedestrians and motorists. However, cumulative effects were identified to be Negligible through implementation of the CEMP.

Operational Phase

13.84. Taking into account residential and other developments within 500m of the proposed site, the cumulative impacts are likely to be Moderate Beneficial with regard to housing and additional household spend in the local economy. The cumulative total of new homes is estimated to be 1,467 indicating to a further 2,237 residents living in the city centre. Increasing the volume and quality of employment uses in the city centre is likely to have a significant cumulative impact on the employment mix, particularly office use and estimated to be Moderate Beneficial.

13.85. The cumulative impact of air quality due to changes in road traffic flows is expected to be negligible. Committed developments within 500m of the Site have been reviewed and are not expected to result in any cumulative impacts or effects for noise beyond those associated with the Proposed Development itself.

Residual Effects

13.86. Post-mitigation residual effects are summarised in the Table 13.2, as follows:

Table 13.2 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects Summary of Health-Related Topics, Likely Significant Effects, Mitigation Measures, and Residual Effects Significant Receptors listed as identified from each technical chapter and as relevant according to those presented in paragraph 13.37 previously – workers, residents & visitors (nearby & site), and pedestrians – during construction and operational phases

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Construction Phase				

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Employment, GVA, skills	Workers, apprentices	None	n/a	Minor Beneficial temporary
Townscape & visual	Workers, nearby residents, visitors	High quality hoardings	CEMP	Moderate Adverse Temporary
Air quality – NO_2, PM_{10} & $PM_{25;}$ Dust	Workers, nearby residents & visitors	Working hours, activities, traffic movements, waste management	CEMP	Not Significant
Noise & Vibration	Residents, Event space	Noise containment, working hours, low vibration plant techniques	CEMP	Negligible to Minor Adverse for noise; Negligible for vibration
Operational Phase				
Housing	Residents	None	n/a	Moderate Beneficial
Employment & GVA	Workers & local spend	None	n/a	Minor Beneficial
Health care & Education	Residents	None	n/a	Negligible
Crime	Residents, workers & visitors	None	n/a	Minor Beneficial
Open space & public realm	Residents, workers & visitors	None	n/a	Moderate/Minor Beneficial on open space & amenity
Townscape & Visual	Residents, workers & visitors	None	n/a	Not Significant for 19 viewpoints; Major/Moderate to Minor Beneficial for 4 viewpoints
Climate Change – Operational buildings & public realm	Climate Change - residents & visitors	Cooling provision, materials to withstand thermal changes,	Design Maintenance & Management Plans including fire evacuation	Not Significant

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
		wind, prevent damp		
Air quality – NO_2, PM_{10} & PM_{25} vehicle emissions	Residents & Visitors	None	n/a	Not Significant
Air Quality – odours from restaurants/bars	Residents & Visitors	None	n/a	Not Significant
Noise	Residents	Specific façade construction	Design	Negligible
Noise	Residents	Relief from overheating by means other than open purge vents	Design	Negligible – Minor Adverse
Noise	Residents	Entertainment noise controlled by enhanced acoustic glazing	Design	Negligible
Noise	Nearby residents & event space	Controlled through appropriate noise limits		Negligible
Daylight	Surrounding residents	None	n/a	Negligible-Minor Adverse
Sunlight	Surrounding residents	None	n/a	Negligible-Minor Adverse
Overshadowing	Surrounding amenity spaces	None	n/a	Negligible-Minor Adverse
Glare	Traffic & train signal locations	None	n/a	Negligible-Minor Adverse
Wind – pedestrian	Residents & visitors	None	n/a	Negligible

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
safety & comfort				

Summary for Healthy Urban Living

Healthy Housing & Buildings:

13.87. Currently, there are no people living on the site and the Proposed Development includes approximately 746 residential apartments that are expected to accommodate 1,222 new residents. The quality of the housing in the wider Study Area around is poor and therefore, the delivery of high-quality residential units will have moderate beneficial effects for the site and contribute to improvements for housing within the city centre. The Proposed Development will not have adverse effects on social/community infrastructure and impacts on healthcare and educational facilities are negligible.

13.88. Lack of daylight or sunlight, overshadowing, solar glare, and the wind microclimate can adversely affect health and well-being with regard to a healthy building environment. However, the proposed building is in a built-up high-rise inner-city area, with adjacent residential and commercial/retail buildings. It was determined that the daylight and sunlight levels enjoyed after the completed development are reasonable such an inner-city location. The design of the Proposed Development has included optimum sizing and positioning of each of the towers to minimise impacts on adjacent residential properties, amenity spaces, and glare. The current size, position and staggered height tower proposal avoids a wide solid continuous mass when viewed from any of the potentially sensitive receptors and thus maintains good levels of daylight and sunlight. The overshadowing of amenity areas was found to be not significant, and the risk of glare for road and rail drivers was found not to be significant. The design process also considered fire risk studies to minimise risk to health and wellbeing of residents and visitors.

13.89. Over the 60-year life of the buildings, there will be changing effects on climate with potential associated risks for human health with more extreme weather conditions that are predicted. Mitigation measures, particularly the transition to sustainable transport, should limit such effects in the longer term and contribute to a healthier environment. The Proposed Development has been designed to limit vulnerability to climate change effects including through provisions for addressing higher temperatures, drought, flooding, wind, and humidity.

Active Travel:

13.90. The Proposed Development is located in the City Centre and is rich in choice and accessibility to sustainable transport modes – walking, cycling, bus, Metrolink, rail – with routes and interchanges for daily movement to work, retail and leisure activities. There are bus stops supporting diverse bus routes on Deansgate, and there are Metrolink stops nearby. There is easy access to wider routes for active travel such as the River Irwell path (less than 0.5 mile). The proposals include car parking (20% with electric vehicle charging).

13.91. Overall, the location of the site in an area with excellent accessibility to public transport, and with varied access to pedestrian and cycle networks for employment, services, and facilities in the city centre, will encourage active travel with likely major positive effects in the local area that may be synergistic and cumulative in the longer-term.

Healthy Environment:

13.92. The land currently supports office, retail and leisure buildings and the proposals comprise renovation and regeneration such that there is unlikely risk of pollution from previously developed land. A survey confirmed that there is no risk from unexploded ordnance. Any associated risk to human health has been considered through ground condition studies and found to be not significant – the results are below the relevant guideline levels for both residential and commercial uses.

13.93. The Site is located within flood zone 1 with a low probability of flooding and therefore, there is low risk to human health and wellbeing from flooding. Embodied carbon emissions (operational and end-of-life), energy emissions, and operational transport emissions are predicted to be not significant with regard to carbon targets for the UK and mitigating the likely effects of climate change on the environment.

13.94. During construction, risks to their health and safety for construction personnel and the public are minimised through the implementation of a Construction Phase Health & Safety Plan that is monitored and periodically reviewed. Site security and safety is secured through perimeter fencing and various activities to ensure that the site is safe from unauthorised access. The potential risks to health for workers and nearby residents from dust and particulates are controlled through the implementation of the CEMP such that residual effects on human health are negligible. Waste will be segregated, and waste generated during construction will be cleared daily to a main holding skip, thus minimising risks to health and safety. The contractor will ensure that regular contact is made with residents, and community groups so that they are kept up to date with the general progress on the site and this will help ameliorate any concerns for wellbeing.

13.95. During construction, there is the potential for dust and noise effects, but these will be minimised through the CEMP such that impacts are not significant. Pollution from vehicle exhausts is the main source of air quality effects in the vicinity of the site. It was determined that the air quality impacts associated with the Proposed Development are not predicted to be significant. Noise studies undertaken to inform the project design considered impacts on the residents of the Proposed Development. Potential noise impacts were reduced to negligible through the embedded design of appropriate facades, and to not be significant through reducing overheating with means other than open purge vents. Noise effects from entertainment and fixed building plant were found to be negligible for the nearby sensitive receptors of residential buildings and an events space. The design, location and variable heights of the buildings has been informed by the wind studies that have identified effects on pedestrian safety and comfort to be negligible for residents, workers and visitors.

13.96. Visual and townscape effects are beneficial as the design process has sought to relate the Proposed Development to its historical origin and to unify the site as a whole through the use of traditional colours and materials. Visual interest is improved by varying the height and form of the taller elements of the scheme and with a better relationship to their taller neighbouring buildings. The Site is located within the city centre and is characterised with other tall buildings nearby.

13.97. The Proposed Development will provide new and enhanced public realm with lighting, planting and more accessibility/permeability, including increasing the number of trees from 27 to 156 – all of which will contribute to healthy environments – for both physical and mental wellbeing, and which are particularly important in the city centre. Heritage is important for human wellbeing and the design of the Proposed Development has sought to minimise impacts on assets and their settings. The built heritage studies indicated a range of impacts from moderate/minor beneficial to negligible, minor/moderate adverse. Any perceived instances of adverse impact were considered to be mitigated by the high-quality design and public benefits of the Proposed Development that overall, contributes to a healthy environment.

Vibrant Neighbourhoods:

13.98. The delivery of the good-quality office, retail and leisure development on the site will contribute to the enhancement of the vibrancy of the local neighbourhood within the wider city centre. Increasing the volume and quality of employment uses in the city centre is likely to have a significant cumulative impact on the employment mix, particularly office use. Provision of and access to employment is known to have a positive effect on health and wellbeing, and the provision of apprenticeships during the construction phase will have particular positive effects for young people and contribute to improving skills. The design of the Proposed Development was informed by crime impact and threat/risk security studies. The change delivered through refurbishment, restoration and extension, including provision of residential units and improved accessibility/permeability, will contribute to a reduction in crime and an improvement in community safety.

Reference List

This ES Chapter has been prepared by reference to the following:

1. National Planning Policy Framework (NPPF, updated 2019 & revised 2021) https://www.gov.uk/government/publications/national-planning-policy-framework--2
2. Public Health England (PHE) Strategy (2019) Public Health England (2019) Strategy 2020-2025 https://www.gov.uk/government/publications/national-planning-policy-framework--2
3. Public Health England (PHE) Strategy (2019) https://www.gov.uk/government/publications/phe-strategy-2020-to-2025
4. Manchester City Council (MCC) Core Strategy (adopted 2012) https://secure.manchester.gov.uk/info/200074/planning/3301/core_strategy
5. Manchester City Council (MCC) The Great Northern Warehouse Strategic Regeneration Framework (SRF) (2017, updated 2019)
6. Places for Everyone – Joint Development Plan (Greater Manchester Councils Publication Draft, 2021) https://www.greatermanchester-ca.gov.uk/what-we-do/planning-and-housing/places-for-everyone/the-plan
7. Manchester City Council (MCC) Manchester State of the City Report (2021) https://www.manchester.gov.uk/info/200088/statistics_and_intelligence/8299/state_of_the_city_report_2021
8. Public Health England (PHE) Spatial Planning for Health (2017) Public Health England (2017) Spatial Planning for Health: an evidence resource for planning designing healthier places
9. Public Health England (PHE) Health Impact Assessment in Spatial Planning (2020) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/929230/HIA_in_Planning_Guide_Sept2020.pdf
10. The Manchester Strategy - Our Manchester (2016) https://www.manchester.gov.uk/mcrstrategy
11. IEMA Cave, B. Fothergill, J., Pyper, R. Gibson, G. and Saunders, P. (2017) Health in Environmental Impact Assessment: A Primer for a Proportionate Approach. Ben Cave Associates Ltd, IEMA and the Faculty of Public Health. Lincoln, England https://www.iema.net/resources/reading-room/2017/05/01/get-primed-for-health-in-eia
12. Shaping Neighbourhoods: For Local Health and Global Sustainability (2010) Barton H, Grant M & Guise R (3rd edition 2021) Taylor & Francis Ltd, England
13. Wider Determinants of Health Public Health England (PHE) https://fingertips.phe.org.uk/profile/wider-determinants
14. The London Healthy Urban Development Unit (HUDU) 'Healthy Urban Planning Checklist' (2017)
15. The London Healthy Urban Development Unit (HUDU) 'Rapid Health Impact Assessment (HIA) Tool (2019) https://www.healthyurbandevelopment.nhs.uk/our-services/delivering-healthy-urban-development/health-impact-assessment/
16. Manchester City Joint Strategic Needs Assessment (JSNA 2021) https://www.manchester.gov.uk/info/500230/joint_strategic_needs_assessment
17. Public Health England (PHE, 2017-2019) https://fingertips.phe.org.uk/profile/health-profiles
18. Office for National Statistics (ONS) for health and life expectancies (2017-2019) https://www.ons.gov.uk/peoplepopulationandcommunity
19. Manchester City Council https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/2178/health_and_wellbeing
20. Manchester City Council https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/438/population/2

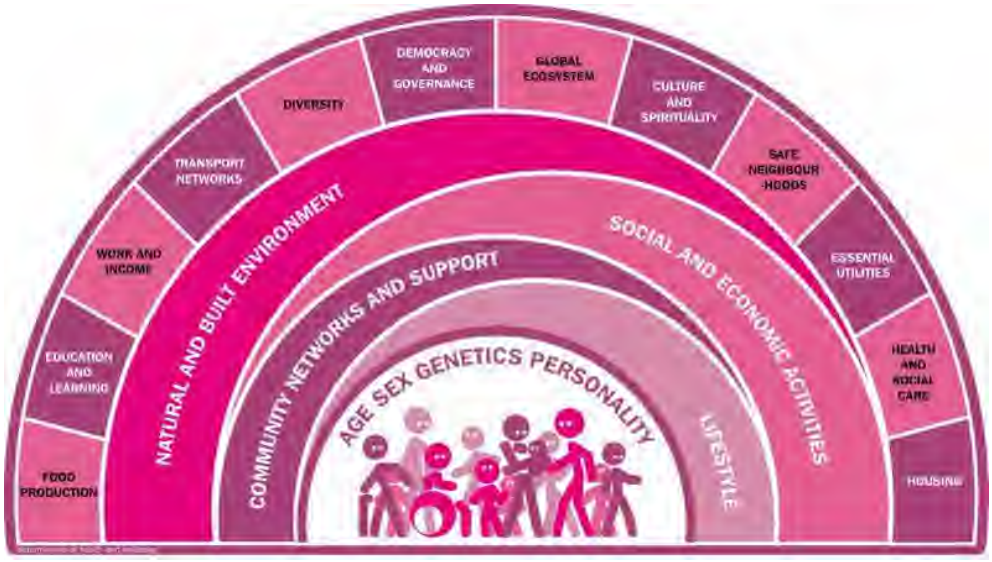


	Figure:	**13.1**		
	Title:	The Determinants of Health and Wellbeing (London HUDU developed from Barton & Grant 2007)		
	Project:	**Great Northern, Manchester**		
	Date:	**October 2022**	**Scale:**	**NTS**

14. Climate Change

Introduction

14.1. This Chapter of the ES has been prepared by WSP and comprises two elements; assessing the likely impacts from greenhouse gas (GHG) emissions of the proposals upon the Site and the climate and the climate change vulnerability of the proposals.

14.2. This Chapter also describes the methods used to assess these impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce, or offset any significant negative impacts and the likely residual impacts after these methods have been adopted.

14.3. The qualifications and professional memberships of the consultant and organisation have been identified below.

Technical Competence in GHG and EIA		
	Lead Author	Reviewer
Name	S Malik	A Parade
Company	WSP	WSP
Qualifications/Accreditations relevant to technical area	M.Plan (Environment)	M.Arch (Environmental Architecture), LEED GA
Does the practitioner hold any IEMA qualification?	Nil	Nil
Company hold IEMA QMark?	Yes	
Years technical experience (in technical area)	2 years	11 years
Number of EIA's delivered to date	3	5

Technical Competence in Climate Vulnerability and EIA		
	Lead Author	Reviewer
Name	I Guyler	S Hands
Company	WSP	WSP
Qualifications/Accreditations relevant to technical area	Geography and Politics BA Hons Environment and Development MA	Master of Environmental Sciences Chartered Environmentalist
Does the practitioner hold any IEMA qualification?	Previously held graduate membership	Full Member of IEMA

Technical Competence in Climate Vulnerability and EIA		
Company hold IEMA QMark?	Yes	
Years technical experience (in technical area)	1.5 years	7
Number of EIA's delivered to date	1	+25

14.4. The requirement to consider a project's impact on and vulnerability to climate change results from the 2014 amendment to the EIA Directive (2014/52). The Directive has been fully transposed into UK law in the EIA Regulations. The Directive requires: "A description of the likely significant effects of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change." As such, this chapter has been split into two and assesses:

- the likely significant effects of the project on climate (for example the nature and magnitude of greenhouse gas emissions) (Climate change mitigation assessment);
- the vulnerability of the project to climate change (Climate change adaptation assessment)

Limitations and Assumptions

14.5. The assumptions made in the assessment and the potential limitations include:

GHG Emissions

- Future improvements to vehicle fuel efficiency and electrification have not been considered in the assessment. Future technological development and changes in trip numbers is likely to result in reduced emissions in comparison to those used in the assessment.
- For the purposes of this assessment, it will be assumed that the Proposed Development would be operational for 60 years, which is the average lifespan for this type of development.
- Due to limitation in the availability of data, operational carbon emissions for the existing baseline have not been included in this stage of the assessment.
- The significance of effects determined in this GHG assessment are based on current design and estimates based on industry benchmarks. The design has the potential to change at detailed design stage and mitigation measures for reducing carbon emissions from the Proposed Development should be considered at further design stages.
- In addition to the embodied carbon assessment undertaken for this chapter, a whole life carbon assessment has been undertaken (TN001 - GNW - Embodied Carbon Assessment Results Summary). The assessments utilise different methodologies, with the assessment presented in this chapter aligned to One Click. In addition, this assessment uses Environmental Product Declaration (EPD) information and calculations are based on assumptions within Design Builder. It is anticipated that the figures generated within this assessment be used as the baseline and LETI to be used as a benchmark rather than a target.

Climate Change Vulnerability

- There is currently no agreed industry methodology that should be applied for assessing the vulnerability of major schemes under the EIA Regulations. Therefore, an approach has been developed and applied in this assessment based on existing best practice and our extensive project experience.

- The UKCP18 projections have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Scheme to climate change. At the time of writing, these represent the most up-to-date representation of future climate in the UK.
- The Climate Risk Indicators, developed as part of the UK Climate Resilience Programme, has been used to infer this assessment. As such there are inherited limitations and uncertainties within the data. Further information on the methodology used to produce this data can be found in Arnell, et al., (2021) Changing climate risk in the UK: a multi-sectoral analysis using policy-relevant indicators. Climate Risk Management 31, 100265 10.1016/j.crm.2020.100265
- There are inherent uncertainties associated with climate projections and they are not predictions of the future. It is possible that future climate will differ from the future baseline climate against which the resilience of the Scheme has been assessed, depending on global emissions over the next century. A 'high' emissions scenario (RCP 8.5) using the 2080s time slice (2070–2099, the longest temporal scale available through UKCP18) has been used to develop the baseline against which resilience has been assessed. This is consistent with the precautionary principle (i.e., 'worst case' scenario).
- Any further research, analysis or decision-making should take account of the accuracies and uncertainties associated with climate projections. It is also important to note that the analysis is based on selected observational data, the results of climate model ensembles and a selected range of existing climate change research and literature available at the time of assessment. Any future decision-making based on this analysis should consider the range of literature, evidence and research available at that time and any changes to this.

Legislative and Policy Context

Legislation

14.6. The applicable legislative context for the assessment of the Proposed Development comprises:

Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref. 14.1): The Climate Change Act 2008 sets targets for reducing the UK's impacts on climate change and the need to prepare for managing the impacts. The Act sets a target of 80% CO2 emissions reduction by 2050 (against a 1990 baseline) and sets interim targets to ensure progress towards this target. The Act also requires a Climate Change Risk Assessment to be used to assess the risks from the impact of Climate Change to the UK. The first UK Climate Change Risk Assessment (CCRA) was presented to Parliament in an Evidence Report in 2012, with the second presented in 2017. The overall aim of the Evidence Report is to assess the urgency of further action to tackle current and future risks, and realise opportunities, arising for the UK from climate change. The Act also requires the production of a National Adaptation Plan for the UK Government to implement to be ready for the challenges of climate change.

Planning and Energy Act 2008 (Ref. 14.2) The Planning and Energy Act 2008 enables local planning authorities in England and Wales to set requirements for energy use and energy efficiency by including policies in local plans imposing reasonable requirements for the use of energy from renewable sources and low carbon energy. The Act enables local planning authorities to ensure that development in the area complies with energy efficiency standards that exceed the energy requirements for building regulations.

Carbon Budgets 2021 (Ref. 14.3): Carbon Budgets place restrictions on the amount of GHG the UK can emit over a five-year period. The UK is the first country to set legally binding carbon budgets. Every tonne of GHG emitted between now and 2050 will be counted towards the budget. If emissions rise in one sector, the UK will have to reduce emissions in another sector to balance the budget. The carbon budget for the fifth budgetary period covering 2028 to 2032 was at 1,725 MtCO2e. The current, sixth carbon budget for the period of 2033-2037 has been set at 965 MtCO2e.

The Carbon Plan: Delivering our Low Carbon Future (2011) (Ref. 14.4): The Plan sets out how the UK will achieve decarbonisation within the framework of its energy policy to make the transition to a low carbon economy while maintaining energy security and minimising costs to consumers, particularly those in the poorer households. The document envisions to cut down emissions from various sectors including buildings, transport, industry, electricity, and agriculture through greater energy efficiency and use of low carbon technology.

Building regulations

14.7. The applicable building regulations for the assessment of the Proposed Development comprise:

- The Building Regulations 2010, Approved Document L1A: conservation of fuel and power in dwellings, 2021 edition with 2016 amendments (Ref. 14.5); and
- The Building Regulations 2010, Approved Document L1A: conservation of fuel and power in buildings other than dwellings, 2021 edition with 2016 amendments (Ref. 14.6)
- The Building Regulations Part L governs the conservation of fuel and power in both new construction and refurbishment of the England and Wales building stock. Compliance with the Building Regulations is a regulatory requirement for all new developments. Carbon emissions of a development comparative to compliance with Part L is the key performance indicator for achieving many carbon targets.

National Planning Policy

National Planning Policy Framework 2021 (Ref. 14.7)

14.8. The National Planning Policy Framework (NPPF) 2021 sets out the Government's Planning Policies for England and how these are to be applied. Guidance relating to the reduction of Greenhouse Gases is set out in Section 14 "Meeting the Challenge of Climate Change, Flooding and Coastal Change'. Within paragraph 8, it is stated that the purpose of the planning system is to contribute to the achievement of sustainable development, which includes economic, social and environmental dimensions. The policies set out in paragraph 8, 20, 148, 150 and 154 all support the reduction of GHG emissions.

14.9. The document highlights that planning process should take a proactive approach to mitigating and adapting to climate change and policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate related impacts.

Planning Practice Guidance

14.10. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require the implementation of appropriate measures by the local planning authorities. The guidance particularly recommends the use of local risk assessments to identify climate-related risks and their implications for the built environment, biodiversity and vulnerable groups and communities.

Local Planning Policy

Manchester City Council Climate Change Action Plan 2020-2025 (Ref. 14.8)

14.11. The Climate Change Action Plan (CCAP) of the Manchester City Council has a target to reduce direct emissions of CO_2 by 50% over the five-year period up to 2025. To achieve this, the Council aims to reduce its emissions by 13% every year, for five years. The CCAP also sets a carbon budget of 119,917 tonnes of CO_2 for the five-year period of 2020-25, calculated using science-based targets. Within this, the carbon budget for 2020-21 is 31,080 tonnes and that for 2021-22 is 27,056 tonnes.

Guidance and Best Practice

14.12. The guidance and best practice relevant to GHG assessment are listed below:

Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA) 2022 (Ref. 14.9)

14.13. The IEMA guidance for assessing greenhouse gas emissions and evaluating their significance aims to assist GHG practitioners with undertaking GHG emissions assessments, identifying mitigation and reporting within statutory and non-statutory EIA.

RIBA 2030 Climate Change Targets version 2 (2021) (Ref. 14.10)

14.14. The Royal Institute of British Architects (RIBA) has developed voluntary performance targets for operational energy use, water use and embodied carbon. The performance targets align with the future legislative horizon of the UK and set out a trajectory to achieve significant reductions necessary by 2030 in order to make net zero carbon a realistic prospect from the whole UK building stock by 2050.

National Planning Practice Guidance on Climate Change (Ref. 14.11)

14.15. The guidance advises how to identify suitable mitigation and adaptation measures in the planning process. This would require robust evaluation of future emissions from different sources at the local authority level to make informed emission reduction decisions.

Guidance and Best Practice

14.12. The guidance and best practice relevant to Climate Vulnerability are listed below:

DMRB LA 114 Climate (Ref 14.32)

14.16. This document establishes the requirements for assessing and reporting the effects of climate on highways. While this project is not a highways scheme, the significance criteria assessment in Section 3 of LA114 provides a useful methodology which has been adopted within this assessment

IEMA EIA Guide to Climate Change Resilience and Adaptation (Ref 14.33)

14.17. This guide sets out how to consider climate change resilience and adaptation in EIA reporting.

ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment (Ref 14.34)

14.18. This document suggests how to assess the risks associated with the potential impacts of climate change.

Local Planning Policy

14.19. The following local planning policy documents have been used during the preparation of this chapter:

Core Strategy Development Plan (Ref. 14.24)

14.20. To ensure that both the natural and built environment in Manchester are protected and enhanced, in order to mitigate and adapt to climate change amongst other environmental aims, a number of planning policies were set out in this Development Plan. Policy EN8 sets out requirements for new development in that they are expected to be adaptable to climate change.

Guide to development in Manchester (Ref. 14.25)

14.21. This Supplementary Planning Document establishes further expectations of new developments in the City, including environmental design, water management, and weather resilience.

Manchester Green and Blue Strategy (Ref. 14.26)

14.22. This Strategy emphasises the importance of utilising green and blue infrastructure in the City and embedding it into new developments for climate mitigation and adaptation aims.

Greater Manchester Spatial Framework (Ref. 14.19)

14.23. One of the key themes of the spatial framework is 'greener growth'. The framework advocates for future development giving due consideration to the protection of natural areas, improvement of environmental credentials of buildings and other infrastructure and enhancing resilience to the impacts of climate change.

Greater Manchester Infrastructure Framework 2040 (Ref. 14.20)

14.24. The infrastructure framework recommends the development of more blue-green infrastructure to help mitigate climate change impacts such as flooding and urban heat island effect. Provision of infrastructure that is resilient to shocks and stresses is one of the key challenges identified in the document.

Greater Manchester Places for Everyone Plan (Ref. 14.21)

14.25. The plan provides a set of measures to increase the capacity of development in the sub-region to survive, adapt and grow in the face of climate change, thereby addressing risks related to flooding, extreme temperature, an emergency or disaster.

Greater Manchester Housing Strategy (Ref.14.22)

14.26. For the development of a carbon neutral, climate resilient city region, the housing strategy recommends reducing the energy demand of homes and increasing their resilience to the challenges of climate change. The aim is to have all new homes and buildings built within Great Manchester in the 'net zero carbon' category by 2028.

Greater Manchester Resilience Strategy (2020-2030) (Ref. 14.23)

14.27. Resilience strategy for the Greater Manchester sub-region prioritises building cohesive and healthy communities, understanding potential hazards and vulnerabilities, building on the existing governance structures and partnerships, enhancing the resilience value of natural and built environment and enabling effective preparedness, response and recovery from emergencies.

Assessment Methodology and Significance Criteria

GHG

Scope of the Assessment

14.28. The emissions sources, described as elements with their associated Lifecycle Stage during the Proposed Development's lifespan, have been identified using guidance from IEMA (Ref. 14.9). Professional judgement has been used to determine which sources to scope in and out of further assessment, as outlined in the previous scoping report and in Table 14.1.

Table 14.1 - Elements scoped in and out of the assessment

Element	Phase	Scoped in	Scoped out	Justification
Product stage (manufacture and transport of raw materials to suppliers) A1-A3	Construction	✔		Raw materials required for the Proposed Development will result in embodied emissions and have the potential to be large.
Transport of materials to site A4	Construction	✔		Construction stage emissions from fuel / energy consumption due to the delivery of materials to site have the potential to be large.

Element	Phase	Scoped in	Scoped out	Justification
Plant and equipment used during construction A5	Construction	✔		Fuel / energy consumption of plant and equipment used during construction would generate GHG emissions.
Land use, land use change and forestry A5	Construction		✔	Emissions from the disposal of biomass are not expected to be large as land use, land use change and forestry will not be in scope due to the type and scale of the project.
Disposal of waste A5	Construction (demolition)	✔		Emissions from the disposal of waste are likely to be large, due to the demolition and refurbishment of existing buildings on site.
Replacement and refurbishment B4-B5	Operation	✔		The replacement and refurbishment of the Proposed Development would release a potentially large magnitude of emissions.
Operational Energy Use B6	Operation	✔		Emissions will be released on an annual basis due to the building use from heating, cooling, ventilation, domestic hot water, lighting, and auxiliary systems.
Operational Water Use B7	Operation		✔	Emissions due to annual potable water usage during the operation phase are likely to be large.
End-user emissions (regional traffic flows) – traffic B9/D	Operation	✔		Changes to regional traffic flows are expected and this has the potential to result in a large change in GHG emissions.
In-use Emissions B1	Operation		✔	This includes the release of GHGs from products and materials (e.g., refrigerants, paints, carpets) during the normal operation of the building. This is not considered to be a large emission source.

Element	Phase	Scoped in	Scoped out	Justification
Maintenance B2-B5	Operation		✔	Maintenance associated with the Proposed Development is not considered to be a large emissions source as only a nominal amount will be additional to the maintenance that already takes place in the existing development.
Repair B2-B5	Operation		✔	The Proposed Development is designed to be maintained rather than repaired, therefore subsequent repair emissions sources are not considered to be large.
Land use, land use change and forestry B8	Operation		✔	The reduction in carbon sequestration due to the Proposed Development is not considered to be large as land use, land use change and forestry will not be in scope due to the type and scale of the project.
Decommissioning process C1-C4	End of Life	✔		Emissions are likely to arise from decommissioning, stripping out, disassembly, deconstruction, and demolition operations as well as from transport, processing, and disposal of materials at the end of life of the project

14.29. The scope of the assessment is consistent with the framework for the quantification of GHG emissions presented in British Standard (BS) EN 15978:2011 'Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method' (Ref. 14.12).

Assessment Methodology

14.30. The assessment follows the Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA) 2022 (Ref. 14.9). This guidance advocates a 'good practice' approach where GHG emissions are always considered and reported but at varying degrees of detail depending on the EIA and the project in question.

14.31. In line with the guidance, this section sets out the methodological approach that has been taken to assess GHG emissions associated with the Proposed Development. This includes calculating the baseline emissions, determining the significance of each GHG emission source scoped into the assessment and setting out strategies for mitigation.

14.32. Existing sources of GHG emissions prior to construction and operation of the Proposed Development (i.e., without development) have been identified to assess the current baseline. Sources of GHG emissions following the construction and during operation of the Proposed Development have then been assessed, based on which the significance, mitigation measures and residual effects are determined.

14.33. To assess the significance of effects of the Proposed Development on climate, the following emissions have been considered:

- Whole life embodied carbon emissions: These are embodied carbon emissions from the construction process and materials used, throughout the lifespan of the building. This includes emissions during construction, construction transport emissions, emissions from replacement/repair work during the operational phase and end-of-life emissions;
- Operational carbon emissions: These include carbon emissions from energy consumption during the operational phase of the development; and
- Operational transport emissions: These include emissions from transport during the operational phase of the development.

14.34. Further details on these are provided below.

Whole Life Embodied Carbon Emissions

14.35. The scope of whole life embodied carbon emissions includes lifecycle modules A1-A3 (Materials and products); A4 (transport of materials and products to construction site); A5 (Construction site impacts); B1-B5 (Maintenance and replacement) and C1-C5 (end-of-life disposal).

14.36. Carbon Designer, which is an add-on to One Click Life-Cycle Assessment software, has been used to calculate the embodied carbon emissions for the proposed buildings. This procedure is suitable for early-stage projects where building shape and areas are available.

14.37. Inputs used to inform the software were based on floor area provided, number of floors, buildings use and material assumptions that were coordinated with the design of the Proposed Development.

14.38. The result includes data related to manufacturing, transport, replacement, and disposal of the existing and proposed building elements.

14.39. RIBA 2030 Climate Challenge (2021) (Ref. 14.10), document has developed targets for embodied carbon and operational energy use. These consider the latest recommendations from the Green Construction Board and have been developed by the RIBA in consultation with other UK professional bodies. The targets are progressive yet realistic, and a vital first step to ensure the construction industry has delivered the significant reductions necessary by 2030 in order to have a realistic prospect of achieving net zero carbon for the whole UK building stock by 2050. Table 14.2 gives the RIBA 2030 targets for embodied carbon for domestic and non-domestic buildings.

Table 14.2 - RIBA 2030 Climate Challenge target for embodied carbon for domestic and non-domestic buildings

RIBA sustainable outcome metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets
Domestic			
Embodied Carbon $kgCO_2e/m^2$	1,200 $kgCO_2e/m^2$	<800 $kgCO_2e/m^2$	<625 $kgCO_2e/m^2$
Non-domestic (new build offices)			
Embodied Carbon $kgCO_2e/m^2$	1,400 $kgCO_2e/m^2$	<970 $kgCO_2e/m^2$	<750 $kgCO_2e/m^2$

Operational Carbon Emissions

14.40. The operational phase of the Proposed Development is expected to start from 20249. Since the expected lifespan of developments of this nature are typically assumed to be 60 years, the operational part of the assessment covers the period of 2029-2089.

14.41. The assessment of significance of the effects from operational building and transport emissions has been undertaken on an annual basis. The results for critical climate period of 2029-2089 are also provided for the Proposed Development on a contextual basis, covering the whole life of the Proposed Development (60 years).

14.42. The RIBA benchmarks for annual operational energy consumption are stated in Table 14.3. Carbon emissions from operational energy use are assessed over the whole expected life (60 years) of the Proposed Development. While calculating the carbon emissions from operational energy use, the decarbonisation of grid electricity has been considered. This has been done by using the average predicted annual carbon factors for grid electricity, based on data published by the UK Government (Ref. 14.13). These emission factors for grid electricity consider grid decarbonisation, and therefore the carbon emissions from grid electricity continue to remain consistent from 2050 until 2100.

Table 14.3 - RIBA 2030 Climate Challenge target for operational energy for domestic and non-domestic buildings

RIBA sustainable outcome metrics	Business as usual (new build, compliance approach)	2025 Targets	2030 Targets
Domestic			
Operational Energy kWh/m^2/y	120 kWh/m^2/y	<60 kWh/m^2/y	<35 kWh/m^2/y
Non-domestic (new build offices)			
Operational Energy kWh/m^2/y	120 kWh/m^2/y DEC D (90)	120 kWh/m^2/y DEC B (50) and/or NABERS Base build 5)	<55 kWh/m^2/y (DEC B (40) and/or NABERS Base build 6)

Operational Transport Emissions

14.43. In order to calculate the operational traffic associated with the Proposed Development, the number of trips per vehicle/transport mode, and the average trip distance have been multiplied by emissions factors for each key vehicle type. The data required was provided by Curtins in line with the Transport Assessment. The 2021 Defra emissions factor selected for each vehicle type represents the closest match. This is summarised in Table 14.4.

Table 14.4 - Transport emissions calculation methodology

Metric	Unit	Personal Vehicle	Transport mode
Total Distance (A)	km/year	A = C x D	A = B x D
Total Person Trips (B)	people trips/year	-	B
Total Vehicle Trips (C)	vehicle trips/year	C	-
Average Trip Length	km/trip	D	D

Metric	Unit	Personal Vehicle	Transport mode
Emissions Factor Value (E)	$kgCO_2e/km$	E	E
Total	$kgCO_2e$	T= E x A	T= E x A

14.44. The provision of EV charging points will become mandatory through the upcoming Building Regulations Part S. In the residential part of the Proposed Development, 10% (17) of the parking spaces will be EV spaces and the remaining 90% (150) will be future proofed with cable routing. In the non-residential part, 5% (39) of the parking spaces will have provision for EVs and 15% (115) will be future proofed.

Significance criteria

14.45. With regards to assigning significance, the 2nd edition of the IEMA guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022) (Ref. 14.9), provides five distinct levels of significance which are not solely based on whether a project emits GHG emissions alone, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards net zero (Table 14.5). Specifically, when considering the aspect of significance, IEMA guidance on GHG assessment states:

"When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative, or negligible...

and

…. The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050."

14.46. Figure 14.1 illustrates how the significance of a project's whole life GHG emissions can be determined with respect to the UK's net zero compatible trajectory.

Table 14.5 - The levels of significance as defined in the IEMA guidance

Level of significance	Description
Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.
Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Minor adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.

Level of significance	Description
Moderate adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Major adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.

14.47. As per the IEMA guidance, "Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant".

14.48. Contextualising the GHG emissions from a project helps to determine whether it supports or undermines the UK's trajectory towards net zero. IEMA guidance further suggests that "It is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact".

14.49. Therefore, apart from the RIBA 2030 Climate Change targets (2021) (Ref. 14.10) described before in Table 2 and Table 3, the carbon emissions of the Proposed Development will also be compared to the UK Carbon Budgets (Ref. 14.3) and the Manchester City Council Climate Change Action Plan (2020-2025) (Ref. 14.8) as described in Table 14.6 and Table 14.7 below.

Table 14.6 - UK Carbon Budgets (2021)

Carbon Budget Period	UK Carbon Budget ($MtCO_2e$)
Third: 2018-2022	2,544
Fourth: 2023-2027	1,950
Fifth: 2028-2032	1,725
Sixth: 2033-2037	965

Table 14.7 - Manchester City Council (MCC) Climate Change Action Plan 2020-2025

Carbon budget period	MCCs carbon budget
2020-21	0.031080 $MtCO_2e$
2021-22	0.027056 $MtCO_2e$
2022-23	0.023538 $MtCO_2e$
2023-24	0.020478 $MtCO_2e$
2024-25	0.017815 $MtCO_2e$

14.50. Based on this contextualisation and professional judgement, the overall significance of effect of the Proposed Development will be defined as outlined in Table 14.8, in accordance with the RIBA targets described in Table 14.2 and Table 14.3.

Table 14.8 - Definition of the overall significance of effect of the Proposed Development, in accordance with the RIBA targets

Significance of effect	Description
Negligible magnitude of impact	Where the Proposed Development exceeds the "2030 Targets" for the embodied carbon and operational energy performance respectively defined by the RIBA guidance
Minor magnitude of impact	Where the Proposed Development meets but does not exceed the "2030 Targets" for the embodied carbon and operational energy performance respectively defined by the RIBA guidance
Moderate magnitude of impact	Where the Proposed Development meets but does not exceed the "2025 Targets" for embodied carbon and operational energy performance respectively as defined by the RIBA guidance.
Major magnitude of impact	Where the Proposed Development meets but does not exceed the "Business as Usual" for embodied carbon and operational energy performance respectively as defined by the RIBA guidance.

Climate Vulnerability

Desk study

14.51. Baseline data has been identified through desk-based study and the assessment has been informed by information on existing and projected change in climate variables derived from the following sources:

- State of the UK Climate (2021) (Ref 14.27) (existing baseline);
- Met Office Regional Climate Profile for the North West England (Ref 14.28) (existing baseline);
- Met Office Local Weather Station Data for Rochdale (Ref 14.29) (existing baseline);
- Met Office Regional Weather data for England North West and Wales North (Ref 14.29) (existing baseline);
- UK Climate Projections 2018 (Ref 14.30) (UKCP18) (future baseline); and
- The Climate Risk Indicators (CRI) (Ref 14.31) (future baseline).

Site visits and surveys

14.52. No site visits or surveys were required for this assessment.

Assessment methodology

14.53. This assessment has been undertaken using an approach based on the guidance identified in 14.10 above, and professional judgement.

14.54. The Scoping Report identified the receptors (relevant components of the Proposed Development) that are vulnerable to climate change. The construction stage was scoped out of further assessment on the basis that measures be included within a CEMP/ESMP which may ensure that the construction site, compound and any associated storage areas are prepared for extreme weather events and more resilient to climate hazards. The significance of effects of changes in the (scoped in) climate variables on receptors has been identified for the operation phase.

14.55. These receptors scoped into this assessment include:

- Operation period (approx. 60 years), consisting of:

- Buildings with the inclusion of office space with retail and leisure and residential apartments;
- Public Realm which includes pedestrianised areas and car parking and vegetation; and
- End users of the scheme.

14.56. The IEMA EIA Guide to Climate Change Resilience and Adaptation (Ref 14.33) (June 2020) identifies the need for the baseline to consider:

- The current climate baseline (defined by historic climate conditions) to provide an indication of past vulnerability; and
- The future climate baseline (short-term extremes and long-term variation) to assess a project's future vulnerability to climate change.

14.57. The consequence and likelihood of potential impacts (that would result from the occurrence of changes in climate variables), determine the significance of effects on the Scheme's receptors. The determination of consequence is based on the Scheme design, including any embedded mitigation. The determination of likelihood is based on the future climate projections, as identified in the baseline. Consequence and likelihood are qualitatively assessed using the descriptions in Table 14.9 and Table 14.10. These descriptions have been developed using professional judgement, informed by relevant guidance. Embedded mitigation is identified through consultation with the project design team.

Table 14.9 - Consequence definitions

Measure of consequence	Description
Negligible	No infrastructure damage, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than 1 day.
Minor adverse	Localised infrastructure disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than 1 day. Small financial losses and/or slight adverse health or environmental effects.
Moderate adverse	Limited infrastructure damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than 1 day but less than 1 week. Moderate financial losses. Adverse effects on health and/or the environment.
Large adverse	Extensive infrastructure damage and severe loss of service. Disruption lasting more than 1 week. Early renewal of infrastructure 50-90%. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment, requiring remediation.
Very large adverse	Permanent damage and complete loss of service. Disruption lasting more than 1 week. Early renewal of infrastructure >90%. Severe health effects and/or fatalities. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 14.10 - Likelihood definitions

Measure of likelihood	Description

Very high	The event occurs multiple times during the lifetime of the project e.g. approximately annually.
High	The event occurs several times during the lifetime of the project e.g. approximately once every five years.
Medium	The event occurs limited times during the lifetime of the project e.g. approximately once every 15 years.
Low	The event occurs occasionally during the lifetime of the project e.g. once in 60 years.
Very low	The event may occur once during the lifetime of the project.

Climate Vulnerability Significance Criteria

14.58. This assessment differs from the standard significance criteria. The standard significance criteria uses a magnitude and sensitivity matrix to assess the impact of the Proposed Development on a particular receptor. However, in the case of this climate resilience assessment, the receptor is the Proposed Development, and the impact is caused by the changes in future climate. Therefore, for the climate resilience assessment the likelihood and consequence are combined to assess the significance of effects on the affected receptors, as shown in Table 14.11. The assessment is qualitative and determined through expert judgment based on knowledge of similar schemes, engagement with the wider Project Team and a review of relevant literature.

Table 14.11 - Significance rating matrix

Likelihood	Consequence of hazard occurring				
	Negligible	Minor adverse	Moderate adverse	Large adverse	Very large adverse
Very High	Not Significant	Significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Not Significant	Significant

Baseline Conditions

GHG

14.59. In the baseline scenario, GHG emissions occur constantly and widely as a result of human and natural activity including energy consumption (fuel, power), industrial processes, land use and land use change.

Current Baseline

14.60. The current baseline scenario reflects the existing GHG emissions from the Site.

14.61. The existing site for the Proposed Development comprises primarily the Great Northern Warehouse, the Deansgate Terrace, the Great Northern Square, and the Odeon Cinema. The 'Do minimum' baseline scenario involves no construction activities and therefore, the construction baseline is zero emissions.

14.62. Since the Proposed Development is not a greenfield development, the existing baseline will include operational emissions (from but not limited to heating, cooling, lighting and electricity) for the existing buildings on site. Due to lack of availability of data, however, operational carbon emissions for the existing baseline have not been included at this stage.

14.63. The site currently comprises 1,240 publicly available car parking spaces which serve the surrounding area and the uses that currently exist at the Great Northern Warehouse and Leisure Box. As per the Transport Assessment undertaken by Curtins, the car park access surveys demonstrated that during the 12-hour period there were 1,025 arrivals and 846 departures associated with the car parks. Based on this, Table 14.12 depicts the operational transport emissions for the existing baseline scenario and is estimated to be about 1,145,256 $kgCO_2e$ or 1,145.25 tCO_2e.

Table 14.12 - Operational transport emissions for the existing baseline scenario

Metric	Unit	Train	Bus	Car (Petrol)	Car (EV)	Bicycle	Walk
Total Distance (A)	km/year	-	-	6,678,659	-	-	-
Total Vehicle Trips (C)	vehicle trips/year	0	0	488,331	-	0	0
Average Trip Length	km/trip	41.7	7.4	13.7	13.7	7.2	1.4
Emissions factor description	Per passenger km	National rail, per passenger km	Average local bus, per passenger km	Average car, unknown fuel, per km	Average car, battery electric vehicle, per km	Conventional bike, per passenger km	On foot
Emissions Factor Value (E)	$kgCO_2e/km$	0.0355	0.1023	0.1715	0.0503	0.0049	0.0098
Total	$kgCO_2e$	-	-	1,145,256	-	-	

Future Baseline

14.64. The future baseline scenario reflects the GHG emissions over the 60-year expected life period from the Site (without the Proposed Development) under 'business as usual'.

14.65. In traffic and transport terms, the 'future baseline' scenario is determined by applying 'natural' traffic growth factors to baseline traffic data. Regarding operational emissions, the amount of coal in the UK electricity mix has substantially decreased in recent years and low and zero carbon technologies (including photovoltaic, wind and nuclear energy) have been increasingly used to generate a larger portion of the UK's electricity. This has resulted in a reduction of carbon emissions generated from grid-supplied electricity. As the grid decarbonises, the lower amounts of emissions created through using on-site electricity will result in a lower carbon impact.

14.66. The UK has committed to becoming net-zero carbon by 2050. GHG emissions need to be dramatically reduced and any remaining emissions will need to be offset. This will consequently help in neutralising environmental impact from GHG emissions and slowing climate change.

Climate Vulnerability

Current Baseline

14.67. The Scheme is located in the Met Office climate profile North West England (Ref 14.28). The range of topography and altitude in North West England provides a variety of different climates. Rochdale weather station (Ref 14.29) is located approximately 15km north east of the Scheme and therefore has been chosen as representative of the local climate. This has been assessed under the baseline period of 1981-2010 as this is the 30-year period that corresponds to the future climate projections.

Precipitation - Rainfall

14.68. North West England is exposed to westerly maritime air masses and the presence of extensive areas of high ground mean that the region has some of the wettest places in the UK; such as the Peak District eastwards of the Scheme.

14.69. Average seasonal rainfall at Rochdale Weather station, England North West and Wales North region (as defined by the Met Office regional weather data), and the UK for the period 1981–2010 is presented in Table 14.13. It shows that the region and weather station is wetter than the UK average for Summer, though the rainfall in the area of the weather station is lower than the average of the region. However, the local area (the weather station) is drier than the UK average in Winter.

Table 14.13 - Long term average seasonal rainfall (mm) (1981–2010) for the England North West and Wales North region and Rochdale Weather Station, in comparison to the rest of the UK (Ref 14.29)

Long Term Average Seasonal Rainfall (1981-2010s) (mm)			
Season	Rochdale Weather Station	England North West and Wales North region	UK
Summer (June, July, August)	249 mm	205 mm	238 mm
Winter (January, February, December)	317 mm	256 mm	328 mm

14.70. Some notable extreme rainfall events for the region include:

- February 2022: Following Storm Eunice, heavy rainfall continued to affect North West England. The Met Office issued a yellow weather alert for the 20th and the 21st of February, warning of heavy rain (Ref 14.35). Homes, businesses and travel routes across the country were flooded as a result (Ref 14.36).
- July 2021: Urgent flood warnings were issued as torrential rainfall swept across Northern England. Heavy rain led to chaos across Greater Manchester, resulting in road closures across the network (Ref 14.37). February 2020: Arriving one week after storm Ciara, storm Dennis brought heavy and persistent rain across much of the UK – especially Wales and North West England, with an amber warning in place for Manchester (Ref 14.38). The flooding also caused major travel disruption with roads blocked, damaged railway lines and hundreds of flights cancelled (Ref 14.39).

Precipitation - Snow and ice

14.71. Snowfall is closely linked with temperature, with falls rarely occurring if the temperature is higher than 4°C. In North West England, snowfall is normally confined to the months from November to April. The region most recently experienced a snow event in:

- February 2021: The UK experienced a week of severe winter weather from 7th to 13th February, with easterly winds drawing a bitterly cold airflow from eastern Europe (Ref 14.40). Resulting in widespread travel disruption. An amber weather warning for snow came into force for Greater Manchester, with 3cm-8cm snow across North West England, with 10cm to 15cm possible in areas above 200 metres (Ref 14.41). The amber warning signifies that there is an increased chance of impacts from severe snow and cold weather, which means there is the possibility of travel delays, road and rail closures, as happened, power cuts, and potential risk to life and property.
- February to March 2018: the most significant spell of snow and low temperatures for the UK overall since December 2010. The snow and ice resulted in road closures, people becoming stranded, trains and flights cancelled, school closures, and power cuts (Ref 14.42). The spell also led to many instances of broken heating or frozen pipes, which led to an uptick in buildings flooding (Ref 14.43).

Temperature

14.72. Table 14.14 shows the long-term average seasonal mean temperature for England North West and Wales North region and Rochdale Weather Station between 1981 and 2010. It shows that the Scheme area is slightly warmer than the region and UK average.

Table 14.14 - Long-term average mean seasonal temperature for the England North West and Wales North region and Rochdale Weather Station, in comparison to the rest of the UK (Ref 1.15)

Long Term Average Seasonal Temperature (1981-2010s) (°C)			
Season	Rochdale Weather Station	England North West and Wales North region	UK
Summer (June, July, August)	15 °C	14.4 °C	14.4 °C
Winter (January, February, December)	3.9 °C	3.85 °C	3.7 °C

14.73. Average maximum temperature for 1981-2010 measured 19 °C in summer and 6.7 °C in winter. For the 30-year period of 1991-2020 average maximum temperatures measured 20 °C in summer and 7 °C in winter. With single years exceeding these averages. Some noteworthy extreme temperature event include:

- July 2022: The UK experienced a brief but unprecedented extreme heatwave from 16 to 19 July 2022, as hot air moved north from the near continent, with extreme temperatures recorded on both 18th and 19th. This heatwave marked a milestone in UK climate history, with 40°C being recorded for the first time in the UK, with a large past of England exceeding 37°C (Ref 14.44).
- Summer 2018: The weather was warm, dry, and sunny with the UK under the influence of high pressure, particularly during June and July. This was the UK's warmest summer since 2006, the driest since 2003 and the sunniest since 1995 (Ref 14.45). Higher temperatures posed a health risk to some people, and there were record A&E numbers over the summer (Ref 14.46).

Humidity

14.74. The relative annual average humidity in the site location is 76 to 78% and slightly higher in the surrounding areas (78 to 80%) (Ref 14.29). This is because the Scheme is located in Manchester City Centre, and cities often have lower humidity due to reduced evapotranspiration from vegetation and increased run-off of precipitation (Ref 14.47).

Wind

14.75. North West England is amongst the more exposed parts of the UK, being relatively close to the Atlantic and containing large upland areas. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest. Noteworthy wind events include:

14.76. February 2022: The most recent notable gale affecting the region was in February 2022, Storm Eunice. Wind speeds reached around 50mph in the area of the proposed site, with transport disrupted due to fallen lorries and trees (Ref 14.48). Fallen trees also damaged buildings, and the storm caused damage to roofs on buildings such as homes and religious buildings, including a fallen tower on a mosque in Manchester (Ref 14.49).

14.77. December 2021: Storm Barra brought strong winds and heavy rain across the UK from 7 to 8 December 2021 (Ref 14.50). A section of the roof of the 'Chill Factor' building on the outskirts of Manchester City Centre blew off during this storm (Ref 14.51).

14.78. November 2021: Storm Arwen brought severe winds across the UK overnight for the 26 to 17 November, with the Met Office issuing a red weather warning (Ref 14.52). The storm brought high winds and chaos on roads and motorways, with tree falls and house toppling being reported (Ref 14.53).

Sea level

14.79. The Scheme is located approximately 30 miles east from the Irish Sea. As the Scheme is a considerable distance from the major UK water bodies and is in Flood Zone 1, variables associated with sea level and sea temperature are not considered relevant and have been scoped out of this assessment.

Future baseline – Climate Vulnerability

14.80. The UKCP18 (Ref 14.30) provide data on projected change in climate variables for the UK. The UKCP18 are the most up-to-date projections of climate change for the UK, providing projections until the end of the twenty-first century. The Climate Risk Indicators (CRI) (Ref 14.31) developed by Nigel Arnell et al., as part of the UK Climate Resilience Programme has been used to infer this assessment. The CRI utilises the UKCP18 projections and allows for a range of climate related indicators (including but not limited to, Met Office Heatwaves and heat stress) to be assessed for Manchester City Council.

14.81. UKCP18 includes probabilistic projections of a range of climate variables for different emissions scenarios, termed representative concentration pathways (RCPs) and for a range of time slices to the end of the century. To address the full range of climate model uncertainty the results are provided as 50th (10th to 90th) percentiles and estimate projections are presented against baseline levels of 1981-2010s.

14.82. The RCP8.5 scenario has been used to infer this assessment. RCP8.5 is a high emissions' scenario which combines assumptions about high population and relatively slow income growth with modest rates of technological change and energy intensity improvements.

14.83. The future baseline has been presented for the 2030s (2020-2049), the 2050s (2040-2069) and 2080s (2070-2099) to identify the anticipated climate conditions over the construction period and design life of the Scheme's key components (refer to the scope of assessment below).

Precipitation - Rainfall

14.84. Climate change is projected to lead to wetter winters and drier summers although natural variation, including extreme events such as storms, flash floods and heavy downpours will continue to punctuate these trends. The projected changes to average summer and winter rainfall for the 2030s, 2050s and 2080s are summarised in Table 14.15.

Table 14.15 - Projected change in average summer and winter precipitation (%) for the 2030s, 2050s and 2080s, RCP8.5. The results are shown as 50th (10th-90th)

Season	2030s	2050s	2080s
Summer (June, July, August)	-9.8 (-24.2 to +5.7)	-19 (-36.8 to +1.3)	-29.4 (-48.7 to -6)
Winter (January, February, December)	+2.2 (-4.5 to +9)	+6.7 (-1.8 to +15.5)	+12.7 (+0.6 to +26.12)

Precipitation - Snow and ice

14.85. With regards to future changes, rising winter temperatures are likely to reduce the amount of precipitation that falls as snow in winter. Snowfall data is unavailable for the probabilistic projections (25km), however both the regional (12km) and the local (2.2km) show a decrease in both falling and lying snow across the UK for the period of 2061-2080 relative to the 1981-2000 baseline (Ref 14.54).

Temperature

14.86. In general, UKCP18 indicates that climate change is projected to lead to hotter summers and warmer winters, however cold snaps will still occur. Table 14.16 summarises the UKCP18 projections for changes in mean temperature for the Scheme location in the 2030s, 2050s and 2080s under RCP 8.5. For example, an increase in +1.2^{o}C summer temperatures in the 2030s at Rochdale Weather Station would equate to an average summer temperature increase from 15 ^{o}C to 16.2oC. This would lead to an average summer temperature increase from 15^{o}C to 19.4^{o}C in the 2080s.

Table 14.16 - Projected change in mean summer and winter temperature (°C) for the 2030s, 2050s and 2080s RCP8.5

Season	2030s	2050s	2080s
Summer (June, July, August)	+1.2 (+0.5 to +1.9)	+2.2 (+0.9 to +3.5)	+4.4 (+2 to +6.8)
Winter (January, February, December)	+0.9 (+0.1 to +1.8)	+1.6 (+0.6 to +2.8)	+3.0 (+1.3 to +4.9)

14.87. A heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year. A UK heatwave is defined as the maximum temperature above a region-specific threshold for at least three days. The present-day heatwave threshold for area of the scheme is 25°C (Ref 14.55). The intensity, frequency and duration of heatwaves are projected to increase under future warming.

14.88. The projected number of present-day heatwave events per year for the scheme is 1.7 (1.3 to 2.4) in the 2030s, 2.6 (1.5 to 4.3) in the 2050s and 4.6 (2.5 to 6) in the 2080s. Long periods of hot weather can pose threats to both people and infrastructure. The public realm space is made up of pedestrianised areas and a car park which can overheat and melt during heatwave events. In the UK, road melt occurs where temperatures exceed 25°C. The risk of road melt in days per year for the area of the scheme is 14.3 (10.7 to 19.6) in the 2030s, 21.3 (12.5 to 37) in the 2050s and 45.9 (20.5 to 76.9) in the 2080s.

14.89. Hot weather can lead to serious health consequences such as heat stress. Heat stress is defined as the amount of evaporation (or perspiration) required as related to the maximum ability of the average person to perspire (or evaporate fluids from the body in order to cool themselves). As temperatures are projected to increase, the risk of heat stress in outdoor workplaces are projected to increase (Ref 14.56). In this case, wet bulb global temperature (combining temperature and humidity) exceeding threshold of 25°C is used as a proxy for heat stress (Ref 14.57). For the area of the scheme, the projected heat stress in days per year are 0.2 (0.1 to 0.3) in the 2030s, 0.5 (0.1 to 2) in the 2050s and 3.7 (0.5 to 11.7) in the 2080s.

Humidity

14.90. Projections for relative humidity anticipate an average decrease of approximately 2.8% (-4.5% to -1.5%) in the 2030s, and a decrease of 5.4% in the 2060s (-7.5% to -3.8%).

Wind

14.91. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes much of this uncertainty (Ref 14.58). It is therefore difficult to represent regional extreme winds and gusts within regional climate models (Ref 14.59).

14.92. Central estimates of change in mean wind speed for the 2050s are small in all ensembles runs (<0.2ms-1). A wind speed of 0.2ms-1 (approximately 0.4 knots) is small compared with the typical magnitude of summer mean wind speed of about 3.6–5.1ms-1 (7 – 10 knots) over much of England (Ref 14.60). Seasonal changes at individual locations across the UK lie within the range of –15% to +10%.

14.93. In terms of storms, the analysis presented here is a summary of expected changes in storm patterns under a changing climate. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 24.5m/s or 55mph).

14.94. Studies (Ref 14.61) relating to future projections of storms suggest that climate driven storm changes are less distinct in the northern than southern hemisphere. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

Sea level

14.95. Sea level rise has been scoped out of the assessment due to the distance of the Scheme from the coast.

Identification and Evaluation of Significant Effects - GHG

Construction Phase

Embodied Carbon Emissions

14.96. Activities during the construction phase would generate GHG emissions from the manufacture of construction materials, transport of these materials to the construction site and from on-site works.

14.97. Table 14.17 provides the whole life embodied carbon emissions for the Proposed Development in the construction phase.

Table 14.17 - Embodied carbon emissions for the Proposed Development during construction phase

Building use	Embodied carbon emissions of the Proposed Development related to A1-A5 in the construction phase (tCO_2e)
Domestic	45,700
Non-domestic (office and commercial)	9,032

Total	54,732

14.98. The total whole life embodied carbon emissions for the Proposed Development A1-A5 stage are estimated to be approx. 54,732 tCO_2e.

14.99. A considerable amount of area is being retained on site and reused for commercial purposes. If calculated using the RIBA 2025 Climate Challenge Target of 650 $kgCO_2e/m2$ the retained area carbon impact is estimated to be approx. 7,085,000 $kgCO_2e$ or 7,085 tCO_2e. This can be considered a substantial saving in terms of embodied carbon emission.

Operational Phase

Embodied Carbon Emissions

14.100. Activities during the operational phase would generate GHG emissions, particularly from the replacement and refurbishment of building elements.

14.101. The embodied carbon emissions generated during the operational phase of the Proposed Development are provided in Table 14.18.

Table 14.18 - Embodied carbon emissions for the Proposed Development during operational phase

Building use	Embodied carbon emissions of the Proposed Development related to B4-B5 in the operational phase (tCO_2e)
Domestic	9,140
Non-domestic (office and commercial)	3,449
Total	12,589

14.102. The total embodied carbon emissions estimated to be generated during the operational phase of the Proposed Development is 12,589 tCO_2e.

Operational Energy Emissions

14.103. The Proposed Development comprises of domestic as well as non-domestic buildings (commercial and office spaces).

14.104. To determine the operational energy emissions for the domestic building typologies, the individual flats (1, 2 and 3 bed) were modelled in Stroma FSAP software to calculate the regulated energy demands. The weighted average (48 kWh/m2/yr) of the energy results is further used for operational energy emission calculation of domestic typology.

14.105. For the non- domestic new-build office spaces, weighted average for the Part L calculations has further been aligned with the TM54 findings to calculate operational energy emissions by the design team at this stage. The number (90 kWh/m2/yr) is also compliant with the 2021 good practice benchmarks for new build, as listed in the RIBA 2030 Climate Challenge Target.

14.106. For the non- domestic commercial areas (both new and retained areas from previous development) of the Proposed Development, operational energy emissions are based on National Calculation Methodology (NCM) standards and BSRIA Guidelines for Building Services. These are used in absence of actual operation consumption data for these typologies.

14.107. Table 14.19 gives the annual operational energy use for the Proposed Development with respect to the domestic and non-domestic (office and commercial) building typologies.

Table 14.19 - Annual operational energy use for the Proposed Development

Building use	Energy consumption (kWh/m^2/yr)	GIA of the Proposed Development (m^2)	Total annual operational energy of the Proposed Development (kWh/yr)
Domestic	48	67,253	3,230,976
Non-domestic (new-build offices)	90	23,301	2,097,090
Non-domestic (new-build commercial)	120	4,285	514,200
Non-domestic (retained commercial)	165	10,626	1,753,290
Total	7,595,556		

14.108. Based on the above scenario, it can be noted that the energy consumption values for retained and new build commercial areas are high as these values are currently taken from industry benchmarks in absence of actual data. Therefore, it is proposed that as the design develops further, it should aim to align the operational energy demand with the RIBA 2025 (<75 kWh/m2/y), RIBA 2030 (<55 kWh/m2/y) Climate Challenge Target as specified in Table 3 or 2021 good practice benchmarks for new build (<90 kWh/m2/y).

14.109. The total annual energy consumption for domestic part of the Proposed Development is estimated as approx. 3,230,976 kWh/yr. For the non-domestic part of the Proposed Development, the total annual energy use is estimated as 4,364,580 kWh/yr. Of this, the share of new-build offices is 2,097,090 kWh/yr, new-build commercial is 514,200 kWh/yr and that of the retained commercial is 1,753,290 kWh/yr. The overall total annual energy consumption rate of the Proposed Development is estimated to be approx. 7,595,556 kWh/yr or 7,596 MWh/yr. The total operational energy use over the 60-year expected life of the Proposed Development is estimated to be about 455,733 MWh.

14.110. Carbon emissions from operational energy use are assessed over the whole expected life (60 years) of the Proposed Development. While calculating the carbon emissions from operational energy use, the decarbonisation of grid electricity has been considered. This has been done by using the average predicted annual carbon factors for grid electricity, based on data published by the UK Government (Ref. 1.12). These emission factors for grid electricity consider grid decarbonisation, and therefore the carbon emissions from grid electricity continue to remain consistent from 2050 until 2100.

14.111. The total tonnes of operational carbon emissions predicted to be generated by the Proposed Development due to energy use are therefore estimated to be about 5,564,570 kgCO_2e or 5,564 tCO_2e.

Operational Transport Emissions from the Proposed Development

14.112. In order to calculate the operational traffic associated with the Proposed Development, the number of trips per vehicle/transport mode, and the average trip distance have been multiplied by emissions factors for each key vehicle type. The data required has been taken from the Transport Assessment undertaken by Curtins for the Proposed Development.

14.113. The calculation for annual transport emissions from various modes of transport during the operational phase of the Proposed Development are provided in Table 14.20. The number of trips has been derived using peak hour trip rates obtained from surveys of schemes of a similar size and nature to that proposed from the TRICS database.

Table 14.20 - Operational transport emissions for the Proposed Development

Metric	Unit	Train	Bus	Car (Petrol)	Car (EV)	Bicycle	Walk
Total Distance (A)	km/year	-	5,404,908	6,305,864	4,102,250	1,760,605	1,191,148
Total Vehicle Trips (C)	vehicle trips/year	0	730,255	461,073	299,949	243,161	822,559
Average Trip Length	km/trip	41.7	7.4	13.7	13.7	7.2	1.4
Emissions factor description	Per passenger km	National rail, per passenger km	Average local bus, per passenger km	Average car, unknown fuel, per km	Average car, battery electric vehicle, per km	Conventional bike, per passenger km	On foot
Emissions Factor Value (E)	$kgCO_2e/km$	0.0355	0.1023	0.1715	0.0503	0.0049	0.0098
Total	$kgCO_2e$	-	552,760	1,081,330	206,384	8,627	11,673

14.114. In the residential part of the Proposed Development, 10% (17) of the parking spaces will be EV spaces and the remaining 90% (150) will be future proofed with cable routing. In the non-residential part, 5% (39) of the parking spaces will have provision for EVs and 15% (115) will be future proofed. Hence, the adoption of EV cars in future has been considered and EV data projections used in the above assessment are based on the TAG table A1.3.9 (Ref. 14.14). The total annual transport carbon emissions for the Proposed Development equates to about 1,860,774 $kgCO_2e/yr$ or 1,861 tCO_2e/yr, and about 111,646 tCO_2e over the period of 60 year (2029 to 2089). The transport carbon emissions from the Proposed Development are estimated to increase by 62.7% against the current baseline scenario.

End of Life Phase

14.115. Activities during the end-of-life phase of the Proposed Development would generate GHG emissions, particularly from the demolition, waste processing and the disposal of building elements.

14.116. The embodied carbon emissions generated during the end-of-life phase of the Proposed Development are provided in Table 14.21.

Table 14.21 - Embodied carbon emissions during the end-of-life phase of the Proposed Development

Building use	Embodied carbon emissions of the Proposed Development related to C1-C4 in the end-of-life phase (tCO_2e)
Domestic	2,285
Non-domestic (office and commercial)	677
Total	2,962

14.117. The total embodied carbon emissions estimated to be generated during the end-of-life phase of the Proposed Development is 2,962 tCO_2e.

14.118. Table 14.22 summarises the total whole life embodied carbon, operational carbon (energy use) and transport emissions during the whole 60-year expected life of the Proposed Development (2029 to 2089).

Table 14.22 - Summary of total whole life embodied carbon, operational carbon and transport emissions

GHG emission category	Total GHG emissions (tCO_2e)
Whole life embodied carbon emissions (A1-A5, B4-B5 and C1-C4)	70,284
Operational carbon emissions (energy use with grid decarbonisation)	5,564
Operational Transport emissions	111,646
Total	**187,494**

14.119. Figure 14.2 provides the percentage of GHG emissions over the 60-year lifespan of the Proposed Development. The transport carbon emissions during the operation phase of the Proposed Development are estimated to have the highest carbon impact, constituting about 60% of the total carbon emissions. This is followed by the whole life embodied carbon emissions, i.e., carbon emissions from the construction, use, repair and maintenance, and end-of-life of the Proposed Development, which are estimated to constitute about 37% of the total carbon emissions. Interestingly, carbon emissions from operational energy use are estimated to constitute only about 3% of the total carbon emissions from the Proposed Development.

Effect on Carbon Budget

14.120. In order to contextualise the GHG emissions generated by the Proposed Development, the results have been compared to the UK Fifth Carbon Budget in Table 14.23.

Table 14.23 - Comparison of GHG emissions from the Proposed Development with the UK Carbon Budget

Type of emissions	Carbon Emissions
Embodied Carbon	70,284 tCO_2e
Building Emissions	5,564 tCO_2e
Transport Emissions	111,646 tCO_2e
Total Emissions for 60 years	187,494 tCO_2e
Comparison with UK Carbon Budget	
Total Emissions for the period of the Fifth Carbon Budget (FCB)	12,499 tCO_2e
UK Fifth Carbon Budget	1,725 $MtCO_2e$
Percentage over FCB	0.00072%

14.121. Emissions from the Proposed Development are expected to account for less than 0.00091% of the UK Fifth Carbon Budget. Hence, the Proposed Development is not expected to influence the achievement of the carbon budget throughout its construction, operation, and end-of-life phases.

Significance of effects based on RIBA targets

14.122. The whole life embodied carbon emissions estimated to be generated by the domestic part of the Proposed Development are 898.17 $kgCO_2e/m2$. This figure exceeds the RIBA 2025 target (<800 $kgCO_2e/m2$). Therefore, the significance of effect of the embodied carbon emissions is likely to be moderate adverse.

14.123. The whole life embodied carbon emissions estimated to be generated by the non-domestic part of the Proposed Development are 456.10 $kgCO_2e/m2$. This figure meets the RIBA 2030 target (<750 kgCO2e/m2). Therefore, the significance of effect of the embodied carbon emissions is likely to be minor adverse.

14.124. The operational energy estimated to be generated by the domestic part of the Proposed Development is 48 kWh/m2/y. This figure meets the RIBA 2025 target (<60 kWh/m2/y). Therefore, the significance of effect of the operational carbon emissions is likely to be moderate adverse.

14.125. The operational energy estimated to be generated by the non-domestic part of the Proposed Development is 90 kWh/m2/y for new build offices, 120 kWh/m2/y for new build commercial and 165 kWh/m2/y for retained commercial. The figures for new build offices and new build commercial exceed the RIBA 2025 target (<75 kWh/m2/y) and the figure for retained commercial exceeds the 'business-as-usual' scenario (<130 kWh/m2/y). Therefore, the significance of effect of the operational carbon emissions is likely to be major adverse.

14.126. The emissions from operational energy for non-domestic typology is an over-estimation (worst case scenario) of the actual emissions from the Proposed Development. It is recommended to explore low carbon and energy efficient design to lower these emissions in next stages.

14.127. The operational transport emissions of the Proposed Development are estimated to be 111,646 tCO2e. This is a 62.7% increase from the baseline transport carbon emissions associated with the current use of the Site.

14.128. There is no method to assess the significance of transport carbon emissions of the Proposed Development. However, based on the magnitude of carbon emissions from transport and it being the highest contributor (66%) to the overall carbon emissions from the Proposed Development the operational transport carbon emissions are likely to have moderate adverse effect prior to the implementation of mitigation measures.

Identification and Evaluation of Significant Effects – Climate Vulnerability

Identification and evaluation of potential impacts

Construction Phase

14.129. The Scoping Report identified that the construction period did not require further assessment.

Operational Phase

14.130. Operational receptors to be assessed, as identified in the Scoping Report are presented in Table 14.24.

Table 14.24 - Climate Variables and receptors to be assessed

Climate Variable	Receptor		
	Buildings	Public Realm	End Users
Precipitation – Change in Annual Average	x	X	
Precipitation – Extreme precipitation events	x	X	x
Precipitation – Drought	x	X	x
Temperature – extreme temperature events	x	X	x
Temperature - change in annual average	x	X	
Wind – Gales and high winds	x	x	x
Wind – Storms	x	x	x
Humidity	x		x

14.131. The assessment of effects takes into account mitigation embedded in the Scheme's design that has been agreed with the design team. Table 14.24 sets out the embedded mitigation measures that address climate risks. Table 14.25 and Table 14.26 assess the significance of effects identified that have potential to impact the Scheme.

Table 14.25 – Climate Resilience Mitigation Embedded within the design

Climate Hazard	Associated Hazard	Receptor Affected	Potential Impact	Embedded Mitigation
Precipitation 2050s projections for decreases in summer precipitation are -19% (drier)	Changes in annual average	Buildings Public realm	Flooding of buildings. Flooding of the public realm. Damage to components from increased run off.	• Attenuation will be provided within rain gardens, oversized pipes and permeable pavement subbase.
	Extreme precipitation events	Buildings Public realm End users	Existing drainage infrastructure overwhelmed leading to surface water flooding and siltation. Flooding (pluvial or fluvial) may lead footways being impassable and causing dangerous active travel conditions.	

Climate Hazard	Associated Hazard	Receptor Affected	Potential Impact	Embedded Mitigation
2080s projections for decreases in summer precipitation are -29.4% (drier) 2050s projections for increase of winter precipitation are +6.7% (wetter) 2080s projections for increase of winter precipitation are +12.7% (wetter)			Flooding may cause damage to buildings, resulting from deterioration of materials and resulting in increased maintenance requirements. Flooding may also cause damage to the public realm, resulting from deterioration of materials and resulting in increased maintenance requirements. Extreme rainfall events may also lead to destabilisation of soils and earthworks Damp buildings can lead to mould growth resulting in health issues for end users. Vegetation can become damaged and destabilised, posing a risk to buildings and end users.	• Any new development site drainage will be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services and should be maintain on site. • The existing buildings (Warehouse, Terraces) on site are to utilise existing drainage connections. • The drainage maintenance regime will be provided on completion. • As is the project is located within flood zone 1 (very low probability of flooding), an emergency plan is not required by the Local Lead Flood Authority (LLFA). • The drainage report for the Leisure Box fully sets out how the existing and proposed surface water systems will be working and how much will be attenuated. • The climate change flood allowance of 45% will be considered as per LLFA recommendation • It is not expected that heavy rain will destabilise the soil as the surface water will be captured by channels and discharge to public sewer. Therefore, slope erosion control measures have not been incorporated.
	Drought	Buildings Public Realm End Users	Prolonged dry periods may lead to drying out and cracking of earthworks and soils, subsidence and greater amounts of dust. Vegetation can become damaged and destabilised, posing a risk to buildings and end users.	

Climate Hazard	Associated Hazard	Receptor Affected	Potential Impact	Embedded Mitigation
				• The consideration of materials within the design that can withstand heavy rainfall is a detailed design issue, relevant to post-planning design stages. Proposed new architectural materials will be specified to be fit for their intended purpose and location, in relation to relevant regulation and guidance, including requirements associated with external cladding materials in relation to watertightness.
<u>Temperature</u> 2050s projections for maximum summer temperature are 37.4°C. 2080s projections for maximum summer temperature are 41.8°C. 2050s projections for maximum winter temperature are 18.1°C. 2080s projections for maximum winter temperature are 20.2°C.	Extreme temperature events	Buildings Public Realm End users	Overheating of buildings and ancillary components. Extreme cold events can cause slippery surfaces and deterioration of road surfaces (from freeze-thaw action), which poses a safety risk to end users. Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading) Increase in thermal expansion of structure joints compromising structural integrity leading to increased maintenance. Shrinking and cracking of soils; this reduces soil stability. Increased risk of fire. High temperatures may cause damage to footways and cycleways, including potential melting and deformation. High temperatures can cause discomfort for end users, alongside impacting concentration and productivity in work spaces. Vegetation in the public realm can dry out.	WSP MEP/ Sustainability Stage 2 Report indicates that: • All office areas have been provided with heating/ cooling provision – (design criteria is 22 +/- 2°C) All office areas are designed to be 24°C maximum, plant is designed to run during peak external temperatures based on future weather data.– to provide sufficient cooling/heating in extreme hot and cold conditions • Leisurebox apartments are compliant with CIBSE TM59 Methodology and Building Regulations Part O. Overheating studies have been carried out in both Leisurebox Tower apartments and atrium/ glazed lifts which has informed the glazing areas, window sizes and ventilation rates within the apartments to ensure compliance and reduce overheating. • Warehouse atrium is compliant with TM52 - this is a check only that it is comfortable. • A BMS system shall be installed that monitors temperature across the whole site. • Due to the warehouse and terraces being listed façades it is not possible for natural shading to be utilised across these aspects of the scheme.
	Change in annual average	Buildings Public Realm		

Climate Hazard	Associated Hazard	Receptor Affected	Potential Impact	Embedded Mitigation
				• Opportunities for natural shading (grass, trees and shrubbery) have been incorporated into the architectural design in the following areas: - GF/L01 balconies to building/retail entrances. - Pergola structures to roof terraces and level 01 mews street. - Recessed balconies within residential towers. - Perforated metal panels providing shading to opening glazed ventilation panels within residential buildings. The consideration of materials within the design that can withstand high temperatures, UV degradation and thermal expansion and contraction is a detailed design issue, relevant to post-planning design stages. Proposed new architectural materials will be specified to be fit for their intended purpose and location, in relation to relevant regulation and guidance in relation to temperature impacts.
<u>Wind</u> Seasonal changes at individual locations across the UK for wind speeds lie within the range of –15% to +10%.	Gales and high winds	Buildings Public Realm End users End users	Damage from high winds and rain infiltration into components. Lightning strikes causing fires and damage to assets and pose health and safety risks to end users. High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation due to wind-driven rain infiltration. Windborne dust and debris causing clogging drainage and requiring clearing.	Wind mitigation measures have been iteratively designed and tested through mitigation workshops and studies. Details of the wind mitigation are identified within Chapter 10 Wind Microclimate and summarised here. On the south-east corner of the development and on private balconies, mitigation consists of porous facades and screens, along with planters. Trees are proposed as per the landscaping scheme.
	Storms (lightning)	Buildings Public Realm End users		

Climate Hazard	Associated Hazard	Receptor Affected	Potential Impact	Embedded Mitigation
			Road and footway users may also be sensitive to high winds and associated infrastructure such as signage or signals could also be damaged by high winds or lightning strike.	
Humidity	Changes in annual average Evaporation	Buildings End Users	Lower humidity can cause health problems for end users, such as catching a cold or infection. Lower humidity can damage the wood, siding or paint in buildings. Higher humidity can lead to mould growth resulting in health issues for end users.	All office areas have been provided with heating/ cooling provision and ventilation. The majority of areas are provided with ventilation based on BCO, B Regs Part F, CIBSE and best practice. Development of a maintenance plan to ensure humidity is appropriately regulated and damage resolved is a detailed design issue, relevant to post-planning design stages.

Table 14.26 – Assessment of Climate Change Vulnerability effects during the operational phase of the scheme

Receptor	Potential Impact	Likelihood	Consequence	Significance
Buildings	Flooding of buildings. This may cause damage, resulting from deterioration of materials and resulting in increased maintenance requirements.	Medium	Minor adverse	Not significant
	Damage to structure or components from increased run off	Medium	Negligible	Not significant
	Damp buildings can lead to mould growth.	Medium	Moderate adverse	**Significant**
	Vegetation can become damaged and destabilised, posing a risk to buildings.	Medium	Moderate adverse	**Significant**

Receptor	Potential Impact	Likelihood	Consequence	Significance
	Prolonged dry periods may lead to subsidence.	High	Moderate adverse	Significant
	Overheating of buildings	High	Minor adverse	Significant
	Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading)	High	Moderate adverse	Significant
	Increase in thermal expansion of structure joints compromising structural integrity leading to increased maintenance.	High	Moderate adverse	Significant
	Increased risk of fire	Medium	Large adverse	Significant
	Lightning strikes causing fires and damage to assets	Medium	Large adverse	Significant
	High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation due to wind-driven rain infiltration	High	Minor adverse	Significant
	Lower humidity can damage the wood, siding or paint in buildings.	Low	Minor adverse	Not significant
Public Realm	Flooding of the public realm. This may cause damage, resulting from deterioration of materials and resulting in increased maintenance requirements.	Medium	Minor adverse	Not significant

Receptor	Potential Impact	Likelihood	Consequence	Significance
	Existing drainage infrastructure overwhelmed leading to surface water flooding and siltation.	Medium	Minor adverse	Not significant
	Flooding (pluvial or fluvial) may lead footways being impassable and causing dangerous active travel conditions.	Medium	Minor adverse	Not significant
	Extreme rainfall events may lead to destabilisation of soils and earthworks	Medium	Minor adverse	Not significant
	Vegetation can become damaged and destabilised, posing a risk to buildings and end users.	Medium	Moderate adverse	**Significant**
	Prolonged dry periods may lead to drying out and cracking of earthworks and soils, subsidence and greater amounts of dust.	High	Moderate adverse	**Significant**
	Extreme cold events can cause slippery surfaces and deterioration of road surfaces (from freeze-thaw action).	Low	Minor adverse	Not significant
	Shrinking and cracking of soils; this reduces soil stability.	High	Moderate adverse	**Significant**
	Increased risk of fire.	Medium	Large adverse	**Significant**
	High temperatures may cause damage to footways and cycleways, including potential melting and deformation.	High	Moderate adverse	**Significant**

Receptor	Potential Impact	Likelihood	Consequence	Significance
	Vegetation in the public realm can dry out.	High	Minor adverse	Significant
	Damage from high winds and rain infiltration into components, such as drainage.	High	Minor adverse	Significant
	Lightning strikes causing fires and damage to assets	High	Large adverse	Significant
	Windborne dust and debris causing clogging drainage and requiring clearing	High	Moderate adverse	Significant
	Roadway and Cycleway Infrastructure such as signage or signals could also be damaged by high winds or lightning strike.	High	Minor adverse	Significant
End Users	Damp buildings can lead to mould growth resulting in health issues for end users	Medium	Moderate adverse	Significant
	Vegetation can become damaged and destabilised, posing a risk to end users.	Medium	Moderate adverse	Significant
	Extreme cold events can cause slippery surfaces and deterioration of road surfaces (from freeze-thaw action), which poses a safety risk to end users	Low	Moderate adverse	Not significant
	High temperatures can cause discomfort for end users, alongside impacting concentration and productivity in work spaces.	High	Minor adverse	Significant

Receptor	Potential Impact	Likelihood	Consequence	Significance
	Lightning strikes causing fires and damage to assets and pose health and safety risks to end users.	High	Large adverse	**Significant**
	Road and footway users may also be sensitive to high winds.	High	Moderate adverse	**Significant**
	Lower humidity can cause health problems for end users, such as catching a cold or infection.	Low	Moderate adverse	Not significant

Mitigation Measures

GHG Assessment

14.132. On the basis of the GHG assessment, mitigation measures are suggested for the construction, operation and end-of-life phase of the Proposed Development.

Construction phase

14.133. Whole life embodied carbon reduction measures including optimising material usage, use of low carbon materials, reducing construction waste and using fewer finish materials (for wall, floor, ceiling, façade).

14.134. Though pre-demolition audit has already been undertaken, the potential for materials to be reused in the Proposed Development should be continuously monitored. Consideration should be given to the robustness and durability of materials and assets.

14.135. Traffic management measures should be implemented to restrict construction vehicles in certain locations and routes at certain times of the day.

14.136. The main contractor will be responsible for monitoring the energy, water and waste data during the construction phase to encourage transparency and accountability. It is necessary to ensure that this is diligently followed.

Operational phase

14.137. Robust monitoring of energy consumption (i.e., smart metering) must be ensured.

14.138. Energy efficient equipment should be used in both domestic and non-domestic buildings.

14.139. Selection of 100% renewable electricity contracts must be ensured, where possible.

14.140. Water-oriented strategies should be implemented including the installation of efficient plumbing fixtures to reduce ‘non-revenue water’ losses, rainwater harvesting, and xeriscaping.

14.141. Over the lifetime of the Proposed Development, as new technologies come in, the lighting and HVAC system should be upgraded, as much as feasible, giving preference to products that are more energy efficient and have an extended lifespan.

14.142. Measures proposed in the Interim Travel Plan of the Transport Assessment must be adopted which aim to increase the level of walking, cycling and public transport use to and from the site, and reduce reliance on private cars.

End of life phase

14.143. It is necessary to ensure that if the buildings were to be deconstructed, it should be at as late a date as possible. Careful design and specification will help extend the lifetime of the Proposed Development.

14.144. Consideration should be given to the proportion of landfilling and reuse and/or recycling materials at the end of life of the Proposed Development. These measures should be developed in accordance with the existing standards and best practices.

Climate Vulnerability

14.145. Following the identification of the embedded mitigation measures in Table 24 and the assessment of significance in Table 25, the following additional mitigation measures are deemed necessary:

Precipitation

14.146. The following should be integrated into the design in relation to potential impacts of precipitation on the project, in order to reduce potential significant effects:

- Confirmation of the provisions in buildings to prevent damp conditions and mould growth.
- Confirmation of vegetation maintenance plans to ensure that vegetation is controlled and stable, and removal plans are in place should vegetation pose a risk to buildings.
- Following dry periods, buildings and the grounds should be inspected for cracking and subsidence.
- Confirmation that slope erosion due to heavy rainfall will be sufficiently captured by channels and discharge to public sewer.

Temperature

14.147. The following should be integrated into the design in relation to potential impacts of temperature on the project, in order to reduce potential significant effects:

- Confirmation that cooling provisions can provide cooling for temperatures beyond 41.8°C.
- The consideration and implementation of materials which can withstand thermal expansion and contraction and which can withstand UV degradation.
- Confirmation of fire management and evacuation plans.
- The consideration and planting of vegetation that can withstand dry periods, alongside the implementation of a green infrastructure maintenance plan.
- The durability requirements of construction materials to accommodate temperature risks.

Wind

14.148. The following should be integrated into the design in relation to potential impacts of wind on the project, in order to reduce potential significant effects:

- The consideration of wind forces in the durability of design and material choices.
- Slope erosion control measures.
- Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Maintenance plans to remove debris from public realm areas and drainage.
- Confirmation that wind tunnels will not exist or impact on public realm spaces.

Humidity

14.149. The following should be integrated into the design in relation to potential impacts of humidity on the project, in order to reduce potential significant effects:

- The consideration of (de-)humidification systems incorporated into buildings to sufficiently humidify or de-humidify buildings.
- The consideration of (de-)humidification systems designed into the heating and cooling systems
- The consideration of particular sealant methods implemented for areas where high humidity may cause mould growth issues
- A maintenance plan to be put in place to ensure humidity is appropriately regulated and damage resolved

Cumulative Effects

14.150. The resilience assessment looks at potential impacts of changes in climate on the Proposed Development, rather than impacts of the Proposed Development on climate or on other developments. Cumulative effects will be assessed in each topic area which will, where relevant, incorporate climate impacts.

Residual Effects

GHG Emissions

14.151. Table 14.27 gives a summary of the GHG assessment and the post-mitigation residual effects for the Proposed Development.

14.152. It is noteworthy that a significant portion of the existing commercial built-up on the Site is being retained. GHG emissions from these retained structures would be relatively less as compared to buildings that are being reconstructed. Retention of existing buildings in the Proposed Development has, hence, reduced its overall emissions to a great extent.

Table 14.27 - Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Receptor(s)	Likely Significant Effects	Significance of Effects	Mitigation Measures	Residual Effects
Construction				
Embodied carbon emissions	Emissions associated with manufacture of construction materials, transport of these materials to the construction site, on-site works and disposal of construction waste.	Domestic: **Moderate adverse (significant)** P / D / LT Non-domestic: **Minor adverse (not significant)** P / D / LT	Optimising material usage, use of low carbon materials, reducing construction waste and using fewer finish materials (for wall, floor, ceiling, façade).	**Minor adverse (not significant)** P / D / LT

Receptor(s)	Likely Significant Effects	Significance of Effects	Mitigation Measures	Residual Effects
			Potential for materials to be reused in the Proposed Development should be continuously monitored. Consideration should be given to the robustness and durability of materials. Traffic management measures to restrict construction vehicles in certain locations and routes at certain times of the day. Considerate construction best practices (such as wheel washing, use of recyclable materials).	
Operational				
Embodied carbon emissions	Emissions associated with replacement/refurbishment of building parts	Domestic: **Moderate adverse (significant)** P / D / LT Non-domestic: **Minor adverse (not significant)** P / D / LT	Consideration should be given to the robustness and durability of materials and minimising material waste.	**Minor adverse (not significant)** P / D / LT
Operational energy emissions	Emissions associated with buildings' (operational) energy use	Domestic: **Moderate adverse (significant)** P / D / LT Non-domestic: **Major adverse (significant)** P / D / LT	Robust monitoring of energy consumption (i.e., smart metering) must be ensured. Energy efficient equipment should be used in both domestic and non-domestic buildings. Selection of 100% renewable electricity contracts must be ensured, where possible.	**Minor adverse (not significant)** P / D / LT

Receptor(s)	Likely Significant Effects	Significance of Effects	Mitigation Measures	Residual Effects
			Installation of efficient plumbing fixtures to reduce 'non-revenue water' losses, rainwater harvesting, and xeriscaping. Over the lifetime of the Proposed Development, as new technologies come in, the lighting and HVAC system should be upgraded, giving preference to products that are more energy efficient and have an extended lifespan. For example, having a future connection into the district heat network.	
Operational transport emissions	End-user emissions associated with changes in regional traffic flows	**Moderate adverse (significant)** P / D / LT	Measures proposed in the Interim Travel Plan of the Transport Assessment aim to increase the level of walking, cycling and public transport use to and from the site, and reduce reliance on private cars.	**Minor adverse (not significant)** P / D / LT
End-of-life				
Embodied carbon emissions	Emissions associated with decommissioning, deconstruction and demolition	Domestic: **Moderate adverse (significant)** P / D / LT Non-domestic: **Minor adverse (not significant)** P / D / LT	Careful design and specification will help extend the lifetime of the Proposed Development. Consideration should be given to the proportion of landfilling and reuse and/or recycling materials at the end of life of the Proposed Development.	**Minor adverse (not significant)** P / D / LT

Key to table:

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

Climate Vulnerability

14.153. Table 14.28 gives a summary of the climate risks from the significant effects identified in Table 14.25 and taking into account the additional mitigation detailed above.

Table 14.28 - Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Operational			
Buildings End Users	Damp buildings can lead to mould growth. This can result in health issues for end users.	Confirmation of the provisions in buildings to prevent damp conditions and mould growth.	Not significant
Buildings Public Realm End Users	Vegetation can become damaged and destabilised, posing a risk to buildings and end users.	Confirmation of vegetation maintenance plans to ensure that vegetation is controlled and stable, and removal plans are in place should vegetation pose a risk to buildings.	Not significant
Buildings Public Realm	Prolonged dry periods may lead to subsidence. This can be caused by the drying out and cracking of earthworks and soils.	Following dry periods, buildings should be inspected for cracking and subsidence. Slope erosion control measures.	Not significant
Buildings	Overheating of buildings	Confirmation that cooling provisions can provide cooling for temperatures beyond 41.8°C.	Not significant
Buildings	Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading)	The consideration and implementation of materials which can withstand which can withstand UV degradation.	Not significant
Buildings	Increase in thermal expansion of structure joints compromising structural integrity leading to increased maintenance.	The consideration and implementation of materials which can withstand thermal expansion and contraction.	Not significant
Buildings Public Realm	Increased risk of fire	Confirmation of fire management and evacuation plans.	Not significant
Buildings Public Realm End Users	Lightning strikes causing fires and damage to assets. This can pose a health and safety risk to end users.	Confirmation of fire management and evacuation plans.	Not significant

Receptor(s)	Likely Significant Effects	Mitigation Measures	Residual Effects
Buildings	High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation due to wind-driven rain infiltration	Consideration of wind loading/action impacts on buildings and public realm elements. Consideration of wind forces in the durability of design and material choices.	Not significant
Public Realm	Shrinking and cracking of soils; this reduces soil stability.	Following dry periods, the grounds should be inspected for cracking and subsidence. Slope erosion control measures.	Not significant
Public Realm	High temperatures may cause damage to footways and cycleways, including potential melting and deformation.	The durability requirements of construction materials to accommodate temperature risks.	Not significant
Public Realm	Vegetation in the public realm can dry out.	The consideration and planting of vegetation that can withstand dry periods, alongside the implementation of a green infrastructure maintenance plan.	Not significant
Public Realm	Damage from high winds and rain infiltration into components, such as drainage.	Consideration of wind loading/action impacts on buildings and public realm elements. Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Maintenance plans to remove debris from public realm areas and drainage.	Not significant
Public Realm	Windborne dust and debris causing clogging drainage and requiring clearing	Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Maintenance plans to remove debris from public realm areas and drainage.	Not significant
Public Realm	Roadway and Cycleway Infrastructure such as signage or signals could also be damaged by high winds or lightning strike.	Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Consideration of wind loading/action impacts public realm elements.	Not significant
End Users	High temperatures can cause discomfort for end users, alongside impacting concentration and productivity in work spaces.	Confirmation that cooling provisions can provide cooling for temperatures beyond 41.8°C.	Not significant
End Users	Road and footway users may also be sensitive to high winds.	Confirmation that wind tunnels will not exist or impact on public realm spaces.	Not significant

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Figures

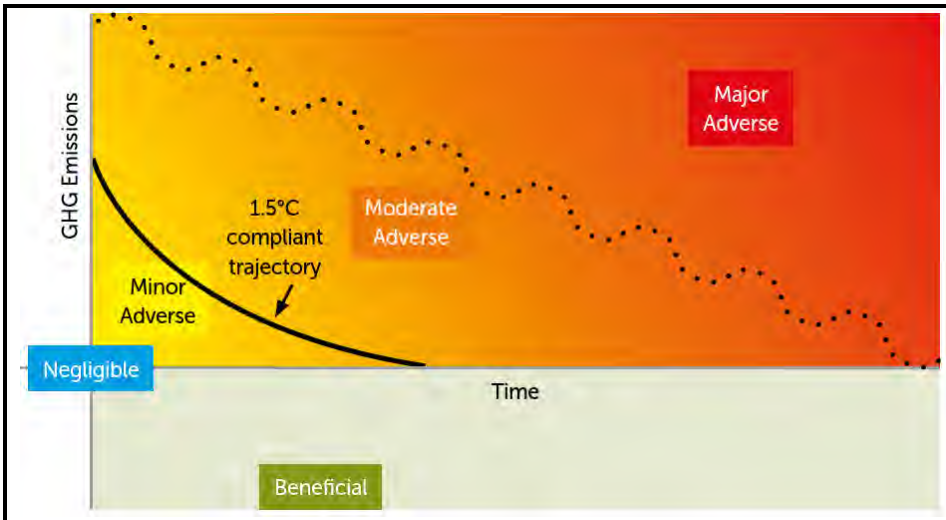


Figure:	**14.1**		
Title:	**Different levels of significance plotted against the UK's net zero compatible trajectory (Source: IEMA (2021) Assessing Greenhouse Gas Emissions and Evaluating their Significance)**		
Project:	**Great Northern, Manchester**		
Date:	**November 2022**	**Scale:**	**Scale /NTS**

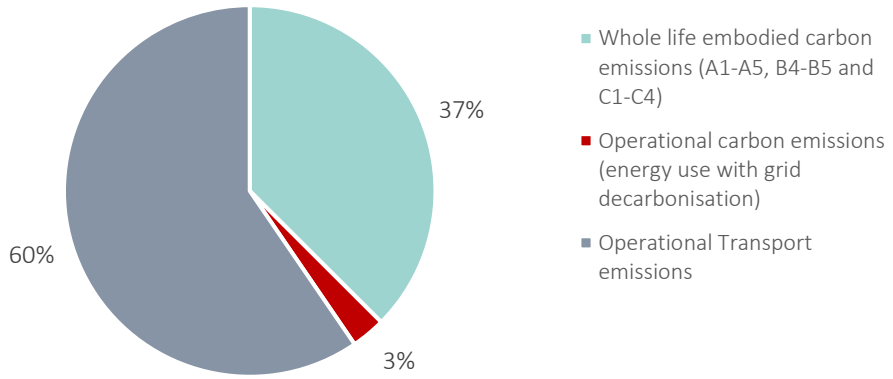


	Figure:	**14.2**		
	Title:	**Proportion of GHG emissions over the 60-year lifespan of the Proposed Development**		
	Project:	**Great Northern, Manchester**		
	Date:	**November 2022**	**Scale:**	**Scale /NTS**

15. Summary of Residual Effects

15.1. This section contains a summary of the residual effects of the Proposed Development. The residual effects take the mitigation measures highlighted within chapter 6-14 into consideration. For some disciplines mitigation includes those embedded into the scheme by way of the design development. This is the case for TVIA, Heritage, Wind and Sunlight, Daylight and Overshadowing, Climate Change where the design has evolved i.e size and position of towers, materiality, design and design quality, porous fins, screens and balustrades, and trees. Where other mitigation measures have been identified, they are summarised in the tables below:

Townscape and Visual Impact

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Negligible – moderate adverse	Viewpoints Character Areas	Construction management plan to assist with the screening of the development during construction.	Negligible – moderate adverse (temporary)
Operational Phase			
Negligible – major beneficial	Viewpoints Character Areas	Embedded within scheme	Negligible – major beneficial Significance of effect categories townscape/ visual receptors: 1No. Major / Moderate beneficial 7 No. Moderate beneficial 8 No. Minor beneficial 5 No. Negligible Beneficial 7 No. No change 13 Townscape Character Areas affected

Historic Environment

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Negligible adverse – moderate adverse	Listed Buildings	CEMP	Negligible adverse – moderate adverse
Minor adverse – minor/moderate adverse	Conservation Areas	CEMP	Minor adverse – minor/moderate adverse
Operational Phase			
Neutral – moderate beneficial	Listed Buildings	Design development and public benefits	Neutral – moderate beneficial
Neutral – moderate beneficial	Conservation Areas	Design development and public benefits	Neutral – moderate beneficial

Air Quality

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Construction dust emissions – Dust and Human Health impacts	All existing	CEMP	Negligible
Construction traffic emissions	All existing	CEMP	Negligible
Operational Phase			
Operational traffic	All existing and proposed	N/A	Negligible

Noise and Vibration

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
NSR 1-5	Construction Noise - Negligible to Major Adverse	BPM of noise control / CMP / Section 61 Agreement	Negligible to Minor Adverse
NSR 1-5	Vibration effects on people – Negligible	Utilise low vibration piling techniques / implement vibration monitoring / CMP	Negligible
Existing buildings on and off site	Vibration effects on buildings – Major Adverse		Negligible

Operational Phase			
Proposed Development	Transportation noise (normal conditions) – Minor to Major Adverse	Appropriately specified façade construction	Negligible
Proposed Development	Transportation noise (overheating conditions) – Negligible to Moderate Adverse	Provide relief from overheating with means other than open purge vents for most impacted façades	Negligible to Minor Adverse
Proposed Development	Entertainment noise – Moderate to Major Adverse	Enhanced acoustic glazing specification at receptors	Negligible
NSR 1-5	Entertainment noise – N/A	None – effects controlled through appropriate noise limits	Negligible
NSR 1-5	Fixed Plant noise – N/A	None – effects controlled through appropriate noise limits	Negligible

Wind Microclimate

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Negligible	-	None	Negligible
Operational Phase			
Moderate Adverse – Major Beneficial	All receptors	Embedded in the design	Moderate Adverse – Major Beneficial

Sunlight, Daylight and Solar Glare

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
N/a	N/a	N/a	N/a
Operational Phase			
Daylight	Surrounding Residential Properties	None required	Negligible / minor adverse
Sunlight	Surrounding Residential Properties	None required	Negligible / minor adverse

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Overshadowing	Surrounding Residential Amenity Spaces	None required	Negligible / minor adverse
Glare	Traffic and Train signal locations	None required	Negligible / minor adverse

Socio-Economic

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Employment & GVA	Jobs and GVA created from construction (temporary during construction)	None	Minor beneficial
Skills/ employment	Construction apprenticeships (temporary during construction)	None	Minor beneficial
Operational Phase			
Local services	Increased residents placing additional burden on local social infrastructure (i.e. GPs, dentists, etc)	Opportunity to provide space for GP / dentist	Negligible
Employment and GVA	Increased household expenditure of new residents supporting local jobs (operational phase) Increased FTE employees and GVA onsite (operational phase)	None	Minor beneficial
Open space	Increased quantity and value of public open space/ public realm (operational phase)	None	Moderate/ minor beneficial
Local Authority Income	Increased rates generated from business onsite (operational phase)	None	Minor beneficial
Local Authority Income	Increased income from council tax from new residents (operational phase)	None	Minor beneficial

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Local Authority Income	Income to the public purse from new homes bonus (operational phase)	None	Minor beneficial

Human Health

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase			
Employment, GVA, skills	Workers, apprentices	n/a	Minor Beneficial temporary
Townscape & visual	Workers, nearby residents, visitors	CEMP	Moderate Adverse Temporary
Air quality – NO2, PM10 & PM25; Dust	Workers, nearby residents & visitors	CEMP	Not Significant
Noise & Vibration	Residents, Event space	CEMP	Negligible to Minor Adverse for noise; Negligible for vibration
Operational Phase			
Housing	Residents	n/a	Moderate Beneficial
Employment & GVA	Workers & local spend	n/a	Minor Beneficial
Health care & Education	Residents	n/a	Negligible
Crime	Residents, workers & visitors	n/a	Minor Beneficial
Open space & public realm	Residents, workers & visitors	n/a	Moderate/Minor Beneficial on open space & amenity
Townscape & Visual	Residents, workers & visitors	n/a	Not Significant for 19 viewpoints; Major/Moderate to Minor Beneficial for 4 viewpoints
Climate Change – Operational buildings & public realm	Climate Change - residents & visitors	Design Maintenance & Management Plans including fire evacuation	Not Significant
Air quality – NO2, PM10 & PM25 vehicle emissions	Residents & Visitors	n/a	Not Significant
Air Quality – odours from restaurants/bars	Residents & Visitors	n/a	Not Significant

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Noise	Residents	Design	Negligible
Noise	Residents	Design	Negligible – Minor Adverse
Noise	Residents	Design	Negligible
Noise	Nearby residents & event space		Negligible
Daylight	Surrounding residents	n/a	Negligible-Minor Adverse
Sunlight	Surrounding residents	n/a	Negligible-Minor Adverse
Overshadowing	Surrounding amenity spaces	n/a	Negligible-Minor Adverse
Glare	Traffic & train signal locations	n/a	Negligible-Minor Adverse
Wind – pedestrian safety & comfort	Residents & visitors	n/a	Negligible

Climate Change

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Construction Phase - GHG			
Emissions associated with manufacture of construction materials, transport of these materials to the construction site, on-site works and disposal of construction waste.	Embodied carbon emissions	Optimising material usage, use of low carbon materials, reducing construction waste and using fewer finish materials (for wall, floor, ceiling, façade). Potential for materials to be reused in the Proposed Development should be continuously monitored. Consideration should be given to the robustness and durability of materials. Traffic management measures to restrict construction vehicles in certain locations and routes at certain times of the day. Considerate construction best practices (such as wheel washing, use of recyclable materials).	Minor adverse (not significant) P / D / LT

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Operational Phase - GHG			
Emissions associated with replacement/refurbishment of building parts	Operational embodied carbon emissions	Consideration should be given to the robustness and durability of materials and minimising material waste.	Minor adverse (not significant) P / D / LT
Emissions associated with buildings' (operational) energy use	Operational energy emissions	Robust monitoring of energy consumption (i.e., smart metering) must be ensured. Energy efficient equipment should be used in both domestic and non-domestic buildings. Selection of 100% renewable electricity contracts must be ensured, where possible. Installation of efficient plumbing fixtures to reduce 'non-revenue water' losses, rainwater harvesting, and xeriscaping. Over the lifetime of the Proposed Development, as new technologies come in, the lighting and HVAC system should be upgraded, giving preference to products that are more energy efficient and have an extended lifespan. For example, having a future connection into the district heat network.	Minor adverse (not significant) P / D / LT
End-user emissions associated with changes in regional traffic flows	Operational transport emissions	Measures proposed in the Interim Travel Plan of the Transport Assessment aim to increase the level of walking, cycling and public transport use to and from the site, and reduce reliance on private cars.	Minor adverse (not significant) P / D / LT
Construction Phase – Climate Vulnerability			
N/a	N/a	N/a	N/a
Operational Phase – Climate Vulnerability			

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
Damp buildings can lead to mould growth. This can result in health issues for end users.	Buildings End Users	Confirmation of the provisions in buildings to prevent damp conditions and mould growth.	Not significant
Vegetation can become damaged and destabilised, posing a risk to buildings and end users.	Buildings Public Realm End Users	Confirmation of vegetation maintenance plans to ensure that vegetation is controlled and stable, and removal plans are in place should vegetation pose a risk to buildings.	Not significant
Prolonged dry periods may lead to subsidence. This can be caused by the drying out and cracking of earthworks and soils.	Buildings Public Realm	Following dry periods, buildings should be inspected for cracking and subsidence. Slope erosion control measures.	Not significant
Overheating of buildings	Buildings	Confirmation that cooling provisions can provide cooling for temperatures beyond 41.8°C.	Not significant
Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading)	Buildings	The consideration and implementation of materials which can withstand which can withstand UV degradation.	Not significant
Increase in thermal expansion of structure joints compromising structural integrity leading to increased maintenance.	Buildings	The consideration and implementation of materials which can withstand thermal expansion and contraction.	Not significant
Increased risk of fire	Buildings Public Realm	Confirmation of fire management and evacuation plans.	Not significant
Lightning strikes causing fires and damage to assets. This can pose a health and safety risk to end users.	Buildings Public Realm End Users	Confirmation of fire management and evacuation plans.	Not significant
High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation due to wind-driven rain infiltration	Buildings	Consideration of wind loading/action impacts on buildings and public realm elements.	Not significant

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
		Consideration of wind forces in the durability of design and material choices.	
Shrinking and cracking of soils; this reduces soil stability.	Public Realm	Following dry periods, the grounds should be inspected for cracking and subsidence. Slope erosion control measures.	Not significant
High temperatures may cause damage to footways and cycleways, including potential melting and deformation.	Public Realm	The durability requirements of construction materials to accommodate temperature risks.	Not significant
Vegetation in the public realm can dry out.	Public Realm	The consideration and planting of vegetation that can withstand dry periods, alongside the implementation of a green infrastructure maintenance plan.	Not significant
Damage from high winds and rain infiltration into components, such as drainage.	Public Realm	Consideration of wind loading/action impacts on buildings and public realm elements. Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Maintenance plans to remove debris from public realm areas and drainage.	Not significant
Windborne dust and debris causing clogging drainage and requiring clearing	Public Realm	Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm. Maintenance plans to remove debris from public realm areas and drainage.	Not significant
Roadway and Cycleway Infrastructure such as signage or signals could also be damaged by high winds or lightning strike.	Public Realm	Maintenance plans following storm events which include assessing the condition of street furniture and the condition of the public realm.	Not significant

Likely Significant Effects	Receptor(s)	Mitigation Measures	Residual Effects
		Consideration of wind loading/action impacts public realm elements.	
High temperatures can cause discomfort for end users, alongside impacting concentration and productivity in work spaces.	End Users	Confirmation that cooling provisions can provide cooling for temperatures beyond 41.8°C.	Not significant
Road and footway users may also be sensitive to high winds.	End Users	Confirmation that wind tunnels will not exist or impact on public realm spaces.	Not significant

15.2. During the course of undertaking the EIA, there has been interaction and information flows between consultants in order that findings are shared with the wider team, and in order to allow the interaction of environmental effects and identified mitigation measures to be considered as part of the assessment process.

15.3. In addition, relevant linkages have been made between the EIA team, design team and client, which has resulted in a considerable amount of embedded mitigation in order address potential significant effects. It also means that mitigation measures have been considered carefully with regard to financial viability and appropriate contingencies have been allowed for in the project.

15.4. It is also worth noting that beyond the identified scope of this EIA, a number of further technical reports have been produced, which have also identified further mitigation measures. As they have been identified, these effects have been considered in the course of preparing and coordinating this EIA.

16. Type 1 Cumulative Effects

Introduction

16.1. This section gives consideration to "Type 1" cumulative effects.

16.2. The assessment is informed by the results of the technical assessments as set out in Chapters 6-14 of the ES.

16.3. Type 1 cumulative effects are also known as 'intra-project' effects, which are the combined effects arising from the Proposed Development upon a set of defined sensitive receptors. An example would be where a local resident is affected by dust, noise and a loss of visual amenity during the construction of a scheme, with the result being a greater nuisance than each individual effect alone.

16.4. Type 2 cumulative effects are considered within the ES technical Chapters. The technical Chapters also had regard to the potential for Type 1 cumulative effects, however for robustness the results of a standalone assessment of these is provided below.

Legislation, Policy and Guidance

Legislation

16.5. There is no legislation outlining how cumulative effects should be assessed or determined as significant. However, there is a requirement in Part 1, Schedule 4 of the EIA Regulations to consider cumulative effects. Cumulative is not defined in the EIA Directive or Regulations however a dictionary definition is 'increasing by one addition after another'.

16.6. The EIA Regulations require 'a description of the likely significant effects', including cumulative effects.

16.7. In the context of this assessment, 'cumulative effects' refers to the interactions between different likely residual effects resulting from the Proposed Development (Type 1). Both positive and negative effects are considered across the construction and operational phases.

Policy

16.8. As this Chapter considers the cumulative effects of the technical areas within the ES, all relevant policy has already been reviewed within the individual technical Chapters.

Guidance

16.9. A number of guidance documents which relate to assessing cumulative effects have been used to inform the assessment and include:

- European Commission (EC) Environment DG (May 1999), 'Study on the Assessment of Indirect and Cumulative Impacts as well as Impact Interaction', Hyder Consulting; and
- Institute of Environmental Management and Assessment (1992), Guidelines for the Environmental Assessment of Road Traffic.

16.10. The EC guidelines 'are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project'.

16.11. Paragraph 24 of the National Planning Practice Guidance (NPPG) (Reference ID: 4-024-20170728) outlines the consideration to be given to cumulative effects in the context of EIA:

> "Each application (or request for a screening opinion) should be considered on its own merits. There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a Proposed Development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development."

Assessment Methodology and Significance Criteria

Methodology

16.12. This assessment is primarily concerned with where there is a likelihood of significant Type 1 cumulative effects occurring, in accordance with EIA practice and the NPPG guidance.

16.13. The assessment is based on experience and professional judgement, drawing upon relevant guidance set out above and the residual environmental effects identified within the results of the EIA technical assessments. The assessment has been undertaken by suitably qualified and experienced EIA practitioners.

16.14. The assessment has primarily focused on sensitive receptors identified within close proximity to the Site (e.g., local residents and businesses located in close proximity to the Site), likely cumulative effects, and their capacity to accommodate changes that will occur as a result of the combined residual environmental effects.

16.15. Relevant guidance has been reviewed, and an approach has been developed which uses the residual environmental effects identified within the ES. An exercise which tabulates the residual effects against receptors or receptor groups has then been carried out in order to identify the potential for Type 1 cumulative effects.

16.16. Negligible or neutral residual effects have been excluded from the assessment as, by their nature, they are considered to be imperceptible. Therefore, only minor, moderate or major effects have been given consideration during the assessment.

16.17. For the purposes of the assessment, receptor groups have been identified as those surrounding the Site and those identified within the individual technical assessments.

Significance Criteria

16.18. The following terms have been used to define the significance of the effects identified:

- Major effect: where the Proposed Development could be expected to have a very significant effect (either positive or negative) cumulatively;
- Moderate effect: where the Proposed Development could be expected to have a noticeable effect (either positive or negative) cumulatively;
- Minor effect: where the Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) cumulatively; and
- Negligible: where no discernible effect is expected as a result of the Proposed Development cumulatively.

16.19. The significance level attributed to each effect has been assessed based on the magnitude of change due to the combination of residual effects and the sensitivity of the affected receptor/receiving environment to change, as outlined in Chapter 2 of the ES. Magnitude of change is assessed on a scale of major, moderate, minor and negligible and the sensitivity of the affected receptor/receiving environment is assessed on a scale of high, medium, low and negligible.

Limitations and Assumptions

16.20. Due to the reliance on qualitative data and subjective opinion, there are limitations related to the range and depth in which the cumulative effects have been investigated. It must be realised that analysing the cumulative effects of developments is often speculative and cannot be predicted as clearly as individual effects such as the effects upon traffic of a development, which relies heavily upon quantitative data to inform the assessment.

16.21. As a result, a number of assumptions have been made throughout in terms of the outcome of the accumulation of effects and based upon professional judgement. This section and the assessment process of identifying the likely significant Type 1 cumulative effects have, however, provided a reasoned consideration of and insight into the potentially significant Type 1 cumulative effects of the Proposed Development.

Identification of Likely Significant Type 1 Cumulative Effects

16.22. Based on the methodology detailed above, Table 16.1 presents the results of the review of the potential for interactions of individual effects during the construction phase of development. The potential effect interactions are then discussed further.

Construction Phase

Table 16:1: Construction Phase Type 1 Cumulative Effects

Sensitive Receptor Group	Construction Phase Residual Effects (after mitigation)	Likely Significant Cumulative Effects
Views, visual setting, Site and townscape character	Townscape and Visual Impact: Temporary Minor to Moderate adverse Heritage: Listed Building and Conservation Area - Tempoary Minor Adverse	No likely significant Type 1 cumulative effects
Existing residents, visitors and nearby population receptors	Noise: Temporary Minor Adverse Climate Change: Minor Adverse	No likely significant Type 1 cumulative effects
Construction workers	Socio Economic: Minor Beneficial Climate Change: Minor Adverse	No likely significant Type 1 cumulative effects.
Employment and GVA	Socio-Economic: Minor Beneficial Human Health: Temporary Minor Beneficial	No likely significant Type 1 cumulative effects.

16.23. The table above illustrates there are no Type 1 potential cumulative effects.

Operational Phase

16.24. Based on the methodology detailed above, Table 14:2 presents the results of the review of the potential for interactions of individual effects during the operational phase of development. The potential effect interactions are then discussed further.

Table 16.2: Operational Phase Type 1 Cumulative Effects

Sensitive Receptor Group	Operational Phase Residual Effects (after mitigation)	Likely Significant Cumulative Effects
Views, visual setting, Site and townscape character	Townscape and Visual Impact: Minor-Major Beneficial Heritage: Listed Building – Minor Adverse. Conservation Area – Minor Adverse	No likely significant Type 1 cumulative effects.
Existing and future local residents, visitors and nearby population receptors	Noise: Minor Adverse Overshadowing: Minor Adverse Human Health: Moderate Beneficial Climate Change: Minor Adverse	No likely significant Type 1 cumulative effects.
Existing residents	Sunlight/Daylight: Minor Adverse	No likely significant Type 1 cumulative effects.
Local Amenity/Public Ream	Overshadowing: Minor Adverse Socio- Economic: Minor-Moderate Beneficial	No likely significant Type 1 cumulative effects.
Transport (road and rail)	Glare: Minor Adverse	No likely significant Type 1 cumulative effects.
Employment and GVA	Socio-Economic: Minor Beneficial Human Health: Minor Beneficial	No likely significant Type 1 cumulative effects.

16.25. The table above illustrates there are no Type 1 potential cumulative effects.

Mitigation Measures

16.26. There are no Type 1 potential cumulative effects; therefore, no mitigation measures are proposed.



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