Deloitte.



Environmental Statement – Volume 1

Trinity Islands

December 2021

Contents

List of Appendices 2

List of Figures 4

1. Introduction 6
2. Environmental Impact Assessment Methodology 12
3. Alternatives and Design Evolution 19
4. Site, Surroundings and Description of Proposals 23
5. Construction Management and Phasing 8
6. Air Quality 15
7. Climate Change 42
8. Daylight, Sunlight and Overshadowing 66
9. Heritage 83
10. Human Health 95
11. Noise 115
12. Socio-Economic Impact 143
13. Solar Glare 165
14. Townscape and Visual Impacts 256
15. Traffic and Transport 286
16. Water Resources 307
17. Wind Microclimate 323
18. Summary of Residual Impacts 341
19. Type 1 Cumulative Impacts 356

List of Appendices

Chapter 1: Introduction

No appendicies

Chapter 2: Environmental Impact Assessment Methodology

Appendix 2.1 – ES Scoping Report

Appendix 2.2 – Committed Developments

Appendix 2.3 – ES Scoping Opinion

Chapter 3: Alternatives and Design Evolution

No appendicies

Chapter 4: Site, Surroundings and Description of Proposals

No appendicies

Chapter 5: Construction Management and Phasing

Appendix 5.1 - Logistics Plan

Chapter 6: Air Quality

Appendix 6.1 - Assessment Inputs

Appendix 6.2 – Figures

Appendix 6.3 – Construction Phase Assessment Methodology

Appendix 6.4 – Construction Phase Road Vehicle Exhaust Impact Assessment

Appendix 6.5 – Sensitivity Analysis Impact Assessment

Appendix 6.6 – EIA Qualifications

Chapter 7: Climate Change

No appendicies

Chapter 8: Daylight, Sunlight and Overshadowing

Appendix 8.1 – Drawings of the Baseline and Proposed Scenario;

Appendix 8.2 – Daylight and Sunlight Results for Baseline v Proposed;

Chapter 9: Heritage

Appendix 9.1 – Heritage Statement

Chapter 10: Human Health

No appendices

Chapter 11: Noise

Appendix 11.1 Noise Assessment

Chapter 12: Socio-Economic

Appendix 12.1 – Socio-Economic Baseline Data

Chapter 13: Solar Glare

Appendix 13.1 – Solar Glare Assessment

Chapter 14: Townscape and Visual Impact

Appendix 14.1 - Maps

Appendix 14.2 - Viewpoint and townscape photographs including AVR and block images.

Appendix 14.3 - Visualization methodology

Chapter 15: Traffic and Transport

Appendix 15.1 - Transport Assessment

Appendix 15.2 - Travel Plan

Chapter 16: Water Resources

Appendix 16.1 – Flood Risk Assessment and Drainage Strategy

Chapter 17: Wind Microclimate

Appendix 17.1 – Wind Microclimate Technical Report

List of Figures

Chapter 1: Introduction

No figures

Chapter 2: Environmental Impact Assessment Methodology

No figures

Chapter 3: Alternatives and Design Evolution

No figures

Chapter 4: Site, Surroundings and Description of Proposals

No figures

Chapter 5: Construction Management and Phasing

No figures

Chapter 6: Air Quality

No figures

Chapter 7: Climate Change

No appendicies

Chapter 8: Daylight, Sunlight and Overshadowing

Figure 8.1 - Surrounding Sensitive Receptors Included in the Assessment

Chapter 9: Heritage

No figures

Chapter 10: Human Health

Figure 10.1 - The Determinants of Health and Wellbeing (London HUDU developed from Barton & Grant 2007)

Chapter 11: Noise

Figure 11. 1 – Nearest noise sensitive residential premises to Plots C and D

Figure 11.2 – Transient vibration guide values for cosmetic damage

Figure 11.3 - Noise survey measurement locations

Chapter 12: Socio-Economic

Figure 12.1 – Map of the Assessment Area

Chapter 13: Solar Glare

Figure 13.1 – Typical Stopping Distances for a car;

Figure 13.2 – Field of Vision Diagram;

Figure 13.3 – Sensitive viewpoints for solar glare assessment; and

Figure 13.4 – Elevations key, as referenced within the assessment.

Chapter 14: Townscape and Visual Impact

No figures

Chapter 15: Traffic and Transport

Figure 15.1 - Greater Manchester Accessibility Level

Chapter 16: Water Resources

No figures

Chapter 17: Wind Microclimate

Figure 17.1 – Baseline Model

Figure 17.2 – Receptors for Assessment (Street Level)

Figure 17.3 – Receptors for Assessment (Elevated Levels)

Figure 17.4 – View of the Completed Development (Scenario 2)

Figure 17.5 – View of the Completed Development (Scenario 4)

Figure 17.6 – View of the Completed Development (Scenario 6)

Figure 17.7 – View of the Completed Development (Scenario 8)

1. Introduction

1.1. This Environmental Statement ('ES') accompanies an application for Full Planning Permission for the construction of four residential towers between 39 and 60 storeys to provide 1,950 residential apartments, commercial and residential amenity space at podium level, underground car and cycle parking, public realm, access, servicing and other associated works.

1.2. The Application Site (hereafter referred to as 'the Site') comprises 1.78 hectares of previously developed land located to the south west of Manchester City Centre and falls within the St. John's and Water Street Strategic Regeneration Framework (SRF) areas. The Site is bounded by the River Irwell to the north and west, Liverpool Road to the east and Water Street and Regent Street to the south.

1.3. The Site currently comprises brownfield land in the form of a surface level car park and is split into two parcels known as Site C and Site D. Please refer to the red line boundary plan.

1.4. The Planning Application seeks permission for the following description of development:

"Full planning permission for the erection of a mixed-use development comprising four buildings comprising residential use (Class C3) and commercial uses (Classes E and Sui Generis: Drinking Establishment) at the lower levels, together with associated landscaping, basement car and cycle parking, access arrangements and highway works, and other associated works."

1.5. The Proposed Development is outlined in detail at Chapter 4 of this ES and is hereafter referred to as the 'Proposed Development'.

1.6. The ES sets out the findings of an Environmental Immpact Assessment (EIA) carried out in respect of the Proposed Development of the Site.

Requirements for EIA

1.7. 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.

1.8. 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, so 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 (as relevant) and construction, and when the Proposed Development is operational.

1.9. 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 (EIA Regulation Schedule 3).

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

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

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

- A description of the development, including in particular:
  a) a description of the location of the development;

b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;

c) a description of the main characteristics of the operational phase of the development; and,

d) an estimate, by type and quantity, of expected residues and emissions during the construction and operation phases.

- A description of the reasonable alternatives studied, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
- A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.
- A description of the factors specified in regulation 4(2) likely to be significantly affected by the development.
- Where relevant, a description of the likely significant effects of the development on the environment resulting from, inter alia:

  a) the construction and existence of the development, including, where relevant, demolition works;

  b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

  c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

  d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

  e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

  f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; and,

  g) the technologies and the substances used.

- A description of the likely significant effects on the factors specified in regulation 4(2) that covers the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.
- A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.
- A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis).
- A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
- A non-technical summary of the information.
- A reference list detailing the sources used for the descriptions and assessments included.

Project Team

1.12. Deloitte has extensive experience and expertise in managing the EIA process and holds the IEMA EIA Quality Mark. Deloitte has managed the EIA process and the production of the ES for Trinity Islands and has received technical input from a range of suitably qualified and experienced technical consultees, together "the Consultants".

Table 1.1 ES Project Team

Topic	Assessment carried out by	Qualifications
Town Planning, EIA Coordination	Deloitte LLP	RTPI, RICS, IEMA EIA Quality Mark
Architect	Simpson Haugh and Partners	RIBA
Air Quality	Ensafe	BSc (Hons), AMIEnvSc
Climate Change	WSP	BSc, BArcch, MSC, Qualified BREEAM Assessor, CIBSE Affiliate Member, BREEAM AP, CEnv.
Daylight, Sunlight and Overshadowing	GIA	BSc, MSc, CIHT, CILT
Heritage	Stephen Levrant Heritage Architecture	BA(Hons), MA, MSc, IHBC
Human Health	Enfusion	BSc, MSc, CEnv, FIEMA
Noise and Vibration	Matt Fisher Acoustics	BEng(Hons) CEng MIOA
Socio-Economic Issues	Ekosgen	MSc
Solar Glare	GIA	MSc
Townscape and Visual Impact	Chris Burnett Associates	BSc BLD CMLI
Traffic and Transport	Vectos	BSc (Hons), MSc, CMILT, MCIHT
Water Resources	Curtins Consulting	BEng(Hons) Civil Engineering, CEng, MICE BSC (Hons) Civil Engineer
Wind Microclimate	WSP	MEng, CEng, FICE

Organisation of the Environmental Statement

1.13. This ES comprises 19 chapters and is supported by figures (located at the back of 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.

1.14. Figures have been referenced using the chapter numbers 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 constrained separately in Volume 2.

1.15. ***Important notice****: This Environmental Statement has been prepared by Deloitte Real Estate, with technical input from the Consultants. Table 1.2 below sets out the parties responsible for the technical content within Chapters 5-17 of this ES. 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 Consultants' Reports and the technical content within Chapters 5-17 of this ES.

1.16. Table 1.2 sets out the structure of the ES.

Table 1.2 ES Structure

Chapter No.	Chapter Title	Responsibility	Description
Volume 1			
1.	Introduction	Deloitte	Introduction to the ES, EIA requirements, details of the project team, ES organisation and availability.
2.	EIA Methodology	Deloitte	Methods used to prepare each chapter, description of ES structure and content, generic significance criteria, scoping and consultation.
3.	Alternatives and Design Evolution	Deloitte with input from Simpson Haugh and Partners ('SHP')	Outline of the main alternatives considered by the Applicant.
4.	Site, Surroundings and Description of Development	Deloitte with input from SHP	Site description and details of the Proposed Development.
5.	Construction Management and Phasing	Renaker Build Ltd	Details of anticipated programme for development and construction methodology are also included.
6.	Air Quality	Ensafe	Provide an assessment of existing air quality surrounding the Proposed Development in addition to the likely impacts on air quality during construction and subsequent operation.
7.	Climate Change	WSP	Assessment of the Proposed Development and its potential impact in relation to climate change.
8.	Daylight, Sunlight and Overshadowing	GIA	Assess the effects of the Proposed Development on sunlight and daylight as well as overshadowing impacts on amenity areas/public spaces.
9.	Heritage	Stephen Levrant Heritage Architecture	Assess the potential impact the Proposed Development may have on the nearby historical setting.
10.	Human Health	Enfusion	Assess the potential impact the Proposed Development may have on human health.
11.	Noise and Vibration	Matt Fisher Acoustics	Assessment of effects relating to noise and vibration.
12.	Socio-Economic Issues	Ekosgen	Effects of the Proposed Development on socio-economic receptors

13.	**Solar Glare**	GIA	Potential impacts of solar glare resulting from the Proposed Development.
14.	**Townscape and Visual Impact**	Chris Burnett Associates	Potential impacts and likely effects of the Proposed Development on the townscape character and visual amenity of the site and the surrounding area.
15.	**Traffic and Transport**	Vectos	Provide an assessment of the level of traffic generated by the Proposed Development.
16.	**Water Resources**	Curtins Consulting	Assess the potential risk for flooding.
17.	**Wind Microclimate**	WSP	Assess impacts on pedestrian comfort and safety as a consequence of wind effects.
18.	**Residual Impacts**	Based on conclusions of technical chapters	Summary of the effects that remain after mitigation.
19.	**Type 1 Cumulative Impacts**	Deloitte	Review of inter project effects, which are combined effects arising from the Proposed Development on defined sensitive receptors.
Volume 2 – Technical Appendices			
Volume 3 - Non-Technical Summary			

Other Documents

1.17. Together with the ES, the following documents in Table 1.3 will be submitted to Manchester City Council (MCC) and the Local Planning Authority (LPA) in support of the Planning Application.

Table 1.3: List of documents submitted in support of this Planning Application.

Document	Prepared By
Location Plan	SHP
Existing Site Plan and Elevations	SHP
Masterplan Context Plan	SHP
Proposed Application Drawings – Proposed Plans, Elevations and Sections	SHP
Phasing Plan	SHP
Landscape Plans	TPM Landscape Architects
CGI	Ambiente
Planning Statement and Tall Building Statement	Deloitte
Statement of Consultation	Deloitte

Document	Prepared By
Design and Access Statement	SHP
Arboricultural Report	Godwins
Archaeological Desktop Study and Written Scheme of Investigation	Salford Archaeology
Blue and Green Infrastructure Statement	Deloitte
Broadband Connectivity Assessment	Pager Power
Crime Impact Statement	GMP
Phase 1 and 2 Ground Conditions	WSP
Ecological Appraisal	ERAP
Energy Statement	Element Sustainability
Environmental Standards Statement	Element Sustainability
Fire Strategy	Hoare Lee
Lighting Strategy	TMP (included within Landscape Drawings)
Local Benefits Proposal – Statement of Intent	Renaker
Residential Management Strategy	Zenith
Servicing Strategy	Vectos
Site Waste Management Strategy	Vectos
TV Reception Survey	Pager Power
Operational Mangement Strategy	Zenith
Ventilation Strategy	WSP
Viability Assessment	Renaker
Air Quality, Ventilation and Overheating Strategy	WSP, Matt Fisher Acoustics and SHP

Environmental Statement Availability

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

1.19. The ES may be purchased in volumes, the costs of 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, 2 and 3) of the ES on CD - £15

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

Trinity Islands Team – Planning and EIA
Deloitte
The Hanover Building,
Corporation Street
Manchester
M4 4AH

2. Environmental Impact Assessment 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 of the Proposed Development on the environment as defined in Chapter 1 and described in detail in Chapter 4.

2.2. It is accompanied by the following technical appendices:

- Appendix 2.1 –ES Scoping Report
- Appendix 2.2 – Committed Developments
- Appendix 2.3 – ES Scoping Opinion

Legislation and Guidance

2.3. 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.

2.4. 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.htm
  - 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)
- 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.

2.6. It is considered that there is no relevant regional planning policy and guidance of relevance to this ES.

2.7. 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)

2.8. Any additional planning policy or guidance documents considered relevant have been identified within the relevant technical chapters.

Screening, Scoping and Consultation

2.9. An EIA Scoping Opinion Request was issued to MCC in August 2021 and a foramal scoping opinion was received in September 2021 (see Appendix 2.3). As part of this process the EIA set out that the following disciplines were found to not give rise to likely significant effects on the environment and would therefore not require inclusion in the ES. An explanation for each discipline is provided in the EIA Scoping Report in Appendix 2.1.

Non-Significant Effects

2.10. As part of this scoping process the following topics have been scoped out:

- Agricultural Circumstances
- Archaeology
- Aviation
- Ecology
- Ground Conditions
- Television, FM Radio and DAB Radio Reception

Approach to Technical Studies

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

2.12. Design 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 design team was fully aware of the environmental constraints and opportunities and of the interactions between disciplines. Meetings were also held with MCC as the Local Planning and Highway Authority and Environmental Health Organisation.

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

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

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

Structure of Technical Chapters

2.16. Each technical chapter of the ES (Chapters 6 to 17) has been set out broadly in line with Table 2.1; any variation from this structure is explained within the chapter.

Table 2.1: Structure of ES Technical Chapters

Technical Chapter Structure	
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

Technical Chapter Structure	
	explains its purpose in the context of the Proposed Development and the ES.
Assessment Methodology and 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.
Assumptions and Limitations	This section describes any assumptions and limitations which have been made that are relevant to the environmental disciplines.
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. These are addressed in Chapter 16. 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 Structure	
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.

2.17. Chapter 5 provides information to allow the construction phase of the Proposed Development to be assessed by the disciplines set out in Chapters 6 to 17.

Assessment and Evaluation of Significant Effects

2.18. 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.

Magnitude

2.19. The methodology for determining the scale, or magnitude of effect as set out in Table 2.2.

Table 2.2: 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 predevelopment circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Sensitivity

2.20. The sensitivity of a receptor is based upon the relative importance of the receptor using the scale in Table 2.3.

Table 2.3: 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 national 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 2.4 below shows how magnitude and sensitivity interact to derive effect significance.

Table 0.1: 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 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 ES, an effect will be considered to be 'significant' if it is classed as either 'moderate' or 'major'.

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 17) includes a clear description of what is assumed as the baseline against which the assessment is being made.

2.25. The baseline includes nearby schemes under construction and where relevant will include nearby committed developments, and therefore represent the 'worst case' scenario.

2.26. 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

2.27. 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.

2.28. 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.

2.29. Detailed mitigation recommended during the construction phase will be set out in the Construction Environmental Management Plan (CEMP) to be agreed with MCC prior to the commencement of work and implemented throughout the duration of the works. Outline mitigation measures to be included in a future CEMP are set out in Chapter 5: Construction Methodology and Programme.

2.30. Mitigation to be implemented during the operational phase will be secured through approved documents, planning conditions and obligations.

Residual Effects

2.31. 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'.

Cumulative Effects

2.32. 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').

2.33. These include:

- Approved but unimplemented projects;
- Plans or projects for which an application has been made and which are under consideration by the consenting authorities; and,
- Certain projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative effects.

2.34. A search of MCC's planning applications database and knowledge of the area has identified a number of schemes for which cumulative effects are considered likely. A full list, as of September 2020, is contained at Appendix 2.2. These have been formally agreed with Manchester City Council via the EIA Scoping Opinion that was received on 30 September 2021; subsequtnly, Union T2 is now identified as approved and is reflected in the assessments as such.

2.35. Each technical chapter (Chapters 6-17) has assessed the potential for likely significant effects on the environment as a result of the above committed developments, together with the Proposed Development.

2.36. In addition, Chapter 19 assesses the Type 1 Cumulative effects.

Assumptions and Limitations

2.37. 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;
- Baseline conditions have been established in 2021 from a variety of sources, including historical data, but due to the dynamic nature of certain aspects of the environment, conditions will change during the Proposed Development;
- 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 and Phasing.
- Conditions will be attached to the Planning Permission that will control disturbance during the Proposed Development; and
- Necessary off-site services infrastructure for the Proposed Development will be provided by statutory undertakers.

Objectivity

2.38. The technical studies undertaken within 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.

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 MCC, 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 Development.
- Alternative Uses for the Site.
- Alternative Scale and Massing for the Proposed Development.

The 'do nothing' Alternative

3.5. The 'do nothing' scenario refers to the option of leaving the Site in its current state, as described below in Section 4.

3.6. The Site is located within a highly strategic and sustainable location within the heart of Manchester City Centre and is therefore not making an efficient use of land in its existing condition as a surface car park (providing 645 car parking spaces). The existing car park also does not enhance the the riverside setting or provide any opportunities for pedestrian connectivity between the two neighbourhoods of St. John's and Water Street.

3.7. The current condition of the Site creates what can be considered as a 'gap site' between the developments within St. John's and those within Water Street. This has a negative effect on the surrounding townscape which is generally characterised by mid to high density urban form by failing to create a connection between them. Furthermore, due to the existing use of the Site as a car park, the Site is an area which receives little activity and can therefore be susceptible to crime due to its reduced natural surveillance. The Site currently contains a very limited amount of vegetation and as a surface level car park is predominantly hardstanding, therefore it provides little in regards biodiversity.

3.8. The Site has been identified on MCC's Brownfield Land Register since 2015 to support a minimum of 1,390 dwellings, similarly it is identified in MCC's Strategic Housing Land Availabiltiy Assessment (SHLAA 2020) as a capacity site of which the majority is to be delivered by 2030. In this way, the Site requires re-development to contribute to Manchester's housing supply and meet demand from the anticipated population growth.

3.9. The Site is also identified within the St. John's (2016) and Water Street (2016) SRFs areas as a pivotal development site that will help to meet the regeneration ambitions sought by MCC within this part of the City Centre. A majority of key developments within St. John's are nearing completion and therefore the activity within this area is expected to increase. The Proposed Development will increase the number of residents in the area which will help to support the commercial offer being brought forward in St. John's whilst also providing a large amount of of public realm for residents, workers and visitors. In addition, the Site roughly sites between the St. John's and Water Street SRFs areas, the latter of which has had limited

regeneration activity. Developing the Trinity Islands site will help to integrate these areas altogether and will therefore acts as a catalyst for further development within the Water Street SRF area.

3.10. Therefore, the 'do nothing' scenario has been discounted due to the established need for regeneration of this part of the City Centre, its listing on the Brownfield Land Register, as well as suitable land for new housing required by Manchester's growing population.

Consideration of Alternative Locations

3.11. The Site is in a highly accessible City Centre location and identified for redevelopment within the St. John's and Water Street SRFs. These characteristics make the Site a suitable location for the Proposed Development. Residential development in this location is supported by its identification in MCC's 2020 Strategic Housing Land Availability Assessment (SHLAA) and within the St. John's and Water Street SRF's which are both endorsed by MCC.

3.12. In 2017, MCC Planning Committee approved proposals for a mixed-use development comprising five residential towers of between circa 26 to 67 storeys alongside retail, commercial, leisure and community uses as well as workspace facilities and an educational facility and new public realm and landscaping. The proposals did not progress and the Site has since been acquired by Renaker who will be applying their demonstrable track record and experience to bring forward a viable development that will contribute the ongoing regeneration in this area.

3.13. Therefore, this Chapter does not consider alternative sites within the context of the planning application as there is an identified need to redevelop this specific site as a key contributor to the realisation of the regeneration area.

Consideration of Alternative Uses for the Site

3.14. The Site is situated within two key regeneration areas which at present are a mix of low rise warehousing units, medium and high density developments comprising a mixture of commercial, cultural, and residential uses as well as a number of other development sites. A number of developments are under construction within the St. John's and Water Street SRF areas:

- Manchester Goods Yard will be a new state-of-the-art flexible workspace with additional retail and leisure uses - expected completion in Spring 2022.
- The Factory will be a world class cultural venue and new home to the Manchester International Festival - expected completion early 2023.
- Globe and Simpson will provide high-quality workspace for a leading headquarters building - expected completion early 2022.
- Old Granada Studios is a redevelopment and refurbishment to create a hotel, workspace, studio complexes workspace and retail and leisure space – expected completion mid-2022.
- Union T1 will be a 'co-living' scheme, providing 390 apartments and 180 studios with ancillary amenity space, commercial space and self-storage.
- Union T2 will be a 'co-living' scheme, providing 188 apartments and 186 studios with ancillary amenity space, commercial space and self-storage.
- Potato Wharf Phase II is a residential development comprising 191 apartments with ancillary public space within the Castlefield Basin.

3.15. The Proposed Development is a residential-led scheme with commercial uses within the lower levels. There is an identified need for City Centre housing as Manchester is expected to deliver 3,533 (per annum) new homes between 2021 and 2037 as identified within the Greater Manchester Combined Authorities Draft 'Places for Everyone' (2021) plan. These new developments should be focused on brownfield land in the first instance and which will reduce the need to develop on green field land. Residential uses are identified within MCC's 2020 SHLAA as well as within the St. John's and Water Street SRFs. In addition, both the SRF's identify the need for a commercial use within new developments to support residents and increase the overall offer within the area.

3.16. Furthermore, a previous planning application was minded for approval at Planning and Highways Committee on the Site. This previous application was residential-led with ground floor commercial uses. In this way the principle of the proposed uses on the Site has been accepted by the Local Authority and are fully justified by this planning application.

3.17. For the reasons above, alternative uses were discounted as the proposed residential-led scheme with commercial uses at lower levels is the most appropriate in the context of location and responds to identified regeneration priorities and housing need.

Consideration of Alternative Scale and Massing

3.18. Different scales and massing options have been considered for the Proposed Development, the aim of which is to maximise the suitable use of the Site to create a viable scheme and minimise any negative impacts on adjacent land uses and the environment, whilst providing public benefits, including a significant amount of high quality public realm.

Massing Options

3.19. The initial design proposals considered the ways in which three buildings could be located on each site whilst maximising overlooking distances, addressing key junctions and generating key routes through the Site to improve connectivity with the surrounding area. Upon reflection, and through more developed design studies, the constraints of the Site, in particular the available area to position and logistically construct three separate buildings began to compromise the arrangement and a series of options for two buildings was explored instead.

3.20. Two buildings rather than three allows a more elegant massing response to be developed with greater separation between the two buildings on each site. Reducing the number of buildings however requires an increase in the height of the buildings to ensure a viable quantum of apartments can be delivered., . Fewer buildings enables better views from and between buildings and more generous connections from the Site into the surrounding areas. This design has also resulted in a significant uplift in the public realm provision from that of the previous 2017 scheme, from 0.4ha to 1.29 ha.

3.21. After a thorough evaluation of different massing options, the project team decided a stronger emphasis on public realm was needed whilst maintaining the highest quality and greatest development efficiency and therefore reached the the decision to proceed with two towers per site as explained above.

Design Development

3.22. After the decision was made to proceed with two buildings on each part of the Site, the design team explored a number of options in relation to the form and massing of the Proposed Development. Each tower has a distinct plan form resulting in a dynamic massing arrangement. The rotation of the towers enables the viewer to understand the repeated form when viewed from any given location. The towers on Site C utilise a diamond shaped plan which are rotated, enabling the whole form to be appreciated through interpretation of both buildings simultaneously.

3.23. On Site D the tower forms are unique to the Site, the curved geometry of opposing faces enabling the taller marker building to lock into the natural curvature of the River Irwell, or the opposing tower to do similar at the junction of Trinity Way and Regent Road. The inflected building faces accentuate the contrast with the outer curved face; these simple moves not only generate a slenderer form, but will encourage the moving daylight and shadow to render the building forms differently depending on time of day or year. Both towers are elevated above a series of exposed columns; responding to the rise in adjacent roads as they pass over the Irwell via their elevated bridges.

Proposed Scale and Massing

3.24. The Proposed Development comprises four towers varying in height:

- Building C1 – 39 storeys / +146.875m AOD
- Building C2 – 48 storeys / +173.350m AOD
- Building D1 – 60 floors / +210.400m AOD

- Building D2 – 55 storeys / +196.150m AOD

3.25. This scale and massing, including layout was chosen to provide a significant amount of public realm whilst delivering a high quantity of residential and commercial unts as well as minimising the effect of townscape and visual impact.

3.26. The tower forms step down to adjacent context; on Site C the smaller tower sits adjacent to the Heritage assets located in and around Liverpool Road and the Museum of Science and Industry; whilst the step down in height on Site D continues beyond in the form of One Regent, the opposing side of Regent Road. The taller buildings sit either side of Trinity Way in a gateway setting; the tallest point of the development therefore creating a visual connection between the two parts of the Site. This scale and massing helps unify the two pairs of buildings to read as one development when viewed within the cityscape. Scale, orientation and location of each tower has also been assessed to ensure all areas of the public realm benefit from direct sunlight at differing times of the day.

3.27. It is considered that the design of the evolved proposals are synonymous with the wider vision for tall buildings within the St. John's and Water Street SRFs, which is contextualised by a number of existing and emerging high-density buildings within St. John's. In redeveloping an underutilised site to provide a selection of high-quality tall buildings and high quality public realm, the proposals will contribute positively to both the vision and objectives of the frameworks.

3.28. For further information please refer to the Design and Access Statement Prepared by SHP.

Summary

3.29. Where possible, alternative options have been considered throughout the design process. The above has set out why the Site is considered suitable for the Proposed Development. This process has been informed by the SRFs, viability, and the desire to create a positive relationship with the surrounding developments and the River Irwell. The Proposed Development has been influenced by pre-application consultation with key stakeholders including local landowers, residents businesses, statutory consultees, as well as with MCC. On this basis, Regulation 18(3) and Paragraph 2 of Schedule 4 of the EIA Regulations has been considered.

4. Site, Surroundings and Description of Proposals

4.1. This Chapter includes a description of the Site, its surrounding context, a more detailed description of the Proposed Development as well as the Site's suitability for the Proposed Development.

The Site

4.2. The Site is in Manchester City Centre located within the St. John's and Water Street SRF Areas and is bounded by the River Irwell to the north and west, Liverpool Road to the east and Water Street and Regent Road to the south.

4.3. The Site comprises 1.78 hectares of brownfield land in the form of a hard standing which was last used as surface car park (sui generis) (with a temporary period as a construction compound for the Orsdall Chord) and is split into two parcels known as Site C and Site D, as per the red line boundary plan. Site C and Site D are connected via an underpass, which goes underneath Trinity Way.

4.4. Site C comprises approximately 0.89 hectares of brownfield land is bounded by the River Irwell to the north, Trinity Way to the west, Water Street to the south and a railway viaduct to the east. The Site can be accessed by vehicle or foot via Water Street on the southern boundary. The Site slopes downwards to the north towards the River Irwell and there is a limited amount of vegetation running along this boundary.

4.5. Site D comprises approximately 0.89 hectares of brownfield land is bounded by the River Irwell to the north and west, Regent Road to the south and Trinity Way to the east. The Site can be accessed by vehicle or foot via Trinity Way on the eastern boundary. The Site slopes downwards to the north and west towards the River Irwell and there is a limited amount of vegetation running along this boundary.

4.6. The Site is situated in the Deansgate Ward and is adjacent to the Hulme ward immediately south of Site D and the Ordsall Ward within Salford on the western boundary.

Site Regeneration Context

4.7. The Site is identified within the St John's and Water Street SRFs. MCC have developed an overarching vision between these frameworks which has been summarised below:

- Creation of a new city centre neighbourhood: an attractive place to live, work and play; a place for enterprise and innovation; for culture, entertainment and leisure; a unique proposition for Manchester that will raise its international profile and set it apart from its peer cities.
- Integration with the City Centre: Development that is fully integrated both functionally and physically with the city centre and adjoining city centre neighbourhoods.
- Public Space: To create a meandering network of public spaces and complementary range of uses. The creation of new public realms and squares within this area provides the opportunity to create a stronger connection between the public spaces across St. John's and increase the overall level of amenity and biodiversity.
- Heritage: A form of development that retains and reutilises the Site's key heritage assets and integrates those features into the new urban form.
- Permeability and Connectivity: A series of existing and newly created public landscaped spaces will support a stronger network of routes and linkages that connect the different parts of the Site to the rest of St. John's, its neighbours and the River Irwell, as well as anchoring the major buildings.

- **Height and Scale:** A scale of building form that in height and plan extends the scale of the St. John's district across to the Site. To the west of St John's, adjacent to the River Irwell, there is the potential to introduce taller, elegant residential buildings. These will comprise high-density living within a series of taller buildings, marking a gateway into the city.
- **Uses:** The development of the Trinity Island site should be designed to the highest architectural quality, promoting high-quality living on the upper levels and a mixture of retail and leisure uses within the ground floors to create active frontages that will bring a new level of activity and vibrancy into the area.

4.8. The surrounding area has seen major investment in recent years with a large number of new residential, commercial and cultural buildings either having been constructed or being under construction. The key component of this regeneration has been the St John's masterplan, which is delivering:

- **Manchester Goods Yard** will be a new state-of-the-art flexible workspace with additional retail and leisure uses - expected completion late 2021.
- **Factory** will be a world class cultural venue and new home to the Manchester International Festival - expected completion 2022.
- **Globe and Simpson** will provide high-quality workspace for a leading headquarters building - expected completion early 2022.
- **Old Granada Studios** is a redevelopment and refurbishment to create a hotel, workspace, studio complexes workspace and retail and leisure space – expected completion mid-2022.
- **Union T1** will be a 'co-living' scheme, providing 390 apartments and 180 studios with ancillary amenity space, commercial space and self-storage.
- **Union T2** will be a 'co-living' scheme, providing 188 apartments and 186 studios with ancillary amenity space, commercial space and self-storage.

Wider Context

4.9. Manchester's ambition and vision for the city for is to be in the top flight of world-class cities by 2025. It is one of the fastest growing cities in Europe and the population of the City is expected to reach over 627,000 residents by 2025.[1] This growth in population will be supported by employment growth, which is expected to see 15,000 more workers within the City Centre alone over the next ten years.

4.10. Residential development in the City Centre therefore has a key role to play in the city achieving this aspiration. The City Centre performs a number of key functions for both the City and the Greater Manchester City Region and is a driver of economic growth through an increasingly popular residential centre and its associated access to work, leisure facilities and high-quality public transport connections.

4.11. In addition to being located within the St. John's area, the Site is located in close proximity to various defined areas within Manchester City Centre. These defined areas are characterised by their proximity to the City Centre, their built environment and mix of uses. In particular, these include:

- **Castlefield:** Castlefield is located to the south-east of the Site. The whole of Castlefield forms a Conservation Area, the boundary of which runs along Chester Road, to the northwest of the Site. Castlefield has a rich history dating back thousands of years. The Roman Fort of Mamucium, established in c. 79 A.D, was found here, giving rise to Manchester's name. In addition, the Science and Industry Museum is located within Castlefield, on Liverpool Road, which is where the word's first passenger railway line, from Liverpool to Manchester, terminated in 1830. This area and its buildings, railway infrastructure and canals, epitomises Manchester's role in the Industrial Revolution in the 19th Century. Castlefield is now predominantly a mature residential district with additional leisure and commercial uses. It mixes new buildings with converted mill buildings from Manchester's booming cotton industry.

[1] MCC (2020) State of the City Report 2020

- **Deansgate and Knott Mill:** This is Manchester's primary north-south cross City Centre thoroughfare and is located to the north east of the Site. The southern end of Deansgate has witnessed a significant amount of regeneration over the last 15 years focused on the re-use of Deansgate Terrace, the success of Deansgate Locks, enhancements to the Deansgate / Castlefield tram station and interchange and the success of Deansgate Locks. Deansgate provides a range of retail, leisure, commercial and residential uses. The Knott Mill area is a predominantly low rise area of converted mills and warehouse, with businesses focused on digital, media, creative sectors and professional / business services. This area plays a valuable role in the City Centre.
- **Hulme:** Hulme is situated to the south of the Site on the other side of the Mancunian Way. Hulme is predominantly a residential area with associated services and amenities as well as Hulme Park, which is a significant green space in the City

4.12. In addition, across the River Irwell from Trinity Islands and within Salford, there have been a number of developments which have come forward in recent years which are predominantly residential-led. This has created a new residential community broadly focused on the land between Ordsall Lane and the River Irwell. These developments are an approximate 10-minute walk from Trinity Islands and include Lamba Court and Steel House, Lowry Wharf, Wilburn Basin, Downtown, and Gresham Mill.

Transport and Accessibility

4.13. The Site is in a highly sustainable location within the south west of the city centre, being close to transport hubs including the Deansgate/Castlefield tram stop and Deansgate Train Station. There are also a number of bus services that run along Chester Road. Manchester is a compact and walkable City Centre and the Site also therefore has excellent access to the services and facilities it has to offer.

Pedestrian

4.14. The Site is well connected to key destinations by a comprehensive network of pedestrian routes, typical of a city centre location. Key leisure, cultural, business and retail facilities on Deansgate, First Street and Castlefield are within easy reach of the Site. There are a number of local shops within a short walk from the Site which include an M&S Foodhall, Sainsbury's Local and a Tesco Express (up to 11 minutes' walk) on Quay Street as well as a large Sainsbury's supermarket within a 6 minutes' walk across the River Irwell and into Salford. The Primary Shopping Area is approximately a 20 minute walk from the Site and provide a wide variety of retail and leisure uses.

4.15. There are a number of additional amenity and leisure facilities within a 15 to 20 minute walk of the Site, including:

- Castlefield Bowl – 6 minute walk
- The Science and Industry Museum – 7 minute walk
- St George's Park – 13 minute walk
- Castlefield Gallery – 13 minute walk
- Albert Hall – 14 minute walk
- Home at First Street – 16 minute walk
- John Ryland's Library – 17 minute walk
- Manchester Central Library – 18 minute walk
- Hulme Park – 19 minute walk
- Palace Theatre – 20 minute walk

4.16. The following facilities are within a 20-30 minute walk from the Site:

- Manchester Arndale Centre / Central Retail District
- The Manchester Art Gallery
- The National Football Museum
- The Royal Exchange Theatre
- The People's History Museum
- Manchester Aquatics Centre
- Northern Quarter

Cycle

4.17. The Site is within easy access to the Bridgewater Canal cycleway which links the Site to Old Trafford, Stretford, Sale, Altrincham, Trafford Park and Media City.

4.18. The Ashton Canal Cycleway is also accessible from Manchester City Centre, which links East Manchester through a dedicated cycle route to this part of the city centre.

4.19. National Cycling Route 6 can be accessed from the western end of Liverpool Road on the northern boundary of the Site. This links the Site to Bury as well as onto Route 55 to Wigan and Route 85 to Wilmslow.

4.20. A number of Beelines cycleways are in close proximity to the Site, this includes the following:

- To the north of the Site, on Water Street, providing a connection to Salford Central and North Manchester.
- To the east of the Site, across and along the River Irwell providing a connection to Salford Quays.
- To the south of the Site, within Castlefield, providing a connection to South Manchester.

Public Transport

Rail

4.21. Deansgate Train Station (12 minute walk from the Site) is approximately 0.6 miles to the east of the Site providing access to a range of destinations across Greater Manchester. These include cross-city links to Manchester Oxford Road, Manchester Piccadilly and Manchester Victoria Stations.

4.22. Further railway services are:

- Manchester Oxford Road Train Station – 21 minute walk
- Manchester Victoria Train Station – 26 minute walk
- Manchester Piccadilly Train Station – 29 minute walk

4.23. The Ordsall Chord opened in November 2017 and comprises a series of bridges and viaducts. It provides a link between Manchester City Centre's main train stations as well as enabling direct services to Manchester Airport from the north. The Ordsall Chord therefore provides improved connectivity across the City Centre and supports the running of more trains across the whole north of England.

4.24. Manchester Oxford Road Railway Station, the second busiest train station in Manchester serves the southern part of the City Centre on a line which moves westwards towards Warrington, Chester, Liverpool, Preston and Blackpool, and eastwards through to Piccadilly.

4.25. Manchester Piccadilly is the rail hub for the North West with frequent and rapid services between Manchester and to a wide range of locations in the UK. Destinations include London with an average journey time of only 2 hours 10 minutes. High Speed Rail 2 (HS2) is due to open at Piccadilly Station in 2033 and will further increase Manchester's connectivity to other major population areas and reduce journey times.

4.26. The Transpennine Express line at Manchester Piccadilly links all major cities in the North of England (and Scotland) including Newcastle, Liverpool and Hull. For instance, there are 46 services to Liverpool and 62 services to Leeds every day. Trains to Birmingham run every half hour and Manchester Airport benefits from up to 8-9 services an hour, with services operating 24 hours a day.

4.27. Manchester Victoria Station is a major regional interchange serving destinations to the north and east of Manchester, including direct rail services to Liverpool (with a fast service at 36 minutes journey time) and Leeds (approximately 49 minutes journey time).

Metrolink

4.28. Over 43 million Metrolink journeys were made to and from the City Centre. The Metrolink has been the subject of significant ongoing investment and expansion of routes in recent years. Recent changes include the introduction of contactless payments using smart meters in July 2019.

4.29. More recently, the Metrolink has expanded to extend the Metrolink to the Trafford Centre; known as the Trafford Park Line. The Trafford Park line has six new tram stops and launched in March 2020. The line runs from the existing Pomona Metrolink stop, through Trafford Park, terminating at Trafford Centre.

4.30. The Deansgate-Castlefield Metrolink stop is approximately 12 minutes' walk from the Site. Existing Metrolink services provide direct high-frequency services on the Altrincham, Eccles, East Didsbury, Media City, Ashton, Rochdale, Bury lines and connecting services to a wider range of destinations including Manchester Airport.

Bus

4.31. There is the New Elm Road, Regent Bridge and Water Street bus stops on the boundary of the Site providing access to various areas across Greater Manchester.

4.32. The Oxford Road Corridor is located approximately 19 minutes' walk from the Site, and provides services across Greater Manchester.

4.33. In addition, the Manchester Piccadilly Gardens Bus Station and tram stop is situated approximately 22 minutes' walk from the Site.

Free Bus

4.34. The Free Bus service ran by Transport for Greater Manchester has three different routes serving most of the City Centre.

4.35. The Metroshuttle Route 1 (Saturday service) has a stop outside of the Science and Industry Museum on Liverpool Road, which provides a route through to Piccadilly Gardens (interchange) and Piccadilly Train Station.

4.36. The Metroshuttle Route 2 has a stop outside of Deansgate Train Station, which provides a route to through to Piccadilly Train Station via Deansgate and Church Street in the Northern Quarter.

4.37. The Site is therefore well served by public transport both in terms of connectivity within Greater Manchester and further afield.

Vehicle

4.38. The Site is well placed for access to the City's arterial ring road with the Egerton Street / Ring Road (A6042) and Regent Road (A57) bordering the Site. The roads are a two-lane, two-way dual carriageways and which provide access to other major arterial routes and to the wider motorway network.

Summary

4.39. The Site is in a strategically important position. It is extremely well connected through public transport links, sustainable modes of transport and private vehicles. The Site is in close proximity to a number of City Centre

facilities including places of work, retail, cultural and leisure uses. These features make the Site well placed for the proposed mix of residential and commercial uses.

Conservation and Heritage

4.40. The Site is located with the Castlefield Conservation Area.

4.41. The Site does not contain any built heritage assets within its site boundary. While there are no Listed Buildings on Site there are a number of Listed Buildings within a 250m radius. These are:

- Railway Bridge Over River Irwell To Former Liverpool Road Station Grade I
- Railway Bridge Over River Irwell To Former Liverpool Road Station Grade I
- The Giants Basin Grade II
- Railway Bridge Over River Irwell To Former Liverpool Road Station Grade I
- Colonnaded Railway Viaduct At Former Liverpool Road Goods Depot Grade II
- Former Grape Street Railway Bonded Warehouse Grade II
- Bridgewater Canal Basin At Potato Wharf Grade II
- Old Warehouse To North Of Former Liverpool Road Railway Station Grade I
- Former Commercial Hotel Grade II
- Railway Viaduct Linking Bridge Over Irwell To Liverpool Road Station Grade II
- 123, Liverpool Road Grade II
- Former Liverpool Road Railway Station: Station Masters House Grade I *)*

4.42. There are a number of key heritage considerations for the redevelopment of the Site. The Conservation Area Appraisal prepared by MCC suggests that development in the Conservation Area should:

- *"Incorporate a mixture of uses.*
- *The height and scale, the colour, form, massing and materials of new buildings should relate to the existing high-quality structures and complement them. This policy still leaves scope for innovation, provided that new proposals enhance the area.*
- *The extreme diversity of form and style in Castlefield's existing structures makes it permissible for designers to use their imaginations freely."*

4.43. For further information regarding the historic use of the Site and surrounding area please refer to Chapter 9: Heritage of this ES and the Desktop Archaeological Assessment's prepared by Salford Archaeology as submitted as part of this planning application.

Planning History

4.44. The approved planning permissions of most relevance on Site and permitted in St. John's and Water Street more broadly are set out in the Table 4.1 below.

Table 4.1: Planning History

Name and PP Reference	Description	Status
Trinity Islands (previous landowner) 115107/FO/2017	Construction of a mixed-use development comprising two podiums of three storeys and five residential (Class C3) towers of 26, 26, 37, 41 and 67 storeys (including podium heights) connected by a new pedestrian bridge. Retail, commercial, leisure (gym and boat club) and community uses (community gallery and events space)(Use Classes A1, A2, A3, A4 or D2), workspace facilities (Class B1) and an educational facility (Class	On 27 July 2017, the Planning Committee resolved to approve this application, subject to signing a section 106 Agreement.

	D1) within the lower floors and podium level together with new riverside walkway, public realm and landscaping (including podium level parks). Two levels of parking for 581 cars and 2,532 bicycles and 200 cycle spaces within the public realm areas.	
Trinity Islands **107668/FO/2014/C1**	Erection of a site office, associated car parking and access to Trinity Way for a temporary period of 3 years.	Approved 1 April 2015
Trinity Islands **045070/DU/CMDC/94**	Change of use from car park, temporary car park and vacant land to a car park/coach park	Approved 25 March 1994

Flood Risk

4.45. The Environment Agency Flood Map indicates that the Proposed Development has areas located with Flood Zone 2 associated with the River Irwell which flows on the northern boundary of the site. Drawing reference 078567-CUR-XX-XX-DR-C-92000-P01 in the FRA shows the flood zone 1 (great than a 1 in 100 year) and flood zone 2 (less than 1 in 100 and greater than 1 in 1000 year) mapping based on the EA modelling the River Irwell/Manchester Ship Canal. The EA level data set shows that the maximum water level across the site assuming the Undefended scenario in the 1 in 100 year is 24.13mAOD and the 1 in 1000-year event is 25.82mAOD.

4.46. The Site also falls within the Conurbation Core Critical Drainage Area in the Salford and Trafford Critical Drainage Area (CDA), designated in 2011.

Ecology

4.47. An Ecology Statement has been prepared by ERAP and confirms that there are no areas designated as being of ecological importance at the regional or national level on Site or in the immediate locality. There are no sensitive areas located within the vicinity of the Site. No records of protected or Priority Species are held for the Site.

4.48. As a surface car park, the existing Site is comprised completely of hardstanding with the exception of limited vegetation on the perimeters.

The Proposed Development

4.49. The Proposed Development would involve the construction of four new residential towers of between 39 and 60 storeys to provide 1,950 apartments with retail, commercial and leisure uses on the lower levels and underground parking spaces.

4.50. The proposed uses, mix, number of residential homes and commercial floorspace within each building is broken down in Table 4.2.

Table 4.2: Proposed Development Parameters

Measurement	Proposed Development
Proposed Site Area	1.78 ha (hectares)
Proposed Development	Residential (Use Class C3) 1,950 total apartments across the Proposed Development. Totals number of apartments for each building are individually set out below: • Building C1 – 414

Measurement	Proposed Development
	• Building C2 – 521 • Building D1 – 532 • Building D2 – 483 Unit mix is set out below: • 638 x 1 bed (32.7%) • 1254 x 2 bed (64.3%) • 42 x 3 bed (2.2%) • 16 x 3 bed (0.8%) *For further information on the unit mix per building please refer to the accommodation schedule prepared by SHP.* <u>Public Realm</u> 4.51. 1.29 ha (hectares) of hard and soft landscaped public realm. <u>Commercial space (Use Class E and Sui Generis)</u> 4.52. Approximately 361 sqm (GIA) of commercial space across two units. These units are located in the lower levels of C1 and C2. <u>Residential Amenity</u> 4.53. Approximately 3,064 sqm of residential amenity space: • 702 sqm in C1 (NIA) • 649 sqm in C2 (NIA) • 893 sqm in D1 (NIA) • 820 sqm in D2 (NIA)
Proposed Development Height	• Building C1 – 39 storeys • Building C2 – 48 storeys • Building D1 – 60 storeys • Building D2 – 55 storeys
Car Parking	**Total across the Site:** 556 (29% provision) **Building C1** Total: 109 Accessible spaces: 10% EV charging: 20% demand-led provision at 7kW **Building C2** Total:152 Accessible spaces: 10% EV charging: 20% demand-led provision at 7kW

Measurement	Proposed Development
	Building D1 Total: 154 Accessible spaces: 10% EV charging: 20% demand-led provision at 7kW **Building D2** Total: 141 Accessible spaces: 10% EV charging: 20% demand-led provision at 7kW
Cycle Spaces	**Total across the Site:** 1,950 (100% provision) Building C1 - 414 Building C2 - 521 Building D1 - 532 Building D2 – 483 Approximately 70 visitor cycle spaces will also be provided within the public realm

4.54. The operator of the commercial units is unknown at this stage, accordingly operating hours will be agreed by pre-occupation condition via an operational management plan.

Scale and Massing

4.55. The proposal includes four buildings comprising 39, 48, 55 and 60 storeys plus underground car parking. Section 3.2 of the Design and Access Statement sets out the process undertaken to arrive at the chosen scale and massing. It sets out that that a number of options were explored in order to choose the most suitable building form for the towers on the Site. The final design has been influenced by a number of factors including wind microclimate, public realm provision and the potential impact on the townscape and visual character of the area.

4.56. The Site has been identified within the St. John's and Water Street SRF's as being suitable for 'elegant, taller buildings'. By using height to its advantage, the Site is able to deliver a higher number of dwellings whilst retaining a significant amount of space to provide high-quality public realm as well as complementary commercial uses and residential amenity space.

Layout

4.57. Section 3.6 of the Design and Access Statement outlines the proposed layout of the scheme. Both towers include a basement element which accommodates car parking, cycle parking and services.

Landscaping

4.58. The public realm and landscape design of the Site has been carefully considered so that it integrates cohesively into the St. John's and Water Street SRFs, positively contributes to and sets a precedent for further development within the neighbourhood and city centre fringe. Public realm and the landscape are a fundamental part of the character of the Proposed Development, included in the scheme as a publicly accessible hard and soft landscaped areas including newly formed riverside access.

4.59. The Proposed Development incorporates a large amount of high quality public realm, of c. 1.29 hectares, that will serve future and existing residents and future residents within the St. John's and Water Street SRF areas, surrounding existing communities in Salford, Castlefield and Hulme, as well as visitors. This public realm will improve the pedestrian and cyclist linkages through the Framework area from the adjacent communities, in particular linking St. John's through to Water and on through to Castlefield and Hulme. This provides improved pedestrian and cyclist links to the existing area of green infrastructure at Hulme Park whilst increasing the attractiveness of the riverside setting by forming new access. This helps to meet the objectives set out within the Irwell City Park Initiative which identifies the Site as being suitable for green and open space whilst maximising its connections and riverside setting.

4.60. The chosen pathways will be compliant with the Equality Act, providing efficient access to various parts of the Site including to the River Irwell. Newly formed access along the River Irwell will be created to open up the riverside setting and provide better and safer routes.

5. Construction Management and Phasing

Introduction

5.1. This Chapter of the ES has been prepared by Renaker Build Ltd and describes the proposed construction programme and key activities that will be undertaken. Detailed consideration of potential impacts during the construction process and any necessary mitigation measures are provided in each relevant chapter of the ES.

5.2. The following appendix is included with this Chapter:

- Appendix 5.1 – Logistics plan

5.3. The main aim throughout the construction period is to minimise the impact on the surrounding properties and roadways for the duration of the work. Close collaboration with all project teams of all construction projects will be maintained at all times to achieve this aim.

5.4. The following narrative explains this methodology and timescales envisaged at the time of the planning application. 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

5.5. The total construction programme will span a period of approximately nine years within which there will be elements of ground works, foundations, frame construction, façade cladding and internal fit out. Whilst there are several issues that will determine the final programming and sequencing at the Proposed Development the target plan is to split the development into phases subject to Planning Permission being granted the proposed key dates and durations are shown below.

- Phase 1 – Towers C1 & C2 with residents car park and public realm – construction estimated to take 4 ½ years; commencing in March 2022 and completing in September 2026
- Phase 2 – Towers D1 & D2 with Residents car park and Public Realm - construction estimated to take 4 ½ years; commencing in September 2026 and completing in March 2031
- Final public realm (for example, reinstating highway post construction and landscaping around the perimeter of the Site) and Section 278 Highways works – completion targeted for Late 2030 – Early 2031

5.6. This is an indicative construction programme and the Applicant highlights that there are multiple risks involved in the development process. The Applicant notes that this programme may ultimately be extended in the event delays caused by sustained periods of poor weather, unexpected ground conditions or other abnormals, volatility in economic and housing markets, political uncertainty, and the availability of funding.

5.7. 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.

5.8. 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.

5.9. We acknowledge the close proximity of the neighbouring residents 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

5.10. The following is a brief overview of the methodology to be adopted for the construction and fit out of the Proposed Development. The section also considers general logistics as well as traffic management for the movement of material to the disposal of waste.

Site Logistics

5.11. The Site has been cleared previously and was recently used as grade level public car parking. The plot has a secure fence line currently in place and dependant on location this will be upgraded to branded 6ft solid hoarding.

5.12. There will be gates erected on Water Street into the C1/C2 plot and these will be served from the existing highway opening that currently serves the car park. These gates will predominantly used for larger material deliveries to this phase of the scheme including concrete and reinforcement as well as plasterboard and glazing.

5.13. A second set of gates will be erected on the current car park opening off the A6042 Ring road. This is to an existing junction with the highway and will be used during phase 1 for smaller deliveries (that will serve the phase 1 site through the existing tunnel under the A6042) and for staff access to the welfare cabins and compound. During phase 2 works, these gates will be used for larger deliveries including concrete and glass whilst the site compound and welfare will be at a satellite location away from the site.

5.14. It is envisaged that the temporary site establishment and welfare space will consist of good quality temporary cabins branded with the Renaker Build Limited logo. The welfare facilities will be suitably sized to suit the anticipated number of operatives. The welfare facilities will be located close to the Site.

5.15. Phase 2 of the works, will see the welfare compound and offices moved to across to a previously used location on Water Street or into the permanent building that is Gaddum House.

5.16. Material storage will be generally contained within the Site & compound boundary with access through the site entrance gates for deliveries. When the concrete frame reaches podium level, small low height fork lift trucks will be employed to store materials both within the below ground floor car parking provision for the façade construction and fit out elements of the works.

5.17. 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.

5.18. Access to the site entrances will be controlled by biometric scanner through a secure metal turnstile. This will monitor Renaker 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.

5.19. Where required, appropriate wheel and vehicle wash facilities will be in place to ensure delivery wagons leave the Site clean and tidy with regular cleaning of Water Street and the ring road using road sweepers.

5.20. Loading and unloading of material deliveries will occur within the site boundary unless exceptional circumstances require special measures to be instigated.

5.21. 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.

5.22. The Site 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

5.23. The works generally comprise of the following:

- Creation of piling mat substrate and formation of tower crane bases.

- CFA & bored piling to the site perimeter with associated temporary propping.
- Bearing pad construction, ring beams and basement car park slab and drainage.
- Installation of tower crane(s).
- Construction of in-situ concrete frame, concrete stair cores and floors to roof level by concrete pump and jump-form construction.
- Roof coverings.
- Installation of unitised facades including windows and MVHR grilles.
- Installation of internal mechanical and electrical systems including main lifts.
- Fit out of apartments including walls, floors, ceilings, bathrooms kitchens and final finishes.
- Installation of BMU
- Removal of Tower crane.
- Completion of internal finishes to communal space.
- Phased completion of communal external space and links.
- Removal of permanent hoardings and temporary gates.
- Phased completion of public realm and S.278 works
- Phased decant from site leading to the full opening of the development.

Infrastructure

5.24. The works generally comprise of the following:

- Drainage connections to a new UU main foul drain on Water Street for phase 1 and Regent Road for Phase 2
- Rainwater drainage, via positive surface water gravity system, to a outfall pipe into the River Irwell. This will service both Phase 1 and 2
- Electrical supply entering at the Water Street junction and following a designated service route around the perimeter service road to each sub station location
- Mains water will be sourced from the identified supply currently in Water Street
- Telecoms and data infrastructure as above.

Traffic Management Plan

5.25. The Site is served well from the A6042 Ring Road and Water Street and these in turn link to the main city arteries that are Regent Road and The Mancunian Way. It is envisaged that deliveries will traverse from the Mancunian Way A57(M) or Ring Road (A6042) then enter the Site via the existing junction on Water Street. For deliveries for phase 2, to avoid turning right into the site and the potential traffic delays, all deliveries will arrive from the Regent Road/Egerton St direction. Traffic will return to the Mancunian Way via Egerton Street. Flexibility in the access/egress points from site will minimise congestion on the neighbouring roads.

5.26. This approach negates the need for traffic to access via the city centre.

5.27. 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.

5.28. In preparation of the above document, Renaker Build Limited Protocol of timed and booked deliveries, off peak deliveries and pre fabrication will be incorporated.

Deliveries

5.29. Delivery routes for the major materials and items of plant will be as per the section above, they will access from the Regent Road and Mancunian Way and will endeavour to deliver outside of peak traffic hours to minimise local disruption and the normal workings of the surrounding properties. The concrete supply will be from our Great Jackson St batching plant which due to its very close proximity to the site, minimises disruption to the road network.

Parking

5.30. There will be a limited number of visitor and key staff parking within the compound area. Site personnel will be encouraged to utilise the extensive public transport options available to them. Any personnel who have to attend by car will be asked to avoid parking in residential areas and instead utilise formal surface car parks within the local area.

Health and Safety

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

5.32. Renaker Build Limited will be the Principal Contractor. Their track record demonstrates their competency in the management and execution of Health and Safety. Renaker Build Limited have the appropriately trained management resource and procedures in place to oversee the activities of a complex, high rise city centre construction project.

5.33. As demonstrated by the appointment prior to the planning application, 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.

5.34. The Principal Contractor will produce a Construction Phase Health and Safety Plan prior to works commencing on site that will be reviewed and signed off by the client and their 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 as the work progresses.

Construction Materials

5.35. The materials selected at this stage of the design process do not generate a risk to construction personnel using the appropriate PPE and following manufacturers guidance.

Site Security and Safety

5.36. Protecting the public 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.

5.37. Vandalism and theft of plant, equipment, materials and fuel is possible throughout the duration of the development. Renaker Build Limited will take appropriate action, as described in previous sections, to ensure the site is secure at all times from unauthorised access. As described previously, the site will have metal

turnstile access system controlled by an individual proximity fob system. In the event of a lost or stolen data the system can be updated to prevent fraudulent use .

5.38. The provision of CCTV would be considered if required to main site points and compound areas to assist in the prevention of unauthorised activities.

Environmental Management

5.39. An Environmental Plan, in line with the Renaker Build Limited 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

5.40. 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

5.41. Renaker Build Limited 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).

Nuisance (Noise, Vibration & Dust)

Noise & Vibration

5.42. The principal concerns relating to the nuisances of noise and vibration come 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.

5.43. Renaker Build are currently in a BAPA agreement process 174522/NW7123 with Network Rail to agree construction methodology and set agreed vibration levels at the sit boundary

5.44. In order to minimise the noise, Renaker Build Limited will provide the following:

- 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 items to be 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. Where possible, works should only take place during given periods, e.g. during normal construction hours and not at night.

5.45. In order to minimise the vibration, Renaker Build Limited will provide the following;

- 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

5.46. 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.

5.47. In order to minimise the dust and fumes, Renaker Build will provide the following:

- Providing a hard surface 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

5.48. The contractor will ensure that regular contact is made with 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. Renaker Build will display a contact number on hoardings which will be operational 24/7.

Waste Management Strategy

5.49. In line with the "Site Waste Management Plan Regulations 2008", a site waste management plan (SWMP) will be developed by the principal contractor and agreed with Manchester City Council.

- Operational Waste Removal

5.50. 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. During high waste activities, such as dry lining, 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 our supplier will sort at their transfer station before issuing us recycling percentages and data.

5.51. To reduce the volume of waste sent to landfill, 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

5.52. All carriers of waste will hold a valid waste transfer licence and provide certification to the main contractor for all elements of the process.

Summary

5.53. 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.

5.54. 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.

5.55. 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.

5.56. 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.

5.57. Renaker Build Limited will have an on-going process of monitoring health and safety standards throughout its organisation. This is normally done directly (on site) 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. Site managers will also undertake regular reviews of safety on site, including any accidents or incidents and any matters raised will be dealt with accordingly.

5.58. Health and safety is also incorporated as a fundamental aspect of the overall project review, the Applicant has appointed Renaker Build Limited as Principal Contractor, Renaker Build Limited can 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.

5.59. The Main 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.

6. Air Quality

Introduction

6.1. This Chapter of the ES has been prepared by Ensafe Consultants 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.

6.2. This Chapter of the Environmental Statement (ES), prepared by Ensafe Consultants, assesses the likely significant effects of the Proposed Development with respect to Air Quality. This Chapter 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; and the likely residual effects after these measures have been adopted.

6.3. The chapter has been prepared with due regard to the requirements of Manchester City Council (MCC) Environmental Health Department. Reference should be made to the following appendices for details of the proposed methodology, assessment inputs, including ADMS-Roads parameters, traffic data and model verification process:

- Appendix 6.1 - Assessment Inputs
- Appendix 6.2 – Figures
- Appendix 6.3 – Construction Phase Assessment Methodology
- Appendix 6.4 – Construction Phase Road Vehicle Exhaust Impact Assessment
- Appendix 6.5 – Sensitivity Analysis Impact Assessment
- Appendix 6.6 – EIA Qualifications

6.4. The Air Quality Chapter was directed by Josh Jones, Senior Air Quality Consultant at Ensafe Consultants with over 4.5 years' experience in the air quality sector. His role includes the production and project management of Air Quality Assessments in support of planning applications for a wide range of UK and international clients and sectors, including support on the wider Great Jackson Street Framework. He has detailed knowledge of the Local Air Quality Management (LAQM) regime, Environmental Impact Assessment (EIA) process and co-ordination of multi-disciplinary environmental assessment work in support of planning Applications.

6.5. He was supported by Rachael Harrison, Air Quality Consultant, who has over 3 years' experience within the air quality sector. She has also assisted with supporting the Great Jackson Street Framework. She also has an in-depth knowledge of relevant Air Quality standards and methodologies in line with the Institute of Air Quality Management (IAQM) guidance.

Legislative and Policy Context

European Legislation

6.6. European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$).

National Planning Policy

6.7. **The National Planning Policy Framework (NPPF)** - was published on 24th July 2018 (updated on 20th July 2021) and sets out the Government's core policies and principles with respect to land use planning, including air quality. The implications of the NPPF have been considered throughout this assessment.

6.8. The National Planning Practice Guidance (NPPG) - launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF. The NPPG will be reviewed, and the relevant guidance considered as necessary throughout the undertaking of the air quality assessment.

UK Legislation

6.9. The Air Quality Standards (Amendment) Regulations 2016 - these Regulations amend the Air Quality Standards Regulations 2010 and transpose the EU Directive 2008/50/EC into UK law. Air Quality Limit Values (AQLVs) were published in these regulations for 7 pollutants, as well as Target Values for an additional 6 pollutants.

6.10. Air Quality Strategy (AQS) 2007 - Sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. It also sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.

6.11. Part IV of The Environment Act 1995 - requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

National Guidance

6.12. The Chapter was undertaken in accordance with a number of guidance documents as detailed below:

- Department for Environment Food and Rural Affairs (DEFRA) (2016): Local Air Quality
- Management Technical Guidance LAQM TG(16).
- IAQM (2014): Guidance on the Assessment of Dust from Demolition and Construction ; and
- IAQM & Environmental Protection UK (EPUK) (2017): Land-use Planning & Development Control: Planning for Air Quality.

6.13. Table 6.1 presents the Air Quality Objectives (AQOs) detailed within the relevant legislation, which will be considered further during the preparation of the Air Quality chapter.

Table 6.1 – Air Quality Objectives

Pollutant	Air Quality Objectives Concentration (µg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
$PM_{2.5}$	25	Annual mean

6.14. Table 6.2 summarises the advice provided in DEFRA guidance LAQM TG(16) on where the AQOs for pollutants considered within this report apply.

Table 6.2 – Examples of Where the Air Quality Objectives Apply

Averaging Periods	Objectives Should Apply At	Objectives Should Not Apply
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean 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 one hour or longer	Kerbside sites where the public would not be expected to have regular access

6.15. The results of the dispersion modelling assessment will also be compared against the relevant AQOs detailed in Table 6.1 to determine significance.

Local Planning Policy

Manchester City Council Local Plan

6.16. The Manchester Local Development Framework (LDF) Core Strategy was formally adopted in 2012 and provides a framework for development within the city. The LDF comprises a number of documents which set out MCC's spatial policy framework A review of the Core Strategy indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy EN16 – Air Quality

  "The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

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

- Policy DM1 – Development Management

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

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

6.17. Reference has been made to these policies during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the Site and determining potential air quality impacts as a result of the Proposed Development.

Greater Manchester Air Quality Action Plan

6.18. The primary objectives of the Greater Manchester Air Quality Action Plan (AQAP)2 are to improve air quality across Greater Manchester and to embed low-emission behaviours into the culture of our organisations and lifestyles by 2025, whilst supporting the UK Government in meeting all EU thresholds for key air pollutants. The Plan identifies 'Key Priority Areas' which are generally locations near to major roads and heavily trafficked areas in Manchester city centre, and other major urban centres across the other nine districts.

6.19. The AQAP comprises a single document including actions that will be ratified by Transport for Greater Manchester (TfGM) and district authorities to tackle air quality in Key Priority Areas.

6.20. Reference has been made to the AQAP during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the Proposed Development.

Assessment Methodology and Significance Criteria

6.21. The following sections detail the applied assessment methodology for the:

- Construction Phase Assessment; and
- Operational Phase Assessment

Construction Phase Dust Risk Assessment

6.22. There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction.

6.23. Activities on the Site have been divided into four types to reflect their different potential impacts. These are:

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

6.24. The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10}

6.25. A desk top survey will be undertaken to identify human and ecological receptors within the relevant assessment buffers specified by the IAQM guidance. Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

6.26. Following the identification of sensitive receptors, a site is then allocated a risk category which is assigned to each activity, based on the scale and nature of the works, as well as the sensitivity of the area to dust impact.

6.27. The assigned magnitude and sensitivity will then determine the overall risk and appropriate mitigation measures to be employed during construction phase activities. The full IAQM methodology is provided in **Appendix 6.3.**

[2] Greater Manchester Air Quality Action Plan 2016–2021

Operational Phase Road Vehicle Impact Assessment

6.28. Potential air quality impacts across the Proposed Development and at sensitive receptors within close proximity to the Site have been assessed on a quantitative basis, by calculating NO_2, PM_{10} and $PM_{2.5}$ levels across the Proposed Development and at sensitive locations with and without the development using the ADMS-Roads dispersion modelling software. The ADMS modelling software package is widely accepted within the UK by the Local Authorities, the Environment Agency and DEFRA.

6.29. The assessment of operational phase impacts has considered the following scenarios:

- Scenario 1: Existing Baseline year 2019, for verification purposes against latest 2019 MCC and SCC ratified Air Quality Monitoring data ;
- Scenario 2: Anticipated Opening Year baseline and relevant cumulative flows;
- Scenario 6: Anticipated Opening Year baseline and relevant cumulative flows, plus predicted operational flows associated with Phases C1, C2, D1 and D2, including multi storey basement car park (for both Phases C and D), highways and public realm.

6.30. The total number of vehicles generated by the operational phase would be realised at the anticipated scheme completion year (2031), upon completion of both Phase C and D, with first occupation within Phase C expected in 2026. Due to the projected improvement of vehicle emissions in the future, guided by government policy and measures detailed with the Greater Manchester AQAP, it was considered a robust approach to use a 2019 emission factors. This provide a robust approach where vehicle emissions would be higher than opening year emissions detailed for 2026. The use of 2019 emission factors in combination with the total number of development vehicles (represented of the 2031 completion year) for the 2026 opening year/occupation scenario, during the operational phase ensures a conservative approach.

6.31. Additionally, two sensitivity scenarios have been undertaken for the purpose of the assessment. The first scenario uses 2026 emission factors to represent predicted emissions in the development first occupation year of 2026. The second scenario uses scenario uses 2030 emission factors (the maximum output from the Emission Factor Toolkit (EFT) version 10) to represent predicted emissions in the development completion year of 2031. This analysis provides a more realistic approach of the likely emissions anticipated for each development phase.

6.32. Furthermore, additional traffic associated with the development has been assessed with the assumption that the existing site is vacant. It has been confirmed by Renaker that should the proposals not proceed the existing site will remain operational as a car park. The scenarios assessed are considered to provide a robust approach, as the net change in traffic generation between the proposals would be greater with a existing vacant site than if the traffic had been determined using an operational site. As a result, using the scenarios presented above would lead to a greater change in pollutant emissions at sensitive receptors, thus providing a conservative approach. It's is also considered that the development proposals would generate less traffic than the operational car park.

Significance Criteria

6.33. Receptors potentially sensitive to changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations have been identified within 200m of the affected highway network road sources. LAQM (TG16) provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and,
- Care homes.

6.34. The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 6.3. These are based upon the guidance provided within the Environmental Protection UK (EPUK) and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality.

Table 6.3 – Operational Traffic Exhaust Emissions – Assessment of Impact

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Minor	Moderate
76 - 94% of AQO	Negligible	Minor	Moderate	Moderate
95 - 102% of AQO	Minor	Moderate	Moderate	Major
103 - 109% of AQO	Moderate	Moderate	Major	Major
110% or more of AQO	Moderate	Major	Major	Major

6.35. The criteria shown in Table 6.3 is EPUK and IAQM guidance with sensitivity descriptors included to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance6. Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 6.3, the EPUK and IAQM6 document states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for.

6.36. Whilst impacts might be determined as 'minor', 'moderate' or 'major' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors are also considered when determining the overall significance of a development in addition to using professional judgement and reasoning as far as practicable:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a major increase or decrease; and,
- The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m3 should attract less significance than an annual mean of 51µg/m3.

6.37. These factors were considered, and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

Assumptions and Limitations

Operational Phase Assessment

6.38. For the operational phase assessment, there is current uncertainty over NO_2 concentrations within the UK not reducing as previously expected due to the shifts towards a greater production and uptake of electric and hybrid vehicles. In order to provide a robust assessment, emission factors for 2019 were utilised within the dispersion model for the prediction of pollution levels for all future operational scenarios. The use of 2026 traffic data, which is inclusive of total development traffic (representative of the 2031 completion year) together with 2019 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted emission levels.

6.39. Similarly, it has been assumed that background concentrations will not improve in line with current predictions and therefore 2019 background concentrations have been utilised for the assessment of the opening year (2026). An additional scenario utilising 2026 emissions data (maximum output in EFT) and background concentrations have been utilised within separate sensitivity analysis.

6.40. As detailed in Figure 6.1, this worse case approach does not consider any future emission reductions and accounts for a 43% increase when compared to future 2025 predictions.

6.41. Given the time between the 2019 baseline and 2031 future completion year, for the 2031 future year scenario, an additional scenario utilising 2030 emissions data (maximum output in EFT) and background concentrations have been utilised within separate sensitivity analysis. This is because local air quality is predicted to improve during future years, due to improved vehicle emission standards associated with a shift towards 'greener' vehicle fleet compositions such as, electric vehicles.

6.42. The limitations stated above are standard limitations associated with atmospheric dispersion modelling assessments. Based on the controls and the application of worse case assumptions it is considered that the assessment is both robust in its conclusions and has been completed in line with current industry standard practice.

Baseline Conditions

6.43. Existing air quality conditions in the vicinity of the Proposed Development were identified in order to provide a baseline for assessment. These are detailed in the following sections.

Local Air Quality Management

6.44. The MCC Review and Assessment of air quality process concluded that annual mean concentrations of NO_2 are above the relevant AQO within the city. As such, one AQMA has been declared, which is described as:

Greater Manchester Combined Authority AQMA (MCC) - This is the part of the Greater Manchester Combined Authority AQMA located within the Manchester City Council area

6.45. The Site is located within this AQMA, as such, there is the potential for the Proposed Development to introduce future Site users to elevated pollutant concentrations as well as cause impacts to air quality within the designated AQMA. Potential impacts at sensitive receptor locations within the GMCA AQMA have therefore been considered further within this report.

6.46. MCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMAs have designated.

Air Quality Monitoring

6.47. Monitoring of pollutant concentrations is undertaken by MCC using continuous and periodic methods throughout their area of administration. A review of GMCA most recent Air Quality data indicated that there are currently three automatic analysers operated by MCC. The closest of which is the Manchester Oxford Road (Urban traffic analyser), located approximately 1.6km east of The Site at the NGR: 384233, 397287.

6.48. This monitoring location is classified as a Kerbside site and as such has not been considered further in the context of the assessment or within the verification process. This is in accordance with LAQM (TG16) which suggests that the inclusion of Kerbside sites within the verification procedure may lead to an over-adjustment of modelling at roadside sites. This may then lead to inaccuracies during the modelling of potential exposure across the Proposed Development and potential impacts at nearby sensitive receptor locations.

6.49. MCC also uses passive diffusion tubes to monitor NO_2 concentrations throughout their area of administration. A review of MCC's most recent Air Quality data available indicated that there are four diffusion tubes located in the vicinity of the Proposed Development. Recent monitoring results are summarised in Table 6.4 . Exceedances of the relevant AQO are shown in bold.

Table 6.4 – MCC Diffusion Tube Monitoring Results

MCC ID	MCC Reference	Site Type	NGR (m)		Distance to Site (m)	Monitored Annual Mean NO_2 Concentration (µg/m³)		
			X	Y		2017	2018	2019
MAN77	Hewitt Street	Urban Traffic	383602	397488	949	38.81	**40.99**	**43.66**
MAN97	Chester Road	Urban Traffic	382886	397215	567	-	-	32.29

6.50. The neighbouring Salford City Council (SCC) also undertake Air Quality monitoring within the vicinity of the Site. A review of the latest GMCA monitoring data indicated three representative diffusion tube monitoring

locations. Recent results from these locations are shown in Table 6.5. Exceedances of the relevant AQO are highlighted in **bold**.

Table 6.5 – SCC Diffusion Tube Monitoring Results

MCC ID	MCC Reference	Site Type	NGR (m)		Distance to Site (m)	Monitored Annual Mean NO_2 Concentration (µg/m³)		
			X	Y		2017	2018	2019
SA27	Trinity Way	Urban Traffic	383078	398741	1,067	36.80	34.10	37.20
SA39	Trinity Way/Chapel Street	Urban Traffic	383040	398563	888	**41.60**	39.10	**41.70**
SA59	West Crown Ave	Urban Traffic	381822	397895	880	36.67	33.31	32.45
SA60	Regent Road	Urban Traffic	382445	397724	245	**40.70**	**40.23**	36.66
SA79	Chapel Street	Urban Traffic	382602	398519	777	-	-	**41.10**
SA81	Regent Road	Urban Traffic	382571	397718	122	-	-	**46.41**

6.51. As shown in Table 6.4 and Table 6.5 there were exceedances of the annual mean AQO for NO_2 at various locations across MCC and SCC in recent years. Exceedances are likely due to their kerbside and roadside locations within or adjacent to AQMAs.

6.52. Both the Chester Road (MAN97) and Regent Road monitoring locations (SA60 and SA81) are situated in similar distance to arterial roads as the Proposed Development. These locations will provide suitable representation to sensitive receptor locations and similarly will be considered further within the model verification process.

6.53. A review of recent monitoring results within the vicinity of the Site indicated that annual mean NO_2 concentrations adjacent to the Site may be marginal to or exceed the AQO. Subsequently, detailed modelling has been produced to assess the risk of on-site exposure to elevated pollutant concentrations.

6.54. Like the Oxford Road analyser, both Oxford Street (29A) and Oxford Road (82) are of kerbside classification and will only be considered further in context of the baseline assessment. The West Crown Avenue monitoring location (SA59) is situated approximately 950m away from the Proposed Development along a minor road and is therefore only considered further in context of the baseline assessment. Subsequently, these location will not provide a suitable representation for baseline concentrations across the Site and have not been considered further within the Chapter.

6.55. Monitoring of particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) and 2.5µm ($PM_{2.5}$) is not currently undertaken by MCC or SCC in the vicinity of the Site.

6.56. Reference should be made to Figure 6.1 for geographical representation of diffusion tube monitoring locations.

Background Pollutant Concentrations

6.57. The total concentration of a pollutant is comprised of explicit local emission sources (such as roads and industrial sources) and the background component. The background component consists of indeterminate sources which are transported into an area from further away by meteorological conditions. Background pollutant concentrations are therefore the ambient level of pollution that is not affected by local sources of pollution.

6.58. Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist Local Authorities (LAs) in their Review and Assessment of air quality. The Proposed Development is located in the background grid square: 383500, 397500

6.59. Data for this location was downloaded from the DEFRA website for the purpose of this assessment and is summarised in Table 6.6; for the baseline year (2019) and first occupation year (2026) and future development completion year (2031). It is important to note that 2030 data have been used to represent 2031 pollutant concentrations as this is the maximum year of data available from the DEFRA website.

6.60. In order to avoid 'double-counting' of road vehicle exhaust emissions of NO_2 and NOx, the proportion of the relevant background concentrations from Motorways In, Trunk A-roads In and Primary A-roads In were removed in accordance with the methodology outlined in DEFRA guidance LAQM.TG(16). The background concentrations following adjustment by the "NOx Removal Calculator" are presented in Table. Both PM_{10} and $PM_{2.5}$ background concentrations are unaffected by this process.

Table 6.6 – Predicted Background Pollutant Concentrations

Pollutant	Predicted Annual Mean Pollutant Concentration (µg/m³)		
	2019	2026	2031
NO_x	**28.30**	21.23	19.52
NO_2	**19.64**	15.29	14.16
PM_{10}	**13.16**	12.30	12.26
$PM_{2.5}$	**8.54**	7.93	7.89

6.61. As shown in Table 6.6 background concentrations of NO_2, PM_{10} and $PM_{2.5}$ are not predicted exceed the relevant AQOs in the baseline or opening year scenarios. Comparison between the monitoring results indicates the impact that vehicle exhaust emissions from the highway network have on pollutant concentrations at roadside locations, specifically adjacent to arterial traffic routes within an AQMA.

Sensitive Receptors

6.62. A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a Proposed Development. These have been defined for fugitive dust and road vehicle exhaust emission impacts associated with the construction and operational phases. These are summarised in the following Sections.

Construction Phase Sensitive Receptors – Human Receptors

6.63. Receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the Site boundary. These are summarised in Table 6.7 .

Table 6.7 – Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary(m)	Approximate Number of Human Receptors	Sensitivity
Less than 20	1 - 10	High
20 - 50	10 - 100	
50 - 100	More than 100	
100 - 350	More than 100	

6.64. Reference should be made to **Figure 6.2 of Appendix 6.**2 a graphical representation of demolition, earthworks and construction dust buffer zones.

6.65. Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the Site access route. These are summarised in Table 6.8 . It has been confirmed that construction traffic would likely access the Site from Trinity Way and Water Street. This will ensure that a maximum potential trackout distance is considered.

Table 6.8 – Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary(m)	Approximate Number of Human Receptors	Sensitivity
Less than 20	More than 100	High
20 - 50	More than 100	

6.66. Reference should be made to **Figure 6.3 within Appendix 6.**3 for a graphical representation of trackout dust buffer zones.

Construction Phase – Ecological Receptors

6.67. There are no local or nationally designated ecological receptors within 50m of the Site or trackout boundaries. As such, construction phase impacts relating to ecological impacts have not been assessed further within this report.

Additional Area Sensitivity Factors

6.68. A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 6.9 .

Table 6.9 – Additional Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The Site is located within a residential area undergoing significant regeneration. As such, historical dust generation may have occurred as a result of windblown emissions from regeneration, specifically as a result of construction phase processes
The likelihood of concurrent dust generating activity on nearby sites	As provided in Appendix 2.1: Committed Developments, a review of the MCC planning portal indicated that there are a series of planning applications are within 500m of the Proposed Development boundary. A full list of committed developments within 500m of the Site are provided in Appendix 2.1. Due to the size and nature of the committed developments, there is a risk of concurrent dust generating activity should the construction phases overlap
Pre-existing screening between the source and the receptors	There is no vegetation present along the northern and western boundaries of The Site. As such, pre-existing protective screening is limited
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south of the Proposed Development, as shown in **Figure 6.4 with Appendix 6.2.** As such, properties to the north would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is anticipated that the proposed completion date will be approximately Q1/Q2 2031
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

Operational Phase - Human Receptors

6.69. A desk-top study was undertaken in order to identify off-Site sensitive receptor locations within 200m of the affected highway network that require specific consideration during the assessment. The list of receptors is not considered to be exhaustive instead they are 'worst-case' receptors representative of their immediate environments. These were modelled at relevant heights to represent worse case exposure and are summarised in Table 6.10 and presented in Figure 6.6 of Appendix 6.2.

Table 6.10 – Existing Sensitive Human Receptors

Receptor		NGR (m)		Height (m)	Distance to Site (m)
		X	Y		
R1	Residential - One Regent	382713.3	397620.8	1.0	129

Receptor		NGR (m)		Height (m)	Distance to Site (m)
		X	Y		
R2	Residential - One Regent	382678.0	397646.7	3.5	101
R3	Residential - Miranda Court	382448.9	397722.4	2.0	242
R4	Residential - St Bartholomew's Drive	382144.6	397799.2	1.5	547
R5	Residential - Regent Plaza	382224.6	397829.9	4.5	472
R6	Residential - Regent Plaza	382162.1	397847.5	4.5	537
R7	Residential - Egerton Street	382973.0	397347.0	4.5	491
R8	Residential - Egerton Street	382973.0	397347.0	8.0	491
R9	Residential - Egerton Street	382912.0	397396.0	5.5	416
R10	Residential - Egerton Street	382912.0	397396.0	8.0	416
R11	Residential - Egerton Street	382786.0	397441.0	0.5	321
R12	Residential - Chester Road	382912.0	397297.0	3.5	502
R13	Commercial - Egerton Street	382864.7	397438.3	1.5	355
R14	Commercial - Egerton Street	382864.7	397438.3	3.1	355
R15	Residential -Wilburn Basin	382712.1	397902.5	4.5	157
R16	Residential - New Bailey Plot A3	382889.8	398053.3	1.5	366
R17	Residential – City Point	383055.1	398603.6	4.5	931
R18	Residential – Trinity Edge	383014.7	398604.7	2.0	917
R19	Residential - The Filaments	383013.0	398477.3	1.5	799
R20	Residential – Chapel Street	382978.7	398445.1	4.5	755

Operational Phase – Ecological Phase

6.70. There are no local or nationally designated ecological receptors within 2,000m of the Site or trackout boundaries. As such, operational phase impacts relating to ecological impacts have not been assessed further within this report.

Identification and Evaluation of Significant Effects

Construction Phase

Step 1 – Screening

6.71. The results of the desk-study detailed in Table 6.7 and Table 6.8 identified a number of sensitive human receptors within 350m of the Site boundary, and within 50m of the anticipated trackout routes.

Step 2 – Identification of Magnitude

6.72. The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix 6.3 and summarised below in Table 6.11.

Demolition

6.73. There is no scope for demolition in order to prepare the site for construction. Subsequently, this aspect of the construction phase dust risk assessment has not been considered further.

Earthworks

6.74. The area of the Proposed Development Site (approx. 17,300m^2) combined with the made ground determined a large magnitude related to earthwork activities.

Construction

6.75. Given the scale of the Proposed Development the approximate total building volume is greater than 100,000m^3. The magnitude of construction activities is therefore considered large.

Trackout

6.76. The number of HGV movements for the development site is currently unknown. Based on the Site area, it is anticipated that the unpaved road length is likely to be over 100m. The magnitude of potential dust emissions from trackout is therefore Large.

Table 6.11 – Dust Emission Magnitude

Magnitude of Activity		
Earthworks	Construction	Trackout
Large	Large	Large

Step 2B – Sensitivity

6.77. The next step (Step 2B) is to determine the sensitivity of the surrounding area, based on general principles such as amenity and aesthetics, as well as human exposure sensitivity.

Dust Soiling

6.78. As shown in Table 6.7 and Table 6.8 , the desk top study indicated that approximately more than 100 sensitive receptors are within 20m of the Proposed Development boundary, and 20m of the anticipated trackout routes.

6.79. The sensitivity of the receiving environment to potential dust soiling impacts of the area is considered to be of moderate sensitivity for earthwork, construction activities and high sensitivity for trackout activities.

Human Health

6.80. The annual mean concentration of PM_{10} is less than 24 µg/m3 as detailed in Table 6.6.

6.81. The presence of 10 to 100 sensitive receptors within 20m of the Proposed Development, and more than 100 within 20m of the anticipated trackout routes, the area is considered to be of minor sensitivity for earthwork and construction activities and moderate sensitivity for trackout activities.

6.82. The sensitivity of the receiving environment is shown in Table 6.12.

Table 6.12 – Dust Emission Magnitude

Potential Impact	Sensitivity of Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Moderate	Moderate	High
Human Health	Minor	Minor	Moderate

Step 2C – Summary of the Risk of Dust Effects

6.83. Both the magnitude and sensitivity factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures. A summary of the risk from each dust generating activity is provided in Table 6.13.

Table 6.13 – Summary of Unmitigated Dust Risks

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Moderate Adverse	Moderate Adverse	Major Adverse
Human Health	Minor Adverse	Minor Adverse	Moderate Adverse

Step 3 – Mitigation

6.84. The IAQM guidance provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Site as summarised in Table 6.24. It will be

required to review these measures prior to the commencement of construction works and incorporated into existing strategies where practical.

Step 4 – Residual Impacts

6.85. Assuming that all relevant mitigation measures outlined in Table 6.24 are implemented effectively, the effect from all dust generation activities is predicted to be negligible and not significant

Operational Phase Assessment

6.86. As discussed in the methodology section of this Chapter additional vehicle movements associated with the operation of the Proposed Development will generate exhaust emissions, such as NO2, PM10 and PM2.5 on the local and regional road networks.

6.87. Operational Traffic data for the assessment scenarios has been supplied by Vectos the appointed Transport Consultant for the scheme. Traffic data for the construction phase was informed by the Applicant (Renaker Build (Renaker) Ltd).

Construction Phase Traffic Generation

6.88. Construction for the two development blocks is due to commence in 2022 for Plot C1 & C2 and 2026 for Plot D1 & D2. To provide a robust assessment, which assess peak construction phase traffic, 2022 and 2026 traffic data was used alongside 2019 emissions factors within the dispersion modelling.

6.89. Based on the information provided the Applicant, it is forecasted that the maximum number of vehicles travelling to the site during the construction phase is 90 AADT (77.8% HGV) during the Peak Bulk digging phase of the development. During the Steady state phase of the development (Frame construction, façade and fit out) the number of construction vehicles is set to reduce to a maximum of 28 AADT (28.6% HGV) per day. Subsequently based on the anticipated AADT, a dispersion modelling assessment was undertaken in accordance with the EPUK and IAQM guidance to quantify potential changes in pollutant concentrations at sensitive locations.

6.90. Predicted impacts on annual mean NO2 concentrations as a result of construction phase exhaust emissions were predicted to be negligible at 19 sensitive receptor locations and moderate adverse at one sensitive receptor within the vicinity of the site during the 2022 construction phase scenario. Impacts on PM10 and PM2.5 were predicted to be negligible at all 20 sensitive receptor locations considered.

6.91. During the 2026 construction phase scenario, impacts on annual mean NO2 and PM concentrations were predicted to me negligible at all 20 sensitive receptor locations considered.

6.92. HGV movements during the construction phase have been assessed using worse case peak movements. It should be noted that daily HGV movements will significantly reduce during the frame construction, façade and fit with peak movements only present during 2022 and 2026.

6.93. Given their transient and short-term presence and minor adverse impact upon the network associated impact significance can therefore be considered not significant with regard to long-term pollutant concentrations.

6.94. As such, the overall significance of potential impacts was determined to be not significant in accordance with the EPUK and IAQM guidance. The use of robust assumptions, in the form of worse-case road vehicle emission factors, was considered to provide sufficient results confidence for an assessment of this nature.

6.95. Full assessment results and commentary can be found in Appendix 6.4.

Operational Phase Traffic Generation (2026 First Occupation Year)

Annual Mean Nitrogen Dioxide -NO_2

6.96. Annual mean NO_2 concentrations were predicted at sensitive uses across the Site for DS scenarios at the following building heights to represent exposure in 2026 across the ground to first floor levels of the Proposed Development:

- Ground Floor Level 00 (1.5m).
- First Floor Level 01 (5.7m).

- Second Floor Level 02 (8.6m); and
- Third Floor Level 03 (12.9m)
- Fourth Floor Level 04 (17.7m)

6.97. Reference should be made to Figures 6.7 to 6.10 within Appendix 6.2 for a graphical representation of contour plots for the predicted 2026 annual mean concentrations. Floor heights provided by the architect provide an accurate representation of pollutant exposure across each assessed floor level.

6.98. Background NO_2, PM_{10} and $PM_{2.5}$ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above fourth floor level has not been assessed further.

Predicted Annual Mean Concentrations at the Development Site

6.99. Predicted annual mean NO_2 concentrations across sensitive uses within the Site for the 2026 DS scenario are summarised in

Table 6.14 – Predicted Annual Mean NO_2 Concentrations

Floor Level (m)	Predicted Annual Mean NO2 Concentration Range (µg/m3)			
	Phase C		Phase D	
	C1	C2	D1	D2
Ground Floor (1.5m)	27.34 – 28.64	29.99 – 37.06	32.97 – 36.08	39.32 – **54.12**
First Floor (5.7m)	26.85 – 27.82	28.89 – 33.27	31.27 – 33.37	36.68 – **42.77**
Second Floor (8.6m)	26.25 – 26.93	27.78 – 30.19	29.84 – 31.50	33.33 – 35.52
Third Floor (12.9m)	25.15 - 25.79	26.10 – 27.10	27.53 – 28.42	28.86 – 29.18
Fourth Floor (17.7m)	24.12 – 24.59	24.74 – 25.21	25.61 – 25.94	25.47 – 25.93

6.100. As indicated in Table 6.14 predicted NO_2 concentrations did exceed the annual mean AQO at ground and first floor level of Plot D2. Based on the results of the dispersion modelling and areas of exceedance (see Figures 6.6 to 6.8) there is not a requirement to implement additional mitigation measures at either building to safeguard future occupants. Annual mean NO_2 concentrations above the relevant AQO are crucially only present at non-sensitive uses. Such areas include car parking, substation and generator rooms as well as refuge and cycle stores.

6.101. Critically, annual mean NO_2 concentration across sensitive residential use (fourth floor) of Plots C and D are predicted to be below the relevant AQO and thus deemed acceptable.

6.102. Predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. LAQM. (TG16) states if annual mean NO_2 concentrations are below 60µg/m^3 then it is unlikely that the 1-hour AQO will be exceeded. Based on the results in Table 6.14, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

6.103. Based on the results of the dispersion modelling assessment, the site is suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated annual mean NO_2 concentrations.

Predicted Annual Mean concentrations at Sensitive Receptors

6.104. Annual mean NO_2 concentrations were predicted at existing off-Site sensitive receptors to assess the impact of the Proposed Development on the surrounding environment. Analysis for the DM and DS scenarios are summarised in Table 6.15. Exceedances of the relevant AQO are highlighted in **bold.**

Table 6.15 – Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration Range (m3/m3)		
		DM	DS	Change
R1	Residential - One Regent	**40.79**	**40.94**	0.15
R2	Residential - One Regent	38.38	38.53	0.15
R3	Residential - Miranda Court	**45.74**	**45.87**	0.13
R4	Residential - St Bartholomew's Drive	34.67	34.76	0.09
R5	Residential - Regent Plaza	**43.48**	**43.60**	0.12
R6	Residential - Regent Plaza	39.38	39.49	0.11
R7	Residential - Egerton Street	**48.68**	**48.76**	0.08
R8	Residential - Egerton Street	38.01	38.06	0.05
R9	Residential - Egerton Street	39.29	39.38	0.09
R10	Residential - Egerton Street	34.18	34.24	0.06
R11	Residential - Egerton Street	29.64	29.69	0.05
R12	Residential - Chester Road	39.59	39.62	0.03
R13	Commercial - Egerton Street	**51.74**	**51.91**	0.17
R14	Commercial - Egerton Street	**46.97**	**47.11**	0.14
R15	Residential -Wilburn Basin	31.60	31.73	0.13
R16	Residential - New Bailey Plot A3	31.18	31.29	0.11
R17	Residential – City Point	36.06	36.13	0.07
R18	Residential – Trinity Edge	**44.05**	**44.17**	0.12
R19	Residential - The Filaments	**46.07**	**46.24**	0.17
R20	Residential – Chapel Street	32.47	32.57	0.10

6.105. As indicated in Table 6.15, predicted annual mean NO_2 concentrations exceeded the relevant AQO at 8 sensitive receptor locations during both the DM and DS scenarios. This is likely due to their roadside locations within an AQMA, at areas within close proximity to arterial junctions where slow speeds and idling vehicles are often present, particularly during peak hours.

6.106. No new exceedances of the AQO are anticipated to arise as a result of the Proposed Development. The remaining 12 receptor locations were predicted to experience NO_2 concentrations below the relevant AQO.

6.107. The significance of potential impacts is considered further in Table 6.16 and based on the criteria provided within Table 6.3.

Table 6.16 – Predicted Annual Mean NO_2 Impacts

Receptor		% Change Relative to AQO	Long Term Average	Significance of Impact
R1	Residential - One Regent	0.37	103-109% of AQO	Negligible
R2	Residential - One Regent	0.37	95-102% of AQO	Negligible
R3	Residential - Miranda Court	0.32	110+ of AQO	Negligible
R4	Residential - St Bartholomew's Drive	0.22	76-94% of AQO	Negligible
R5	Residential - Regent Plaza	0.30	110+ of AQO	Negligible
R6	Residential - Regent Plaza	0.27	95-102% of AQO	Negligible
R7	Residential - Egerton Street	0.20	110+ of AQO	Negligible
R8	Residential - Egerton Street	0.13	95-102% of AQO	Negligible
R9	Residential - Egerton Street	0.23	95-102% of AQO	Negligible
R10	Residential - Egerton Street	0.15	76-94% of AQO	Negligible
R11	Residential - Egerton Street	0.13	75% or Less of AQO	Negligible

Receptor		% Change Relative to AQO	Long Term Average	Significance of Impact
R12	Residential - Chester Road	0.07	95-102% of AQO	Negligible
R13	Commercial - Egerton Street	0.42	110+ of AQO	Negligible
R14	Commercial - Egerton Street	0.35	110+ of AQO	Negligible
R15	Residential -Wilburn Basin	0.32	76-94% of AQO	Negligible
R16	Residential - New Bailey Plot A3	0.27	76-94% of AQO	Negligible
R17	Residential – City Point	0.18	76-94% of AQO	Negligible
R18	Residential – Trinity Edge	0.30	110+ of AQO	Negligible
R19	Residential - The Filaments	0.43	110+ of AQO	Negligible
R20	Residential – Chapel Street	0.25	76-94% of AQO	Negligible

6.108. As indicated in Table 6.16 impacts on annual mean NO_2 concentrations as a result of road vehicle exhaust emissions associated with the Proposed Development are predicted to be negligible at 36 sensitive receptor locations, minor adverse at 1 location and moderate adverse at 2 sensitive receptor locations.

Annual Mean Particulate Matter -PM_{10}

Predicted Annual Mean Concentrations at the Development Site

6.109. Predicted annual mean PM_{10} concentrations across sensitive uses within the Site for the 2026 DS scenario are summarised in Table 6.17.

Table 6.17 – Predicted Annual Mean PM_{10} Concentrations

Floor Level (m)	Predicted Annual Mean PM_{10} Concentration Range (µg/m3)			
	Phase C		Phase D	
	C1	C2	D1	D2
Ground Floor (1.5m)	14.45 – 14.66	14.85 – 16.03	15.28 – 15.94	16.26 – 18.62

6.110. As indicated in Table 6.17 predicted PM10 concentrations do not exceed the annual mean AQO across the ground floor level of either Buildings within Phase C or Phase D.

6.111. Based on the results of the dispersion modelling assessment, the site is suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated annual mean PM_{10} concentrations.

Predicted Annual Mean concentrations at Sensitive Receptors

6.112. Predicted annual mean PM_{10} concentrations for the DM and DS scenarios are summarised in Table 6.18

Table 6.18 – Predicted Annual Mean PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration Range (m3/m3)		
		DM	DS	Change
R1	Residential - One Regent	16.66	16.69	0.03
R2	Residential - One Regent	16.08	16.10	0.02
R3	Residential - Miranda Court	17.28	17.30	0.02
R4	Residential - St Bartholomew's Drive	15.56	15.58	0.02
R5	Residential - Regent Plaza	16.74	16.76	0.02
R6	Residential - Regent Plaza	16.41	16.43	0.02
R7	Residential - Egerton Street	18.59	18.61	0.02
R8	Residential - Egerton Street	16.51	16.52	0.01
R9	Residential - Egerton Street	17.12	17.14	0.02

Receptor		Predicted Annual Mean PM_{10} Concentration Range (m3/m3)		
		DM	DS	Change
R10	Residential - Egerton Street	15.97	15.98	0.01
R11	Residential - Egerton Street	15.12	15.13	0.01
R12	Residential - Chester Road	16.45	16.46	0.01
R13	Commercial - Egerton Street	20.57	20.61	0.04
R14	Commercial - Egerton Street	19.27	19.31	0.04
R15	Residential -Wilburn Basin	15.21	15.23	0.02
R16	Residential - New Bailey Plot A3	14.25	14.27	0.02
R17	Residential – City Point	14.83	14.84	0.01
R18	Residential – Trinity Edge	16.44	16.46	0.02
R19	Residential - The Filaments	16.25	16.28	0.03
R20	Residential – Chapel Street	14.40	14.41	0.01

6.113. As indicated in Table 6.18 , predicted annual mean PM_{10} concentrations do not exceeded the relevant AQO at any sensitive receptor locations, in both the DM and DS scenarios.

6.114. The significance of potential impacts is considered further in Table 6.19.

Table 6.19 – Predicted Annual Mean PM_{10} Impacts

Receptor		% Change Relative to AQO	Long Term Average	Significance of Impact
R1	Residential - One Regent	0.08	75% or Less of AQO	Negligible
R2	Residential - One Regent	0.05	75% or Less of AQO	Negligible
R3	Residential - Miranda Court	0.05	75% or Less of AQO	Negligible
R4	Residential - St Bartholomew's Drive	0.05	75% or Less of AQO	Negligible
R5	Residential - Regent Plaza	0.05	75% or Less of AQO	Negligible
R6	Residential - Regent Plaza	0.05	75% or Less of AQO	Negligible
R7	Residential - Egerton Street	0.05	75% or Less of AQO	Negligible
R8	Residential - Egerton Street	0.02	75% or Less of AQO	Negligible
R9	Residential - Egerton Street	0.05	75% or Less of AQO	Negligible
R10	Residential - Egerton Street	0.02	75% or Less of AQO	Negligible
R11	Residential - Egerton Street	0.03	75% or Less of AQO	Negligible
R12	Residential - Chester Road	0.03	75% or Less of AQO	Negligible
R13	Commercial - Egerton Street	0.10	75% or Less of AQO	Negligible
R14	Commercial - Egerton Street	0.10	75% or Less of AQO	Negligible
R15	Residential -Wilburn Basin	0.05	75% or Less of AQO	Negligible
R16	Residential - New Bailey Plot A3	0.05	75% or Less of AQO	Negligible
R17	Residential – City Point	0.02	75% or Less of AQO	Negligible
R18	Residential – Trinity Edge	0.05	75% or Less of AQO	Negligible
R19	Residential - The Filaments	0.08	75% or Less of AQO	Negligible
R20	Residential – Chapel Street	0.02	75% or Less of AQO	Negligible

6.115. As indicated in Table 6.19 the significance of impacts on annual mean PM_{10} concentrations as a result of road vehicle exhaust emissions associated with the Proposed Development was predicted to be negligible at all sensitive receptor locations.

6.116. Based in the assessment results the overall impact significance upon annual mean PM_{10} concentrations as a result of the Proposed Development was determined to be not significant.

Annual Mean Particulate Matter -$PM_{2.5}$

Predicted Annual Mean Concentrations at the Development Site

6.117. Predicted annual mean $PM_{2.5}$ concentrations across sensitive uses within the Site for the 2026 DS scenario are summarised in Table 6.20.

Table 6.20 – Predicted Annual Mean $PM_{2.5}$ Concentrations

Floor Level (m)	Predicted Annual Mean $PM_{2.5}$ Concentration Range (µg/m3)			
	Phase C		Phase D	
	C1	C2	D1	D2
Ground Floor (1.5m)	9.30 – 9.38	9.54 – 10.24	9.81 – 10.16	10.50 – 11.76

6.118. As indicated in Table 6.20 predicted $PM_{2.5}$ concentrations do not exceed the annual mean AQO across the ground floor level of either Building within Phase C and phase D.

6.119. Based on the results of the dispersion modelling assessment, the site is suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated annual mean PM_{10} concentrations.

Predicted Annual Mean concentrations at Sensitive Receptors

6.120. Predicted annual mean $PM_{2.5}$ concentrations for the DM and DS scenarios are summarised in Table 6.21

Table 6.21 – Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration Range (m3/m3)		
		DM	DS	Change
R1	Residential - One Regent	10.63	10.64	0.01
R2	Residential - One Regent	10.29	10.30	0.01
R3	Residential - Miranda Court	11.01	11.03	0.02
R4	Residential - St Bartholomew's Drive	9.97	9.98	0.01
R5	Residential - Regent Plaza	10.70	10.71	0.01
R6	Residential - Regent Plaza	10.47	10.49	0.02
R7	Residential - Egerton Street	11.74	11.75	0.01
R8	Residential - Egerton Street	10.51	10.52	0.01
R9	Residential - Egerton Street	10.85	10.86	0.01
R10	Residential - Egerton Street	10.18	10.19	0.01
R11	Residential - Egerton Street	9.68	9.69	0.01
R12	Residential - Chester Road	10.50	10.50	0.00
R13	Commercial - Egerton Street	12.83	12.85	0.02
R14	Commercial - Egerton Street	12.08	12.10	0.02
R15	Residential -Wilburn Basin	9.75	9.76	0.01
R16	Residential - New Bailey Plot A3	9.26	9.27	0.01
R17	Residential – City Point	9.52	9.53	0.01
R18	Residential – Trinity Edge	10.47	10.48	0.01
R19	Residential - The Filaments	10.40	10.41	0.01
R20	Residential – Chapel Street	9.36	9.37	0.01

6.121. As indicated in Table 6.21 predicted annual mean $PM_{2.5}$ concentrations do not exceed the relevant AQO at any sensitive receptor locations, in both the DM and DS scenarios.

6.122. The significance of potential impacts is considered further in Table 6.22.

Table 6.22 – Predicted Annual Mean $PM_{2.5}$ Impacts

Receptor		% Change Relative to AQO	Long Term Average	Significance of Impact
R1	Residential - One Regent	0.04	75% or Less of AQO	Negligible
R2	Residential - One Regent	0.04	75% or Less of AQO	Negligible
R3	Residential - Miranda Court	0.08	75% or Less of AQO	Negligible
R4	Residential - St Bartholomew's Drive	0.04	75% or Less of AQO	Negligible
R5	Residential - Regent Plaza	0.04	75% or Less of AQO	Negligible
R6	Residential - Regent Plaza	0.08	75% or Less of AQO	Negligible
R7	Residential - Egerton Street	0.04	75% or Less of AQO	Negligible
R8	Residential - Egerton Street	0.04	75% or Less of AQO	Negligible
R9	Residential - Egerton Street	0.04	75% or Less of AQO	Negligible
R10	Residential - Egerton Street	0.04	75% or Less of AQO	Negligible
R11	Residential - Egerton Street	0.04	75% or Less of AQO	Negligible
R12	Residential - Chester Road	0.00	75% or Less of AQO	Negligible
R13	Commercial - Egerton Street	0.08	75% or Less of AQO	Negligible
R14	Commercial - Egerton Street	0.08	75% or Less of AQO	Negligible
R15	Residential -Wilburn Basin	0.04	75% or Less of AQO	Negligible
R16	Residential - New Bailey Plot A3	0.04	75% or Less of AQO	Negligible
R17	Residential – City Point	0.04	75% or Less of AQO	Negligible
R18	Residential – Trinity Edge	0.04	75% or Less of AQO	Negligible
R19	Residential - The Filaments	0.04	75% or Less of AQO	Negligible
R20	Residential – Chapel Street	0.04	75% or Less of AQO	Negligible

6.123. As indicated in Table 6.19 the significance of impacts on annual mean $PM_{2.5}$ concentrations as a result of road vehicle exhaust emissions associated with the Proposed Development was predicted to be negligible at all sensitive receptor locations.

6.124. Based in the assessment results the overall impact significance upon annual mean PM2.5 concentrations as a result of the Proposed Development was determined to be not significant.

Operational Phase Traffic Generation (2031 Completion Year)

6.125. Predicted NO_2 concentrations exceeded the annual mean AQO at ground and first floor level of Plot D2. Critically annual mean these areas of exceedances are only present at non-sensitive uses. Annual mean PM concentrations were below the AQO across the development and therefore is not a requirement to implement additional mitigation measures at across either site to safeguard future occupants.

6.126. Predicted impacts on annual mean NO2, PM10 and PM2.5 concentrations as a result of construction phase exhaust emissions were predicted to be negligible at all 20 sensitive receptor locations within the vicinity of the site.

6.127. There were new exceedances of the annual mean AQO for NO2 at one isolated sensitive receptor location on Regent Road (R6) when using 2019 emission factors. Concentration levels at this receptor location are predicted to be marginal at the AQO within the DM scenario (0.02µg/m3) and exceeded the AQO in the future year scenario.

6.128. Associated impacts were also based on worst case sensitivity analysis in the form of emission factors. The use of 2031 operational traffic data, together with 2019 emission factors does not consider future improvements (due to the current shift towards a greater production and uptake low emission vehicles) and significantly overestimate actual pollutant concentrations within the modelling domain.

6.129. Therefore, a sufficient level of confidence can be placed within the predicted emission levels and conclusions regarding impact significance.

6.130. Full assessment results and commentary can be found in Appendix 6.5.

Sensitivity Analysis

6.131. Predicted impacts on annual mean pollutant concentrations as a result of the operational phase exhaust emissions using 2026 traffic data and 2026 emission factors were predicted to be negligible at all 20 sensitive receptor locations. As such, the overall significance of potential impacts for this scenario was determined to be not significant in accordance with the EPUK and IAQM guidance.

6.132. Predicted impacts on annual mean pollutant concentrations as a result of operational phase exhaust emissions using 2031 traffic data and 2030 emission factors (maximum EFT output) were predicted to be negligible at all 20 sensitive receptor locations. As such, the overall significance of potential impacts for this scenario was determined to be **not significant** in accordance with the EPUK and IAQM guidance.

6.133. Full assessment results and commentary can be found in Appendix 6.5.

Impact Significance

6.134. The overall significance of operational phase road traffic emission impacts was determined as **negligible.** This was based on the predicted impacts at discrete receptor locations and the considerations outlined in the assessment methodology detailed in Table 6.3. Further justification is provided in Table 6.23.

Table 6.23 – Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Number of properties affected by minor, moderate or major air quality impacts and a judgement on the overall balance	Impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be negligible at all 20 sensitive receptors considered.
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The proposed development results in no new exposure to annual mean NO_2 pollutant concentrations above the AQOs. All exceedances of the annual mean are present in the DM scenario and are not a result of the Proposed Development.
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentrations relative to the annual mean AQO for NO_2 was predicted to range between 0.03% and 0.43%. Resultant impacts were therefore described as **negligible** at all sensitive receptor locations in accordance with the EPUK and IAQM criteria. The change in concentrations relative to the AQO for PM_{10} and $PM_{2.5}$ was predicted to range from <0.01% to 0.10%. Resultant impacts were therefore described as **negligible** at all sensitive receptors considered.
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a major increase or decrease	There were exceedances of the AQOs for NO_2 at 8 sensitive receptor locations within the modelling extents for the 2026 DM and DS scenarios. Critically, all AQO exceedances were predicted during both the DM and DS and therefore no new exposure above the AQO are accounted to the operation of the Proposed Development. Within the 2031 scenario, there was one new exceedance at receptor location R6. R6 was marginal at the AQO in the DM (0.02µg/m3) and exceeded the AQO in the future year scenario. Having reached that conclusion, it should be noted that associated impacts were also based on worst case sensitivity analysis in the form of robust emission factor assumptions. The use of 2031 operational traffic data, together with 2019 emission factors does not consider future improvements, guided by the MCC AQAP,

Guidance	Comment
	and significantly overestimates future pollutant concentrations within the modelling domain. There were no exceedances of the relevant annual mean AQO at any receptor location whilst utilising future year emissions scenarios. Conversely, there were no predicted exceedances of the annual mean AQO for PM_{10} or $PM_{2.5}$ at any location within the modelling extents.
The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m3 should attract less significance than an annual mean of 51µg/m3	As stated above there were exceedances of the annual mean AQO for NO_2 at 8 sensitive locations, of which one location exceeded an annual mean concentration of 51µg/m3. The maximum exceedance was predicted at 51.91µg/m3 (R13). It should be noted that of the aforementioned receptor locations, all receptors were predicted to experience **negligible impacts** as a result of proposed development,

6.135. The overall magnitude of predicted impacts is judged to be of minor adverse significance in the context of this assessment, prior to mitigation measures being implemented.

Mitigation Measures

6.136. There are a number of air quality mitigation options available to ensure suitable reductions to air quality impacts as a result of the Proposed Development. Additionally, mitigation measures are required to protect existing receptor location as a result of fugitive dust emissions and road vehicle exhaust emissions generated by the construction and operational phase of the Proposed Development. Measures relevant to the operational and construction of the Site are outlined in the following Sections.

Construction Phase Assessment

6.137. The IAQM guidance provides a number of potential mitigation measures to reduce potential impacts from the construction phase. The Site has been classified as a high risk in regard to the potential of dust soiling and low risk in regard to human health resulting from construction phase activities. Mitigation measures have therefore been adapted for the Site and summarised in Table 6.24 . It will be required to review these measures prior to the commencement of construction works and incorporated into existing strategies.

Table 6.24 – Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary • Develop and implement a stakeholder communications plan that includes community engagement • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	• Record all dusty and air quality complaints • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation • Hold regular liaison meetings with other high-risk construction sites that are within 500m of the site boundary. Ensuring plans are co-ordinated and dust and particulate matter emission are minimised • Make complaints log available to LA when asked
Monitoring	• Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the LA when asked • Carry out regular site inspections to monitor compliance with the DMP

Guidance	Comment
	• Increase frequency of site inspections when activities with a high potential to produce dust are being carried out • Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority.
Preparing and Maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors • Erect solid screens or barriers around dust 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 as actives for an extensive period • Avoid site runoff of water or mud • Use water as dust suppressant where applicable • 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 • Cover, seed or fence stockpiles to prevent wind whipping
Operating Vehicle/ Machinery and Sustainable Travel	• All vehicles to switch off engines - no idling vehicles • Avoid the use of diesel or petrol-powered generators where practicable • Impose a signpost a maximum-speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas • Produce a Construction Logistics Plan to manage sustainable deliveries
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation • Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation • Use enclosed chutes, conveyors and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
Waste Management	• No bonfires or burning of waste materials
Earthworks	• Re-vegetate earthworks and exposed areas • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate • Only remove the cover in small areas during work and not all at once
Construction	• Avoid scabbling • Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process • Ensure bulk cement and other fine powder materials are delivered and stored to prevent escape • For smaller supplies of fine powder ensure bags are sealed after use and stored appropriately to prevent dust
Trackout	• Use water-assisted dust sweeper on the access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials • Inspect on-site haul routes for integrity, instigate necessary repairs and record in site log book • Record all inspections of haul route and any subsequent action in a site log book • Install hard surfaced haul routes which are regularly damped down with fixed or mobile sprinkler systems, or mobile bowsers and regularly cleaned • Implement a wheel washing system at a suitable location near site exit • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits • Access gates to be located at least 10m from receptors, where possible

6.138. Assuming the relevant mitigation measures outlined in Table 6.24 are implemented, the residual effect from all dust generating activities is predicted to be **negligible** and not significant in accordance with the IAQM guidance.

Operational Phase Assessment

Abatement Measures

6.139. Detailed dispersion modelling undertaken at heights equivalent to the proposed elevations and residential units above podium level on first floor are not predicted to be exceed relevant annual mean AQO for NO2 or PM.

6.140. Subsequently, further measures aimed to reduce annual mean NO2 across the Proposed Development are not required.

Operational Phase Offsetting Measures

6.141. Although associated operational impacts have been deemed of minor adverse significance the Proposed Development will implement a comprehensive mitigation strategy to offset additional road vehicle exhaust emissions.

6.142. Given there is still a requirement to secure a reduction in pollution concentrations associated with road vehicle exhaust emissions. The offsetting measures are therefore proposed and will be implemented within the design of the Proposed Development:

- 556 parking spaces with up to 20% demand-led Electric Vehicle Charge (EVC) provision (7kw each). Spaces will be future proofed with containment channels that enable cable connections to be installed as and when required.
- 1,950 Private Cycle Parking Spaces and 58 visitor Sheffield stands.

6.143. It is considered that the above measures are proportional to the nature and scale of the Proposed Development and will secure a reduction in development associated road vehicle exhaust emissions.

6.144. Furthermore, the significant offsetting investments will future proof the scheme and reduce associated impacts over time with the increased uptake of low emission vehicles. The residual effect from additional road vehicle exhaust emissions is predicted to be **negligible** and not significant in accordance with the IAQM guidance

Cumulative Effects

6.145. Cumulative effects are defined as those that occur as a result of current and future activities that may impact collectively over time. Cumulative effects on air quality at the Proposed Development are outlined in the following Sections. These sections consider the effect of the Proposed Development in conjunction with traffic associated with the identified committed developments listed in Appendix 2.2.

Construction Phase

6.146. A review of the MCC planning portal indicated there are a number of planning applications within 350m of the Proposed Development, as listed in Appendix 2.1. As such, there is a likelihood for cumulative effects should the construction phases of the committed development's overlap.

6.147. However, the implementation of the mitigation measures suggested in Table 6.24 will ensure that any cumulative effects will ensure that concurrent Construction Phase impacts are negligible on a temporary basis and therefore construction phase impacts are considered not significant. It is also assumed that adjacent site will be adhering to Dust Management Plans to control fugitive dust emission from construction activities.

Operational Phase

6.148. The assessment has considered the effect of the Proposed Development in conjunction the identified committed developments with Appendix 2.1. Associated traffic generation from the appropriate and

available applications were factored into the modelled traffic data to consider the combined risk of committed developments and the Proposed Development.

6.149. The future year 2026 DM and DS scenario traffic flows as provided by Curtains, the appointed Transport Consultant for the scheme.

Residual Effects

6.150. Residual effects are defined as those that remain following the implementation of mitigation. Effects on air quality for the Proposed Development are outlined in the following Sections.

Construction Phase

6.151. Assuming the relevant mitigation measures outline in Table 6.24 are implemented, the residual effect from all dust generation activities is predicted to be negligible.

Operational Phase

6.152. Predicted impacts on referenced pollutant species as a result of the operational phase were predicted to be minor adverse at 8 sensitive receptor locations.

6.153. When considering the high level of offsetting measure provided in Section 6.142 the residual effects resulting from development generated road vehicle exhaust emissions are predicted to be not significant.

6.154. Additionally, assuming a suitable uptake of low emission vehicles and sustainable transport methods supported by government strategies and the MCC AQAP permanent impacts would therefore be considered as not significant in light of significant offsetting measures proposed within the design of the Proposed Development.

Table 6.25– Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

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				
The IAQM guidance does not recommend determining pre-mitigation effects	Construction Phase Fugitive Dust Emissions Dust Soiling and Human Health	Table 6.24: The Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	.Such measures will be included with in a Construction Phase Environmental Management Plan(CEMP).	Negligible dust impacts to property and people on a temporary basis
	Existing Residential and Educational Use	Sustainable construction phase travel plan to reduce HGV movements during construction		Minor Adverse impacts upon existing sensitive uses on a temporary basis
Operational Phase				
Negligble to Minor Adverse	Existing Baseline Road Vehicle Traffic Exhaust Emissions	Not required	Not required.	Negligible exposure to elevated pollutant concentrations on a permanent basis
	Proposed Residential Use	Best practice measures	Section 6.123 to 6.126: Proposed Development will consider a significant level of offsetting measures in the form of sustainable transport principles. The provision of EVC charging facilities (10% provision) as well as cycle parking facilities	Negligible impact upon existing sensitive uses on a permanent basis

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
			(100% provision) will secure a suitable reduction in development related road vehicle exhaust emissions	

Reference List

6.155. This ES Chapter has been prepared by reference to the following:

- Department for Environment, Food and Rural Affairs (DEFRA) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.
- Department for Environment, Food and Rural Affairs (DEFRA) (2021) Local Air Quality Management Technical Guidance 2016 LAQM.TG(16).
- England Directive 2008/50/EC (2016) The Air Quality Standards (Amendment) Regulations.
- Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) (2017) Land-Use Planning and Development Control: Planning for Air Quality.
- Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction.
- Ministry of Housing, Communities & Local Government (2019), The National Planning Guidance (NPPG).
- Ministry of Housing, Communities & Local Government (2021) The National Planning Policy Framework (NPPF).
- Greater Manchester Air Quality Annual Status Report (2019), Greater Manchester Combined Authority (GMCA)
- Manchester City Council Local Plan

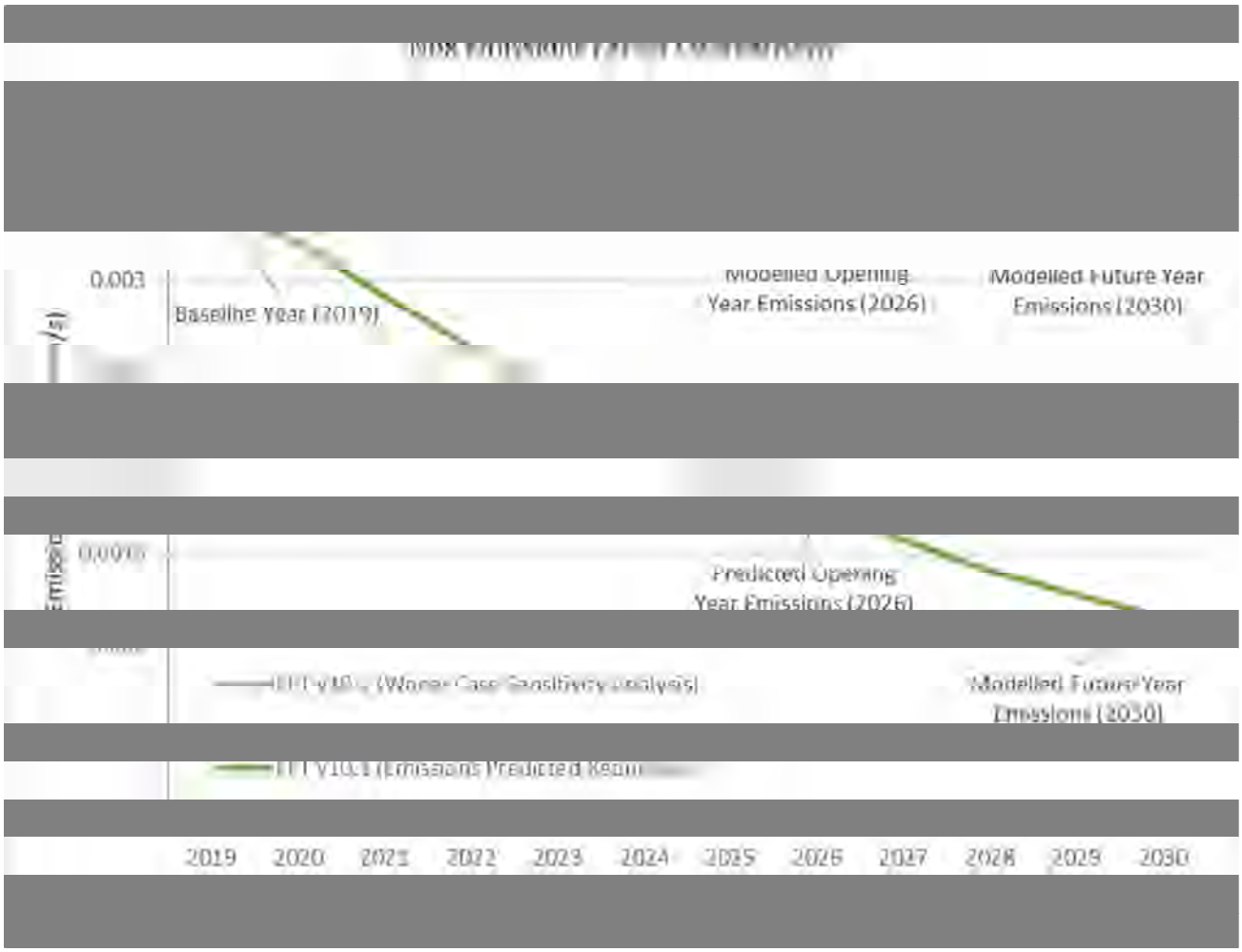


	Figure:	6.1		
	Title:	NOx Emission Factor Comparisons		
	Project:	Trinity Islands		
	Date:	December 2021	Scale:	NTS

7. Climate Change

Introduction

7.1. This section reports the impacts of the Proposed Development on the climate by providing an assessment of GHG emissions, that concludes on the significance of the Proposed Development in terms of climate change.

7.2. The section describes the assessment methodology and the baseline conditions relevant to the assessment. It includes a summary of the likely significant effects leading to the additional mitigation measures required to avoid, prevent, reduce or, if possible, offset any likely significant adverse effects, and the likely residual effects and any required monitoring after these measures have been employed.

7.3. This section (and its associated figures) should be read as part of the wider ES.

7.4. This report has been prepared by members of the WSP Sustainability & Climate Change Team who have been responsible for undertaking the assessments reported, contributing to the information described and for compiling the document. Table 7. 1 provides details of the experts who have contributed.

Table 7. 1- Competent Expert Evidence

Name	Competent Expert Evidence
Yanis Savvopoulos (Technical Reviewer)	• Masters in Architecture • MSc Environmental Design & Engineering, Accredited Energy and Carbon Assessor by CIBSE (LCC, LCEA) • MCIBSE, CEng, ARB • 7 years of experience
Danae Petrou (GHG Author)	• Masters in Architecture • MSc Environmental Design & Engineering • ARB, LEED GA, WELL AP • 2 years of experience

Legislative Framework, Policy and Guidance

Legislative Framework

7.5. The applicable legislative framework comprises:

- Climate Change Act 2008 (2050 Target Amendment) Order 2019: introduce a net zero target for at least 100% reduction in GHG emissions (compared to 1990 levels) in the UK by 2050[3];
- Planning and Energy Act 2008[4];
- The Carbon Plan: Delivering our Low Carbon Future, 2011[5];
- UK Climate Change Risk Assessment, 2017[6];
- Carbon Budgets, 2016[7]; and

[3] HM Government, Climate Change Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/27/introduction
[4] HM Government, Planning and Energy Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/21/introduction
[5] DECC (2011). The Carbon Plan: Delivering our Low Carbon Future. Available at: https://www.ukgbc.org/sites/default/files/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf
[6] HM Government (2017). UK Climate Change Risk Assessment 2017. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf
[7] HM Government, 2016. The Carbon Budgets Order 2016

- Building Regulations 2010, Approved Document L1A: conservation of fuel and power in new dwellings, 2013 edition with 2016 amendments[8].

Planning Policy

7.6. The following policy documents have been considered in defining the scope and focus of the assessment presented in this report:

- National Planning Policy Framework - NPPF (2021): The NPPF 2021 sets out the Governments planning policies for England and how these are to be applied. Guidance relating to the reduction of greenhouse gases is mainly set out in Section 14 "Meeting the Challenge of Climate Change, Flooding and Coastal Change". Within paragraph eight, the document confirms that the purpose of the planning system is to contribute to the achievement of sustainable development, which includes economic, social and environmental dimensions. "[9]; and
- Great Manchester Combined Authority (GMCA) Climate Emergency Declaration in July 2019, aiming to achieve carbon neutrality by 2038[10].

Guidance

7.7. The following guidance documents have been used during the preparation of this Report:

- Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA)11;
- RIBA 2030 Climate Challenge (version 2-2021)12; and
- National Planning Practice Guidance on Climate Change[13].

Assumptions and Limitations

7.8. The construction phase is assumed to be between 2022 and 2026. In reality, the construction of Phase 1 (Towers C1 & C2 with residents car park and public realm) is estimated to take 4 ½ years (commencing in March 2022 and completing in September 2026) and the construction of Phase 2 (Towers D1 & D2 with Residents car park and Public Realm) is estimated to take 4 ½ years (commencing in September 2026 and completing in March 2031). The common 5-year period (2022-2026) used for this assessment provides a worst-case and reduces the complexity of assessment. On the same time the results of the assessment aren't impacted as the effects during the construction aren't related to any changing trends whose effect changes over the years.

7.9. The operational phase of the development is assumed to start on 2027. In reality, the operational phase will start later in 2031, but this isn't expected to have a significant impact on the results. Since the expected lifespan of this development for this assessment has been assumed to be 60 years, then the operational part of the assessment covers the period 2027-2086.

7.10. It should be noted that within the 2027-2086 period, the first three decades up to 2050 the most critical ones regarding their impact on climate. This is because in June 2019 parliament passed legislation requiring the government to reduce the UK's net emissions of greenhouse gases by 100% relative to 1990 levels by 2050. Doing so would make the UK a 'net zero' emitter. Prior to this, the UK was committed to reducing net greenhouse gas emissions by at least 80% of their 1990 levels, also by 2050.

[8] HM Government, 2016. The Building Regulations 2010, Approved Document L1A: conservation of fuel and power in new dwellings, 2013 edition with 2016 amendments. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/540326/BR_PDF_AD L1A 2013_with_2016_amendments.pdf

[9] Ministry of Housing, Communities & Local Government (2021). National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

[10] https://www.greatermanchester-ca.gov.uk/news/combined-authority-declares-climate-emergency/

[11] Institute of Environmental Management and Assessment (2017). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

[12] Royal Institute of British Architects, 2021. RIBA 2030 Climate Challenge. Available at: https://www.architecture.com/-/media/files/Climate-action/RIBA-2030-Climate-Challenge.pdf

[13] Department for Communities and Local Government. National Planning Practice Guidance. Available at: https://www.gov.uk/government/collections/planningpractice-guidance

7.11. Regarding embodied carbon calculations, it should be noted that this is a planning stage estimate utilising estimated quantities and generic material data for the proposed development, that would produce a conservative setoff results that would be expected to improve with more detailed information during the later design stages

7.12. Regarding operational building emissions, the RIBA targets that are used for benchmarking include both regulated and unregulated loads. Regarding the regulated energy consumption, data has been derived from the Energy Statement provided by Element Sustainability. For the assessment of the unregulated energy loads, the findings of the "Embodied and whole life carbon assessment for architects" report by Sturgis S. and RIBA (2019) [14], according to which unregulated building emissions are 22.5% of the regulated building emissions. This finding is also referenced in the RIBA Sustainable Outcomes Guide 2019[15]. It should be noted that the unregulated carbon emissions can be highly unpredictable, as they depend on the future tenants of the residential units.

7.13. The assessment of the operational building emissions takes into consideration the national grid decarbonisation which will largely take place between today and 2050. This is because the proposed development has followed an all-electric approach so it will be in a position to benefit from the decarbonisation of the electricity and gradually reduce its operational building emissions over the years (although the energy consumption will remain the same). To account for this benefit and to present a conservative approach, the electricity emission factor used is the average of the electricity emission factors for the period 2027-2086, based on the emissions factors published by the government. [16]

7.14. Regarding the assessment of the operational transport carbon emissions, the on demand approach in EV charging infrastructure installation has been assessed as part of the additional mitigation measures. To assess the mitigation effect of this approach, the projections from Transport Assessment Guidance (TAG) Data Book[17] has been used. All EVs assumed to be Battery Electric Vehicles (BEV) for this assessment. The percentage of EV trips is changing every year according to these projections while slowly increasing. Therefore the EV trips per year are calculated and then the total EV trips in the period 2027-2086 is estimated. An annual average which incorporates this trend is used for the assessment of the annual transport emissions of the development. It should be noted that after 2050 (when UK's net emissions of greenhouse gases should be reduced by 100% relative to 1990 levels), the projections available on EV use are limited. Therefore, it has been assumed that the development's EV usage after 2050 are stable to 2050's levels, under the assumption that decarbonisation and electrification would be largely achieved by then.

7.15. No further analysis has been undertaken as to the long-term increases in vehicle efficiency and possible increase in autonomous vehicle use. These would likely reduce the total GHG emissions associated with the Proposed Development.

Methodology

7.16. This section of the report sets out the scope of the assessment.

7.17. The emissions sources, described as elements with their associated Lifecycle Stage during the Proposed Development's lifespan, have been identified using guidance from IEMA. Professional judgement has been used to determine which sources to scope in and out of further assessment, as outlined in Table 7. 2.

7.18. 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'.

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[14] Sturgis S. and RIBA, 2019. Embodied and whole life carbon assessment for architects. Online Available at: https://www.architecture.com/-/media/gathercontent/whole-life-carbon-assessment-for-architects/additional-documents/11241wholelifecarbonguidancev7pdf.pdf

[15] RIBA, 2019. RIBA Sustainable Outcomes Guide. Available at: https://www.architecture.com/-/media/GatherContent/Test-resources-page/Additional-Documents/RIBASustainableOutcomesGuide2019pdf.pdf (Accessed: 05/11/2021)

[16] The Grid Average consumption based carbon intensity figures for Domestic developments were used, as published by the UK government (https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal)

[17] Department of Transport, 2021. Transport Assessment Guidance (TAG) Data Book - July 2021, v.1.15. Table A 1.3.9. – Proportion of vehicle kilometres per fuel type. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007435/tag-data-book.xlsm (Accessed: 13/09/2021)

Table 7. 2 - Scope of the assessment

Element	Phase	Scoped In	Scoped Out	Justification
Product stage (manufacture and transport of raw materials to suppliers) A1-3	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 material to site have the potential to be large.
Plant and equipment use during construction A5	Construction	✓		Fuel / energy consumption of plant and equipment used during construction would generate GHG emissions.
Disposal of waste A5	Construction	✓		Emissions from the disposal of waste are unlikely to be large, due to a large proportion of construction waste being inert.
Replacement and refurbishment B2-5	Operation	✓		The replacement and refurbishment of the Proposed Development would release a potentially large magnitude of emissions.
Operational Energy Use B6	Operation	✓		In-use electricity emissions will be released on an annual basis due to the building use.
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.
Decommissioning process C1-C4	End of Life	✓		Any emissions arising 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.
In-use Emissions B1	Operation		✓	This is not considered to be a large emission source.
Maintenance B2-5	Operation		✓	Maintenance associated with the Proposed Development is not considered to be a large emissions source as only a small amount will be additional to the maintenance that already takes place within the region.
Repair B2-5	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	Construction		✓	Emissions from the disposal of biomass are not expected to be large.

Study Area

7.19. The GHG emissions assessment has not been restricted by geographical area but has instead included any increase or decrease in emissions as a result of the Proposed Development, wherever that may be. This includes:

- Construction emissions - from the Application Site footprint, but also related to the transport of materials to and from the Application Site and their manufacture (this may be distant from the Proposed Development location);
- Operational emissions - (increase or reduction) which result from the end-use of the Proposed Development and any shifts in transport modes/patterns which may occur. Such emissions include those for traffic using the Proposed Development as well as the surrounding regional road network to gain access; and
- Decommissioning process - Any emissions arising 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.
- Assessment Methodology

7.20. The assessment follows the emerging best practice. Current best practice is reflected in IEMA (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance[18]. 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.

7.21. In line with the guidance, this report sets out the methodological approach that has been taken to address GHG emissions associated with the Proposed Development. This means providing the assessment approach, calculating the baseline, determining the significance of each GHG emission source scoped into the assessment and setting out strategies for mitigation.

7.22. Existing sources of GHG emissions prior to construction and operation of the Proposed Development (i.e. without development) are identified to assess the current baseline. Sources of GHG emissions following the construction and during operation of the Proposed Development are then assessed, from which the significance, mitigation measures and residual effects are determined.

7.23. The environmental effects assessed are:

- Whole Life Embodied emissions: This includes embodied carbon emissions related to materials and construction process throughout the lifespan of the building, including upfront emissions during constructions, construction transport emissions, emissions from replacements/repairs during the operational phase and end-of-life emissions.
- Operational Building emissions (from energy use): This includes emission related to the energy consumption of the building, throughout its operational phase
- Operational Transport emissions: This includes emission related to the transport, throughout its operational phase

7.24. More details on these three assessed effects are provided below, organised per construction, operational and end-of-life phase.

7.25. In this regard the proposals asseses Scenario 8 only.

Construction Phase

7.26. The construction phase is assumed to be between 2022 and 2026.

7.27. As explained further in the assumptions and limitations section, in reality the construction of Phase 1 (Towers C1 & C2 with residents car park and public realm) is estimated to take 4 ½ years (commencing in March 2022 and completing in September 2026) and the construction of Phase 2 (Towers D1 & D2 with Residents car park and Public Realm) is estimated to take 4 ½ years (commencing in September 2026 and completing in March 2031). The common 5-year period (2022-2026) used for this assessment provides a worst-case and reduces the complexity of assessment. On the same time the results of the assessment aren't impacted as the effects during the construction aren't related to any changing trends whose effect changes over the years.

[18] IEMA (2017), Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance, Online Available at: https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf

Embodied Carbon Emissions

7.28. An assessment of the whole life embodied emissions has been undertaken.

7.29. The analysis has been carried out to align with the requirements of RICS Professional Statement "Whole Life Carbon Assessment for the Built Environment" (2017). The approach to the assessment covers the 'cradle to grave' stages of the building life cycle, including A1-3 Product stage, A4-5 Construction process stage, B1-5 Use stage and C1-4 End of life stage.

7.30. The LCA tool 'OneClickLCA' has been used to source carbon databases and perform LCA calculations. The OneClickLCA tool utilised is the 'Carbon assessment, RICS', while the materials were chosen from the associated database.

7.31. The building elements included in the scope of the assessment are aligned with the 'Embodied Carbon Target Alignment' work (2021) and RICS Professional Statement "Whole Life Carbon Assessment for the Built Environment" (2017). Elements 1-Substructure, 2-Superstructure and were assessed based on material quantities derived from the Revit models of the typical Renaker residential tower. The elements 3-Finishes, 4-FF&E, 5-Services and 8-External works were added as separate % allowances of the A1-5 and B-C embodied emissions, based on data from GLA's Whole Life Carbon (WLC) Guidance (Consultation version, Oct 2020). This is an acceptable approach for the concept design stage where such detailed material quantities and specifications are not yet available for all the in-scope building elements.

7.32. The assessment of the whole life embodied emissions has been undertaken for towers C1 and C2. The GHG results of the assessment were converted to GHG per GIA ($kgCO_{2e}/m^2$) and then multiplied with the GIA of the whole Proposed Development (incl. towers C1, C2, D1, D2) to populate the GHG results for the Proposed Development.

7.33. To assess the magnitude of impact for this effect, a comparison has been done with the RIBA targets for whole life embodied carbon (including construction, operation and end-of-life phase), as described in Table 7. 5.

Transport Emissions

7.34. The carbon emissions (CO_{2e}) associated with transportation used during the construction stage where calculated based on generic construction data for Renaker (as provided for the a typical Renaker development and adjusted to the size of the proposed development at Trinity Islands).

Operational Phase

7.35. The operational phase of the development is assumed to start on 2027, following the 2022-2026 construction phase. Since the expected lifespan of this development for this assessment has been assumed to be 60 years, then the operational part of the assessment covers the period 2027-2086.

7.36. The assessment of significance of the effects from operational building and transport emissions is undertaken on an annual basis. The results for the whole 60-year lifespan of the proposed development are also provided for the proposed development on a contextual basis.

Embodied Carbon Emissions

7.37. The same procedure has been followed as described above in paragraphs 7.28-**Error! Reference source not found.**7.32. The results refer to the replacement/refurbishment of building parts during use stage. The RICS19 assumptions on material and building component lifespans have been used for this assessment.

7.38. To assess the magnitude of impact for this effect, a comparison has been done with the RIBA targets for whole life embodied carbon (including construction, operation and end-of-life phase), as described in Table 7. 5.

Building Emissions

7.39. For the regulated carbon emissions from the new buildings during the operational stage, an Energy Strategy was prepared by Element Sustainability and it is included in the Environmental Standards Statement. The

[19] RICS 2017, Whole life carbon assessment for the built environment. Online Available at: https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the--built-environment-november-2017.pdf. Data from Table 9 – Indicative component lifespans have been derived.

embedded mitigation measures included as part of this strategy (fabric specification, building services etc.) are summarised in the mitigation section of this chapter.

7.40. The building energy use has been tested for compliance with both Part L (Conservation of Fuel and Power) of the Building Regulations 2010 (2013 edition with 2016 amendments) and the upcoming Part L 2021 (see Energy Statement). The first methodology uses SAP 2012 emission factors for electricity, while the second one uses the SAP 10.1 factors. In both methodologies, the effect of energy efficiency improvements and the low carbon technologies have been considered.

7.41. The unregulated carbon emissions can be highly unpredictable, as they depend on the future tenants of the residential units. For their assessment the findings of the "Embodied and whole life carbon assessment for architects" report by Sturgis S. and RIBA (2019)[20], according to which unregulated building emissions are 22.5% of the regulated building emissions. This finding is also referenced in the RIBA Sustainable Outcomes Guide 2019[21].

7.42. To assess the magnitude of impact for this effect, a comparison has been done with the RIBA targets for operational energy consumption (incl. both regulated and unregulated energy loads), as described in Table 7. 5. Since the target by RIBA is based on energy consumption and not on carbon emissions, for the purpose of this assessment the energy consumption figures deriving from DER results have been calculated to energy figures using SAP 10.1 factors.

7.43. Besides assessing the magnitude of impact of effects, it is also important to contextualise the operational building emissions over the proposed development's lifespan. As per IEMA *Guidance on Assessing GHG emissions and evaluating their significance*[22], it is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact, against sectoral, local or national carbon budgets. For this purpose, the operational emissions are estimated over the 60-year lifespan of the Proposed Development, starting from the opening year (2027) until 2086. The emissions factor used for this calculation takes into consideration the grid decarbonisation, because the development has followed an all-electric approach, using air-source heat pumps instead of gas boilers. The average electricity emissions factor for the period 2027-2086 has been calculated and used for this assessment, based on the predicted electricity emissions factors published by the government[23] (Table 7. 3).

[20] Sturgis S. and RIBA, 2019. Embodied and whole life carbon assessment for architects. Online Available at: https://www.architecture.com/-/media/gathercontent/whole-life-carbon-assessment-for-architects/additional-documents/11241wholelifecarbonguidancev7pdf.pdf

[21] RIBA, 2019. RIBA Sustainable Outcomes Guide. Available at: https://www.architecture.com/-/media/GatherContent/Test-resources-page/Additional-Documents/RIBASustainableOutcomesGuide2019pdf.pdf (Accessed: 05/11/2021)

[22] https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance

[23] The Grid Average consumption based carbon intensity figures for Domestic developments were used, as published by the UK government (https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal)

Table 7. 3 – Predicted electricity emissions factors over the period 2027-2086

Year	Electricity emissions factor (*kgCO2e/kWh*)	Year	Electricity emissions factor (*kgCO2e/kWh*)	Year	Electricity emissions factor (*kgCO2e/kWh*)
2027	0.076	**2047**	0.008	**2067**	0.007
2028	0.071	**2048**	0.008	**2068**	0.007
2029	0.066	**2049**	0.007	**2069**	0.007
2030	0.053	**2050**	0.007	**2070**	0.007
2031	0.042	**2051**	0.007	**2071**	0.007
2032	0.036	**2052**	0.007	**2072**	0.007
2033	0.031	**2053**	0.007	**2073**	0.007
2034	0.028	**2054**	0.007	**2074**	0.007
2035	0.025	**2055**	0.007	**2075**	0.007
2036	0.021	**2056**	0.007	**2076**	0.007
2037	0.019	**2057**	0.007	**2077**	0.007
2038	0.018	**2058**	0.007	**2078**	0.007
2039	0.017	**2059**	0.007	**2079**	0.007
2040	0.016	**2060**	0.007	**2080**	0.007
2041	0.013	**2061**	0.007	**2081**	0.007
2042	0.012	**2062**	0.007	**2082**	0.007
2043	0.012	**2063**	0.007	**2083**	0.007
2044	0.011	**2064**	0.007	**2084**	0.007
2045	0.010	**2065**	0.007	**2085**	0.007
2046	0.009	**2066**	0.007	**2086**	0.007
	Annual Average Electricity emissions factor 2027-2086 (*kgCO2e/kWh*)				**0.014**

7.44. The calculation of the operational building emissions for the proposed development over its lifespan is estimated with the purpose of contextualising and not with the purpose of assessing the magnitude of impact, as this is assessed based on the annual operational energy consumption targets from RIBA.

Transport Emissions

7.45. 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 current emissions factors for each key vehicle type. The data required where provided by Vectos, and they align with the Transport Assessment and Framework Travel Plan. The 2021 Defra emissions factor selected for each vehicle type represents the closest match. This is summarised in the table below.

Table 7. 4 - Transport Emissions Calculation Methodology

Metric	Unit	Personal Vehicle	Transport Mode
Total Distance (A)	km / year	A=CxD	A=BxD
Total Person Trips (B)	people trips / year	-	B
Total Vehicle Trips (C)	vehicle trips / year	C	-
Average Trip Length (D)	km / trip	D	D
Emissions Factor Value (E)	kg CO2e/km	E	E
Total (T)	kgCO2e	T = ExA	T = ExA

7.46. The use of electric vehicles has been assessed based on the traffic data on personal vehicles provided by Vectos and with the assumption that 10% of the total parking spaces will provide active EV charging infrastructure. Further details are included in the mitigation section of this chapter.

End of Life Phase

Embodied Carbon Emissions

7.47. The same procedure has been followed as described above in paragraphs 7.28-**Error! Reference source not found.**7.32. The results refer to the end of life of materials.

7.48. To assess the magnitude of impact for this effect, a comparison has been done with the RIBA targets for whole life embodied carbon (including construction, operation and end-of-life phase), as described in Table 7. 5.

Significance Criteria

Determining Significance Criteria

Sensitivity of receptor and Nature of impact

7.49. There are currently no agreed thresholds for what level of GHG emissions is considered significant in the context of the EIA Regulations. With regards to assigning significance, the IEMA guidance provides guidance on how to assess GHG emissions in EIA:

"When evaluating significance, all new GHG emissions contribute to a significant negative environmental effect; however, some projects will replace existing development that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impact, which may be positive or negative……

…. Whilst there is no single preferred method to evaluate significance, extensive research is being undertaken to explore significance, thresholds for GHG emission assessments, and science-based targets. "

7.50. Following the rationale of IEMA guidance above, the sensitivity of the receptor (which is the climate) is considered to be high and all effects are considered to be adverse.

Assessing the magnitude of impact

7.51. In the absence of being able to assign a magnitude of impact and therefore a significance level, IEMA further provides some guidance on contextualising a project's GHG emissions:

"Under the principle that all GHG emissions might be considered significant, and the ongoing research of how to actually measure significance, it is down to the practitioner's professional judgement on how best to contextualise a project's GHG impact.

Generating a project's carbon contribution, will enable the impact of your project, to be contextualised against sectoral, local or national carbon budgets. This will provide the practitioner and the Local Planning Authority with a sense of scale."

7.52. Therefore, to contextualise and assess the carbon emissions of the Proposed Development, these have been compared to:

- **Royal Institute of British Architects (RIBA) 2030 Climate Challenge** (Table 7. 5) targets – with the purpose to assess the magnitude of impact of the effects. This has been undertaken for the whole life embodied emission and operational emissions from energy.
- **Regional Transport Carbon Emission data** (Table 7. 6) – with the purpose to assess the magnitude of impact of the effects. In the absence of specific targets related to transport carbon emissions from new developments, the transport carbon emissions from the propose development have been compared with the regional transport carbon emissions.

7.53. The following paragraphs describe the significance criteria for determining the magnitude of impact:

7.54. The RIBA has developed targets[24] 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 (summarised in Table 7. 5) 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.

7.55. It is also important to highlight that the RIBA targets that are used for benchmarking include both regulated and unregulated loads. On the other hand, the energy figures from the proposed development include only the regulated energy consumption. Therefore, on the later design stages, the assessment should be revised to include both types of load to enable a better comparison with the RIBA targets.

Table 7. 5 - RIBA 2025 and 2030 targets

RIBA Sustainable Outcome Metrics	Business as Usual	2025 Targets	2030 Targets
Whole life Embodied Carbon (kgCO2e/m2)	1200	< 800	< 625
Operational Energy (kWh/m2/y)	120	< 60	< 35

7.56. A comparison with the RIBA 2030 target, 2025 target and Business-As-Usual benchmark has been undertaken with the purpose to assess the magnitude of impact of the whole life carbon emissions and the operational emissions from energy, as below:

- **Major magnitude of impact**: where the Proposed Development exceeds the "Business as Usual" for embodied carbon and operational energy performance respectively as defined by the RIBA guidance;
- **Moderate magnitude of impact**: where the Proposed Development meets the "Business as Usual" for embodied carbon and operational energy performance respectively as defined by the RIBA guidance;
- **Minor magnitude of impact:** where the Proposed Development meets the "2025 Targets" for embodied carbon and operational energy performance respectively as defined by the RIBA guidance; and
- **Negligible magnitude of impact**: where the Proposed Development meets the "2030 Targets" for the embodied carbon and operational energy performance respectively defined by the RIBA guidance;

7.57. The regional transport GHG emissions for Great Manchester have been quantified, as per national statistics (Table 7. 6)[25]. The operational transport emissions of the proposed development are contextualised by comparing with the regional transport GHG emissions to provide a sense of scale.

Table 7. 6 – Regional GHG Emissions, Manchester, 2016 (MtCO2e)

Manchester, 2016	GHG emissions (kt CO2)
Industry and Commercial (total)	857
Domestic (total)	645
Transport (total)	**676**
Grand total	2,178

7.58. In absence of relevant guidance and benchmarks and using the author's professional experience, all operational emissions from transport are considered to be of moderate magnitude of impact.

[24] We have been using the latest version of this targets: RIBA (2021). RIBA 2030 Climate Change Challenge – Version 2. Online Available at: https://www.architecture.com/-/media/files/Climate-action/RIBA-2030-Climate-Challenge.pdf

[25] https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2016

Assessing the significance of effects

7.59. The matrix to assess the significance of effects (which are the embodied, building and transport emissions) based on the sensitivity of receptor (which is high for climate) and the magnitude of impact (as explained above) is shown in Table 7. 7. Effects of Major and Major-Moderate significance are considered 'significant' in EIA terms. Effects of Moderate-Minor and Minor significance are considered 'not-significant' in EIA terms.

Table 7. 7 – Matrix to assess significance of effects, based on sensitivity of receptor and magnitude of impact of each effect

Magnitude of impact	Sensitivity High	Medium	Low
Major	Major	Major - Moderate	Moderate - Minor
Moderate	Major - Moderate	Moderate - Minor	Minor
Minor	Moderate - Minor	Minor	Minor - Negligible
Negligible	Minor	Minor - Negligible	Negligible

Contextualising against regional and national carbon budgets

7.60. Carbon budgets place restrictions on the amount of GHG emissions the UK can emit over a five-year period - expressed in millions of tonnes of carbon dioxide equivalents ($MtCO_{2e}$). 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. Then the UK carbon budget is apportioned locally, including Great Manchester.

7.61. A comparison with the UK and Great Manchester Carbon Budgets has been undertaken with the purpose to contextualise the effect of the sum of whole life carbon emissions, the operational emissions from energy and transport emissions throughout consecutive 5-year periods of the development's lifespan until 2037.

Table 7. 8 - National carbon budgets set by the Government (MtCO2e)

Carbon Budget Period	UK Carbon Budget ($MtCO_{2e}$)[26]	Great Manchester Carbon Budget ($MtCO_{2e}$)[27]
Third: 2018-2022	2,544	36
Fourth: 2023-2027	1,950	17
Fifth: 2028-2032	1,725	8
Sixth: 2033-2037	965	4

Baseline Conditions

Existing Baseline

7.62. 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. The GHG assessment only considers instances in which the Proposed Development results in additional or avoided emissions in comparison to the baseline scenario and its assumed evolution.

7.63. The proposed development site has an established use as a 645 space car park and is lawfully permitted to continue this operation into the future if the development proposals are not progressed. As established in the Vectos TA, this land use would generate considerably more traffic in the AM and PM peak hours than the proposed development. However, the traffic impact assessment adopted robust parameters and did not undertake any discounting to account for these trips. Traffic from the proposed development should therefore be considered in this context.

[26] https://www.gov.uk/guidance/carbon-budgets
[27] https://www.manchesterclimate.com/sites/default/files/Greater%20Manchester%20Carbon%20Budget.pdf

7.64. The management of the existing Site likely requires some components and bulk materials for minor maintenance works and repairs. These materials have embodied emissions associated with them, and the transport emission to and on the Site. The associated energy and embodied baseline emissions are anticipated to be small, and as such will not be quantified. As a result, there are zero transport, demolition and building GHG emissions associated with the Site.

Sensitive Receptors

7.65. The sensitive receptor relevant to this assessment is the global climate, which is impacted by the creation and release of GHG emissions.

Future Baseline

7.66. The traffic impact assessment for the development proposals has adopted two key scenarios in order to establish the relative impact of development traffic on the surrounding highway network. An assessment year of 2026 has been adopted which reflects a point five years post registration of the planning application.

7.67. The 2026 Baseline 'Without Development' scenario is based on 2021 surveyed traffic flows with the addition of traffic from other committed developments and forms a reference case against which the impact of development traffic can be compared. The scope of committed developments included in this scenario has been agreed with MCC and TfGM.

7.68. The 2026 Baseline 'With Development' scenario adds development trips on top of the 'Without Development' scenario so that the forecast operation of the highway network once the development is operational can be appraised

Assessment of Potentially Significant Effects

Construction Phase

Embodied and Transport Carbon Emissions

7.69. 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.

7.70. The calculations for the embodied carbon emissions generated during the construction phase of the Proposed Development is provided in the table below.

Table 7. 9 - Embodied and transport carbon emissions during construction phase

Type	Carbon emissions (t CO2e)
Emissions related to A1-A3 Product Stage	83,036
Emissions related to A4 Transport to Site	2,734
Emissions related to A5 On-site construction works	9,480
Total	**92,250**

7.71. The total tonnes of embodied carbon estimated to be generated during construction phase by the Proposed Development are 92,250 tCO2e.

Operational Phase

Embodied Carbon Emissions

7.72. Activities during the operational phase would generate GHG emissions, particularly from the replacement and/or refurbishment of building elements.

7.73. The calculations for the embodied carbon emissions generated during the operational phase are provided in the table below.

Table 7. 10 - Calculations for the embodied carbon emissions during operation

Type	Carbon emissions (t CO2e)

Emissions related to B4: Replacement, B5: Refurbishment	50,196

7.74. The total tonnes of embodied carbon estimated to be generated during operational phase by the Proposed Development is **50,196 tCO_{2e}.**

Building Emissions

7.75. The calculations for the building emissions during the operational phase related to the first operational year of the Proposed Development are provided in the table below.

Table 7. 11 – Operational building energy consumption and GHG emissions - annually

Energy	Regulated	Unregulated (*incl. cooking and appliances*)	Total
Energy consumption (MWh/yr)	9,019.5	2,630.7	11,650.1
Energy consumption intensity (kWh/m^2/yr)	41.7	12.2	53.9
Carbon emissions - A. with SAP 10.1			
Carbon emissions (t CO2/yr)	1,226.6	357.8	1,584.4
Carbon emissions intensity -BER (kgCO2/m^2/yr)	5.7	1.7	7.3
Carbon emissions - B. with decarbonising grid			
Carbon emissions (t CO2/yr)	130.3	38.0	168.3
Carbon emissions intensity -BER (kgCO2/m^2/yr)	0.6	0.2	0.8

7.76. The annual regulated energy consumption rate of the proposed development is **9,019.5 MWh/year** and its annual energy consumption intensity per m^2 is **41.7 kWh/m^2/year**. The annual unregulated energy consumption rate of the proposed development is **2,631 MWh/year** (incl. cooking and appliances) and its annual energy consumption intensity per m^2 is **12.2 kWh/m^2/year**. The total tonnes of operational emissions estimated to be generated by the Proposed Development is **1,584 tCO_{2e} per year** when using the SAP 10.1 emissions factor.

7.77. However, since the proposed development has followed an all-electric approach using air source heat pumps, then it is realistic to account for the benefits of decarbonising electricity grid when calculating its emissions over the period 2027-2086. Therefore using the projected electricity carbon factors as published by the UK Government, then the annual operational building emissions are reduced to **168.3 t CO_{2e}.**

Transport Emissions

7.78. The calculations for the annual transport emissions during the operational phase are presented below.

Table 7. 12 - Transport emissions for delivery and servicing vehicles during the operational phase

Metric	Unit	LGV
Total distance	*km/year*	1,098,285
Total vehicle trips	*vehicle trips/yr*	18,615
Average Trip length	*km/trip*	59
Emissions factor description	*kgCO2e/km*	Average van (<3.5 tonnes), unknown fuel, per km
Emissions factor value	*kgCO2e/km*	0.24017
Total kgCO2e /year		**263,775**
Total tCO2e /year		**264**

Table 7. 13 -Transport emissions for car vehicle movements during the operational phase – Traffic data provided by Vectos, with 10% EV charging

Metric	Unit	Car-Petrol	Car - BEV
Total distance	*km/year*	4,327,317	480,813
Total person trips	*vehicle trips/yr*	323,901	35,989
Average Trip length	*km/trip*	13.4	13.4
Emissions factor description	*kgCO2e/km*	Average car, Petrol, per km	Average car, Battery Electric Vehicle, per km
Emissions factor value	*kgCO2e/km*	0.28053	0.05031
Total kgCO2e		**1,213,942**	**24,190**
		Total tCO2e - Annual	**1,238**

Table 7. 14 -Transport emissions for public transport during the operational phase – Traffic data provided by Vectos,

Metric	Unit	Bus	Train
Total distance	*km/year*	4,217,802	28,628,245
Total person trips	*vehicle trips/yr*	503,919	562,994
Average Trip length	*km/trip*	8.4	50.85
Emissions factor description	*kgCO2e/km*	Average local bus, per passenger.km	National rail, per passenger.km
Emissions factor value	*kgCO2e/km*	0.10227	0.0355
Total kgCO2e		**431,355**	**1,016,016**
		Total tCO2e - Annual	**1,447**

7.78.1.

7.79. The total tonnes of transport emissions estimated to be generated by the Proposed Development during the operational phase (incl. good vehicles, personal vehicles and public transport) is **2,949 t CO_{2e} per year** when assuming a 10% active EV changing infrastructure. This annual emission rate would generate **176,957 t CO_{2e}** throughout the 60-year lifetime of the proposed development.

End of Life Phase

Embodied Carbon

7.80. 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.

7.81. The calculations for the embodied carbon emissions generated during the end of life phase are provided in Table 7. 15.

Table 7. 15 - Embodied carbon emissions during end of life

Type	Carbon emissions (t CO2e)
Emissions related to C1: De-construction, Demolition, C2: Transport, C3: Waste processing, C4: Disposal	7,723

7.82. The total tonnes of embodied carbon estimated to be generated during the end of life of the Proposed Development is **7,723 t CO_{2e}**.

Assessment Summary

7.83. Table 7. 16 summarises the embodied, operational and transport emissions per life stage of the development (construction, operation, end-of-life).

Table 7. 16 - Summary of embodied, operational and transport emissions per life stage

Stages	Category	Value	Units
Construction	**Embodied A1-3 -** Product and Materials	83,036	t CO2e
	Embodied A4 - Transport-to-site	2,734	t CO2e
	Embodied A5 - On-site works	9,480	t CO2e
Operation	**Embodied B4 -** Replacements	50,196	t CO2e
	Operational Energy B6 - Embedded Mitigation - Decarbonising grid	168	t CO2/year
		11,650	MWh/year
	Operational Transport - Embedded Mitigation (10% EV charging)	2,949	t CO2/year
End-of-life	**Embodied C1-C4 -** End-of-life	7,723	t CO2e

7.84. Table 7. 17 summarises the total embodied, operational and transport emissions during the construction phase, operational phase and end-of-life phase taking into consideration the embedded mitigation measures.

Table 7. 17 - Summary of total embodied, operational and transport emissions over 60 years

Construction (2022-2026), Operation (2027-2086) and End-of-life (2086) phases Embedded Mitigation (Grid decarbonisation, 10% EV charging)		
Category	Value	Units
Whole life Embodied emissions (*A-C*)	153,170	t CO2
Operational Building emissions (*Grid decarbonisation*)	10,095	t CO2
Transport Operational Carbon (*10% EV charging*)	176,957	t CO2
Total	**340,222**	**t CO2**

7.85. The whole embodied (A-C from construction to end-of-life) carbon emissions of the development are 153,170 t CO_{2e}, which corresponds to 708.5 kgCO_{2e}/m^2.

7.86. The annual energy consumption rate of the proposed development is estimated to be 53.9 kWh/m^2 per year. Since the proposed development has followed an all-electric approach using air source heat pumps, then it is realistic to account for the benefits of decarbonising electricity grid when calculating its emissions over the period 2027-2086. Therefore using the projected electricity carbon factors as published by the UK Government, then the annual operational building emissions are estimated to be 168 t CO_{2e}, or 10,095 t CO_{2e} over 60 years.

7.87. The total operational transport emissions throughout the lifetime of the development are estimated to be 176,957 t CO_{2e} (2,949 tCO_{2e}/year). The results show that transport carbon emissions are the largest share of the all emission categories for the proposed development.

Assessment of Significance of Effects

7.88. In order to assess the significance of the GHG emissions generated by the Proposed Development in terms of embodied carbon, operational carbon (energy) and transport carbon, the comparisons below have been undertaken.

Whole Life Embodied emissions

7.89. The whole-life embodied carbon emissions of the proposed development (including the construction transport emissions) are estimated to be **708.5 kgCO_{2e}/m^2**. This complies with the RIBA **2025** Climate Challenge target (800 kgCO_2/m^2), but it doesn't reach the RIBA **2030** Climate Challenge target (625 kgCO_2/m^2). Therefore, the embodied carbon emissions are likely to have an effect of **minor magnitude of impact** on climate and therefore the significance of effect of the embodied carbon emissions will be **moderate-minor (adverse)** prior to the implementation of mitigation measures set out below for the construction, operation and end of life phases.

Operational Building Carbon

7.90. The annual energy consumption of the proposed development is estimated to be **53.9 kWh/m^2 per year**. This complies with the **RIBA 2025** Climate Challenge target (60 kWh/m^2 per year). Therefore, the operational carbon emissions is likely to have an effect of **minor magnitude of impact** on climate and therefore the significance of effect of the operational building emissions will be **moderate-minor (adverse)**, prior to the implementation of mitigation measures set out below.

Operational Transport Emissions

7.91. The operational transport emissions of the proposed development are estimated to be **2,949 tCO_{2e}/year** (this result is based on the provision of EV charging infrastructure for 10% of parking spaces). This exceeds the existing baseline of transport carbon emission associated with the current use of the Site as the site is not currently associated with transport emissions. However, when compared to the annual regional transport carbon emission data for Manchester (676 ktCO_{2e}), the annual transport emissions from the proposed development have a share of 0.44%.

7.92. There is no method to assess the significance of transport carbon emissions of the proposed development. Based on the author's professional experience, the operational transport carbon emissions are likely to have an effect of **moderate** magnitude of impact on climate and therefore the significance of effect of the operational transport emissions will be **major-moderate (adverse)**, prior to the implementation of mitigation measures set out below.

7.93. The significance of these three effects (whole life embodied, operational building and operational transport emissions) on the climate is summarised in Table 7. 18.

Table 7. 18 – Summary of significance of effects on the climate (prior to mitigation)

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance
Whole Life Embodied emissions (incl. construction transport)	High	Adverse	Minor	Moderate - Minor Adverse
Operational Building emissions	High	Adverse	Minor	Moderate - Minor Adverse
Operational Transport emissions	High	Adverse	Moderate	Major - Moderate Adverse

Local Carbon Budget Effect

7.94. In order to contextualise the GHG emissions generated by the Proposed Development during the operation phase and provide a sense of scale, the results on the assessment of potential effects have been compared against the local Carbon Budgets of Manchester, as shown in Table 7. 8.

7.95. The total emissions during each of the Great Manchester Carbon Budget 5-year periods is presented in Table 7. 19 and compared in percentage terms to the respective budget.

Table 7. 19 - Proposed Development impacts on the local Carbon Budgets

Carbon Budget Period	Great Manchester (GM) Carbon Budget (Mt CO2e)	Carbon emissions from the proposed development (Mt CO2e)	% share from GM Carbon budget
Third: 2018-2022	36	0.0007	0.0019%
Fourth: 2023-2027	17	0.1024	0.6025%
Fifth: 2028-2032	8	0.0179	0.2232%
Sixth: 2033-2037	4	0.0162	0.4049%

7.96. The Proposed Development is not expected to influence the achievement of Great Manchester carbon budgets prior to the implementation of mitigation measures set out below for the construction, operation and end of life phases.

UK Carbon Budget Effect

7.97. In order to contextualise the GHG emissions generated by the Proposed Development during the operation phase and provide a sense of scale, the results on the assessment of potential effects have been compared against the UK Carbon Budgets, as shown in Table 7. 8.

7.98. The total emissions during each of the UK Carbon Budget 5-year periods is presented in Table 7. 20 and compared in percentage terms to the respective budget.

Table 7. 20 - Proposed Development impacts on the UK Carbon Budgets

Carbon Budget Period	UK Carbon Budget (Mt CO2e)	Carbon emissions from the proposed development (Mt CO2e)	% share from UK Carbon budget
Third: 2018-2022	2,544	0.0007	0.00003%
Fourth: 2023-2027	1,950	0.1024	0.00525%
Fifth: 2028-2032	1,725	0.0179	0.00104%
Sixth: 2033-2037	965	0.0162	0.00168%

7.99. The Proposed Development is not expected to influence the achievement of national carbon budgets prior to the implementation of mitigation measures set out below for the construction, operation and end of life phases.

Mitigation Measures

Whole Life Embodied Emissions

7.100. The effect of the Whole life carbon emissions and Operational Building emissions on the climate is considered to be non-significant. However, enhancement measures could be identified throughout all the life cycle stages of the Proposed Development, for further minimisation of the effect.

7.101. As the majority of the emissions are related to the product stage, the raw material supply, transport and manufacturing selection is an important element of mitigation. Consideration where possible should also be given to the Circular Economy principles recommended by GLA in the Circular Economy Statement Guidance (*Draft for consultation, September 2020*), which are presented in Table 7. 21.

Table 7. 21 - Circular Economy principles recommended by GLA in the Circular Economy Statement Guidance (Draft for consultation, September 2020)

Principle	Develop commitments to…
	1.1 Minimise the quantities of materials used
	1.2 Minimise the quantities of other resources used

1. Conserve resources, increase efficiency and source sustainably	1.3 Specify and source materials and other resources responsibly and sustainably
2. Design to eliminate waste (and for ease of maintenance)	2.1 Design for longevity, adaptability or flexibility and reusability or recoverability
	2.2 Design out construction, demolition, excavation and municipal waste arising
3. Manage waste sustainably and at the highest value	3.1 Manage demolition waste
	3.2 Manage excavation waste
	3.3 Manage construction waste
	3.4 Manage municipal waste (and industrial waste, if applicable)

7.102. Also the next design stages of Proposed Development can seek to align where possible with the Whole Life Carbon reduction principles as recommended by GLA in the Whole Life Carbon Assessment Guidance (*Draft for consultation, September 2020*), presented in Table 7. 22.

Table 7. 22 - Principles for reducing WLC emissions recommended by GLA in the Whole Life Carbon Assessment Guidance *(Draft for consultation, September 2020)*

	WLC reduction principles	Key benefits
1	Reuse and retrofit of existing buildings	Significant retention and reuse of structures is carbon efficient and reduces construction costs.
2	Use recycled or repurposed material	Reduces carbon emissions and reduces waste.
3	Material selection	Appropriate material choices is key to carbon reduction. Ensuring that there is synchronicity between materials selected and planned life expectancy of the building reduces waste and the need for replacement, thus reducing in use costs.
4	Minimise operational energy use	A 'fabric first' approach should be prioritised to minimise energy demand and reduce carbon and in-use costs.
5	Minimise operational water use	Choice of materials and durability of systems, to avoid leakage and subsequent building damage, contribute to reducing the carbon cost of water use.
6	Disassembly and reuse	Designing for future disassembly ensures that products do not become future waste and maintain their environmental and economic value.
7	Building shape and form	Compact efficient shapes help minimise both operational and embodied carbon emissions for a given floor area. This means a more efficient building overall resulting in lower construction and in use costs.
8	Regenerative design	Removing CO2 from the atmosphere through materials and systems absorbing it makes a direct positive contribution to carbon reduction.
9	Designing for durability and flexibility	Durability means that repair and replacement is reduced which in turn helps reduce life-time building costs. A building designed for flexibility can respond with minimum environmental impact to future changing requirements and a changing climate, thus avoiding obsolescence which also underwrites future building value.
10	Optimisation of the relationship between operational and embodied carbon	Optimising the operational/embodied carbon relationship contributes directly to resource efficiency and overall cost reduction.
11	Building life expectancy	Defining building life expectancy gives guidance to project teams as to the most efficient choices for materials and products. This aids overall resource efficiency, including cost efficiency and helps future proof asset value.
12	Local sourcing	Sourcing local materials reduces transport distances and supply chain lengths and has associated local social and economic benefits.
13	Minimising waste	Waste represents an unnecessary and avoidable carbon cost. Buildings should be designed to minimise fabrication and construction waste, and to ease repair and replacement with minimum waste, which helps reduce initial and in-use costs.
14	Efficient fabrication	Efficient construction methods (e.g. modular systems, precision manufacturing and modern methods of construction) contribute to better build quality, reduce

WLC reduction principles		Key benefits
		construction phase waste and reduce the need for repairs during post completion and the defects period (snagging).
15	Lightweight construction	Lightweight construction uses less material which reduces the carbon footprint of the building as there is less material to source, fabricate and deliver to site.
16	Circular economy	The circular economy principle focusses on a more efficient use of materials which in turn leads to carbon and financial efficiencies.

7.103. The effects could be reduced further through a monitoring tool that will enable contractors and managers to reliably and effectively benchmark, monitor, and acquire a better understanding of the expected and released embodied carbon footprint of the Proposed Development.

Construction Transport Emissions

7.104. Embedded mitigation measures around the construction-transport emissions comprise the following:

- Measures proposed in the **Transport Assessment** and the accompanied **Framework Travel Plan** submitted in support of the planning application, to encourage workers to travel to the Application Site in a sustainable manner;
- An **Construction Management and phasing chapter** has been prepared by Renaker Build Ltd and describes the proposed construction programme and key activities that will be undertaken.

7.105. Additional mitigation measures to further reduce the construction-transport emissions are described in the Construction Management and phasing chapter. According to this chapter, a Traffic Management Plan will be developed to minimise emission from construction transport through measures such as:

- Integration of traffic management scheme with surrounding construction developments and calming measures.
- Delivery routes for the major materials and items of plant will endeavour to deliver outside of peak traffic hours to minimise local disruption and the normal workings of the surrounding properties. This also contributes to reduces emissions due to reduced idling time in traffic and more efficient fuel consumption.
- The concrete supply will be from our Great Jackson St batching plant which due to its very close proximity to the site, minimises disruption to the road network; and
- Limited number of visitor and key staff parking within the compound area. Site personnel will be encouraged to utilise the extensive public transport options available to them. Any personnel who have to attend by car will be asked to avoid parking in residential areas and instead utilise formal surface car parks within the local area.
- Any other measures to ensure the safe integration of pedestrians, cyclists and road users both on, off and surrounding the development

Operational Building Emissions

Embedded mitigation

7.106. Proposed embedded mitigation measures focusing on regulated energy are included in the Environmental Standards Statement (5-Energy Strategy) prepared by Element Sustainability and summarised here.

7.107. The table below presents the proposed material specification related with the building fabric and thermal performance that will be incorporated to limit heat loss and ensure efficient operation of the Proposed Development.

Table 7. 23 – Proposed Building Specification

Item	Specification
Ground Floor	U=0.12W/m^2K

Unitised Curtain Wall	U=0.90W/ m^2K (area weighted average)
Party wall	U=0.00W/ m^2K (full fill & seal)
Corridor Wall	U=0.00W/ m^2K (full fill & seal) – heated corridor
Roof	U=0.12W/ m^2K
Windows & Glazed Doors	As per curtain wall specification; g=0.40
Purge Vents	As per curtain wall specification; g=0.20
Air Permeability	2.75 m^3/hm^2 (@50Pa.) – 1-bedroom apartments 2.50 m^3/hm^2 (@50Pa.) – 2- and 3-bedroom apartments
Cold Bridge	Bespoke values, assessed for each plot for concrete frame construction

7.108. These specifications and design attributes will provide the following benefits:

- High performance thermal insulation throughout the building envelope (ensuring very low U-values for all heat loss elements) and thermally efficient windows and doors will minimise heat loss through the main building elements;
- Thermally efficient, triple glazed windows will be specified with argon gas fill and low emissivity coatings to limit heat loss through the panes. The glazing g-value will be specified to optimise beneficial solar gains but limit the propensity for the dwellings to overheat;
- Very low air permeability of at least 2.75m^3/hm^2 (@50Pa.) is targeted for this build in order to minimise uncontrolled ventilation. This will further reduce heat losses and provide high levels of occupant comfort (in combination with the proposed mechanical ventilation strategy). Focus on the quality of the build is vital to deliver such airtight buildings;
- Optimised cold bridging junctions including the provision of insulation to reduce heat and limit heat losses that occur at the junctions between building elements and around openings and will significantly improve the emission rate of the dwellings; and,
- Efficient Form - apartments are an inherently efficient form of construction, both in terms of the materials required to build the dwellings and the ongoing heat energy demand. This is a result of relatively low areas of external heat loss elements associated with such layouts which enhance the energy efficiency of the dwellings and guarantees low energy demand throughout their occupation.

7.109. The buildings will utilise a 'full electric' energy strategy. The proposed mechanical and electrical specification (building services) that will be incorporated to ensure efficient servicing of the residential dwellings and non-domestic areas is the table below:

Table 7. 24 – Proposed Mechanical and Electrical Specification - Residential and Non-Residential zones

Item	Specification RESIDENTIAL ZONES	NON-RESIDENTIAL ZONES
Ventilation	High efficiency MVHR, insulated ductwork (Brookvent Aircycle 1.2 - SFP 0.74 or better / 91% efficiency)	MVHR (>80% heat recovery)
Lighting	100% 'Low E' or LED (At least 80 lumens/circuit Watt)	100% 'Low E' or LED
Space Heating	Electric Panel Heaters	Split system, Variable Refrigerant Flow Air Source Heat Pump
Water Heating	High efficiency immersion cylinders Capacity varying dependant on apartment size as follows: 1 Bed Flat – 120 Litres, 0.96 kWh standing losses 2 Bed Flat – 150 Litres, 1.13 kWh standing losses	High efficiency immersion cylinders served by heat pump
Heating Controls	Programmer and appliance thermostat	

7.110. This mechanical and electrical specification will deliver a Building Regulation Part L1A (2013), Part L2A (2013) and Part L1A (2021) compliant scheme for all aspects of the Proposed Development and will provide the following benefits:

- Mechanical ventilation with heat recovery (MVHR) systems will be specified in each dwelling to maintain a healthy living environment and further reduce the heat losses and the energy demand of the dwellings. The proposed MVHR system can recover over 90% of heat from the extracted stale air from the dwelling by using a counter flow heat exchanger which 'pre-heats' cool incoming, fresh air. The outgoing and incoming air pass next to each other, but do not mix. The design air permeability of 2.50m^3/hm^2 (@50Pa.) for the dwellings will virtually eliminate uncontrolled ventilation and ensure that the majority of the expelled stale air will pass across the heat exchanger, thereby boosting the energy reduction potential of these systems;
- No mechanical cooling required for the dwellings. Dynamic simulation energy model (DSM) calculations (applying the CIBSE TM59 assessment procedure) for these buildings have been completed to demonstrate that the dwellings are not considered to be at risk from overheating. This is due to optimisation of the glazing's solar transmission (g value) which (currently applied as g=0.40) limits unwanted, excess solar gain whilst allowing useful heat from the sun to enter the dwellings coupled with the proposed MVHR systems which incorporate a summer by-pass function to provide cool air within the dwelling during warm days;
- Low energy and LED lighting will be specified throughout the Site in order to maximise operational efficiencies and lifespan of the fittings. LEDs operate with an estimated energy efficiency of up to 90% when compared to traditional lighting and conventional light bulbs. This means that about c.90% of the electrical energy is converted to light, rather than wasted heat as in conventional bulbs. Common areas and non-domestic zones will also benefit from PIR control and photocell dimming controls;
- High efficiency hot water storage will be specified within the apartments by means of low standing (heat) loss immersion cylinders reducing hot water energy loads. To further limit energy demand for hot water, dwellings will be provided with water-efficient fixtures and fittings, to limit overall water consumption to <105 litres per person per day;
- Sophisticated heating controls including appliance programmer and room thermostats will ensure the efficient delivery of heat from electric panel heaters to further reduce the dwellings' energy demand; and,
- Split system heat pumps benefit from high seasonal efficiencies for both heating and cooling modes and are proposed for the non-domestic zones. Additionally, these systems allow precise control of the necessary refrigerant circulation amount required according to the system load facilitating a comfortable environment in the non-domestic zones by use of smooth capacity control.

7.111. Finally embedded mitigation measures related to the unregulated energy loads are the following (as per Energy Strategy):

- Integration of A and A+ rated white goods (where applicable). White goods are graded on a scale from G (the least efficient) up to A++ (the most efficient) under the EU energy efficiency labelling scheme; and
- Provision of EU energy efficiency labelling scheme details to assist in the purchasing of energy efficient white goods;

Additional mitigation

7.112. Proposed additional mitigation measures comprise of the following:

- Robust monitoring of energy consumption (i.e. smart metering);
- Procurement of high standards energy efficient whitegoods (A++ where possible);
- Monitoring of In-Use Energy Consumption and comparison against the RIBA 2030 targets during later design stages;

Operational Transport Emissions

Embedded mitigation

7.113. The proposed development is located in Manchester city centre, which is one of the most sustainable locations in the northwest, particularly in relation to key pedestrian, rail, Metrolink and bus transport routes. Accessibility by sustainable modes of travel is excellent and is reflected by the Greater Manchester Accessibility Level 8.

7.114. To further enhance the sustainable credentials of the proposals, a Transport Assessment and the accompanied Travel Plan has been prepared by Vectos. The Assessment concludes that future residents and building occupants will have a variety of sustainable travel options that will reduce reliance on the car. Overall, the development will provide improvements to enhance the environment for all road users, most notably pedestrians and cyclists including accessibility enhancement measures along Water Street and Trinity Way.

7.115. The principle embedded mitigation measures outlined in the Travel Plan are:

- New Resident and Employee Starter Welcome Packs;
- Improving travel awareness;
- Creation of a travel database;
- Ensuring the availability of travel information;
- Public Transport Display Areas;
- Provision of Cycle Facilities and cycle user groups. The proposed development will offer 100% cycle parking provision provided in secure, internal locations across the basement levels, in addition to 58 cycle spaces for visitors across the public realm to encourage the use of sustainable modes of transport;
- Walking Measures;
- The creation of car share clubs - A number of Enterprise Car Club cars and spaces will be provided at convenient locations close to the site, providing a socially inclusive, low emission and low-cost alternative to private car dependency; and
- Promoting sustainable travel by visitors including bus, rail and Metrolink.

7.116. A suitable level of parking is proposed to meet demand yet reflect the highly accessible location of the Site in terms of opportunities for active and sustainable travel. The proposals include for the provision of 578 car parking spaces to support the residential development. There will be capacity for Electric Vehicle Charge (EVC) provision (7kW each) for 10% of the parking spaces on the opening year of the development. Spaces will be future proofed with containment channels that enable cable connections to be installed as and when required.

Additional mitigation

7.117. Additional mitigation is recommended to mitigate the effect of the operational transport emissions on climate. Further to the initial 10% Electric Vehicle Charge (EVC) provision on the opening year Renaker will provide on-demand EVC provision for up to 20% throughout the lifetime of the development and in alignment with trends in EV use.

7.118. The effect of this measure is shown in the table below. To assess the mitigation effect of this additional mitigation measure, the projections from Transport Assessment Guidance (TAG) Data Book28 have been used. All EVs assumed to be Battery Electric Vehicles (BEV) for this assessment. The percentage of EV trips is changing every year according to these projections while slowly increasing (and up to 20%). Therefore the EV trips per year are calculated and then the total EV trips in the period 2027-2086 is estimated. An annual

[28] Department of Transport, 2021. Transport Assessment Guidance (TAG) Data Book - July 2021, v.1.15. Table A 1.3.9. – Proportion of vehicle kilometres per fuel type. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007435/tag-data-book.xlsm (Accessed: 13/09/2021)

average which incorporates this trend is used for the assessment of the annual transport emissions of the development.

7.119. No further analysis has been undertaken as to the long-term increases in vehicle efficiency and possible increase in autonomous vehicle use. These would likely further reduce the total GHG emissions associated with the Proposed Development.

Table 7. 25 -Transport emissions for car vehicle movements during the operational phase after additional mitigation – EV data as per Transport Assessment Guidance (TAG) Data Book, on demand increase up to 20% EV charging

Metric	Unit	Car-Petrol	Car-Diesel	Car - BEV	
Total distance	*km/year*	2,448,770	1,436,167	923,194	
Total person trips	*vehicle trips/yr*	183,291	107,498	69,101	
Average Trip length	*km/trip*	13.4	13.4	13.4	
Emissions factor description	*kgCO2e/km*	Average car, Petrol, per km	Average car, Diesel, per km	Average car, Battery Electric Vehicle, per km	
Emissions factor value	*kgCO2e/km*	0.28053	0.27108	0.05031	
Total kgCO2e		**686,953**	**389,316**	**46,446**	
				Total tCO2e – Annual (only personal vehicles)	**1,123**
				Total tCO2e – Annual (including personal vehicles, good vehicles and public/active transport)	**2,813**
				Total tCO2e – 60 year lifetime of the development	**168,785**

7.120. When the on-demand EV charging infrastructure approach on additional mitigation is followed, the proposed development is considered to be following a future-ready approach. This future-ready approach will allow for the Proposed Development to benefit in the future from the increased use of electric vehicles and stay aligned with current best-practice in transport trends. Therefore, the operational transport emissions are expected to gradually reduce in the future. Therefore, when additional mitigation is considered the operational carbon emissions is likely to have a residual effect of **Minor** (adverse) magnitude of impact on climate.

Residual Effects

7.121. The effects from whole life embodied emissions (incl. construction transport), operational building and operational transport emissions assessed are likely to have a residual minor magnitude of impact and therefore the residual significance of effects will be Moderate-Minor (adverse) taking into account the high receptor sensitivity of climate. In the context of the carbon budgest, this is considered to be '**not-significant**' in EIA terms.

7.122. A summary is provided in Table 7. 26 below.

Table 7. 26 – Summary of significance of effects on the climate, before and after mitigation

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect
Whole Life Embodied emissions (incl. construction transport)	High	Adverse	Minor	**Moderate-Minor Adverse**	For enhancement only: Whole life carbon and construction reduction measures and further optimisation of the construction transport schedule further	Minor	**Moderate-Minor Adverse**

					explored in later design stages, where possible		
Operational Building emissions	High	Adverse	Minor	**Moderate-Minor Adverse**	For enhancement only: A+++ whitegoods and appliances	Minor	**Moderate-Minor Adverse**
Operational Transport emissions	High	Adverse	Moderate	**Major - Moderate Adverse**	On demand EV Charging up to 20%	Minor	**Moderate - Minor Adverse**

7.123. The total emissions during each of the Great Manchester and UK Carbon Budgets 5-year periods is presented in the Table 7. 27 below and compared in percentage terms to the respective budget, as summarised in the table below.

Table 7. 27 – Proposed Development impacts on the local and national Carbon Budgets

Carbon Budget Period	Great Manchester (GM) Carbon Budget (Mt CO_{2e})	Carbon emissions from the proposed development (Mt CO_{2e})	% share from GM Carbon budget	UK Carbon Budget (Mt CO_{2e})	Carbon emissions from the proposed development (Mt CO_{2e})	% share from UK Carbon budget
Third: 2018-2022	36	0.0007	**0.0019%**	2,544	0.0007	**0.00003%**
Fourth: 2023-2027	17	0.1024	**0.6025%**	1,950	0.1024	**0.00525%**
Fifth: 2028-2032	8	0.0179	**0.2232%**	1,725	0.0179	**0.00104%**
Sixth: 2033-2037	4	0.0162	**0.4049%**	965	0.0162	**0.00168%**

7.124. Overall, the Proposed Development is not expected to influence the achievement of Great Manchester or UK carbon budgets.

7.125. The findings of the assessment as presented in tables Table 7. 26 and Table 7. 27 above show that the adverse effect of the proposed development on climate is **not-significant** when considered against the relevant carbon budgets.

8. Daylight, Sunlight and Overshadowing

Introduction

8.1. This Chapter of the ES has been prepared by GIA and assesses the likely daylight, sunlight and overshadowing 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 assessment and ES chapter has been produced by GIA and is supported by the following technical results within Appendix 8:

- Appendix 8.1 – Drawings of the Baseline and Proposed Scenario;
- Appendix 8.2 – Daylight and Sunlight Results for Baseline v Proposed;

8.3. This Chapter of the ES was written by Michael Beatty BSc (Hons) MRICS. Michael is a chartered surveyor with six years' experience specialising in daylight and sunlight. GIA are the largest specialist daylight and sunlight advisor in the UK, with over 25 years of specialisation and expertise, having advised on some of the largest developments within Greater Manchester.

Legislative and Policy Context

National Planning Policy

Revised National Planning Policy Framework 2021

8.4. The National Planning Policy Framework stipulates that *"…Planning policies and decisions should ensure that developments… 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."*

8.5. The document also states that *"…planning policies and decisions should always seek to secure a good standard of amenity for existing and future occupants of land and buildings."*

8.6. Paragraph 125 further states:

"Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities, and ensure that developments make optimal use of the potential of each site. In these circumstances:

[…]

c) when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards)."

The National Planning Practice Guidance (NPPG) 2019

8.7. The National Planning Practice Guidance (NPPG) – Making Efficient Use of Land, published on 22 July 2019, Paragraph: 006 Reference ID: 66-006-20190722 states that:

"Where a planning application is submitted, local planning authorities will need to consider whether the proposed development would have an unreasonable impact on the daylight and sunlight levels enjoyed by neighbouring occupiers, as well as assessing whether daylight and sunlight within the development itself will provide satisfactory living conditions for future occupants."

8.8. Paragraph 007 Reference ID: 66-007-20190722 also states:

"All developments should maintain acceptable living standards. What this means in practice, in relation to assessing appropriate levels of sunlight and daylight, will depend to some extent on the context for the development as well as its detailed design. For example in areas of high-density historic buildings, or city centre locations where tall modern".

Local Planning Policy

Manchester Core Strategy (2012 – 2027)

8.9. Policy DM1 – Development Management – States that all developments should have regard to the effects on amenity including privacy, light, noise, vibration, air quality and odours.

8.10. Policy EN2 – 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.

Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (Adopted April 2007)

8.11. The SPD sets out a series of design principles which should be considered and implemented where necessary, those measures relevant to this assessment are:

- Minimise reliance on energy-using equipment for heating, cooling, lighting and natural ventilation.
- Site layout and building design principles should maximise the capture and use of daylight and passive solar energy, whilst avoiding excessive solar gain in the summer.
- Consider the impacts of overshadowing.

Guidance Documents and Standards

Building Research Establishment (BRE) 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice', Second Edition, 2011

8.12. The Building Research Establishment (BRE) Guidelines 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice 2011, 2nd edition' (released October 2011) provides advice on site layout planning to achieve good sunlighting and daylighting within buildings, and in the open spaces between them. It is intended for use by building designers, developers, consultants and Local Planning Authorities (LPAs). The advice it gives is not mandatory and should not be used as an instrument of planning policy, it states:

"This guide is a comprehensive revision of the 1991 edition of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice. It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location."

8.13. It also states:

"The advice is 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. In special circumstances the developer or planning authority may wish to use different target values… in an area with modern high rise buildings, a higher degree of obstruction maybe unavoidable if new developments are to match the height and proportions of existing building" (para.1.6).

8.14. In addition, the BRE Guidelines state (para. 1.3) that, *"it is intended to be read in conjunction with the interior daylighting recommendations in the British Standard 8206-2 Code of practice for daylighting, and in the CIBSE publication Lighting guide: daylighting and window design".*

British Standard (BS) 8206-2:2008: 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'

8.15. The British Standard 8206 part 2 provides recommendations regarding the design for daylight in buildings and sets out various methods for assessing daylight. The document states:

"Daylighting gives to a building a unique variety and interest. An interior which looks gloomy, or which does not have a view to the outside when this could reasonably be expected, will be considered unsatisfactory by its users."

EN17037:2019 Daylight in Buildings (December 2018)

8.16. The new European Standard for Daylighting, or EN17037 was published in December 2018. Most local authorities continue to refer to the BRE guidelines. The BRE hope to secure funding and re-write the BRE guidelines in the financial year beginning April 2019, with the view of a revised publication in 2020. These timescales leave a fair degree of ambiguity as to when the new European Standard will become part of planning policy and what the transition between standards will be. In the meantime, The BRE guidelines and BS8206 remain the relevant tests.

Daylighting and window design: Lighting Guide LG10 (CIBSE) (1999)

8.17. This guide replaces the CIBSE Applications Manual Window Design (1987) and provides a daylight design guide. It 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."

Assessment Methodology and Significance Criteria

Methodology for Determining Baseline Conditions and Sensitive Receptors

8.18. The BRE Guidelines suggest that residential properties have the highest requirement for daylight and sunlight and states that:

"the guidelines are intended for use for rooms in adjoining dwellings where light is required, including living rooms, kitchens and bedrooms."

8.19. The scope of residential properties that have been assessed has been determined through professional judgement, considering their orientation and proximity to the Proposed Development. The nearest residential receptors have been considered in all directions.

8.20. Surrounding commercial properties with non-residential uses have been scoped out of the assessment.

8.21. The following properties are defined as receptors and will be considered due to their proximity to the Site, and their use:

- 133 Liverpool Road;
- 125 Liverpool Road;
- 183 Water Street;
- 1-25 Woollam Place;
- The Riverside;
- The Riley Building;
- One Regent Road;
- Wilburn Basin; and
- Irwell Building.

8.22. These properties are identified in the drawings contained at Appendix 8.1 and identified in Figure 8.1.

8.23. The assessment has considered other adjacent residential properties and due to the distance and orientation from the Proposed Development, they are unlikely to be affected, so they have not been assessed in detail. This includes Union T1/T2, which are sufficient distance from the Site not to be affected.

8.24. The proposed amenity areas to The Factory development on Liverpool Road have been assessed for overshadowing.

8.25. Windows that are not within 90 degrees of due south, or do not serve living rooms, were excluded from the assessment. As such, a sunlight assessment has not been undertaken to the following properties:

- 133 Liverpool Road;
- 125 Liverpool Road;
- 183 Water Street; and
- Irwell Building.

Scenarios Assessed

8.26. The following scenarios have been assessed and are reported within this Chapter of the ES:

- Scenario 1 – Existing Baseline; and
- Scenario 6 – Completed Development (baseline and cumulative).

8.27. Where consented schemes have the potential to be affected by the Proposed Development, or cause cumulative impact to the existing surrounding residential buildings, these have been included in the baseline scenario and assessed individually in detail, so no separate technical assessment of the cumulative impact is required. This approach is in line with the BRE Guidelines and represents a worst-case scenario in line with EIA guidance.

8.28. The Baseline scenario considers the current baseline condition (as can be seen in August 2021). This scenario is depicted on drawing nos. 0933/01-03 (Appendix 8.1).

8.29. The Proposed Development Scenario 6 is illustrated on drawing nos. 0933/04-06 (Appendix 8.1).

Methodology for Determining Demolition and Construction Effects

8.30. Owing to the evolving and changing nature of demolition and construction activities, the assessment of potential effects during demolition and construction of the Proposed Development on daylight and sunlight to surrounding properties has not been modelled.

8.31. Since the potential daylight and sunlight effects relating to demolition and construction works will vary throughout the construction programme and gradually increase to the potential effects identified for the completed Proposed Development, the interim construction effects are not assessed quantitatively as it is considered that the completed Proposed Development represents the worst case assessment in terms of likely daylight and sunlight.

Methodology for Determining Operational Effects

8.32. The following approaches are undertaken to assess the effect on the sensitive receptors of surrounding properties when the Proposed Development is completed and operational:

- Daylight
  - Vertical Sky Component (VSC); and
  - No Sky Line (NSL) Method.
- Sunlight
  - Annual Probable Sunlight Hours (APSH).
- Overshadowing
  - Sun Hours on Ground (SHOG).

Outline Approach for Daylight, Sunlight and Overshadowing Assessments

8.33. The technical analyses carried out to inform the daylight and sunlight assessment have been undertaken by creating a digital three-dimensional (3D) model of the existing Site and Proposed Development, based on measured survey data.

8.34. The 3D model uses Waldram Diagrams to establish the VSC and 3D geometric calculations for daylight distribution. This model (which is orientated to north by the use of Ordnance Survey (OS) information) enables the path of the sun to be tracked throughout the year to establish the shadow cast by the existing and proposed buildings and thus calculate the sun hours on ground in each scenario.

8.35. In accordance with the BRE Guidance, only those surrounding properties which have windows facing towards the Site were included in the assessment. If a nearby property has no windows facing the Site, these properties would not be affected by the Proposed Development in terms of light.

Daylight

Vertical Sky Component (VSC) Method

8.36. The VSC method of assessment is defined in the BRE Guidelines as the:

"ratio of that part of illuminance at a point on a given vertical plane that is received directly from a CIE standard overcast sky, to illuminate on a horizontal plane due to an unobstructed hemisphere of this sky".

8.37. This ratio is the percentage of the total unobstructed view that is available, once obstructions (e.g. the Proposed Development), are placed in front of the point of view.

8.38. The assessment is calculated from the centre of a window on the outward face and measures the amount of light available on a vertical wall or window following the introduction of visible barriers, such as buildings. The VSC has been calculated using a 'Waldram Diagram'.

8.39. The Waldram Diagram is effectively a snapshot taken from that point of the sky in front of the window, together with all relevant obstructions to it, i.e. the buildings. For calculation purposes, trees may be ignored unless they form dense continuous belts.

8.40. Due to the limitations of peripheral vision, the maximum VSC value is almost 40% for a completely unobstructed vertical wall or window. In terms of assessment criteria, the BRE Guidelines state that:

"if the VSC, with the development in place, is both less than 27% and less than 0.8 times its former value, occupants *of the existing building will notice the reduction in the amount of skylight. The area lit by the window may appear more gloomy and electric lighting will be needed more of the time".*

No Sky Line (NSL) Method

8.41. The BRE Guidelines provide that where room layouts are known, the effect on the daylight distribution can be calculated by plotting the NSL. In terms of the surrounding receptors, it has not been possible to obtain room layouts for all the properties and therefore layouts have been assumed where information is not available. This is standard industry practise. In this instance, assumed layouts were used for 133 Liverpool Road.

8.42. The NSL method is a measure of the distribution of daylight at the 'working plane' within a room. The 'working plane' means a horizontal 'desktop' plane 0.85m in height for residential properties. The NSL divides those areas of the working plane which can receive direct sky light from those which cannot. If a significant area of the working plane lies beyond the NSL (i.e. it receives no direct sky light), then the distribution of daylight in the room will be poor and supplementary electric lighting may be required.

8.43. The potential effects of daylighting distribution in an existing building can be found by plotting the NSL in each of the main rooms. For houses, this will include living rooms, dining rooms and kitchens. Bedrooms should also be analysed, although the BRE state that they are less important. The BRE Guidelines identify that if the area of a room that does receive direct sky light is reduced to less than 0.8 times its baseline value, then this would be noticeable to its occupants.

8.44. BS 8206 Part 2 states (para 5.7) that the:

"uniformity of daylight is considered to be unsatisfactory if a significant part of the working plane (normally more than 20%) lies behind the no sky line".

8.45. Therefore, it is implied that an NSL of at least 80% would be considered satisfactory.

8.46. Regarding deep rooms which are lit by windows on one side, the BRE Guidelines state (para. 2.2.10):

"If an existing building contains rooms lit from one side only and greater than 5m deep, then a greater movement of the no sky line may be unavoidable."

Sunlight

Annual Probable Sunlight Hours

8.47. Sunlight is measured using a sun indicator which contains 100 spots, each representing 1% of APSH. Therefore, where no obstruction exists the total annual probable sunlight hours would amount to 1486, and each spot equates to 14.86 hours of the total annual sunlight hours.

8.48. The number of spots is calculated for the Baseline and Proposed Development scenarios during the year and also during the winter period, and a comparison made between the two. This provides a percentage of APSH for each of the time periods for each window assessed.

8.49. 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."

"all main living rooms of dwellings…should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun".

"If the main living room to a dwelling has a main window facing within 90° of due north, but a secondary window facing within 90° of due south, sunlight to the secondary window should be checked."

"…a south facing window will, in general, receive most sunlight, while a north facing one will receive it only on a handful of occasions. East and west facing windows will receive sunlight only at certain times of day".

8.50. In regards to existing surrounding receptors, the BRE Guidelines provide that a window may be adversely affected if a point at the centre of the window receives less than 25% of the APSH, including at least 5% of the APSH during the winter months (21 September to 21 March), or less than 0.8 times its baseline sunlight hours during either period, or if there is a reduction in total APSH which is greater than 4%.

8.51. BS 8206 Part 2 (section 5.2) states that:

"Provided that the entry of sunlight is properly controlled, it is generally welcome in most buildings in the UK. Dissatisfaction can arise as much from the permanent exclusion of sunlight as from its excess. The provision of sunlight is important in dwellings, particularly during winter months. Sunlight is especially valued in habitable rooms used for long periods during the day."

"Interiors in which the occupants have a reasonable expectation of direct sunlight should receive at least 25% of probable sunlight hours (see 2.10.2). At least 5% of probable sunlight hours should be received during the winter months, between 21 September and 21 March. Sunlight is taken to enter an interior when it reaches one or more window reference points."

8.52. As is often the case, it is not possible to determine the room uses within each of the neighbouring properties, nor is it clear which window should be considered as the 'main windows'. Therefore, unless the rooms use is known through plans, all the rooms with windows facing the Site and within 90 degrees of due south have been considered in the assessment. Windows that do not face within 90 degrees of due south do not have a realistic expectation of direct sunlight, due to their orientation and the sunlight path in the northern hemisphere.

Overshadowing

Sun Hours on Ground

8.53. The method for assessing hours in sun is the 'sun-on-ground indicator'. The assessment applies to both to new and existing gardens/amenity areas, which are affected by new developments. The BRE Guidelines suggest that the Spring Equinox (21 March) is a suitable date for the assessment. Using specialist software, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.

8.54. The BRE Guidelines recommend that at least half of a garden or amenity area should receive at least 2 hours of sunlight on March 21 or the area which receives 2 hours of direct sunlight should not be reduced to less than 0.8 times its former value (i.e. there should be no more than a 20% reduction).

8.55. The BRE Guide does also refer to transient overshadowing, where it states:

"It is often illustrative to plot a shadow plan showing the location of shadows at different times of the day and year."

8.56. There are no numerical targets associated with the shadow paths upon which significance criteria can be applied. An analysis of the shadows cast by the Proposed Development, using Scenario Two have been undertaken, as this represents a worst-case scenario. The plots illustrate the baseline and proposed shadowing during daylight hours on 21 March, 21 June and 21 December.

Summary of Criteria for Daylight and Sunlight

8.57. The following table provides a summary of the criteria set out within the BRE Guidelines for daylight and sunlight.

Table 8.1 – Summary of Daylight and Sunlight Assessment 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 is former value.
NSL	A room may be adversely affected if the daylight distribution (NSL) is reduced beyond 0.8 times its existing area.
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 (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period, and for existing neighbouring buildings, if there is a reduction in total APSH which is greater than 4%.
SHOG	An amenity area may be adversely affected if less than 50% of its area receives less than 2 hours of direct sunlight on 21 March and less than 0.8 times its former value.

Significance Evaluation Methodology

Daylight, Sunlight and Overshadowing Magnitude of Effect

8.58. For daylight and sunlight, the BRE Guidelines outline the approach within the accompanying appendix, in terms of assigning criteria to assess the effects:

"Adverse impacts occur when there is a significant decrease in the amount of skylight and sunlight reaching an existing building where it is required…The assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied."

"Where the loss of skylight or sunlight fully meets the guidelines, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines and a larger number of windows or open space are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space."

"Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- 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."

8.59. The classification of major adverse is documented within Paragraph 7 of the BRE Guidelines:

"Factors tending towards a major adverse impact include:

- 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".

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building. Beneficial impacts should be worked out on the same principals as adverse impacts."

8.60. The BRE Guidelines do not provide any guidance on what constitutes a moderate adverse impact.

8.61. Therefore, best practice guidance and professional judgment will be used to determine any impacts based on the guidance set out in Appendix I of the BRE Guidelines. Potential effects will be identified as beneficial, adverse or negligible, and their magnitude of effects will be set out as Minor, Moderate and Major.

8.62. The initial numerical criteria for determining the magnitude of effect is based on percentage alterations, as follows:

Table 8.2 – Daylight & Sunlight Magnitude of Effect

Magnitude of Effect	Percentage Alteration from Baseline
Negligible	0-20%
Minor	20-29.9%
Moderate	30-39.9%
Major	40%+

Sensitivity of Identified Receptor

8.63. It is important that the location and nature of the Site and surrounding are considered when determining the significance of any impacts identified. The BRE Guide is very clear that the targets provided are not mandatory. The location of the development could be deemed to be special circumstances in which the planning authority may wish to use different target values. This scope and view should also be followed through to the sensitivity of the surrounding receptors. There should be an expectation that a higher degree of obstruction is inevitable in an area with modern high-rise buildings. This point is also made in the NPPF and NPPG.

8.64. The sensitivity of surrounding receptors must also be considered in context to other established, successful residential buildings in the city centre of Manchester, that are recognised as positive urban environments which people choose to live in. This provides a benchmark of what is considered to be acceptable daylight and sunlight amenity in the context of Manchester city centre.

8.65. The surrounding receptors may have a lower sensitivity to change in an urban location than those located in sub-urban, less dense areas. Sensitivity classification is assigned on how the proposed receptor is able to accommodate or adapt to the effect of the development. The existing residential receptors surrounding the Site reside in a city centre location where there is an expectation for a higher density of development. The Site is currently cleared, meaning it is underdeveloped and unusually open aspect given the city centre location. These receptors are therefore deemed to have a medium to low sensitivity.

8.66. The following existing receptors are defined as having a medium sensitivity:

- 133 Liverpool Road;
- 125 Liverpool Road;
- 183 Water Street;
- 1-25 Woollam Place;
- The Riverside;
- The Riley Building;
- One Regent Road;
- Wilburn Basin; and
- Irwell Building.

Significance of Effects

8.67. The significance of any identified environmental effects is determined by the assessment of their magnitude against their sensitivity. The table below illustrates how the sensitivity of the receptors and the magnitude of any effect combine to confirm significance.

Table 8.3 – Significance of Effect

Magnitude	Sensitivity		
	High	Medium	Low
Major	Major Adverse / Beneficial*	Major Adverse / Beneficial*	Moderate – Minor Adverse / Beneficial
Moderate	Moderate Adverse / Beneficial*	Moderate Adverse / Beneficial	Minor Adverse / Beneficial
Minor	Moderate – Minor Adverse / Beneficial	Minor Adverse / Beneficial	Minor – Negligible
Negligible	Negligible	Negligible	Negligible
Key	*Significant in terms of EIA regulations		

8.67.1.

8.68. When assigning significance criteria for daylight and sunlight effects, professional judgement has been used. Consideration has been given to the proportion of rooms/windows affected, as well as the percentage alterations, absolute changes, sensitivity of the receptor, the room use, and any other relevant factors. There may be mitigating factors such as location and nature of development, balconies, overhangs or design features which may also affect the determination of assigning the criteria.

Limitations and Assumptions

8.69. Where actual room layouts were available on the planning portal, these have been considered in regard to the modelling of the internal layouts within the existing surrounding properties. Where layout information was not available, assumptions have been made as to the use and internal configuration of the rooms (from external observations during a site inspection) behind the fenestration observed. This is standard industry practice. In this instance, information relating to all properties but 133 Liverpool Road were available publicly and used in the assessment.

8.70. In such cases a standard 4.2 metre (m) (14ft) room depth has been assumed, unless the building form dictated otherwise. This is common practice where access to buildings for surveying is unavailable. Obtaining these room layouts enables precise evaluation of the diffuse levels of daylight within each of the rooms via the NSL).

8.71. Floor levels have been assumed for adjoining properties assessed, where access has not been obtained. This dictates the level of the working plane which is relevant for the NSL assessments.

Baseline Conditions

Daylight & Sunlight

8.72. The full Baseline Daylight and Sunlight results can be found in Appendix 8.2 and are summarised in Table 8.4 below.

8.73. A total of 986 windows facing the Site serving 758 rooms within nine buildings were assessed for VSC and NSL for daylight, and 156 rooms were assessed for APSH for sunlight within five buildings.

8.74. For all VSC and NSL assessments, only windows/rooms facing the development are considered, in line with BRE guidelines. For APSH, only windows facing the site, and within 90 degrees of due south, are considered, again this is in line with BRE guidelines.

8.75. Out of the 986 windows assessed for daylight, 621 (63%) meet the BRE guidelines for VSC. For NSL, 622 (82%) of the 758 rooms assessed meet the BRE criteria. For sunlight, 141 (90%) of the 156 rooms assessed meet the BRE criteria for both Winter and Annual APSH.

8.76. For overshadowing, The Factory was found to meet the BRE criteria for Sun Hours on Ground.

8.77. Overall, this baseline scenario is considered a high level of compliance considering the city centre context of the Site.

8.78. The Site is underdeveloped and therefore has an unusually open aspect given its city centre location, which contributes to higher baseline results to the surrounding receptors.

Table 8.4 – Baseline Daylight and Sunlight results to surrounding sensitive receptors

Address	Total No. Windows That Meet VSC Criteria		Total No. of Rooms That Meet NSL Criteria		Total no. of Rooms That Meet APSH Criteria	
	Pass	Total	Pass	Total	Pass	Total
133 Liverpool Road	15	17	10	12	N/A	N/A
125 Liverpool Road	8	8	6	6	N/A	N/A
183 Water Street	26	40	14	16	N/A	N/A
1-25 Woollam Place	25	30	12	12	3	3
The Riverside	3	70	20	20	12	20
Riley Building	35	112	32	72	7	8
One Regent Road	206	308	221	250	2	2
Wilburn Basin	284	381	297	360	117	123
Irwell Building	20	20	10	10	N/A	N/A
Total	**621**	**986**	**622**	**758**	**141**	**156**

Identification and Evaluation of Significant Effects

Daylight to Surrounding Sensitive Receptors

8.79. The full Proposed Development daylight results can be found within Appendix 8.2 and are summarised in Tables 8.5 and 8.6 below.

8.80. A total of 986 windows serving 758 rooms were assessed for daylight within nine buildings considered to be sensitive receptors. For clarity, all the VSC and NSL assessments consider only windows facing the development, and this in line with BRE guidelines.

8.81. The breakdown of the baseline results against the Proposed Development for each of the individual buildings forming part of this assessment are discussed in more detail below.

Table 8.5 – Summary of VSC Daylight Results

Address			VSC Below BRE Guidelines		
	Total No. of Windows	No. of Windows That Meet BRE	Minor Adverse	Moderate Adverse	Major Adverse
133 Liverpool Road	17	11	3	3	0
125 Liverpool Road	8	8	0	0	0
183 Water Street	40	40	0	0	0
1-25 Woollam Place	30	30	0	0	0
The Riverside	70	70	0	0	0
Riley Building	112	112	0	0	0
One Regent Road	308	186	4	31	87
Wilburn Basin	381	84	36	66	195
Irwell Building	20	20	0	0	0
Total	**986**	**561 (57%)**	**43 (4%)**	**100 (10%)**	**282 (29%)**

Table 8.6 – Summary of NSL Daylight Results

Address			NSL Below BRE Guidelines		
	Total No. of Rooms	No. of Rooms That Meet BRE	Minor Adverse	Moderate Adverse	Major Adverse
133 Liverpool Road	12	12	0	0	0
125 Liverpool Road	6	6	0	0	0
183 Water Street	16	16	0	0	0
1-25 Woollam Place	12	12	0	0	0
The Riverside	20	20	0	0	0
Riley Building	72	72	0	0	0
One Regent Road	250	133	73	20	24
Wilburn Basin	360	291	52	16	1
Irwell Building	10	10	0	0	0
Total	**758**	**572 (76%)**	**125 (16%)**	**36 (5%)**	**25 (3%)**

133 Liverpool Road

8.82. A total of 17 windows serving 12 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.83. For VSC, 11 (65%) of the 17 windows meet the BRE criteria. Three of the affected windows will experience an alteration between 20-30% and three will experience an alteration between 30-40% from the baseline value.

8.84. For NSL, 12 (100%) of the 12 rooms assessed will meet the BRE criteria.

8.85. Three of the windows that do not meet the BRE criteria for VSC daylight are reduced by between 20-30%, and four windows will retain VSC daylight levels in excess of 21%, which is considered a minor impact and acceptable given the city centre context of the site.

8.86. Overall, given the limited impacts on this receptor, the city centre location of the Site and the flexibility with which the BRE guide is intended to be used, the effect on daylight to this property is considered to be **minor adverse** in significance and non-significant in EIA terms.

125 Liverpool Road

8.87. A total of 8 windows serving six rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.88. For VSC, 8 (100%) of the eight windows meet the BRE criteria. For NSL, six (100%) of the six rooms assessed will meet the BRE criteria.

8.89. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

183 Water Street

8.90. A total of 40 windows serving 16 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.91. For VSC, 40 (100%) of the 40 windows meet the BRE criteria. For NSL, 16 (100%) of the 16 rooms assessed will meet the BRE criteria.

8.92. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

1-25 Woollam Place

8.93. A total of 30 windows serving 12 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.94. For VSC, 30 (100%) of the 30 windows meet the BRE criteria. For NSL, 12 (100%) of the 12 rooms assessed will meet the BRE criteria.

8.95. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

The Riverside

8.96. A total of 70 windows serving 20 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.97. For VSC, 70 (100%) of the 70 windows meet the BRE criteria. For NSL, 20 (100%) of the 20 rooms assessed will meet the BRE criteria.

8.98. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

Riley Building

8.99. A total of 112 windows serving 72 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.100. For VSC, 112 (100%) of the 112 windows meet the BRE criteria. For NSL, 72 (100%) of the 72 rooms assessed will meet the BRE criteria.

8.101. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

One Regent Road

8.102. A total of 308 windows serving 250 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.103. For VSC, 186 (60%) of the 308 windows meet the BRE criteria. Four of the affected windows will experience an alteration between 20-30%, 31 will experience an alteration between 30-40%, and the remaining 87 windows will experience alterations in excess of 40% from the baseline value.

8.104. For NSL, 133 (53%) of the 250 rooms assessed will meet the BRE criteria. 73 of the affected rooms will experience an alteration between 20-30%, 20 will experience an alteration between 30-40%, and the remaining 24 rooms will experience alterations in excess of 40% from the baseline value.

8.105. 43 of the windows which do not meet the criteria for VSC daylight, and 91 of the rooms which do not meet the NSL daylight target, are bedrooms, which the BRE considers having a lesser requirement for daylight.

8.106. The design of One Regent Road is such that deep, single aspect rooms are located on the boundary facing the development site.

8.107. The BRE discusses the neighbourliness of surrounding properties, stating that *"another important issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light"*.

8.108. The BRE states further that *"if an existing building contains rooms lit from one side only and greater than 5m deep, then a greater movement of the no sky line may be unavoidable"*. The design of One Regent Road, with deep single aspect rooms, is such that it places a high burden on the development site to maintain the existing levels and leads to several rooms not meeting the NSL criteria.

8.109. Furthermore, the nature of the Site and its location are key to understanding the impacts to One Regent Road in context.

8.110. One Regent Road is in a city centre where there is an expectation for a higher density of development, evidenced by the number of tall buildings constructed in the locality in recent years. The Site is currently cleared, meaning it is underdeveloped and unusually open aspect given the city centre location, meaning One Regent Road receives unusually high levels of daylight in the baseline scenario.

8.111. Notwithstanding the above, One Regent Road will retain average VSC daylight levels of 23.23% with the Proposed Development in place, which is acceptable in a dense, city centre location, as recognised by the BRE.

8.112. Overall, given the city centre location and existing nature of the Site, and the flexibility with which the BRE guide is intended to be used, the effect on daylight to this property is considered to be moderate adverse in significance and non-significant in EIA terms.

8.113. The effect on daylight is considered non-significant in EIA terms for the following reasons:

- Several of the affected windows/rooms are bedrooms, which the BRE consider to have a lesser requirement for daylight;
- The design of One Regent Road, with deep, single aspect rooms on the boundary overlooking the Site, is such that it places a high burden on the development to maintain existing levels. The BRE acknowledge that, in such instances, deviations from the NSL target criteria may be unavoidable;
- The Site is underdeveloped given its city centre location, meaning that One Regent Road receives unusually high levels of daylight in the baseline scenario; and
- The retained VSC daylight levels are commensurate with the dense, urban nature of the site and its location in a city centre.

Wilburn Basin

8.114. A total of 381 windows serving 360 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.115. For VSC, 84 (22%) of the 381 windows meet the BRE criteria. 36 of the affected windows will experience an alteration between 20-30%, 66 will experience an alteration between 30-40%, and the remaining 195 windows will experience alterations in excess of 40% from the baseline value.

8.116. For NSL, 291 (81%) of the 360 rooms assessed will meet the BRE criteria. 52 of the affected rooms will experience an alteration between 20-30%, 16 will experience an alteration between 30-40%, and the remaining room will experience alterations in excess of 40% from the baseline value.

8.117. 168 of the windows which do not meet the criteria for VSC daylight, and 64 of the rooms which do not meet the NSL daylight target, are bedrooms, which the BRE considers having a lesser requirement for daylight. This means that just five living kitchen diners to this receptor do not meet the NSL daylight criteria, all of which are single aspect and receive daylight to less than 50% of their area in the baseline scenario.

8.118. Similarly to One Regent Road discussed above, the design of Wilburn Basin and nature of the Site are key considerations in understanding the impacts in context. Wilburn Basin is designed with a number of single aspect rooms facing the Site. The Site is underdeveloped meaning that Wilburn Basin is receiving unusually

high levels of daylight for a city centre location, and deviations from the BRE criteria, which are predicated against low-rise, suburban development are therefore inevitable.

8.119. Notwithstanding, Wilburn Basin will continue to receive VSC daylight levels of 19.66% which is considered acceptable given the city centre location and emerging height and density in the locality in recent years.

8.120. Overall, given the city centre location and existing nature of the Site, and the flexibility with which the BRE guide is intended to be used, the effect on daylight to this property is considered to be **moderate adverse** in significance and non-significant in EIA terms.

8.121. The effect on daylight is considered non-significant in EIA terms for the following reasons:

- Several of the affected windows/rooms are bedrooms, which the BRE consider to have a lesser requirement for daylight;
- Only five principal habitable rooms do not meet the NSL criteria, all of which are single aspect and do not meet the BRE target in the baseline scenario;
- Wilburn Basin is designed with deep, single aspect rooms on the boundary overlooking the Site, which places a high burden on the development to maintain existing levels. The BRE acknowledge that, in such instances, deviations from the NSL target criteria may be unavoidable;
- The Site is underdeveloped given its city centre location, meaning that Wilburn Basin receives unusually high levels of daylight in the baseline scenario; and
- The retained VSC daylight levels are commensurate with the dense, urban nature of the site and its location in a city centre.

Irwell Building

8.122. A total of 20 windows serving 10 rooms were assessed for daylight within this building to compare the baseline against the Proposed Development.

8.123. For VSC, 20 (100%) of the 20 windows meet the BRE criteria. For NSL, 10 (100%) of the 10 rooms assessed will meet the BRE criteria.

8.124. The effect on daylight to this property is therefore considered **negligible** in significance and non-significant in EIA terms.

Sunlight to Surrounding Sensitive Receptors

8.125. The Full Proposed Development Sunlight results can be found within Appendix 8.2 and are summarised in Tables 8.7 and 8.8 below.

8.126. A total of 156 rooms were assessed for sunlight within nine buildings considered sensitive receptors.

8.127. Windows that are not within 90 degrees of due south, or do not serve living rooms, were excluded from the assessment. As such, a sunlight assessment has not been undertaken to the following properties:

- 133 Liverpool Road;
- 125 Liverpool Road;
- 183 Water Street; and
- Irwell Building.

8.128. The buildings that have been assessed are discussed in more detail below.

Table 8.7 – Summary of Annual Sunlight Results

Address	APSH				
			Below threshold for Total APSH		
	Total No. of Rooms	No. of Rooms That Meet BRE	Minor Adverse	Moderate Adverse	Major Adverse
1-25 Woollam Place	3	3	0	0	0
The Riverside	20	20	0	0	0

Riley Building	8	8	0	0	0
One Regent Road	2	2	0	0	0
Wilburn Basin	123	106	2	1	14
Total	**156**	**139 (89%)**	**2 (c.1%)**	**1 (c.1%)**	**14 (6%)**

Table 8.8 – Summary of Winter Sunlight Results

Address	Winter PSH				
			Below threshold for Total APSH		
	Total No. of Rooms	No. of Rooms That Meet BRE	Minor Adverse	Moderate Adverse	Major Adverse
1-25 Woollam Place	3	3	0	0	0
The Riverside	20	20	0	0	0
Riley Building	8	8	0	0	0
One Regent Road	2	2	0	0	0
Wilburn Basin	123	122	1	0	0
Total	**156**	**155 (99%)**	**1 (c1%)**	**0**	**0**

1-25 Woollam Place

8.129. A total of three rooms within this building were assessed for sunlight to compare the baseline against the Proposed Development.

8.130. Three (100%) of the three rooms meet the BRE criteria for annual and winter PSH.

8.131. The effect on daylight to this receptor is therefore considered to be **negligible** in significance and non-significant in EIA terms.

The Riverside

8.132. A total of 20 rooms within this building were assessed for sunlight to compare the baseline against the Proposed Development.

8.133. 20 (100%) of the 20 rooms meet the BRE criteria for annual and winter PSH.

8.134. The effect on daylight to this receptor is therefore considered to be **negligible** in significance and non-significant in EIA terms.

Riley Building

8.135. A total of eight rooms within this building were assessed for sunlight to compare the baseline against the Proposed Development.

8.136. Eight (100%) of the eight rooms meet the BRE criteria for annual and winter PSH.

8.137. The effect on daylight to this receptor is therefore considered to be **negligible** in significance and non-significant in EIA terms.

One Regent Road

8.138. A total of two rooms within this building were assessed for sunlight to compare the baseline against the Proposed Development.

8.139. Two (100%) of the two rooms meet the BRE criteria for annual and winter PSH.

8.140. The effect on daylight to this receptor is therefore considered to be **negligible** in significance and non-significant in EIA terms.

Wilburn Basin

8.141. A total of 123 rooms within this building were assessed for sunlight to compare the baseline against the Proposed Development.

8.142. 106 (86%) of the 123 rooms meet the BRE criteria for both annual and winter PSH.

8.143. For annual PSH, two of the affected rooms will experience an alteration between 20-30%, one will experience an alteration between 30-40%, and the remaining 14 rooms will experience alterations in excess of 40% from the baseline value.

8.144. For winter PSH, one room will experience an alteration between 20-30% from the baseline value.

8.145. All but one of the rooms assessed will meet either the annual or winter PSH targets. All of the rooms which do not meet the annual PSH target will receive in excess of 17%, against a target of 25%, and the room which does not meet the winter PSH will receive 3% against a target of 5%. Given the city centre location of the site, this is considered acceptable.

8.146. Overall, given the city centre location and limited impacts on this receptor, the effect on sunlight to this property is considered to be **minor adverse** in significance and non-significant in EIA terms.

Overshadowing to Surrounding Sensitive Receptors

8.147. Full results and drawings for the overshadowing analysis are included at Appendix 8.1 and 8.2, and the assessment is discussed in more detail below.

The Factory

8.148. The proposed amenity areas to The Factory were assessed for overshadowing. The amenity areas will continue to receive two hours of direct sunlight on 21 March to in excess of 50% its area with the Proposed Development in place. Therefore, they will meet the BRE criteria for Sun Hours on Ground.

8.149. As such, the effect on overshadowing to this amenity area is considered to be **negligible** in significance and non-significant in EIA terms.

Mitigation Measures

Demolition and Construction

8.150. The potential daylight and sunlight effects during demolition and construction have been scoped out, as per paragraph 8.8 and 8.29.

8.151. Since the potential daylight and sunlight effects relating to demolition and construction works will vary throughout the construction programme and gradually increase to the potential effects identified for the completed Proposed Development, the interim construction effects are not assessed quantitatively as it is considered that the completed Proposed Development represents the worst case assessment in terms of likely daylight and sunlight.

Completed Development

8.152. Overall, the impact on daylight impacts to the surrounding properties is considered **negligible** to **moderate adverse** and the impact on sunlight is considered **negligible** to **minor adverse**. Overall, this is considered to result in non-significant effects. Given the context of the Site and nature of effects, no further mitigation is considered necessary.

Cumulative Effects

8.153. Where consented schemes have the potential to be affected by the Proposed Development, these have been included in the baseline scenario and assessed individually in detail, so no separate technical assessment of the cumulative impact is required. This approach is in line with the BRE Guidelines.

Residual Effects

Table 8.10 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation **Residual Effect** – Significance and Duration (i.e Temporary/Permenant)
Construction Phase				

Daylight	Scoped Out	-	-	-
Sunlight	Scoped Out	-	-	-
Overshadowing	Scoped Our	-	-	-
Operational Phase				
Daylight	Surrounding Residential Properties	None required	-	Negligible to Moderate Permanent Adverse (Non-Significant Effect)
Sunlight	Surrounding Residential Properties	None required	-	Negligible to Minor Permanent Adverse (Non-Significant Effect)
Overshadowing	Surrounding Amenity Areas	None required	-	Permanent Negligible

Reference List

8.154. This ES Chapter has been prepared by reference to the following:

- Revised National Planning Policy Framework (2019);
- National Planning Practice Guidance (NPPG) 2019;
- Manchester Core Strategy (2012 – 2027);
- Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (Adopted April 2007);
- Building Research Establishment (BRE) 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice', Second Edition, 2011; and
- British Standard (BS) 8206-2:2008: 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'.

9. Heritage

Introduction

9.1. This Chapter of the ES has been prepared by Heritage Architecture Ltd. the aim of the following chapter is to assess the likely impacts of the proposals upon the site and surrounding area, with particular regard to impact upon built heritage. 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 one technical appendix, a Heritage Statement (Appendix 9.1).

9.3. The author of the chapter has over 15 years experience in preparing Built Heritage chapters for EIA developments. They are a full member of the IHBC and have an MSc and a MA in heritage related courses.

Legislative and Policy Context

Planning (Listed Buildings and Conservation Areas) Act 1990

9.4. The Site is adjacent to and within the setting of a number of listed buildings and conservation areas. Section 66 of the Act 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 whether to grant planning permission.

National Planning Policy 2021

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

9.6. 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 should not be supported. This is because one of the key dimensions of sustainability is protecting and enhancing our historic environment.

9.7. In accordance with the legislation, the NPPF's core principles, which underpin decision-taking, require that Planning decisions should contribute to conserving designated heritage assets in a manner proportionate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations (paragraph 189).

9.8. The NPPF stresses that "great weight" should be given to the conservation of designated heritage assets (NPPF paragraph 199), emphasising the need to avoid substantial harm, in terms of demolition, alteration or the compromise of its setting. It will be clear that the redevelopment of a site adjacent to heritage assets could affect the setting of them, and that could be either beneficial or harmful. 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.

9.9. The NPPF establishes a clear hierarchy of significance for heritage assets, which is reflected in the adopted local policy (see below) and Historic England's guidance on measuring impact. Consequently, it is important that the relevant hierarchy of heritage assets surrounding the Site is understood, in order to apply proportionate consideration to the Proposals.

9.10. The 'designated heritage asset' status of the identified Listed Buildings and Conservation Areas 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 demolition of the four sites outweigh any perceived harm, in the context of the statutory duties set out above.

Local Planning Policy: Manchester City Council Unitary Development Plan (1995) and Core Strategy (2012)

9.11. The relevant, local heritage Planning policy maintains the same focus as the NPPF. The City Council's heritage policies focus on the fundamental importance of "preserving or, where possible, enhancing the historic environment". The following policies from Manchester's Core Strategy (2012) are of importance to the heritage assets considered within this statement.

9.12. Policy CC9 (Design and Heritage) states that development in Manchester City Centre should preserve or enhance the heritage assets that have been identified, including listed buildings, conservation areas and scheduled ancient monuments. The policy also establishes that new development must support the range of uses the Council expects in the City Centre and contribute to a coherent and integrated physical environment.

9.13. Policy EN3 (Heritage) states that throughout the City, MCC will encourage development that complements and takes advantage of the distinct historic and heritage features of its districts and neighbourhoods. New developments must be designed to support MCC in preserving or, where possible, enhancing the historic environment, the character, setting and accessibility of areas and buildings of acknowledged importance.

9.14. The Council's key regeneration objective is tempered by the need to ensure that: "historic sites and areas of particular heritage value should be both safeguarded for the future and, where possible, enhanced for their own heritage merits and as part of wider heritage regeneration proposals" (paragraph 12.21, Policy EN3). The policy thus evidently requires development proposals to be sensitive to the inherent values of the designated heritage asset, with any impact justified by clear, documentary evidence. This report aims to demonstrate how this requirement is addressed by the current proposal.

Assessment Methodology and Significance Criteria

9.15. This assesses the effect of the Proposed Development on designated built heritage assets within a 500m study area.

9.16. It is considered that for the purpose of assessing the potential impact of the Proposed Development upon the settings of any designated heritage assets, a 500m search area is ample but not prescriptive. The settings of any additional heritage assets which have the potential to be affected by the Proposed Development have been incorporated into the impact assessment.

Baseline Assessment

9.17. The baseline assessment was undertaken using a combination of desk-based study, research and fieldwork to identify and assess the heritage significance of the designated and non-designated heritage asset receptors. It also establishes the way in which the settings and the Site contribute to the heritage significance of these assets.

9.18. The above receptors are valued and the impact on them assessed giving a significance of effect. Individual viewpoints from which to undertake the Visual Impact assessment were determined following site inspection and discussion with Historic England.

9.19. In order to predict the magnitude and significance of visual impact the following criteria is considered:

- The sensitivity and proximity of receptors;
- The nature of the existing views;
- The degree of change to existing views and visibility of the Proposed Development; and
- The availability and amenity of alternative views.

Assessment Methodology

9.20. The assessment methodology for the Historic Environment and Visual Impact is a synthesis of established guidance, best practice and professional judgement. In accordance with an adapted form of the methodology set out in the Department for Transport's Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 2 Cultural Heritage HA 208/07, all receptors identified in the baseline which might be affected by the Proposed Development are valued and the impact on them is assessed in order to give a

significance of effect. The following Historic England (formerly English Heritage) guidance has also been utilised for the assessment:

- DCMS's Principles of Selection for Listing Buildings (2010);
- Historic England's Conservation Principles, Policies and Guidance (2008);
- Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets (2015); and
- Historic England's Good Practice Advice Note 4: Tall Buildings (2016).

9.21. The aim of this assessment has 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 known resource.
- Evaluation of the magnitude of impacts on identified resources.
- Identification of mitigation in the form of further surveys, investigation and recording to be undertaken in light of the identified impacts.

9.22. Identification and description of the baseline environment has involved a combination of desk-based review of plans, maps, records and other documents, consultation with Historic England and visual survey.

9.23. Consideration has also been given to the historical development, non-designated heritage assets, building types and materials, key views to the notable historic buildings which contribute to the identification of the built form, and understanding of the special interest of the area.

9.24. For the purposes of this assessment, consideration has been given within a 500m radius of the Site. The study area provides a focus for assessment but is not intended to be prescriptive; buildings outside the boundary of the study area are considered where relevant.

9.25. The characterisation appraisal, of the study area, which informed the selection of key views for the visual impact assessment, took into account the following factors regarding character and distinctiveness of the area surrounding the Site: open spaces, public realm, materials, views into and from the Site, current and historic uses and the urban grain. The key views were also agreed with Manchester City Council.

9.26. Information was collated from a number of online and primary sources including:

- The National Heritage List (Historic England).
- Manchester City Council Website.
- John Rylands University Library website.

Significance Criteria

9.27. Criteria have been established to appraise a heritage asset's significance. Statutory criteria, as set out in the '*Principles of Selection for Listing Buildings*', DCMS, 2010 (revised 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 (formerly English Heritage)'s criteria outlined in 'Conservation Principles, Policies and Guidance,' are also considered in this assessment.

9.28. 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 had also been applied when considering sensitivity of views containing heritage assets. Indicative definitions for each of these ratings are outlined in Table 9.1:

Table 9.1 – Significance Criteria for Determing the Value of Heritage Assets

Significance	Definition
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.

Assessment of Effects and Evaluation of the Magnitude of Impact

9.29. Impacts may be beneficial or adverse. If the Proposed Development will enhance heritage values or the ability to appreciate them, as expressed in the first stage of the assessment, then the impact on heritage significance will be deemed to be beneficial; however, if they fail to sustain heritage values or impair their appreciation then the impact will be deemed to be adverse.

9.30. Table 9.2 summarises the factors to be taken into account when assessing the magnitude of impact. The criteria are not intended to be prescriptive and the weighting to be accorded to each requires professional judgement.

Table 9.2 – Criteria for Determining Magnitude of Impact

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 development would imperceptibly enhance the intrinsic values of the identified heritage assets, or the experience and appreciation of the buildings or the designated area.
Neutral	The development may result in some visual change but does not affect the heritage values of the heritage assets in the view, or the ability to appreciate those values.
Negligible adverse	The development would alter, but not diminish, the intrinsic values of the identified heritage assets, or the experience and appreciation of the buildings or the designated area 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.

Significance of Effect

9.31. Derived by combining the significance rating of the resource with the magnitude of impact for each asset, Table 9.3 illustrates how information on the significance of the asset and the magnitude of the impact has been combined to arrive at an assessment of the significance of effect. The matrix is not intended to 'mechanise' judgment of the significance of effect but act as a check to ensure that judgments regarding value, magnitude of impact and significance of effect are reasonable and balanced.

9.32. The tabulated matrix below is generally consistent with recognised criteria as defined within ICOMOS Guidance (2011). This is not, however, intended to be prescriptive, and does not take into account the existing character of the areas around the site. Scale or severity of impacts or changes can be judged taking into account their direct and indirect effects and whether they are temporary or permanent, reversible or irreversible. The cumulative effect of separate impacts should also be considered. The scale or severity of impact can be ranked without regard to the value of the asset.

Table 9.3 – Significance of Effect Matrix

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

Limitations and Assumptions

9.33. Survey of the identified heritage assets within the study area was from publicly accessible areas. As such the study is limited to assessment from ground level.

9.34. Assessment of below ground archaeology does not form part of this assessment.

Phasing and Delivery

9.35. As a result of the proposed phasing, it is necessary to test a number of scenarios within the Environmental Impact Assessment. This is to ensure robustness that all impacts that may arise because of partial delivery of the proposals (due to phasing) are assessed.

Baseline Conditions

9.36. The Site is bounded by the River Irwell to the north and west, Liverpool Road to the east and Water Street and Regent Street to the south in Manchester City Centre and is currently an unused cleared site.

9.37. The Site comprises approximately 1.78 hectares of brownfield land in the form of a car park and is split into two parcels known as Site C and Site D.

9.38. The Site falls within the St Johns and Water Street Strategic Regeneration Framework Areas as well as the Castlefield Conservation Area.

9.39. Site C comprises approximately 0.89 hectares of brownfield land is bounded by the River Irwell to the north, Trinity Way to the west, Water Street to the south and a railway viaduct to the east. The Site can be accessed by vehicle or foot via Water Street on the southern boundary. The Site slopes downwards to the north towards the River Irwell and there is a limited amount of vegetation running along this boundary.

9.40. Site D comprises approximately 0.89 hectares ha of brownfield land is bounded by the River Irwell to the north and west, Regent Road to the south and Trinity Way to the east. The Site can be accessed by vehicle or foot via Trinity Way on the eastern boundary. The Site slopes downwards to the north and west towards the River Irwell and there is a limited amount of vegetation running along this boundary.

9.41. The assessment has identified 30 no. heritage assets within the study area (Table 9.4 and Figure 9.1). It should be noted that only 22 heritage assets in total were scoped in for further assessment (Nos.6, 13, 14, 16, 17, 18, 19, and 25 were scoped out due to factors such as distance and relationship to the Proposed Development Site).

Table 9.4 – Heritage Assets and their value

Name of Heritage Asset	Designation	No./ref on Figure 9.1	Value of Heritage Asset
Railway Bridge Over River Irwell to Former Liverpool Road Station	Listed Building, Grade I	1	High
Former Canal Flour Mills	Listed Building, Grade II	2	Medium
Colonnaded Railway Viaduct at Former Liverpool Road Goods Depot	Listed Building, Grade II	3	Medium
Railway Viaduct Over River Irwell Leading to Lower Byrom Street Warehouse	Listed Building, Grade II	4	Medium
Former Commercial Hotel	Listed Building, Grade II	5	Medium
Two Bollards at West End Of St Johns Passage	Listed Building, Grade II	6	Medium
Railway Viaduct Linking Bridge Over Irwell to Liverpool Road Station	Listed Building, Grade II	7	Medium
Former Liverpool Road Railway Station Station Masters House	Listed Building, Grade I	8	High
Church Of St George	Listed Building, Grade II*	9	High
Churchyard Walls, Gate Piers and Gates At Church Of St George	Listed Building, Grade II	10	Medium
Power Hall of Museum Of Science And Industry	Listed Building, Grade II	11	Medium
Former Grape Street Railway Bonded Warehouse	Listed Building, Grade II	12	Medium
Former St Matthews Sunday School	Listed Building, Grade II	13	Medium
The Giants Basin	Listed Building, Grade II	14	Medium
Castlefield Railway Viaduct From G-Mex to Dawson Street	Listed Building, Grade II	15	Medium

Name of Heritage Asset	Designation	No./ref on Figure 9.1	Value of Heritage Asset
St Johns College of Further Education	Listed Building, Grade II	16	Medium
Pair Of Culvert Arches Over River Medlock and Associated Overflow Channel	Listed Building, Grade II	17	Medium
Rochdale Canal Lock Number 92 And Castle Street Bridge	Listed Building, Grade II	18	Medium
Hulme Lock Branch Canal	Listed Building, Grade II	19	Medium
Old Warehouse to North Of Former Liverpool Road Railway Station	Listed Building, Grade I	20	High
123, Liverpool Road	Listed Building, Grade II	21	Medium
Albert Warehouse Quay on West Side Fronting River Irwell/ Victoria Warehouse	Listed Building, Grade II	22	Medium
Merchants Warehouse	Listed Building, Grade II	23	Medium
Museum Of Science And Industry, Air And Space Museum	Listed Building, Grade II	24	Medium
Bridgewater Canal Basin at Potato Wharf	Listed Building, Grade II	25	Medium
Manchester Museum of Science And Industry, Former Lower Byrom Street Warehouse	Listed Building, Grade II	26	Medium
Irwell Street Bridge (That Part in Salford Civil Parish)	Listed Building, Grade II	27	Medium
MSJ&AR Viaduct	Listed Building, Grade II	28	Medium
Castlefield	Conservation Area	Orange	High
St Johns	Conservation Area	Green	High

Historic Context

9.42. To the east of the subject site is Castlefield where the Roman fort of Mamucium was based. However, it wasn't until the 18th Century with the navigation of the River Irwell and the subsequent construction of canals, such as the Rochdale Canal, that the area became developed. The success of the canal system was short lived as it soon became apparent that canals could not move goods quickly enough. This was compounded by the development of the railways; the world's first being opened on Liverpool Road in 1830.

Soon devoted to goods traffic, Liverpool Road Station became the centre of a network of railway lines, several of which crossed Castlefield on viaducts. These were concentrated over the site of the former Roman Fort, where four viaducts, including the Castlefield Viaduct, converge.

9.43. During the 20th Century both the canal and rail transport declined but the regeneration of the area for residential, recreational and commercial use has seen the conversion and reuse of many historic industrial buildings in the wider area. The development of the road network immediately surrounding the subject site has dominated the area and resulted in poor pedestrian environments and low quality commercial developments. Regeneration initiatives for the area seek to readdress the imbalance in the economic and social spheres of the area.

9.44. In summary, this area has witnessed dramatic cycles of development and decline; the area was first developed in the beginning of the 19th century into a dense industrial area before the decline of industry 100 years later saw the area become underused and derelict. Following the construction of the Mancunian Way and the associated road network in the 1960s, the area immediately surrounding the subject site become shorn of any historic context and was redeveloped for commercial uses.

Statement of Significance

9.45. The statement of significance provides a summary of the Site's relative architectural and historic interest. Please refer to Section 5 of the Heritage Statement for further detailed analysis (Appendix 9.1).

9.46. The Site no longer contains any evidence of built form or historic fabric, it yields **no heritage interest** and makes a **neutral** contribution to the character and appearance of the Castlefield Conservation Area.

9.47. The focus of the Conservation Area is to Castlefield Basin/ Potato Wharf and Liverpool Road as these areas contain a large number of listed buildings which best represent the development of the railways and industry in this part of the city.

9.48. The character area in which the Site lies is dominated by the road network, cleared sites and contains no historic built form. Surrounding character areas have largely been affected by redevelopment in the mid-late 20th Century but contain landmark buildings which allow for the understanding and appreciation of the industrial and commercial development of the area and the associated growth of the railways in Manchester.

9.49. As stated above, there are no buildings of architectural or historic remaining within the defined Site area. It will be clear, therefore, that there is scope to develop the currently dilapidated Site and enhance the character and appearance of the Conservation Area.

Identification and Evaluation of Significant Effects

9.50. Heritage assets are susceptible to numerous forms of development and non-development impacts both during the construction process and as a consequence of the operational life of the Proposed Development. The potential effects in relation to the current Proposed Development have been deemed to relate to impacts on the setting of the identified heritage assets only.

9.51. Detailed evaluation of the impacts of the identified heritage assets are provided within the Impact Assessment set out in Section 6 of the Heritage Statement within Appendix 9.1.

Construction Phase

9.52. The assessment methodology and approach to the relative impact on heritage assets during the construction phase is based on evidence-based assumptions in relation to common issues such as demolition, dust, noise, site hoarding and scaffolding.

9.53. Due to the proximity of the Grade I Listed Railway Bridge over the River Irwell (No.1, table 9.4), the Grade II listed Railway viaduct over the River Irwell (No.4, table 9.4), the Grade II listed Railway viaduct linking bridge (No.7, table 9.4) and the Grade II MSJ&AR viaduct (No.28, table 9.4), the potential effects of the demolition and construction phase will result in temporary, localised minor adverse impacts on the ability to understand and appreciate the settings of these structures.

Operational Phase

9.54. It will be clear that the proposals will result in a number of minor to negligible adverse impacts upon surrounding designated heritage assets, with some slightly higher instances of 'moderate' adverse impact occurring nearer to the site. The instances of moderate adverse impact are in relation to the visual impact on the understanding and experience of the setting of the MSI complex (including views along Liverpool Road). However, the relative impact upon the Castlefield Conservation Area is demonstrated to be minor due to the significance of the area being largely preserved through the retention and abundance of Listed Buildings which characterise the area. Whilst the collection of towers presented by the Proposed Development will result in some visual change within certain views, when assessed as a whole, it will be clear that the proposals will not diminish the areas distinct character and appearance of the Castlefield Conservation Areas as a whole.

9.55. Whilst the collection of towers presented by the Proposed Development will result in some visual change within certain views, when assessed as a whole, it will be clear that the proposals will not diminish the designated areas distinct character and appearance to anything beyond a minor degree. This is reflected in the overall significance of effect value.

9.56. The potential effects of the Proposed Development are considered in full within the Visual Impact Assessment in Section 6 of the Heritage Statement, Appendix 9.1.

Mitigation Measures

9.57. Heritage considerations have been integral to the design of the proposals. Enlisting appropriate specialists and consultation with the local authority has informed the design development and assessment process to ensure potential adverse visual impacts on the identified heritage assets are minimised.

9.58. The identification of key heritage viewpoints has been one of the principal factors in identifying where impact may occour, and therefore allowing for an understanding of how best to minimise and mitigate harm. These have been informed by on-going consultation with the LPA and Zone of Visual studies which provide an objective evidence base on which informed conclusions can be made.

Cumulative Effects

9.59. Despite the proximity of the Proposed Development to the St John's Conservation Area the relative impact upon the designated area's significance has been demonstrated to be negligible. This is due to the established contemporary nature of the area which has been brought about by the new Factory and Vita developments. It is considered that the Proposed Development at Trinity Way will be read as an incidental contributor to the skyline beyond in conjunction with this new development.

9.60. Similarly, whilst the development will result in considerable, visual change from within certain locations within the Castlefield Conservation Area, when assessed as a whole, the Proposed Development would not diminish the character defining architectural and historic appearance of the designated area to anything above a minor degree. As has been demonstrated in a number of views, the Proposed Development will be read as a contributor to the evolving skyline, which is soon to be transformed by the cumulative developments within the St. Johns area (under construction).

Residual Effects

9.61. Consideration to mitigating the impacts on the identified heritage assets has been made throughout the development of the proposals. Consequently, the residual effects will be the same as the potential effects discussed.

9.62. A summary of the potential and residual effects is set out below in Table 9.5

Table 9.5 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Construction Phase				

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Minor adverse	Railway Viaduct Over River Irwell Leading to Lower Byrom Street Warehouse (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Minor Adverse	Manchester South Junction and Altrincham Railway Viaduct (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Minor Adverse	Railway Bridge Over River Irwell to Former Liverpool Road Station (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Minor Adverse	MSJ&AR Viaduct (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Operational Phase				
Negligible adverse	Railway Bridge Over River Irwell to Former Liverpool Road Station	Public benefits	n/a	Negligible adverse (permenant)
Minor adverse	Former Canal Flour Mills	Public benefits	n/a	Minor adverse (permenant)
Negligible adverse	Colonnaded Railway Viaduct at Former Liverpool Road Goods Depot	Public benefits	n/a	Negligible adverse
Negligible adverse	Railway Viaduct Over River Irwell Leading to Lower Byrom Street Warehouse	Public benefits	n/a	Negligible adverse (permenant)
Minor adverse	Former Commercial Hotel	Public benefits	n/a	Minor adverse (permenant)
Negligible adverse	Railway Viaduct Linking Bridge Over Irwell to Liverpool Road Station	Public benefits	n/a	Negligible adverse (permenant)
Moderate adverse	Former Liverpool Road	Public benefits	n/a	Moderate adverse (permenant)

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
	Railway Station, Station Masters House			
Negligible adverse	Church Of St George	Public benefits	n/a	Negligible adverse (permenant)
Neutral	Churchyard Walls, Gate Piers and Gates at Church of St George	n/a	n/a	Neutral (permenant)
Minor-to-moderate adverse	Power Hall of Museum of Science and Industry	Public benefits	n/a	Minor-to-moderate adverse (permenant)
Minor adverse	Former Grape Street Railway Bonded Warehouse	Public benefits	n/a	Minor adverse (permenant)
Negligible adverse	Castlefield Railway Viaduct From G-Mex to Dawson Street	Public benefits	n/a	Negligible adverse (permenant)
Moderate adverse	Old Warehouse to North of Former Liverpool Road Railway Station	Public benefits	n/a	Moderate adverse (permenant)
Minor adverse	123, Liverpool Road	Public benefits	n/a	Minor adverse (permenant)
Negligible adverse	Albert Warehouse Quay on West Side Fronting River Irwell Victoria Warehouse	Public benefits	n/a	Negligible adverse (permenant)
Minor adverse	Merchants Warehouse	Public benefits	n/a	Minor adverse (permenant)
Minor adverse	Museum Of Science and Industry, Air and Space Museum	Public benefits	n/a	Minor adverse (permenant)

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Minor adverse	Manchester Museum of Science and Industry, Former Lower Byrom Street Warehouse	Public benefits	n/a	Minor adverse (permenant)
Negligible adverse	Irwell Street Bridge (That Part in Salford Civil Parish)	Public benefits	n/a	Negligible adverse (permenant)
Minor adverse	MSJ&AR Viaduct	Public benefits	n/a	Minor adverse (permenant)
Minor adverse	Castlefield Conservation Area	Public benefits	n/a	Minor adverse(permenant)
Negligible adverse	St Johns Conservation Area	Public benefits	n/a	Negligible adverse (permenant)

Reference List

9.63. This ES Chapter has been prepared by reference to the following:

- Highways Agency. 2007. Design Manual for Roads and Bridges, Volume 11, Section 3, Part 2 HA 208/07 – Cultural Heritage;
- Planning (Listed Buildings & Conservation Areas Act 1990.
- Department of Communities and Local Government (2021). National Planning Policy Framework.
- Department of Communities and Local Government (2019) Planning Practice Guide. Conserving and enhancing the historic environment.
- DCMS's Principles of Selection for Listing Buildings (2010);
- Historic England's Conservation Principles, Policies and Guidance (2008);
- Historic England's Good Practice Advice Note 2: Managing Significance in Decision-Taking in the Historic Environment (March 2015);
- Historic England's Good Practice Advice Note 3: The Setting of Heritage Assets (2017);
- Historic England's Good Practice Advice Note 4: Tall Buildings (2016); and
- Historic England's Understanding Place: Conservation Area Designation, Appraisal and Management (2017).

10. Human Health

Introduction

10.1. 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.

10.2. 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 development project proposals in Manchester. She is a co-author of the practical guide - *The EIA Handbook* (Telfords, Third Edition, November 2019).

Legislative and Policy Context

National Planning Policy and Guidance

National Planning Policy Framework (2021)

10.3. 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.'*

10.4. 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).

10.5. 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).

10.6. "*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)

10.7. 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 10 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 10 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 and Guidance

Manchester City Council (MCC) Core Strategy (adopted 2012)

10.8. 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 CC1 Primary Economic Development Focus: City Centre and Fringe states that the focus of employment growth is in the City Centre and will be a suitable location for consideration of high density buildings.
- Policy CC3 Housing advises that the most intensive development of housing will be in the City Centre.
- Policy CC6 High Density Development is a location where land should be used to maximise its efficiency.
- Policy CC7 Mixed Use Development guides that the City Centre presents the most viable opportunities for mixed use development.
- Policy CC10 A Place for Everyone advises that the City Centre will develop as a location which appeals to a wide range of residents and visitors.
- 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 H1 Overall Housing Provision defines high-density developments as those with over 75 units and states that they are appropriate in the City Centre.
- 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 & 11 safeguard and create new open space, sport & 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.

St John's Strategic Development Framework (2016)

10.9. The Development Framework Vision and Development Principles are established and include to 'deliver a best-in-class city centre neighbourhood; a place to live, work and play'. This is detailed further in the Planning and Tall Building Statement.

Places for Everyone – Joint Development Plan (Greater Manchester Councils, 2021)

10.10. The Greater Manchester Spatial Framework (GMSF, Publication Draft, 2020) has now been 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. It may be noted that the PfE Vision that GM is a "*place where people are proud to live, with a decent home, a fulfilling job, and stress-free journeys the norm. But if you need a helping hand you'll get it"*; and Strategic Objectives include No 10 "*to promote the health and wellbeing of communities"*. The overall draft Strategy and many of the policies in the plan support improvements in health and wellbeing, and help tackle climate change, such as by creating a "*place where people live healthy lives and older people are valued" and a "place at the forefront of action on climate change with clean air and a flourishing natural environment".*

10.11. A period of public consultation on the draft Plan has recently closed on 3 October 2021. Following this, additional reviews will be undertaken by the Secretary of State and an independent inspector with a view to adopting a final version in 2023. Given that it is yet to be examined it is considered that the Draft Plan holds limited weight in the determination of planning applications within Greater Manchester

Other Relevant Policy, Strategy & Guidance

Public Health England (PHE) Spatial Planning for Health (2017)

10.12. 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)

10.13. 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. 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)

10.14. The Our Manchester Strategy 2016-25 was published by MCC in January 2016 and sets the ambitions for the City for the next decade. It was refreshed in March 2021 following a review of its first five years. The Strategy sets out a vision for Manchester to be in the top-flight of world-class cities by 2025, when the City will:

- Have a competitive, dynamic and sustainable economy that draws on our distinctive strengths in science, advanced manufacturing, culture, and creative and digital business – cultivating and encouraging new ideas;
- Possess highly skilled, enterprising and industrious people;
- Be connected, internationally and within the UK;
- *Play its full part in limiting the impacts of climate change;*
- Be a place where residents from all backgrounds feel safe, can aspire, succeed and live well; and
- *Be clean, attractive, culturally rich, outward-looking and welcoming.*

Assessment Methodology and Significance Criteria

10.15. 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 (Appendix 2.3), professional experience, and assessment of impacts against relevant baseline information.

10.16. *Shaping Neighbourhoods: For Local Health and Global Sustainability* (2010) 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.

10.17. 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.

10.18. 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 housing development 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. For the purposes of this assessment, we have applied the checklist to the proposals.

10.19. This checklist recognises that health and wellbeing can be affected by multiple determinants as shown in Figure 10.1.

10.20. Changes in certain determinants caused by development may affect the health and wellbeing of existing and new residents. The HUDU checklist interprets these determinants into a set of four themes for healthy urban living that can be used to assess residential development, as follows:

- Healthy Housing
- Active Travel
- Healthy Environment
- Vibrant Neighbourhoods

10.21. Specific criteria sit under each of these themes to cover a fuller range of determinants. These include access to health and social care, healthy food, freedom from pollution, open space, reducing crime and fear of crime, and access to employment and services.

10.22. The checklist and criteria were used to inform the proposed scope of the Health Chapter of this EIA and then provided the basis for the assessment stage, where the proposals (including embedded mitigation such as through the design of the project with reduced carbon emissions, enhanced public realm with a gain in street

trees, and enhanced accessibility to sustainable transport networks) were considered to each of the relevant determinants to identify the receptors that would be affected.

10.23. The use of checklists helps identify the topics that are relevant to the health impact assessment for the proposed development. This Health Chapter considers the direct implications for health such as the provision of housing and employment. Also, direct effects such as those arising through pollution, air quality, climate change, and safety risks, as well as accessibility to healthcare facilities and sustainable transport (public, cycling and walking) for healthy living. It further considers the wider implications for health and well-being, such as disturbance/nuisance, provision and accessibility to green infrastructure, amenity, cultural and recreational facilities.

10.24. 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 determinants of health and wellbeing. Searches were made through web-based sources and using Google Maps to measure approximate distances by walking or public transport from the centre of the development area to the facility. The proximity of open spaces and walking routes is investigated since access to open space and healthy modes of transport also contributes to healthier lifestyles and wellbeing.

10.25. Findings from the Socio-Economics Assessment (Chapter 12) are integrated as necessary taking into account the benefits arising from the Proposed Development, and the effects on demand for social and community infrastructure. Provision of good quality housing, access to employment and social infrastructure/open space are known to have positive effects on health and wellbeing. The summary findings from the Townscape & Visual Impact studies (Chapter 14) are considered as the quality of the local environment affects health and wellbeing. The Transport studies (Chapter 15) are considered since access to sustainable modes of transport contributes to improvements in health and wellbeing.

10.26. The key findings from the Air Quality (Chapter 6); Noise & Vibration (Chapter 11); Daylight, Sunlight & Overshadowing (Chapter 8); Solar Glare (Chapter 13); Climate Change (Chapter 7); Water Resources (Chapter 16); and Wind Microclimate (Chapter 17) 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.

10.27. 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. The key impacts for health are considered and inter-relationships are integrated within the four key themes identified for healthy urban living.

10.28. The proposed scope uses the approach as outlined above. 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. Therefore, the scope of the Health Chapter is in part dependent upon the study areas and potential receptors identified in the other technical assessments (such those for socioeconomics, visual impact, transport, noise, and air quality). Thus, the study area comprises the proposed development site with local surrounds in the City Centre, the wider study area of Manchester City, together with any implications for the North West of England – as applicable to each of the factors relevant to human health and wellbeing for the proposed project.

10.29. 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

10.30. 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, 2017-2019) and Office for National Statistics (ONS) for health and life expectancies (2017-2019), and as reported by Manchester City Council. The key

baseline from the other technical topics is considered, such as capacity of local facilities and employment/local expenditure statistics identified in the socio-economics assessment, and risks to health/wellbeing such as from air quality and noise/vibration, and risks associated with the effects of climate change. 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.

10.31. 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.

10.32. 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?

10.33. 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 takes into account the sensitivities of receptors (high, moderate, low) and as set out previously in Table 2.3 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 & 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

10.34. 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 socioeconomics; townscape & visual; traffic & transport; air quality; noise & vibration; daylight, sunlight & overshadowing; solar glare; climate change; and wind. Then, the overall likely significant effects on health have been determined in a qualitative way using professional judgment.

Limitations and Assumptions

10.35. This Health Chapter considers the findings relevant to human health of each technical impact assessment scoped into the Environmental Statement – Townscape & Visual (Chapter 14); Traffic & Transport (Chapter 15); Air Quality (Chapter 6); Noise & Vibration (Chapter 11); Socio-Economic (Chapter 12); Daylight, Sunlight & Overshadowing (Chapter 8); Solar Glare (Chapter 13); Climate Change (Chapter 7); Water Resources

(Chapter 16); and Wind Microclimate (Chapter 17) – 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

10.36. The Site is bounded by the River Irwell to the north and west, Liverpool Street to the east, with Water Street and Regent Street to the south in Manchester City Centre and it is currently a cleared site. The Site comprises approximately 4.4 ha of brownfield land in the form of a surface level carpark and is split into two parcels known as Site C and Site D – each approximately 2.2 ha – and divided by the A6042 Trinity Way that forms part of the Inner Relief Road.

10.37. Health Profiles: MCC has developed its own population forecasting model and this estimates that the residential population in 2019 was 576,500, compared to 568,100 in 2018. The higher figure is associated with high levels of construction, numbers of international students, and increasing demand for school places[29]. The rate of city population growth is likely to increase to over 627,000 by 2025. The Manchester State of the City Report (2020)[30] 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).

10.38. According to ONS data (2017-2019), life expectancy at birth for Manchester is 76.4 (males) & 80.3 (females) compared with 79.8 (males) & 83.4 (females) averaged for England. The proposed development is located on in the City Centre – 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). 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 of 15.5-31.1, (i.e least deprived with 48.4-62.7 indicating the most deprived) similar to the adjacent Piccadilly Ward. The Deansgate Ward also shows good health when other indicators are considered such as emergency hospital admissions, households in fuel poverty, and incidents of cancers. Childhood obesity is in the medium range for the city centre Piccadilly & Deansgate Wards, those Wards to the north and south have less, whilst Wards to the east have more childhood obesity. Reported street crime is high in the City Centre, as with other nearby Wards. Unemployment is low in the city centre.

10.39. Socio-Economics-Local Population: No people currently reside at the site. There is a rapidly growing population in Manchester City Centre and with a significantly denser population than all other areas of Manchester. The Local Assessment Area has been defined to reflect the anticipated catchment of the proposed development and is defined using Lower Super Output Area (LSOA) data for Trinity Island where this is available. The Local Assessment Area covers the core of Manchester city centre, including the LSOA that the site is located in, as well as surrounding LSOAs in the Salford Local Authority that borders the site and the city centre. As of 2019, the Assessment Area had a resident population of 53,546, equal to 9.7% of Manchester's population. Between 2011 and 2019 the population of the Assessment Area grew by 65.3% representing an uplift of 21,156 people, compared to 9.5% in the local authority population. 94.0% of the population of the Assessment Area is of working age (16-64 years), significantly higher than the proportion of the working age population at the Manchester (70.5%), Greater Manchester (63.6%) and national (62.4%) level. This profile corresponds with small proportions of children and older people living within the Assessment Area. As of 2020 a significant proportion of Manchester's working age population held a degree or higher degree. qualification.

10.40. Socio-Economics-Housing: There are no existing residential units on the site.

10.41. Socio-Economics-Employment: Jobs in the Assessment Area account for 45.5% of the total employment in Manchester, reflecting the Area's inclusion in the city centre economy. There is a concentration of employment in professional, scientific and technical activities, which is the most prominent sector by

employment within the Assessment Area. Overall, the Assessment Area is a centre for high-skilled service jobs, compared to Manchester and Greater Manchester. Between 2009 and 2019 GVA grew by 56%, a faster rate of growth than across Greater Manchester (41.6%) and nationally (42.1%).

10.42. Socio-Economics-Healthcare Facilities: There are 11 GP practices within 1 mile of the site with 5 of these accepting new NHS patients. There are 31 dental practices within 2 miles of the site.

10.43. Socio-Economics-Educational Facilities: There are 10 day nurseries within 1.2 miles of the site and of the 6 where information is available, all have places. There are 14 primary schools within 1.2 mile radius and at least 10 have additional capacity. There are 53 secondary schools within a 3 mile radius of the site and at least 17 have additional capacity.

10.44. Socio-Economics-Crime: The policing priorities for the area relate to anti-social behaviour, vehicle crime, and theft. Violent crime, theft from a person, and other theft accounted for about half of all crimes recorded within 0.5 mile radius of the site.

10.45. Socio-Economics-Open Space, Recreation & Amenity: There are 4 public green spaces within 1km radius of the site including gardens and Hulme Park. There are over 10 gyms and leisure/sports centres within 1.5 km of the site.

10.46. Townscape & Visual Impact: The centre of Manchester has been undergoing major new development in recent years with construction that affects most of the inner city character zones in some form or other. The baseline conditions in terms of townscape character and views were established at the current time in 2021 with the identification of relevant zones – Medieval Core; St Johns; Water Street; Great Jackson Street; Castlefield; Hulme; Salford; Ordsall – and each with identified and agreed representative viewpoints to form the basis for assessment.

10.47. Built Heritage: 30 heritage assets were identified within the study area – including 3 Grade I listed buildings and 25 Grade II listed buildings – and may affect 2 Conservation Areas – Castlefield and St Johns. There are no historic buildings or structures in the site itself; however, the site within the Castlefield Conservation Area and adjacent to the numerous listed buildings. The area surrounding the Site has witnessed dramatic cycles of development and decline. It was initially developed at the beginning of the 19th century into a dense industrial area until the decline of industry in early 20th century and the area became underused and derelict. Following construction of the Mancunian Way and associated road network in 1960s, the areas was redeveloped for low quality commercial uses.

10.48. Traffic & Transport: Site C is accessed by vehicles and pedestrians from Water Street and Site D is accessed from the Trinity Way. There is a link between the two sites underneath the Trinity Way Bridge that permits cars to cross from one car park to the other. Traffic collision data for 5 years to February 2020 indicated that there have been 56 accidents in the area of which 50 are considered to be slight and 6 categorised as serious with no fatalities and attributable to driver error with no evidence of any underlying highway safety issues.

10.49. Air Quality: The site is within the Greater Manchester Combined Authority AQMA and declared for nitrogen dioxide NO_2. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ are not predicted to exceed the relevant Air Quality Objectives (AQOs) in the baseline or opening year scenarios for the proposed development.

10.50. Noise & Vibration: The site is located in a busy inner-city area and the long-term noise environment at and around the site is principally determined by road traffic on Trinity Road and Regent Road. Noise levels to the east of the site are affected by train movements on the adjacent viaducts.

10.51. Climate Change: Greenhouse Gas (GHGs) emissions occur constantly and widely as a result of human and natural activity including energy consumption, industrial processes, land use, and land use change. The current use is a car park which is not operating and thus the site does not generate significant traffic flows or emissions. Essentially, there are zero transport, demolition and building GHGs associated currently with the site.

10.52. Daylight, Sunlight & Overshading: The site is currently a used surface level carpark and as such has an unusually open aspect given its city centre location and this does contribute to higher baseline results for the surrounding receptors. A total of 986 windows facing the site serving 758 rooms within 9 buildings were assessed for daylight effects (vertical sky component VSC and no sky line NSL, and 156 rooms were assessed for annual probable sunlight hours (APSH) for sunlight within 5 buildings. For daylight, 63% of windows assessed met BRE guidelines for VSC and 82% for NSL. For sunlight, 90% of the rooms assessed meet the

criteria for winter and annual APSH. For overshadowing, The Factory was found to meet the BRE criteria for sun hours on ground (SHOG).

10.53. Solar Glare: Glare of solar dazzle can occur when sunlight is reflected from a glazed façade. This can affect road users outside and the occupants of adjoining buildings and it is only likely to be an issue for some heavily glazed or mirror clad buildings.

10.54. Water Resources: The River Irwell is located along the north-western boundary of the site. The River Medlock is approximately 125m to the south-east, and the Bridgewater Canal is approximately 170m south-east of the site. Three public sewers were identified to be relevant within the vicinity of the site. Levels tend to generally fall towards the River Irwell, and there may be historical drainage across both sites and further CCTV surveying will determine this at the detailed design stage. The site sits predominantly in flood zone 2 (medium probability) with some minor areas of flood zone 1 (low probability) along the eastern boundary of Site C and the southern boundary of Site D. There are no known risks from groundwater flooding and the site is at very low risk of flooding from surfacewater.

10.55. Wind Microclimate: Within the boundary of the Site there are no exceedances of the pedestrian safety criteria and wind conditions rate – at worst – as suitable for walking in comfort during the winter months. Within the areas surrounding the Site, there is only one localised exceedance of the pedestrian safety criteria (receptor no. 55 within the One Regent development). There are 3 exceedances of pedestrian comfort criteria at receptor no's 55 & 56 (bus stops along Regent Road) and no. 55.

Identification and Evaluation of Significant Effects and Mitigation Measures

10.56. Socio-Economics-Housing: The Proposed Development will deliver a significant 1,950 new homes, making a notable contribution to Manchester's housing growth targets in the recent spatial framework (3,533 per annum), and supporting the proposed focus for much of Manchester's housing growth to be delivered in the city centre. High density development such as this also helps to ensure there remains sufficient sites available to accommodate forecast population and employment growth in the city centre. The Proposed Development is on an underutilised site and does not currently have any residential provision. The residents are expected to be largely additional to the area and would support a net uplift in the Assessment Areas population of 4,000, representing a 6.9% population uplift. It is possible that an increase in the population could lead to potential negative impacts, such as increased crowding, noise, and nuisance in the immediate area. However, the plans show that the proposed development will help to regenerate an area which is currently underutilised, providing high quality accommodation close the River Irwell, helping to mitigate potential negative effects. Therefore, impacts are Moderate Beneficial on population.

10.57. Socio-Economics-Employment & Local Expenditure: During the construction phase, the number of construction workers on site will vary across the construction phase dependent on requirements at each stage. The impact on employment and GVA is considered to have a temporary, short-term Minor Beneficial effect at the local authority level. The construction workers are expected to generate local expenditure while working at the Site – consider to be temporary and Minor Beneficial.

10.58. During the operational phase, the proposals will deliver commercial space expected to be occupied by food/drink operator – considered to have a Negligible impact on employment and GVA at the local level. The additional households accommodated in the proposed development will support additional household spend, increasing local expenditure and this is predicted to be Moderate Beneficial for the local economy. The addition of new homes in the Assessment Area will generate additional Council Tax revenue for the City Council and this is considered to be Moderate Beneficial.

10.59. Socio-Economics-Healthcare Facilities: The new development is expected to accommodate a relatively young demographic suggesting residents may have a lower demand for healthcare than the older population, limiting the likely magnitude of the impact upon local healthcare providers. Minor Adverse on healthcare facilities at the local scale.

10.60. Socio-Economics-Educational Facilities: Additional demand for school places is expected from the uplift of residents in the area but there is sufficient capacity available indicating that impacts on educational provision are Negligible.

10.61. Socio-Economics-Open Space, Recreation & Amenity: Additional use of open spaces and demand for recreational facilities is expected as a result of the uplift in population arising from the proposed

development. Despite the additional public realm and onsite residential amenities, the significant uplift in residents is likely to impact on nearby open space and recreational facilities that are **Minor Adverse**.

10.62. **Socio-Economics-Crime:** The proposed development will be of high quality with high standards of buildings and management, with associated public realm increasing connectivity, helping to animate the area, provide natural surveillance, and create a better sense of place and community. This can help to reduce some types of criminal activity such that impacts are considered to be **Negligible** on crime at the local scale.

10.63. **Townscape & Visual Impact**: During the construction period that will last for approximately 9 years, potential unsightly visual impacts will be mitigated through high quality hoardings. This would affect mostly those Townscape Character Zones immediately adjacent to the site and impacts are predicted to **Moderate – Minor Adverse** depending upon proximity. This is due to demolition works, stockpiling of materials and the use of equipment such as cranes. However, effects are relatively localised, temporary and will not affect other Character Zones in any measurable way.

10.64. For the occupational phase, mitigation measures are embedded and an integral part of the design, dealing with the proposed development's relationship to neighbouring buildings and its location. The proposals will have a limited effect in the core city centre zones largely due to the presence of Deansgate Square, Crown Street, Elizabeth Tower, and Axis developments. For those zones where significant effects were identified, most effects are recorded as **Minor-Moderate Beneficial** (viewpoint nos: 5, 6, 7, 8, 15, 17 ,19 and 1, 2, 9, 10, 12, 13, 18). For 5 viewpoints (nos: 14 and 3, 4, 11, 21), where the historic character is the dominant feature of the townscape character, the effects are predicted to be **Minor- Moderate Adverse** in nature as the scale of the change is, occasionally, overwhelming and inconsistent with existing character or view. This is largely confined to the area surrounding MOSI or specific elements of Castlefield Basin. Elsewhere (viewpoint nos: 16 & 20), the effects are recorded as **Negligible** Beneficial.

10.65. **Built Heritage**: The Site is not considered to yield any heritage value and it is not considered to enhance the character of the Conservation Area. The proposed development will not result in any physical impacts on the surrounding heritage assets, but there is possibility for adverse effects on the settings of the surrounding identified heritage assets. During the construction phase, the potential effects of the demolition and construction activities will result in temporary, localised **Minor Adverse** impacts on the ability to understand and appreciate the settings of the Grade I listed Railway Bridge over the River Irwell, the Grade II listed Railway Viaduct, and the Grade II MSJ&AR Viaduct.

10.66. For the completed development and occupational/operational phase, heritage considerations have been integral to the design of the proposals to ensure that potential adverse visual impacts on the identified heritage assets are minimised. The proposals will result in instances of **Moderate and Minor Adverse** impacts in relation to the visual impact on the understanding and appreciation of the MSI complex (including views along Liverpool Road) and the views from within the Castlefield Basin. It is not considered that this impact will affect the character and appearance of the Castlefield Conservation Area as a whole – **Negligible**.

10.67. **Traffic & Transport**: During the construction phase, the estimated daily trips for HGVs would not significantly affect the existing traffic flows or significantly increase the proportion of HGVs indicating that effects are Minor Adverse which is Not Significant with regard to pedestrian delay, pedestrian amenity, fear and intimidation, severance, and accidents and safety.

10.68. During the operational phase, traffic flows at the identified links are not predicted to increase over 30% and therefore, impacts on severance are **Negligible**. Highway capacity predictions show that there will be capacity with minimal queuing and delay resulting in **Negligible** impacts on driver delay including public transport users. The proposed development will provide improvements to the pedestrian environment including widening of footpaths and effects have been identified to be **Negligible** on pedestrian delay and pedestrian/cyclist amenity. The studies indicated that there will be **Negligible** impacts on fear/intimidation, as well as for accidents and safety. Car parking provision at the site is limited and seeks to discourage car ownership for future residents. A significant level 1:1 of cycle parking will be provided and this will encourage more sustainable transport and movement, together with the enhancements to the public realm/pedestrian and cycle environments and 70 visitor Sheffield stands.

10.69. **Air Quality**: Construction traffic will likely access the site from Trinity Way and Water Street and sensitive receptors to dust and road vehicle exhaust emissions were identified for up to 350m from the site. During earthworks, construction & trackout, dust soiling was identified as Moderate Adverse – Major Adverse, and for risks to human health as Minor Adverse – Moderate Adverse. However, mitigation measures will be

implemented through a Construction Environmental Management Plan (CEMP) and effects from all dust generation activities are reduced to **Negligible**. For construction traffic generation, impacts on annual mean NO_2 and PM concentrations were predicted to be **Negligible**.

10.70. For the operational phase 2026 first occupation, sensitive human receptors were identified as residents at 20 locations within 200m of the affected highway network. Impacts on annual mean NO_2 concentrations as a result of road vehicle exhaust emissions associated with the proposed development are predicted to be **Negligible** at 36 sensitive receptor locations, minor adverse at 1 location and moderate adverse at 2 sensitive receptor locations. Impacts on annual mean PM_{10} concentrations and annual mean $PM_{2.5}$ concentrations as a result of road vehicle exhaust emissions associated with the Proposed Development was predicted to be **Negligible** at all sensitive receptor locations. For the operational phase the predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of construction and operational phases exhaust emissions were predicted to be **Negligible**.

10.71. **Noise & Vibration**: Five nearby sensitive receptors were identified – all residential – Wilburn Basin, One Regent, Liverpool Road, Hotel Campanile, and the Vie Building. During the construction phase, there is the potential for noise and vibration effects from clearing and excavation of the site, additional traffic flows, and the construction of the proposed development. For excavation and piling activities, effects were found to be Minor Adverse- Negligible. For the frame construction activities, effects were identified to be Minor Adverse – Negligible for 4 receptors and Minor-Moderate Adverse for Liverpool Road. Mitigation will be provided through provision of a solid close-boarded hoarding around the site and other working arrangements as detailed in the CEMP, including working hours and precise location of noisy plant, such that the noise effects will be reduced to Negligible at all sensitive receptors. Construction vibration was found to be **Negligible** for all receptors. During operation/occupation of the towers, the noise impacts of mechanical plant serving the buildings was found to be **Negligible** since building services noise limits have been designed to ensure compliance with guidelines. Environmental noise limits relating to activity noise egress from the proposed amenity spaces and commercial units have been established through project design to ensure compliance with guidelines such that effects are **Negligible**.

10.72. **Climate Change**: Activities during the construction phase would generate GHG emissions particularly from the manufacture of construction materials and also from transport to and from the site. Whole Life Embodied emissions were found to be **Moderate – Minor Adverse**; whole life carbon reduction measures may be further explored in later design stages where possible. Transport emissions may be reduced through use of local materials where possible and controlling vehicle movements through the CEMP.

10.73. 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 development would generate GHG emissions, particularly from the demolition, waste processing, and the disposal of building elements. Thus, three categories of GHG emissions were investigated for a 60-year life – whole life embodied carbon, operational and transport emissions. Transport carbon emissions were found to be the largest share of all carbon categories. Operational building emissions were identified to be Major to Moderate Adverse, reduced **to Moderate to Minor Adverse** through mitigation measures suggested in the energy Strategy. Operational transport emissions were found to be Major to Moderate Adverse, reduced to **Moderate to Minor Adverse** through mitigation measures set out in the Travel Plan, and including provision of up to 20% demand-led Electric Vehicle charge (EVC) with spaces future-proofed for installation as and when required.

10.74. **Daylight, Sunlight & Overshading**: The surrounding sensitive receptors were investigated and overall, it was found that the impacts on daylight to surrounding properties are considered to be **Negligible to Moderate Adverse**, the impacts on sunlight are considered to be **Negligible to Minor Adverse**. Such impacts are **Not Significant** in EIA terms, and no further mitigation is necessary. The effects of overshadowing on the amenity area of The Factory were found to be **Negligible** as the amenity areas still meet the BRE criteria for SHOG.

10.75. **Solar Glare**: As the site is near to several sensitive road junctions and rail tracks, an iterative review process was undertaken to investigate options and then to incorporate mitigation strategies within the detailed façade design. Embedded mitigation within the façade design includes for C1 and C2, the use of tilted glazed panel, non-specular purge ventilation panels and non-specular anodised aluminium strips. Additionally, for the lower portion of the buildings that are visible near to the direct line of sight of a driver at a nearby junction, a frit pattern has been applied to the outer surface of shadowboxes and for vision glazing, a low Visible Light Reflectance (VLR) glazing has been selected to reduce the intensity of reflections. For D1 and D2, the facetted nature of the curved facades results in reflections occurring a slightly different times to the

adjacent panel, non-specular anodised aluminium panels, non-specular purge ventilation panels, imitation purge ventilation panels and vertical fins have also been included. Additionally, the VLR of all glazing within D1 and D2 has been minimised.

10.76. During construction, and as the facades of the towers are installed, the potential solar glare effects would progress to be similar to those for the completed development, and this was identified to be **Minor Adverse** which is **Not Significant** for both rail and road drivers. During the operational phase, 31 locations for road users and 6 rail tracks were identified to have **Negligible/Minor to Minor Adverse** effects which is **Not Significant**. For 6 road locations and 3 rail tracks, **Moderate Adverse** effects were identified from solar glare – however, it was determined that these effects would not present any safety issues.

10.77. **Water Resources**: During the construction phase, there are risks of contamination to the water environment – ground and surface waters. Also, a risk to construction from the unlikely event of large flooding from the River Irwell; also, unlikely risk of flooding from a reservoir should there be a breach in the dam. Implementation of measures through the CEMP will ensure that there is no contamination and **Negligible** impacts. The unlikely risk of flooding from the river or the reservoir will be mitigated through robust flood evacuation plans – with **Negligible** impacts.

10.78. During the operational phase, the finished floor levels of the buildings have been designed to limit risks from river flooding, and together with flood resilient construction, will reduce any risks to **Negligible**. The unlikely risk of a reservoir flooding event will be mitigated through the development of a robust flood evacuation plan and future building management – **Negligible** impacts. The proposed development will include a positive surfacewater drainage system to enable a limited local surfacewater discharge into the local sewerage system resulting in **Negligible** impacts on fluvial flooding.

10.79. **Wind Microclimate**: During the various stages of the construction phase, potential effects will vary and likely be of lesser magnitude than those that will be experienced on completion and considered to be Negligible. During the operational phase, there is the potential for adverse effects on pedestrian safety and comfort along pedestrian routes, at building entrances, in waiting areas, and at leisure open areas in the surrounding areas. Within the boundary of the Site, it was determined that there will be no exceedances of the pedestrian safety criteria at street level and effects are Negligible. Localised breaches of the safety criteria could occur across some the terraced part of the Proposed Development. Within the areas surrounding the Site, the introduction of the buildings C1&2, D1&2, the exceedance of the pedestrian comfort criteria at receptor 56 (bus stop) disappears – Moderate Beneficial and Not Significant. The exceedances at receptors 51 & 55 persist and considered to be Negligible. Wind conditions at 14 other receptors deteriorate by one comfort category during the winter months but remain suitable for their intended use – Moderate Adverse and Not Significant. Wind mitigation measures include trees in soft and hard landscapes, instant hedges, and 50% porous baffles.

Cumulative Effects

Temporary during Construction Phase

10.80. Each separate technical topic has considered the relevant effects for health and wellbeing that could be cumulative with other nearby development projects. Whilst it is acknowledged that this part of Manchester's City Centre has been subject to regeneration over a number of years, 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.

10.81. During the approximately nine-year construction time period, there are the possibilities for cumulative adverse impacts on air quality - dust soiling from activities and emissions from transport; noise from demolition and construction activities; transport disturbance; and loss of amenity for pedestrians and motorists. However, cumulative effects were identified to be Negligible through implementation of the CEMP for noise, air quality, transport, and the Travel Management Plan (TMP) for pedestrian and motorist amenity and safety.

10.82. During the construction phase, there are Beneficial effects for employment and local expenditure; in-combination (cumulative) effects arising during construction of nearby development projects will provide a

temporary boost in employment and GVA. Provision of employment is known to have positive effects on health and wellbeing.

Operational Phase

10.83. Taking into account other residential developments within 500m of the proposed site, the cumulative impacts are likely to make a **Major Beneficial** contribution to the City's housing needs, including the commitment to higher densities. The cumulative increase of population with around 90% expected to be of working age making a Moderate Beneficial contribution to the city's workforce supporting economic growth objectives and a notable cumulative uplift in employment, GVA and local expenditure. The scale of cumulative residential developments will lead to a significant influx of residents over the next five years with Minor-Moderate Adverse cumulative impacts on healthcare facilities. Increased pressure of local services, open space and recreational facilities is also expected from the cumulative scale of development, although a number of developments are providing additional amenity, public space and leisure facilities.

10.84. For the built heritage, the overall cumulative effects of the committed developments, alongside the Proposed Development in 2031 is not considered to cause any additional significant impact on the baseline historic built environment. Therefore, **Moderate-Minor Adverse** on the settings of the SIM complex and **Negligible** cumulative effects on the Castlefield Conservation Area. For townscape and visual, most effects were found to be **Minor-Moderate Beneficial**, with the exception of 5 viewpoints associated with the area surrounding MOSI or specific elements of Castlefield Basin. For cumulative effects, as other developments are built, the proposals will be seen in the context of a greater number of similar developments of equivalent scale such that there will be a general lowering of these adverse cumulative effects. For solar glare, additional developments could obscure the view of the proposed development from certain viewpoints and thus would reduce instances of solar reflections.

10.85. Traffic? enhancements to pedestrian/cycle environments? Given the relative distances of the identified sensitive receptors to each development, the cumulative impacts of building services noise will be **Negligible**.

10.86. It is assumed that all nearby developments will meet with national requirements regarding risks of flooding of contamination of the water environment – potential negative impacts will be mitigated for each site such that there will be no significant cumulative negative impacts on the water environment. Where consented schemes have the potential to be affected by the proposed development, these have been included in the baseline scenario and assessed individually in detail, so no separate technical assessment of the cumulative impact is required with regard to daylight, sunlight and overshadowing. The on-site and off-site wind conditions are not appreciably different taking into account the effects of the Proposed Development with or without other nearby committed developments.

Residual Effects

10.87. Post-mitigation residual effects are summarised in the table 10.2, as follows:

Table 10.2 – Summary of Receptors, 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 10.29 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				
Socioeconomics: jobs & GVA	Employment & GVA	None	None	Minor Beneficial on employment & GVA
Construction workforce local expenditure	Local expenditure	None	None	Minor Beneficial on local expenditure
Air Quality	Fugitive Dust - Dust Soiling	Table 6.24: The Proposed Development will incorporate the specific construction phase mitigation	Construction Phase Environmental	Negligible dust impacts to property and people on a temporary basis

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
	& Human Health	measures outlined in the IAQM guidance.	Management Plan (CEMP)	
Air Quality	Existing Residential and Educational Use	Sustainable construction phase travel plan to reduce HGV movements during construction	Construction Phase Environmental Management Plan (CEMP)	Minor Adverse impacts upon existing sensitive uses on a temporary basis
Built Heritage	Settings of Railway Bridge & Viaducts	None	None	Minor Adverse
TVIA	Nearby residents & visitors	Use of hoardings & community engagement	Construction Phase Environmental Management Plan (CEMP)	Minor Adverse
Traffic & Transport – driver delay - accidents & safety	Drivers using network	Construction Transport Management Plan CTMP	CTMP to be developed & agreed with relevant consultees	Negligible Temporary
Traffic & Transport – public transport, pedestrian delay, pedestrian/cycling amenity, fear & intimidation, severance	Residential on Liverpool St & vulnerable road users	Construction Transport Management Plan CTMP	CTMP to be developed & agreed with relevant consultees	Negligible Temporary
Noise & Vibration	5 residential sensitive receptors	Solid screening around site, CEMP	CEMP	Negligible Temporary
Solar Glare	31 road user & 6 rail track locations	Embedded in design facades	None	Negligible/Minor Adverse
Solar Glare	6 road user & 3 rail track location	Embedded in design facades	None	Moderate Adverse but no issues for safety
Climate Change – whole life embodied emissions	Climate Change & carbon targets	Materials – whole life reduction Construction Traffic - CEMP	CEMP	Moderate to Minor Adverse
Water – fluvial flooding; reservoir flooding	Onsite workers	Robust flood evacuation plan	CEMP	Negligible
Water – contamination	Groundwater & surfacewater	Storage & use of materials	CEMP	Negligible
Wind Microclimate – pedestrian safety & comfort	Residents & visitors	None	None	Negligible
Operational Phase				
Socioeconomics: Housing	Housing	None	None	Minor Beneficial on Housing
Socioeconomics: Population	Population	None	None	Moderate Beneficial on Population
Socioeconomics: Jobs & GVA	Employment & GVA	None	None	Negligible on employment & GVA
Socioeconomics: household expenditure	Local expenditure	None	None	Moderate Beneficial on local expenditure
Socioeconomics: council tax income	LA income	None	None	Moderate Beneficial on LA income

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Socioeconomics: educational provision	Educational provision	None	None	Minor Adverse on educational provision
Socioeconomics: health care provision	Healthcare	None	None	Minor Adverse on healthcare provision
Socioeconomics: crime	Crime	None	None	Negligible on crime
Socioeconomics: open space & recreation facilities	Open space & recreational facilities	None	None	Minor Adverse on open space & recreational facilities
Air Quality	Road Vehicle Traffic Exhaust Emissions	None	None	Negligible exposure to elevated pollutant concentrations on a permanent basis
Air Quality	Residential Use	Best practice measures	Section 6.123 to 6.126: Proposed Development will consider a significant level of offsetting measures in the form of sustainable transport principles. The provision of EVC charging facilities (up to 20% provision) as well as cycle parking facilities (100% provision) will secure a suitable reduction in development related road vehicle exhaust emissions	Negligible impact upon existing sensitive uses on a permanent basis
Built Heritage	Setting of the MSI complex	Embedded into design	Embedded into design	Moderate – Minor Adverse
Built Heritage	Castlefield Conservation Area	Embedded into design	Embedded into design	Negligible
TVIA	Viewpoint Nos: 16, 20	Embedded into design	Embedded into design	Negligible
TVIA	Viewpoint Nos: 5, 6, 7, 8, 15, 17, 19	Embedded into design	Embedded into design	Minor Beneficial
TVIA	Viewpoint Nos: 1,2 9, 10, 12, 13, 18	Embedded into design	Embedded into design	Moderate Beneficial
TVIA	Viewpoint Nos: 14	Embedded into design	Embedded into design	Minor Adverse
TVIA	Viewpoint Nos: 3, 4, 11, 21	Embedded into design	Embedded into design	Moderate Adverse
Traffic & Transport – driver delay	Drivers using network	Enhancement to capacity at Trinity Way/Water St junction	Secured by condition &	Negligible

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
- accidents & safety	Public transport users		implemented prior to occupation of Site D	
Traffic & Transport –pedestrian delay, pedestrian/cycling amenity	Residential on Liverpool St & vulnerable road users	Provision of high quality public realm in the site & improvements to existing footways and cycleways	Publicrealm as part of proposals; improvements to pedestrian & cycle facilities to be by condition	Negligible
Traffic & Transport – fear & intimidation, severance	Residential on Liverpool St & vulnerable road users	None	None	Negligible
Noise & Vibration – building services; activity/amenity noise	5 residential sensitive receptors	Design of building services, amenity spaces & commercial units	None	Negligble
Solar Glare	31 road & 6 rail track users	Embedded into design of facades	Embedded into design	Negligible/Minor Adverse Not Signficant
Solar Glare	6 road & 3 rail track users	Embedded into design of facades	Embedded into design	Moderate Adverse & Significant but no issues for safety
Building Emissions	Climate Change	Measures suggested in Energy Strategy	Energy Strategy	Moderate to Minor Adverse
Transport Emissions	Climate Change	Measures suggestd in Travel Plan	Travel Plan	Moderate to Minor Adverse
Water – surfacewater flooding	Site & occupants	Development will include positive surfacewater drainage system to minimise discharge into local sewerage system	Designed into system	Negligible
Water – fluvial flooding	Site & occupants	Finished floor levels; flood resilient construction; flood evacuation plan	Designed into building Flood evacuation plan	Negligible
Water – reservoir flooding	Site & occupants	Flood evacuation plan	Flood evacuation plan	Negligible
Daylight & Sunlight	Surrounding residential properties	None	None	Negligible to Moderate Adverse
Overshadowing	Surrounding amenity areas	None	None	Negligible to Minor Adverse
Wind Microclimate – pedestrian safety & comfort	Receptors D, G, J, K, L, M	None specifically	None	Major Adverse
	Receptor 6	Section 2 Appendix 17.1	-	Moderate Adverse – Significant
	Receptors 26-30, 32-3, 48-50, 59, 72-73, 77	Section 2 Appendix 17.1	-	Moderate Adverse – Not Significant
	Receptor 55	-	-	Major Beneficial – Not Significant
	Receptor 56	-	-	Moderate Beneficial – Not Significant
	All other receptors	Section 2 Appendix 17.1	-	Negligible

Summary

Healthy Housing:

10.88. The Proposed Development will deliver 1,950 new homes and access to good quality housing is known to have positive effects for health and well-being. The overall design is acceptable within the context of a vibrant city centre area and the proposals complement and fit with the emerging pattern of townscape character in a consistent way, through the embedded mitigation that is integral to the design of the buildings. The development once completed was found to have negligible to positive effects for most of the local townscape character and visual impacts in the local and surrounding areas – moderate adverse effects were only identified for 4 viewpoints associated with the surrounding SIM and specific elements of Castlefield Basin. As other developments are built, the proposals will be seen in the context of a greater number of similar developments of equivalent scale such that there will be a general lowering of cumulative effects. Overall, all contributing to overall positive effects for Healthy Housing.

10.89. The new homes and their residents are considered to have a negligible effect on the availability of local schools and nurseries, and minor negative effects on healthcare facilities, including GP and dental practices. Impacts on the use of local open space, recreational and amenity facilities are also minor negative. The change from a site with unused carparking to a lived-in area will contribute to safety and security. Overall, the proposed development will have major positive effects for Healthy Housing.

Active Travel:

10.90. The proposed development is located at the heart of the City Centre that 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, and including easy access to wider routes for active travel such as NCR 6 on Liverpool Road and attractive routes along the Bridgewater Canal and the River Irwell. The proposals include limited car parking but significant cycle parking, and together with a Travel Plan, it is anticipated that the number of car trips will be minimised, and residents will be encouraged to use sustainable transport modes. Overall, the location of the site in an area with excellent accessibility to public transport, and with excellent 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:

10.91. The site is a previously developed brownfield site but the risk of pollution from previously contaminated land and any associated risk to human health has been considered to not be significant and it has not been necessary to investigate this technical topic any further in this ES. The site is mostly within flood zone 2 with a medium probability of flooding (and some flood zone 1 of low probability) and therefore, there is some potential risk to human health and well-being from both fluvial flooding and a very unlikely risk from reservoir flooding due to a breach in the dam wall. During construction, potential risks of flooding for site workers, is mitigated through the implementation of a Construction Environmental Management Plan (CEMP). Risks of contaminating water resources are also controlled through the CEMP. During the operational phase, occupants are protected from flood risk through the design of the buildings with appropriate finished floor levels and flood resilient construction, and the preparation of a flood evacuation plan in the unlikely risk of flooding from the river or the reservoir. The impact assessment for water resources has taken into account the predicted effects of climate change on the water environment. Thus, overall, the risk to human health and wellbeing through flood risk has been addressed and identified to be negligible.

10.92. 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 on a daily basis to a main holding skip, thus minimising risks to health and safety. The contractor will

ensure that regular contact is made with local 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.

10.93. Air quality effects on the future residents from NO_2 and PM emissions are Negligible. Noise effects were found to be Negligible during construction through management and screening. During operation, pollution from vehicle exhausts was found to be Negligible. Noise effects are Negligible through design of building services plant, together with the design of amenity spaces and the commercial units to minimise potential noise to within guideline levels.

10.94. There is a risk to human health and safety from the glare of solar dazzle that can occur when sunlight is reflected from a glazed façade. This could affect road and rail drivers and users of adjacent buildings. The assessment considered a worst-case scenario and found that overall effects from solar glare on road users and tram drivers is mostly Negligible-Minor Adverse and this is Not Significant. For 6 road locations and 3 rail track locations, Moderate Adverse effects were identified, and this is significant, but it was confirmed that there are no issues for safety. It is also noted that as other developments are constructed nearby, they could obscure some viewpoints and reduce solar glare in the longer term.

10.95. Lack of daylight/sunlight and overshadowing can adversely affect health and well-being. In a city centre area, there is an expectation for a higher density of development and a lower sensitivity to such issues depending upon the context of the development and its surroundings. The regeneration of the St. John's area accepts that the height and density of buildings will increase at such a key gateway to the city centre. The studies investigated the surrounding residential buildings for daylight/sunlight and a nearby amenity area for overshadowing and identified that effects would not be significant within the context of a regeneration area in the city centre, and thus not significant with regard to a healthy environment.

10.96. The pedestrian comfort and safety for thoroughfares, pavements/walkways, bus stops, and entrances for the Site and surrounding buildings and effects were found to be Negligible for most of the receptors investigated, indicating that the wind environment is suitable for the intended uses. Localised breaches of the safety and comfort criteria occur across some of the terraced part of the Proposed Development and bespoke wind mitigation measures will be needed here. Over the 60-year life of the buildings, there will be moderate adverse but non-significant effects on climate with potential associated risks for human health with more extreme weather conditions. Mitigation measures, particularly the transition to sustainable transport, should limit such effects in the longer term and contribute to a healthier environment.

10.97. The proposals include up to 20% demand-led ECV provision with spaces future-proofed. GHG emissions from buildings and transport are likely to be Moderate to Minor Adverse during occupation and the whole life embodied emissions calculated to be Moderate to Minor Adverse. It was also calculated that the GHG emissions from proposed development are so small relatively that they will not influence the achievement of the Greater Manchester carbon budgets.

Vibrant Neighbourhoods:

10.98. The delivery of the good-quality housing on the site will contribute to the neighbourhoods developing around as other developments are completed. The proposals include 1.29 ha of new public realm and landscaping – all will contribute to Vibrant Neighbourhoods. Provision of and access to employment is known to have a positive effect on health and wellbeing – the proposals will have moderate beneficial impacts on local expenditure, supporting new jobs, and also on local authority income. The additional employment created and positive effects on the local economy will further contribute to Vibrant Neighbourhoods. The change from a site with unused car parking to a lived-in and vibrantresidential area will contribute to a reduction in crime and an improvement in community safety.

Reference List

10.99. This ES Chapter has been prepared by reference to the following:

- National Planning Policy Framework (NPPF, updated 2019 & revised 2021) https://www.gov.uk/government/publications/national-planning-policy-framework--2
- Public Health England (PHE) Strategy (2019) *Public Health England (2019) Strategy 2020-2025*
- Manchester City Council (MCC) Core Strategy (adopted 2012)
- St John's Strategic Development Framework (update 2016) https://secure.manchester.gov.uk/downloads/download/6583/st_johns_strategic_regeneration_framework

- Places for Everyone – Joint Development Plan (Greater Manchester Councils 2021 https://greatermanchester-ca.gov.uk/news/greater-manchester-councils-to-set-out-next-steps-with-places-for-everyone-joint-plan/
- 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
- 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
- The Manchester Strategy - Our Manchester (2016) https://www.manchester.gov.uk/mcrstrategy
- 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* www.iema.net https://www.iema.net/resources/reading-room/2017/05/01/get-primed-for-health-in-eia
- *Shaping Neighbourhoods: For Local Health and Global Sustainability* (2010) *Barton H, Grant M & Guise R (2nd edition 2010) Shaping Neighbourhoods: for local health and global sustainability Taylor & Francis Ltd, England*
- Wider Determinants of Health Public Health England (PHE) https://fingertips.phe.org.uk/profile/wider-determinants
- The London Healthy Urban Development Unit (HUDU) '*Healthy Urban Planning Checklist'* (2017) https://www.healthyurbandevelopment.nhs.uk/wp-content/uploads/2019/10/HUDU-Rapid-HIA-Tool-October-2019.pdf
- Manchester City Joint Strategic Needs Assessment (JSNA 2021) https://www.manchester.gov.uk/info/500230/joint_strategic_needs_assessment
- Public Health England (PHE, 2017-2019) https://fingertips.phe.org.uk/profile/health-profiles
- Office for National Statistics (ONS) for health and life expectancies (2017-2019)

https://www.ons.gov.uk/peoplepopulationandcommunity

- Manchester City Council https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/2178/health_and_wellbeing
- Manchester City Council https://secure.manchester.gov.uk/info/200088/statistics_and_intelligence/438/population/2
- Manchester City Council https://www.manchester.gov.uk/downloads/download/7316/state_of_the_city_report_2020
- Manchester City Council https://cleanairgm.com/monitoring-reports/

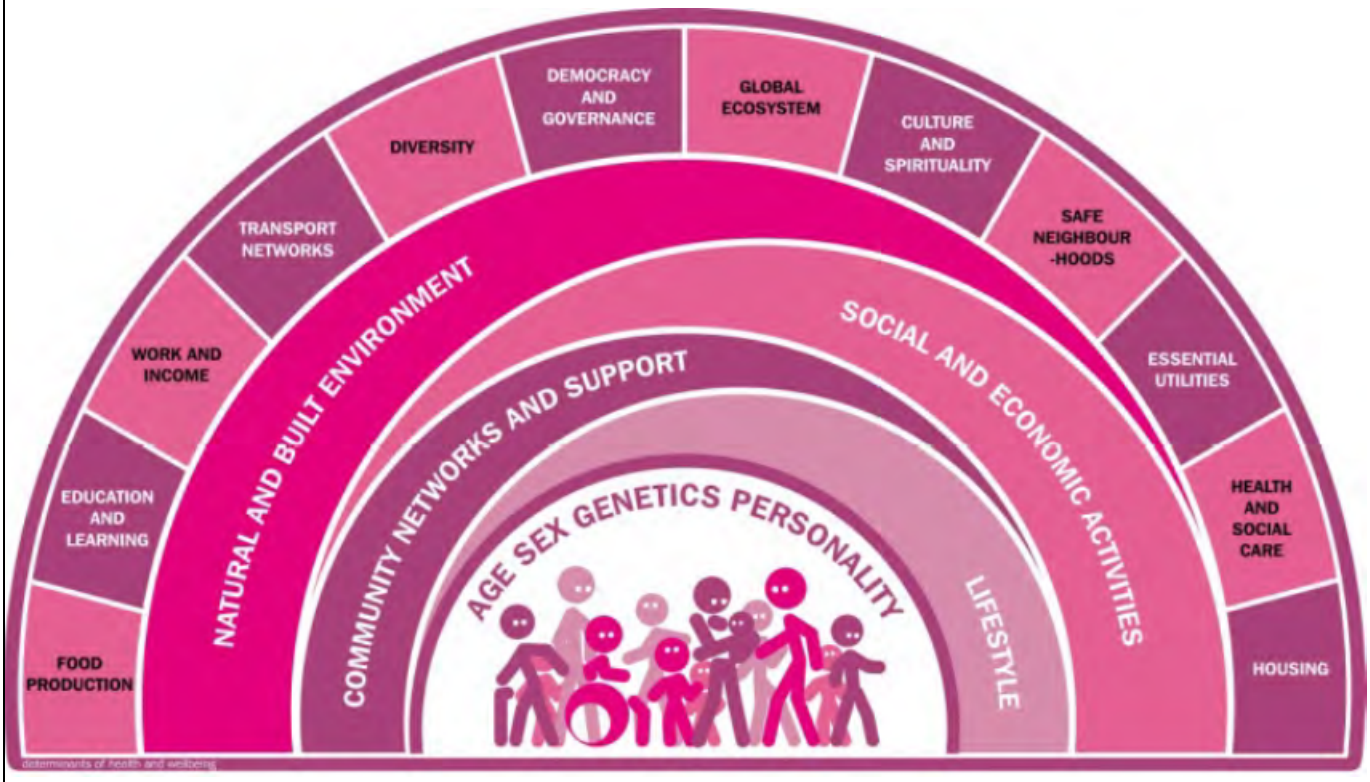


	Figure:	10.1		
	Title:	The Determinants of Health and Wellbeing (London HUDU developed from Barton & Grant 2007)		
	Project:	Trinity Islands		
	Date:	November 2021	Scale:	NTS

11. Noise

Introduction

11.1. This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to noise and vibration. 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 negative effects; and the likely residual effects after these measures have been adopted.

11.2. This Chapter has been compiled by Fisher Acoustics Ltd. Fisher Acoustics has extensive experience in the acoustic design of large-scale residential and commercial developments. The Director of Fisher Acoustics is a Chartered Engineer, holds a First Class Bachelor of Engineering in applied acoustics and has 30 years post-graduate experience in acoustic consultancy.

11.3. Appendices to this Chapter are as follows:

- Appendix 11.1: Environmental Noise Study, report reference PR0661-REP01-MPF
- Appendix 11.2: Technical Note, Acoustics, Ventilation & Overheating, reference T01-PR0634-MPF

Legislative and Policy Context

Legislation

11.4. The Control of Pollution Act 1974 contains powers for local authorities to deal with noise and vibration from construction and demolition sites. Prior consent for demolition and construction activities can be granted under Section 61 of the Act.

11.5. The Planning and Compulsory Purchase Act 2004 requires local authorities to draw up local development plans, setting the broad framework for acceptable development in their area and reconciling any potential conflicts. Under the Town and Country Planning Act 1990, and in their development management role, local planning authorities may attach conditions to Planning Consents which may include controls on the emission of noise. Advice on the use of these powers is given to English authorities in the light of the Governments Noise Policy Statement for England in the National Planning Policy Framework (July 2021).

11.6. The Environmental Protection Act 1990 provides the principal controls over so-called 'statutory nuisances', including noise emitted from premises so as to be prejudicial to health or a nuisance. Under the Act, local authorities have a duty to inspect their areas from time-to-time to detect nuisances and, subject to a discretion to defer for seven days, when satisfied that a statutory nuisance exists or is likely to occur or recur, to serve an abatement notice on the person responsible. They also have a duty to investigate any complaint made by a person living within their area. Businesses are able to rely on the provision of 'best practicable means' to attenuate noise sources, but failure to comply with a notice is a criminal offence. Local authorities have a power of entry to private premises, power to seize noise-making equipment and powers to carry out works in default of Notices.

11.7. The Licensing Act 2003 establishes a scheme administered by local authorities for licensing premises which are used for the supply of alcohol, to provide 'regulated entertainment' or to provide 'late night refreshment'. Licensing authorities are obliged to prevent public nuisance, e.g. through noise, via the use of appropriate conditions.

National Planning Policy

11.8. The National Planning Policy Framework (NPPF), published in July 2021 by the Ministry of Housing, Communities and Local Government 'sets out the Government's planning policies for England and how these should be applied'.

11.9. Clause 174 of the National Planning Policy Framework states that 'Planning policies and decisions should contribute to enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

11.10. Clause 185 of the National Planning Policy Framework states that: Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

11.11. The National Planning Policy Framework document cross references the 'Explanatory Note to the Noise Policy Statement for England'. The 'Noise Policy Statement for England' (NPSE) was published by the Department for Environment Roof and Rural Affairs in March 2010. The NPSE does not give suggested external noise criteria for commercial Developments. In the absence of specific criteria, reference shall be made in this document to established guidance and principles, as established in British Standards and the local Planning policy.

National Planning Practice Guidance – Noise

11.12. 'Planning Practice Guidance – Noise' is a web-based resource provided by the Ministry of Housing, Communities and Local Government (last revision date 22 July 2019) which gives guidance on Planning considerations in relation to noise.

11.13. The document identifies the subjective grading of noise and the recommended actions and different effect levels, as reproduced in Table 11.1.

Table 0.1: Summary of noise exposure hierarchy based on average response

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small	Observed Adverse Effect	Mitigate and reduce to a minimum

	actual or perceived change in the quality of life.		
	Significant Observed Adverse Effect Level		
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Manchester's Local Development Framework – Core Strategy Development Plan 2012-2027

11.14. The local planning context is provided by Manchester's Local Development Framework, Core Strategy, Development Plan Document. The Document was adopted on 11th July 2012.

11.15. With regard to noise, Policy DM1, Development Management, states that '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.'

'Planning & Noise, Technical Guidance' issued by Manchester City Council, December 2015

11.16. 'Planning & Noise, Technical Guidance', dated December 2015 has been issued by the Environmental Protection, Environmental Health and The Neighbourhoods Service sections of Manchester City Council. The document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development. Reference is also made in the document to the relevant supporting information and guidance documents that Developers are expected to refer to when submitting a planning application.

11.17. Planning & Noise, Technical Guidance' refers to the following guidance documents:

- BS 7385 (1990) Evaluation and measurement of vibration in buildings
- BS 4142 (2014) Methods for rating and assessing industrial and commercial sound
- BS 8233 (2014) Guidance on sound insulation and noise reduction for buildings

- BS 6472 (2008) Guide to the evaluation of human exposure to vibration in buildings
- BS 5228 (2009+A1:2014) Code of practice for noise and vibration control on construction and open sites
- BS 7445-1 (2003) The description and measurement of environmental noise: Guide to quantities and procedures
- BS 717-1 (2013) Acoustics. Rating of sound insulation in buildings and of building elements. Airborne sound insulation
- National Planning Policy Framework (2012) (now on 2019 update)
- National Planning Policy Guidance (2014)
- WHO (1999) Guidelines for Community Noise

Manchester Residential Quality Guidance, (Issue 01, March 2017)

11.18. Section 4 of 'Key Actions - Ensure Visual and Acoustic Privacy' of The Manchester Residential Quality Guidance states that 'Homes are places of retreat. Residents should be able to 'shut out' the external world and enjoy sleep without suffering from either external noise generated by traffic or the public realm; or from neighbouring homes, common spaces or other functions in the building'.

Manchester City Council – Noise from construction and demolition sites

11.19. Manchester City Council provides outline information on the control of noise pollution from construction sites in an undated guidance document entitled 'Guidance on completing an application for prior consent; Noise from construction and demolition sites'.

11.20. The document sets out the steps that should be taken when completing a Section 61 application. Where a Section 61 application is not to be made, the document provides a useful reference document, as it highlights the construction noise assessment method that Manchester City Council are likely to employ when assessing planning applications.

11.21. The document states that:

'The assessment should be completed as per British Standard 5228 (Parts 1 & 2) and usually takes the form of the ABC Method. To assess the impact of noisy work, baseline levels of ambient noise and vibration on the site boundary should be established. These data / details may be available from work carried out for the planning application stage of the development. The measured noise and vibration data should include results for periods during which the works will be carried out. Predictions of construction noise should be calculated at one metre, free field, from the facades of the worst affected (generally the nearest) sensitive receptors, thus allowing for a 'worst case scenario' noise assessment to be made'.

British Standards

BS 4142: 2014+A1:2019

11.22. BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound noise' details assessment methods to determine the likely effects on people inside or outside residential buildings of noise of an industrial nature such as fixed building services plant.

BS 5228: 2009+A1: 2014

11.23. BS 5228: 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites' provides guidance on significance criteria for construction noise.

BS 6472: 2008

11.24. BS6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings - part 1: Vibration sources other than blasting' provides guidance on typically acceptable limits for vibration within residential and office buildings during the day and night.

BS 8233: 2014

11.25. BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings' provides appropriate criteria for acceptable levels of noise within dwellings.

Other Guidance

Design Manual for Roads and Bridges

11.26. Volume 11, Part 7 of the Design Manual for Roads and Bridges (DMRB) highlights methods for the assessment of traffic noise levels and advises on the impact magnitude of changes in noise levels.

11.27. The DMRB advises that the threshold criteria used for traffic noise assessment during the day is a permanent change in magnitude of 1 dB LA10,18h in the short term (i.e. on opening) or a 3 dB LA10,18h change in the long term (typically 15 years after project opening).

11.28. Furthermore, the DMRB also states that a change in noise level of 1 dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3 dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

Acoustics, Ventilation and Overheating, Residential Design Guide

11.29. 'Acoustics, Ventilation and Overheating, Residential Design Guide', (AVO) was published by the Association of Noise Consultants and the Institute of Acoustics in January 2020. In the current absence of mandatory requirements under the Building Regulations in relation to the overheating of dwellings, the AVO is 'intended to be used by acoustics practitioners as well as all those involved in the planning, development, design and commissioning of new dwellings. It recommends an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating'.

11.30. The AVO presents a method for assessing the risk of an adverse effect on occupants depending on the potential internal noise level within apartments with windows open to control overheating and the duration of window opening.

Assessment Methodology and Significance Criteria

11.31. In order to assess the potential environmental noise and vibration effects of the Proposed Development, the following methodology has been adopted:

- Liaison with Manchester City Council Environmental Health department to agree noise and vibration assessment methodologies;
    - Identification of significant existing noise and vibration sources and existing sensitive receptors and baseline monitoring locations;
    - Establishing by representative noise surveys the daytime and night time noise levels at and around the Site;
    - Establishing by a representative vibration survey the vibration levels at the Site due to train movement on the rail viaduct at the eastern boundary of the site;
    - Calculation of noise and vibration levels likely to arise at the nearest sensitive receptors during construction phases using the procedures and guidance given in BS 5228-1: 2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites;
    - Review of measured noise climate at the Site in order to derive appropriate environmental noise limits for potential music nose egress from amenity areas and commercial units within the Proposed Development;
    - Review of measured noise climate at the Site in order to derive appropriate environmental noise limits for stationary building services plant serving the Proposed Development;
    - Interpretation of results and comparison of the likely noise levels with relevant national criteria and guidance for construction noise; and

- Where appropriate, formulation of proposals for controlling noise and vibration during the construction works, to be agreed with Manchester City Council Environmental Health department.

11.32. In addition, potential impacts on the Proposed Development from the following principal local noise sources have been assessed:

- Traffic on local roads; and
- Noise from building services plant within the Proposed Development affecting the buildings within the development.

11.33. The existing nearby noise sensitive residential premises are described below and identified in Figure 11.1.

11.34. Dwellings at Wilburn Basin

A. Dwellings on Regent Road ('One Regent')

B. Dwellings at junction of Liverpool Road and Water Street

C. Hotel Campanile

D. Vie Building, Water Street

11.35. Whilst there are other receptors around the Site, these other receptors are at greater distances from the Site than the receptors identified above and with similar exposure to the existing noise sources in the areas. Therefore, the achievement of acceptable noise levels at the assessed receptors would lead to acceptable noise level at receptors at a further distance from the Site.

11.36. Along the eastern perimeter of the site lie train viaducts that carry rail traffic through the day and night. Measurements and assessments of the potential impact of train-induced groundborne vibration on the proposed residential building adjacent of the viaduct have therefore been carried out. There are no other notable existing sources of potential vibration at or around the Site. Road traffic generates insignificant levels of groundborne vibration.

11.37. This Chapter includes the results of calculations of construction noise and vibration levels at the nearest residential properties to the Site and a comparison of these predicted noise levels with noise limits based on guidance given in BS 5228-1: 2009+A1:2014.

11.38. The results of environmental noise surveys around the Site and the determination of the likely environmental noise effect of the Proposed Development on the surrounding residential areas are presented.

11.39. Where applicable, noise mitigation options have also been recommended in order to limit construction noise effects. In addition, mitigation measures to achieve appropriate noise and vibration levels within the Proposed Development are discussed.

Construction Noise and Vibration

11.40. Annex E of BS 5228-1: 2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites' provides guidance on significance criteria for construction noise.

11.41. Example Method 1 within Annex E, termed the 'ABC Method' is for residential receptors only, and allows the setting of threshold noise levels above which a potential significant effect could be generated. For the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This noise level is then compared with the noise level at the receptor in question due solely to site operations. If the noise level originating from the site exceeds the appropriate category value, then a potential significant effect is indicated. Other project-specific factors, such as the number of receptors affected and the duration and character of the impact then need to be taken into consideration to determine if there is a significant effect. Table 11.2 gives the threshold values and explains how the method is applied.

Table 0.1: Example threshold of potential significant effect at dwellings

Assessment category and threshold value period	Threshold value (dB LAeq, T)		
	Category A [A]	Category B [B]	Category C [C]
Night time (23.00 - 07.00)	45	50	55
Evening and weekends [D]	55	60	65
Daytime (07.00 – 19.00)	65	70	75
NOTE 1: A potential significant effect is indicated if the LAeq, T noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.			
NOTE 2; If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total LAeq, T noise level for the period increases by more than 3 dB due to site noise.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00 – 23.00 weekdays, 13.00 – 23.00 Saturdays and 07.00 – 23.00 Sundays			

11.42. Example Method 2 within Annex E states that noise generated by construction activities of duration of one month or more is deemed to be potentially significant if the total noise (pre-construction ambient noise plus construction noise) exceeds the pre-construction ambient noise level by 5dB or more, subject to lower cut-off values during daytime, evening and night of 65dB, 55dB and 45dB LAeq respectively.

11.43. The criteria stated within example method 2 are generally applicable to the following building types:

- Residential
- Hotels and hostels
- Religious
- Education
- Health and/or community

11.44. For office and residential buildings, BS5228-1: 2009+A1:2014 refers to the 1976 revision of Advisory Leaflet 72 'Noise control on building sites, published by the Department of the Environment, which states [inter-alia] 'Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut…Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise
- 75 dB(A) in urban areas near main roads in heavy industrial areas'.

11.45. These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments, and when working outside normal working hours, such as between 19.00 and 22.00 hours, the allowable noise levels from building sites will be less. A reduction of 10 dB(A) may often be appropriate'.

11.46. With reference to the above discussions, Table 11.3 summarises the suggested significance criteria for the rating of construction noise affecting the noise sensitive premises around the Site.

Table 0.2: Summary of construction noise impact magnitude

Negligible	Minor	Moderate	Major
Site noise is equal to the threshold value	Site noise is 3dB to 5dB greater than the threshold value	Site noise is 5dB to 10dB greater than the threshold value	Site noise is more than 10dB greater than the threshold value

11.47. Section B.2 and Table B.1 of Annex B of BS 5228-2: 2009+A1: 2014 'Code of practice for noise and vibration control on construction and open sites – Vibration' provides guidance on human response to vibration. The vibration levels at which different effects may be perceived and their impact magnitude are summarised in Table 11.4.

Table 0.3: Guidance on Effects of Vibration Levels

Vibration Level (PPV)	Effect	Impact Magnitude
0.14 mm·s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.	Minor
1.0 mm·s^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate
10 mm·s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	Major

11.48. BS6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings - part 1: Vibration sources other than blasting' provides guidance on typically acceptable limits for vibration within residential and office buildings during the day and night.

11.49. Table 11.5 gives the applicable criteria from BS6472-1: 2008. The applicable assessment criterion is the 'Vibration Dose Value' (VDV). Values of VDV within certain ranges indicate the likelihood or otherwise of adverse comment from occupants of the building.

Table 0.4: Vibration Dose Value ranges which might result in various probabilities of adverse comment within residential buildings

Place and Time	Low probability of adverse comment ms-1.75	Adverse comment possible ms-1.75	Adverse comment probable ms-1.75
Residential buildings 16hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8hr night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

11.50. For offices, BS6472-1: 2008 advises that a multiplying factor of 2 should be applied to the above vibration dose values ranges for a 16 h day.

Vibration Effects on Buildings

11.51. Section B.3 and Table B.2 of Annex B of BS 5228-2: 2009+A1: 2014 'Code of practice for noise and vibration control on construction and open sites – Vibration' identifies the transient vibration levels above which cosmetic damage could occur. The guideline levels are reproduced in Table 11.6.

Table 0.5 Transient vibration guide values for cosmetic damage

Line (see Figure 10.2)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	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 and above
NOTE 1 Values referred to are at the base of the building.			
NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded			

Operation Environmental Noise Impact

Building Services Noise

11.52. For noise of an industrial nature such as fixed building services plant, an assessment of the likely effects on people inside or outside residential buildings due to noise can be carried out using BS4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

11.53. The following acoustic parameters are described within BS4142: 2014+A1:2019:

- Specific Noise Level – the equivalent continuous A-weighted sound pressure level measured over a specified time period, Tr, at the assessment position with the specific noise source contribution, LAeq, Tr (i.e. the noise level due to the new noise source).
- Rating Level – the Specific Noise Level plus an adjustment for any characteristic noise features, LAr, Tr.
- Residual Noise Level – the equivalent continuous A-weighted sound pressure level measured when the specific noise does not contribute to the ambient noise.
- Background Noise level – measured for a specific duration, T, in the absence of the specific noise source, LA90,T.

11.54. To complete a BS4142 assessment of potential noise effects upon residential properties, it is necessary to obtain the Rating Level due to the sound source in question. The Rating Level is derived by adding corrections to the measured Specific Noise Level, if the noise source:

- is tonal (correction of 0dB to +6dB, depending on severity)
- contains distinct impulses (correction of 0dB to +9dB, depending on severity)
- is intermittent (correction of +3dB if applicable)
- is otherwise distinctive against the residual acoustic environment (correction of +3dB)
- Where a sound source is strongly tonal and impulsive over the duration of the appropriate assessment period, a correction of +15 dB may apply.

11.55. The Rating Level can then be used in order to ascertain the likelihood of complaints due to industrial noise disturbance by subtracting the measured background noise level. The greater the positive difference, the greater the likelihood of complaints. Table 11.7 summarises the assessment method.

Table 0.1: BS4142: 2014+A1:2019 Assessment Method

Difference between Rating Level and Measured Background Level	Assessment
+10 dB or greater	Significant adverse impact
+5 dB	Indication of adverse impact, depending on context
0 dB or less	Indication of low impact, depending on context

11.56. Where a new noise source has not yet been introduced, a recommended specific noise level can be determined based on a knowledge of the existing background noise level.

11.57. BS 4142: 2014+A1:2019 recognises that where background and rating levels are low, the potential absolute noise levels at the sensitive receptor might be more relevant in assessing potential impact than a simple comparison of the rating level and background noise level.

11.58. In such instances, reference can be made to BS 8233: 2014+A1:2019 in order to determine appropriate external noise levels due to buildings services plant, such that acceptable noise levels are achieved inside buildings.

11.59. 'Planning & Noise, Technical Guidance' issued by Manchester City Council in December 2015 gives guidance on the preferred approach to environmental noise assessments. With regard to external noise due to building services plant, Section 3.6.1.5.1 of the document states:

- '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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.

Noise from Amenity Spaces and Commercial Units

11.60. Noise egress from the proposed amenity spaces and commercial units at the Proposed Development must be controlled to appropriate levels so as to avoid noise nuisance to existing sensitive receptors. With regard to entertainment venues, 'Planning & Noise, Technical Guidance' states:

- 'When considering the potential impact of a proposal for an entertainment venue, consultants should consider the overall noise level (LAeq) and the 63 Hz and 125 Hz octave band noise levels (Leq). Music noise in the 63 Hz and 125 Hz octave bands, which is often described as "bass noise", is particularly difficult to contain and the impulsive character of this low frequency music noise is particularly disturbing for local residents exposed to it.
- A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:
- Entertainment noise (LAeq) should be controlled to 10dB below the background noise level (LA90) without the entertainment noise present, in each octave band at the nearest noise sensitive location.
- A criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be: '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), respectively.
- This criterion may also be applicable for new residential developments that are structurally separate from an existing entertainment venue'.

Intrusive Noise and vibration within Proposed Residential Dwellings

11.61. Internal noise levels within the proposed apartments must be appropriate for the intended use. BS8233: 2014 'Guidance on sound insulation and noise reduction for buildings' provides appropriate criteria for acceptable levels of noise ingress within dwellings.

11.62. In particular, section 7.2.2 'Internal ambient noise levels in dwellings' of BS8233: 2014 states that 'In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4'. Table 11.8 identifies the guideline values.

Table 0.2: BS8233: 2014 intrusive noise criteria

BS8233: 2014 – Indoor ambient noise levels for dwellings			
Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16 hours	-
Dining	Dining room / area	40 dB LAeq, 16 hours	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 hours	dB LAeq, 16 hours

11.63. Note 7 of section 7.2.2 states that: 'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5 dB and reasonable internal conditions still achieved'.

11.64. The pre-existing external Noise levels at the Site are above the WHO (World Health Organisation) external noise guideline levels and therefore, with reference to BS8233: 2014, the maximum recommended daytime

intrusive noise level within the habitable rooms of the Proposed Development is 35 dB LAeq,(16 hours) to 40 dB LAeq,(16 hours), and the corresponding night time intrusive noise limit within bedrooms is 30 dB LAeq,(16 hours) to 35 dB LAeq,(8 hours). Additionally, the recommended daytime intrusive noise level within bedrooms of the Proposed Development is 35 dB LAeq(16 hours) to 40 dB LAeq(16 hours).

11.65. With regard to maximum night time noise levels within bedrooms, BS8233: 2014 states 'regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,f depending on the character and number of events per night. Sporadic noise events could require separate values'.

11.66. In the absence of a specific performance criterion within BS8233 for short-term noise maxima, reference can be made to guidance published by the WHO. In particular, the WHO publication 'Guidelines for Community Noise' (1999), from which the guidance given in BS8233: 2014 is itself derived, states that 'for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than ten to fifteen times per night'.

11.67. With regard to noise ingress to residential dwellings, section 3.5 'National & International Standards' of 'Planning & Noise, Technical Guidance' issued by the Environmental Protection Section of Manchester City Council, references both BS8233: 2014 and WHO 'Guidelines for Community Noise', but advises that 5dB relaxations of the internal noise criteria in these documents should not be assumed. The document states that 'Manchester City Council has adopted the following internal noise limits for residential properties':

- Living Rooms: Daytime (0700-2300 hrs) 35dB LAeq
- Bedrooms: Daytime (0700-2300 hrs) 35dB LAeq
- Bedrooms: Night time (2300-0700 hrs) 30dB LAeq, 45dB LAmax
- (fifteen excesses over 45dB LAmax allowed per night)

11.68. Manchester City Council has advised that the planning application for the proposed development must include an assessment in line with 'Acoustics, Ventilation and Overheating, Residential Design Guide', (AVO).

11.69. BS6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings - part 1: Vibration sources other than blasting' provides guidance on typically acceptable limits for vibration within residential and office buildings during the day and night. This document provides guidance on typically acceptable limits for perceived 'feelable' vibration, such that annoyance is likely to be avoided.

11.70. Table 11.9 gives the applicable criteria from BS6472-1: 2008. The applicable assessment criterion is the 'Vibration Dose Value' (VDV). Values of VDV within certain ranges indicate the likelihood or otherwise of adverse comment from occupants of the building due to feelable vibration.

Table 0.3: Vibration Dose Value ranges which might result in various probabilities of adverse comment within residential buildings

	Low Probability of Adverse Comment $ms^{-1.75}$	Adverse Comment Possible $ms^{-1.75}$	Adverse Comment Probable $ms^{-1.75}$
Daytime (07:00 - 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Night Time (23:00 - 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.6

Sensitivity of receptors

11.71. Table 11.9 presents the sensitivity criteria for receptors during the construction phase and the operational phase of the Proposed Development.

Table 0.4: Criteria to Determine Receptor Sensitivity

Sensitivity of Receptor	Description	Examples
High	Receptors where people or operations are particularly susceptible to noise or vibration	Residential dwellings, schools (during the daytime), hospitals, places of worship
Medium	Receptors of moderate to low sensitivity to noise or vibration, where it may cause some distraction or disturbance.	Conference facilities, hotels, offices
Low	Receptors of low sensitivity to noise or vibration, where it may cause mild distraction or disturbance.	Bars, cafes, restaurants, sports grounds
Negligible	Receptors where distraction or disturbance from noise or vibration is minimal	Un-occupied buildings, factories and working environments with existing high levels of noise, night clubs

Significance Criteria

11.72. In line with the guidance presented in Guidelines for Environmental Noise Impact Assessment, published by the Institute of Environmental Managements and Assessment in November 2014, the significance of an impact can be determined with reference to the impact significance matrix detailed in Table 11.10.

Table 0.5: Impact Significance Matrix

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

11.73. A description of the magnitude terms given in Table 11.10 is given below:

- Major: Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area;

- Moderate: Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life;
- Minor: Noise impact can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life
- Negligible: no discernible effect on noise or in the character of the area.

Limitations and Assumptions

11.74. As part of the overall study of noise and vibration, a quantitative assessment of the potential noise levels generated by construction activities has been carried out. The assessment has been based on the potential construction programme and information received relating to the number and type of plant items expected on site over the construction programme.

11.75. It is possible that there may be variation between the assumed construction programme and the actual construction programme and that plant items may vary from those considered as part of this assessment. However, the risk is expected to be small, in that there is certainty regarding the broad demolition and construction tasks that must be undertaken and the plant items that will be required to undertake these tasks.

Baseline Conditions

Noise

11.76. Manned surveys of the existing noise environment at the Site were carried out by Fisher Acoustics Ltd from 11am to 3pm on Wednesday 25 August 2021 and from 4pm Thursday 26 August 2021 to 9:30am of Friday 27 August 2021.

11.77. The measurement locations used during the surveys were suitable for the determination of the prevailing ambient noise level at the existing local sensitive buildings and for assessing the noise levels able to impact upon the façades of the Proposed Development. Measurement locations for the noise surveys are shown in Figure 11.3 and described below.

- Location 1: At location of closest façade of Proposed Development to the railway line on Castlefield Viaduct, 15.2m from the viaduct, at a microphone height of 15 metres above site ground level.
- Location 2: At location of closest façade of Proposed Development to Water Street, at 22 metres from the kerb, at a microphone height of 1.5 metres above site ground level.
- Location 3: At location of closest façade of Proposed Development to Water street, at 10.5 metres from the kerb, at a microphone height of 1.5 metres above site ground level.
- Location 4: At location of closest façade of Proposed Development to Trinity Way (A6042), at 16 metres from the kerb, at a microphone height of 6 metres above site ground level.
- Location 5: At a location 6.5 metres from the kerb of Regent Road (A57(M)), at a microphone height of 7 metres above site ground level.
- Location 6: At 6 metres from the kerb of the Trinity Way (A6042), at a microphone height of 12 metres above site ground level.
- Location 7: At 13 metres from the kerb of the Trinity Way (A6042), at a microphone height of 7 metres above site ground level.

11.78. The long-term noise environment at and around the Application Site is principally determined by road traffic on Trinity Way and Regent Road. Noise level to the east of the site are affected by train movements on the adjacent viaducts.

11.79. The measured noise levels during the day and night at and around the Site are summarised in Table 11.11.

Table 0.1: Summary of measured environmental noise levels – existing and proposed receptors

	Measured Noise Level					
	Daytime (defined as 0700 to 2300)			Night time (defined as 2300 to 0700)		
Location	dB, L_{Aeq}	dB, L_{Amax}	dB L_{A90}	dB, L_{Aeq}	dB, L_{Amax}	dB L_{A90}
1 – Wednesday (East Elevation, C1)	66	62 to 85	56 to 65	-	-	-
1 – Thursday (East Elevation, C1)	66	60 to 93	50 to 62	63	51 to 95	39 to 60
1 – Friday (East Elevation, C1)	67	62 to 97	53 to 61	-	-	-
2 – Wednesday (S. East Elevation, C1)	61	58 to 90	50 to 55	-	-	-
3 – Wednesday (South Elevation, C2)	58	65 to 86	51 to 53	-	-	-
4 – Wednesday (West Elevation, C2)	68	73 to 95	58 to 61	-	-	-
4 – Thursday (West Elevation, C2)	66	64 to 94	51 to 63	62	52 to 86	39 to 62
4 – Friday (West Elevation, C2)	67	64 to 88	56 to 65	-	-	-
5 – Wednesday (South Elevation, D2)	71	77 to 86	63 to 67	-	-	-
5 – Thursday (South Elevation, D2)	71	71 to 74	59 to 71	69	65 to 100	46 to 71
5 – Friday (South Elevation, D2)	72	71 to 87	62 to 72	-	-	-

6 – Wednesday (East Elevation, D2)	68	74 to 79	64 to 65	-	-	-
7 – Wednesday (East Elevation, D1)	68	73 to 94	61 to 62	-	-	-

Vibration

11.80. Measurements of vibration have been carried out in order to determine the potential for vibration generated by train movements to cause adverse comment within the buildings of the Proposed Development.

11.81. The vibration measurements were carried out at location 1 identified on Figure 11.1. The measurements have been conducted in accordance with the guidance given in 'Measurement and Assessment of Groundborne Noise and Vibration' published by The Association of Noise Consultants.

11.82. The calculated Vibration Dose Value at location 1 due to train movements is 0.11 m/s1.75 during the day and 0.14 m/s1.75 during the night. With reference to the values given in Table 11.8, adverse comment due to potential 'feelable' vibration induced by train movements would not be expected in any building of the Proposed Development.

11.83. There are no other significant sources of vibration at or around the Site. .

Identification and Evaluation of Likely Significant Effects

11.84. There is the potential for environmental noise effects at the nearby sensitive premises from the following during the construction phase of the project:

- Clearing and excavation of site
- Temporary addition to traffic flows on local roads due to construction traffic
- Construction of Proposed Development

11.85. With reference to the guidance discussed above and the results of the noise surveys, the threshold values for potential significant effects are as given in Table 11.12.

1 Table 0.12: Threshold noise values for potential significant effect due to construction

Location	Threshold Values, daytime
	dB, L_{Aeq}
A: Wilburn Basin (residential)	65
B: One Regent (residential)	75
C: Liverpool Road (residential)	65
D: Hotel Campanile (residential)	70
E: Vie Building (residential)	65

11.86. In order to estimate the likely levels of noise from construction activities at the development Site, calculations have been carried out using the methodologies and data given in BS5228: 2009+A1:2014 'Code

of Practice for noise and vibration control on construction and open sites; Part 1 - Noise' and by applying corrections for distance attenuation (i.e. by how much noise reduces with increasing distance from the plant).

11.87. This exercise has been carried out for each major construction phase of the project in order to calculate the worst case hourly noise level (LAeq,1hour) at each receptor.

11.88. For large construction vehicles that will travel to and from Site, additional calculations have been carried out for the maximum number of expected movements per hour, speed and average travel distance from each receptor.

11.89. The construction works will involve the operation on site of the following principal major plant items at certain stages of the construction works:

- Excavators;
- Dumper trucks;
- Continuous flight auger piling rigs;
- Concrete pump;
- Poker vibrators;
- Tower cranes;
- Telehandler.

11.90. With regard to construction traffic, it has been estimated that in the worst case during concrete deliveries, there could be approximately one hundred vehicle movements to the Site per working day i.e. approximately twelve vehicles per hour to arrive and offload and then depart.

11.91. Table 11.13 identifies the calculated noise levels at the receptors identified above due to cumulative noise from construction noise sources at the Site during the main construction phases. The Table presents the worst case cumulative noise level on the assumption that all of the noisier mobile items of construction plant are situated at the section of the Site perimeter that is closest to the receptor in question. This situation will not prevail for an extended period of time, as the construction plant will move around the Site as each section of the works is completed. In addition, the typical expected noise level is presented given the location of plant items at more typical distances from the nearby receptors. It should be noted that the calculations at this stage do not include for any beneficial acoustic screening provided by any solid hoarding around the Site or by the local screening of individual plant items. An 'on' time of construction noise sources during each day of 50% has been assumed during the excavation and piling stage, and of 70% during the frame construction.

Table 0.13: Calculated noise levels at sensitive receptors during construction phases

Receptor	Calculated noise levels during construction phase (dB LAeq)	
	Excavation/Piling worst case/typical	**Frame Construction worst case/typical**
A: Wilburn Basin (residential)	69 / 67	70 / 67
B: One Regent (residential)	71 / 68	68 / 66
C: Liverpool Road (residential)	69 / 68	71 / 68
D: Hotel Campanile (residential)	67 / 66	68 / 67

E: Vie Building (residential)	63 / 60	60 / 58

11.92. At other stages of the construction programme, the expected noise levels at the sensitive receptors will be lower than those given in Table 11.13, depending upon the ongoing processes and the stage of the build programme.

11.93. Table 11.14 shows the calculated excess over the threshold noise values for potential significant effect due to construction, if no mitigation measures are in place.

Table 0.14: Calculated excess over threshold noise values for potential significant effect, without mitigation

Receptor type and location	Calculated excess over construction noise target (dB LAeq)	
	Excavation/Piling worst case/typical	**Frame Construction worst case/typical**
A: Wilburn Basin (residential)	+4 / +2	+5 / +2
B: One Regent (residential)	-4 / -7	-7 / -9
C: Liverpool Road (residential)	+4 / +3	+6 / +3
D: Hotel Campanile (residential)	-3 / -4	-2 / -3
E: Vie Building (residential)	-2 / -5	-5 / -7

11.94. The values given in Table 11.14 can be compared to the values given in Table 11.3 to determine the potential impact of construction noise, as summarised in Table 11.15.

Table 0.15: Potential impact of construction noise, without mitigation

Receptor type and location	Potential noise impact	
	Excavation/Piling worst case/typical	**Frame Construction worst case/typical**
A: Wilburn Basin (residential)	Minor Adverse	Minor Adverse
B: One Regent (residential)	Negligible	Negligible
C: Liverpool Road (residential)	Minor Adverse	Moderate/Minor Adverse
D: Hotel Campanile (residential)	Negligible	Negligible
E: Vie Building (residential)	Negligible	Negligible

11.95. In the worst case, minor to moderate effects are possible at the existing residential building on Liverpool Road.

11.96. Given the potential adverse effects, measures to mitigate construction noise would be appropriate.

11.97. As discussed in BS5228-2: 2014 'Code of Practice for noise and vibration control on construction and open sites', it is fully expected that the construction vibration levels would not be sufficient to cause structural damage to buildings around the Site.

11.98. Natural mitigation of potential ground borne vibration due to the proposed construction activities will be afforded to the residential buildings around the Site by virtue of the distance of these receptors from the works. Potential significant effects are not expected to arise on the basis that good communication is established between the Contractor and residents.

11.99. The impact of construction vibration on existing sensitive receptors is therefore expected to be Negligible.

Operational Noise and Vibration

Building Services Plant

11.100. At this design stage, the specific total building services requirements for the various aspects of the Proposed Development are not known. However, noise limits for any and all building services plant can be established using published guidance.

11.101. In line with the assessment methodology detailed in BS4142:2014 'Methods for rating and assessing industrial and commercial sound', in order to avoid potential noise nuisance at existing and proposed sensitive receptors, the non-emergency building services plant at the Proposed Development should be selected and suitably attenuated so as to achieve noise levels in line with those stated in Table 11.16. It should be noted that the noise limits in Table 11.16 relate to the simultaneous operation of all plant serving the Proposed Development. The stated criteria are on the basis that the installed plant items are not tonal. Given compliance with the noise limits in Table 11.16, the predicted noise effects would be negligible and therefore not significant.

Table 11.1: Cumulative environmental noise limits for non-emergency building services plant

Location	Noise Level, dB LAeq	
	Daytime (07:00hrs to 23:00hrs)	**Night time (23:00hrs to 07:00hrs)**
A: Wilburn Basin (residential)	45	40
B: One Regent (residential)	55	49
C: Liverpool Road (residential)	45	40
D: Hotel Campanile (residential)	47	40
E: Vie Building (residential)	45	38
Trinity Islands, Tower C1	45	40
Trinity Islands, Tower C2	46	40
Trinity Islands, Tower D1	55	40
Trinity Islands, Tower D2	55	49

11.102. Building services plant with tonal characteristics should be avoided if possible. If such plant is provided such that tonal noise is significant at the receptors in question, then the noise limits given in Table 11.16 must be reduced by 5dB in order to comply with the published requirements of Manchester City Council.

11.103. It is expected that any emergency plant items required at the Proposed Development, such as smoke extract fans and standby generators would only operate during emergencies and during periodical test runs (perhaps test runs of thirty minutes every two weeks). On this basis, it is not considered appropriate to require emergency plant to comply with the noise limits that would apply to continuously-operating non-emergency plant. It is therefore suggested that the noise level from any emergency plant is no more than 10dB(A) greater than the ambient noise level (measured as an LAeq noise level) at any proposed or existing residential receptor.

11.104. It is therefore recommended that the noise level at any residential façade during operation of any emergency plant does not exceed the daytime noise levels given in Table 11.17. Given compliance with the noise limits in Table 11.17, the predicted noise effects at each receptor would be negligible and therefore not significant.

Table 11.2: Cumulative environmental noise limits for emergency building services plant

Location	Noise Level, dB LAeq
	Daytime (07:00hrs to 23:00hrs)
A: Wilburn Basin (residential)	71
B: One Regent (residential)	79
C: Liverpool Road (residential)	66
D: Hotel Campanile (residential)	72
E: Vie Building (residential)	69
Trinity Islands, Tower C1	70
Trinity Islands, Tower C2	66
Trinity Islands, Tower D1	71
Trinity Islands, Tower D2	76

Noise Egress from Amenity Spaces and Commercial Units

11.105. In order to avoid potential noise nuisance to existing noise sensitive receptors, activity noise egress from the proposed amenity spaces and commercial units within the Proposed Development must be controlled. As the proposed spaces may potentially employ music replay, suitable limits relating to music noise egress from the proposed areas must be established.

11.106. As detailed above, Manchester City Council suggests that external music noise levels (measured as an Leq noise level) external to a residential property due to an entertainment venue should be 10dB lower than the prevailing background noise level in each octave band. In some circumstances this requirement is more stringent than would be necessary to maintain residential amenity, as strict compliance with this criterion lead could lead to external music noise levels that would be below the threshold of human hearing. It is therefore suggested that external noise limits include a lower bound.

11.107. Table 11.18 identifies the maximum allowable cumulative daytime and night time free-field noise levels at the closest residential façades due to music noise from the proposed amenity spaces and commercial units to comply with the guidance of Manchester City Council. Given compliance with the noise limits in Table 11.18, the predicted noise effects at each receptor would be negligible and therefore not significant.

Table 11.3: Maximum allowable external music noise levels due to proposed amenity spaces and commercial units

Location/period	Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Wilburn Basin (0700 to 2300)	50	45	43	40	42	37	26
Wilburn Basin (2300 to 0700)	44	39	39	36	37	31	20
One Regent (0700 to 2300)	58	52	50	48	50	44	37
One Regent (2300 to 0700)	45	39	39	39	42	36	23
Liverpool Road (0700 to 2300)	45	35	33	31	34	27	20
Liverpool Road (2300 to 0700)	45	35	31	30	32	25	20
Hotel Campanile (0700 to 2300)	50	45	43	40	42	37	26
Hotel Campanile (2300 to 0700)	44	39	39	36	37	31	20
Vie Building (0700 to 2300)	49	41	37	34	36	31	20
Vie Building (2300 to 0700)	45	37	32	27	29	24	20
Tower C1 (0700 to 2300)	45	35	33	31	34	27	20
Tower C1 (2300 to 0700)	45	35	31	30	32	25	20
Tower C2 (0700 to 2300)	59	53	52	51	52	46	35
Tower C2 (2300 to 0700)	45	35	33	31	32	26	20
Tower D1 (0700 to 2300)	54	50	48	46	48	42	31
Tower D1 (2300 to 0700)	45	35	33	31	32	26	20
Tower D2 (0700 to 2300)	58	52	50	48	50	44	37
Tower D2 (2300 to 0700)	45	39	39	39	42	36	23

Noise Affecting the Proposed Development

11.108. The sensitive areas of the Proposed Development that could be affected by the noise levels summarised in Tables 11.11 above are the living rooms and bedrooms of the proposed apartments. An intrusive noise study is included in Appendix 11.1. This gives the minimum recommended sound insulation of the building facades to achieve the internal noise criteria of Table 11.8.

11.109. Appendix 11.2 is a Technical Note that details the response to the recommendations of the Acoustics, Ventilation and Overheating, Residential Design Guide.

Vibration Affecting the Proposed Development

11.110. The sensitive areas of the Proposed Development that could be affected by the vibration levels summarised in paragraph 11.81 above are the living rooms and bedrooms of the proposed apartments. An assessment of

vibration is included in Appendix 11.1. This identifies the potential structureborne noise levels in apartments due to the passage of trains.

Mitigation Measures

Construction

11.111. The construction of a solid, close-boarded hoarding (2.4 metres high) around the majority of the Site is expected to be provided. This can be expected to reduce noise levels at local receptors by 0dB(A) to 5dB(A), depending upon the location of the noise source on Site and the height of the receptor.

11.112. In addition, the following recommendations must be followed to achieve appropriate reductions of construction noise.

- Noisy plant should be located so as to maximise the distances between the plant and the sensitive receptors.
- The works should be carried out in as timely a manner as possible in order to minimise the duration of any disturbance.
- Via communication between the Contractor and the Council, local residents should be kept informed of general construction activities, including working hours.
- Wherever possible, working hours should be restricted in line with Manchester City Council's typical requirements.
- Excavations in hard materials should use silenced and sensitively located compressors in conjunction with shrouded breakers.
- The drop height of materials into wagons shall be minimised.
- Any materials hoists used on the Site should be enclosed by hoarding at ground level and operated by mains electricity or via a silenced generator.
- Rubbish skips should be housed within enclosed areas that encompass the chute terminations. The materials unloading point should be enclosed.
- All reasonable steps should be taken to limit the number of vehicles waiting to deliver to the Site.
- All plant and equipment should be properly maintained.
- All plant and equipment should be operated in their minimum-noise modes with any manufacturer's silencers and covers properly in place.
- With the exception of enhanced generators, pumps and electric plant, all plant and equipment should be shut down when not in use.
- Vehicle movements should be arranged so as to minimise noise from reversing warning indicators.
- The Contractor should generally comply with the guidance and procedures given in BS5228: 2014.

11.113. Given the implementation of the above best practice measures, the impact of construction noise at the majority of receptors is expected to be **negligible**.

Operation

Building Services noise

11.114. Overall building services noise limits have been established to achieve compliance with published guidelines. To ensure compliance with the criteria, individual items of building services plant and any associated noise control hardware will need to be selected such that the cumulative noise levels from all plant items do not exceed the overall building services noise limits.

11.115. Given compliance with the building services noise limits given in Tables 11.16 and 11.17, the noise impact of mechanical plant serving the Proposed Development is expected to be negligible and therefore no mitigation is required.

Noise from Amenity Areas and Commercial Units

11.116. Environmental noise limits relating to activity noise egress from the proposed amenity spaces and commercial units have been established to ensure compliance with published guidelines.

11.117. Given compliance with the external music noise limits given in Table 11.18, the noise impact of the amenity spaces and commercial units within the Proposed Development is expected to be negligible and therefore no mitigation is required.

Cumulative Effects

Construction

11.118. There is expected to be an overlap of construction works at the Site and at other committed developments in the vicinity of the Site. However, the other developments sites are at a greater distance from many of the closest buildings to the Site and are expected to be at a different stage in their build programmes such that the noisier construction activities including demolition and excavation may have ceased at the time that these activities commence at the Site. In addition, these other development sites will be controlled by approved Construction Environmental Management Plans, which will limit noise through implementation of mitigation. It is therefore expected that the cumulative construction noise levels at the nearby noise-sensitive buildings will be principally determined by the construction activities at the proposed Site. With reference to paragraph 10.115 above, the cumulative effect of construction noise following mitigation is expected to be **negligible** at all receptors.

Operation

11.119. Operational noise due to the Proposed Development and the committed developments in the surrounding area would include mechanical services noise, noise egress due to leisure activities and changes in road traffic noise levels due to changes in traffic flows.

11.120. The cumulative impact of noise due to changes in road traffic flows is expected to be negligible. This result takes into account the predicted changes in traffic flow relating to the committed developments in the surrounding area. A full Transport Statement is submitted in support of this application.

11.121. Operational noise limits due to mechanical services at the Proposed Development have been derived using the methodology and assessment criteria given in BS4142: 2014. Operational noise limits for any mechanical services systems at the buildings of the committed developments in the surrounding area would also be derived using the methodology and assessment criteria given in BS4142: 2014. The Planning Conditions for the committed developments in the surrounding area include a requirement for the building and any externally mounted ancillary equipment to be acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council in order to secure a reduction in the level of noise emanating from the equipment. The applicable noise limits will tend to be governed by the need to minimise noise levels at the buildings within the Proposed Development, as these are the closest sensitive receptors in the majority of cases. Therefore, given the relative distances of the sensitive receptors applicable to each development, cumulative impact of building services noise will be **negligible**.

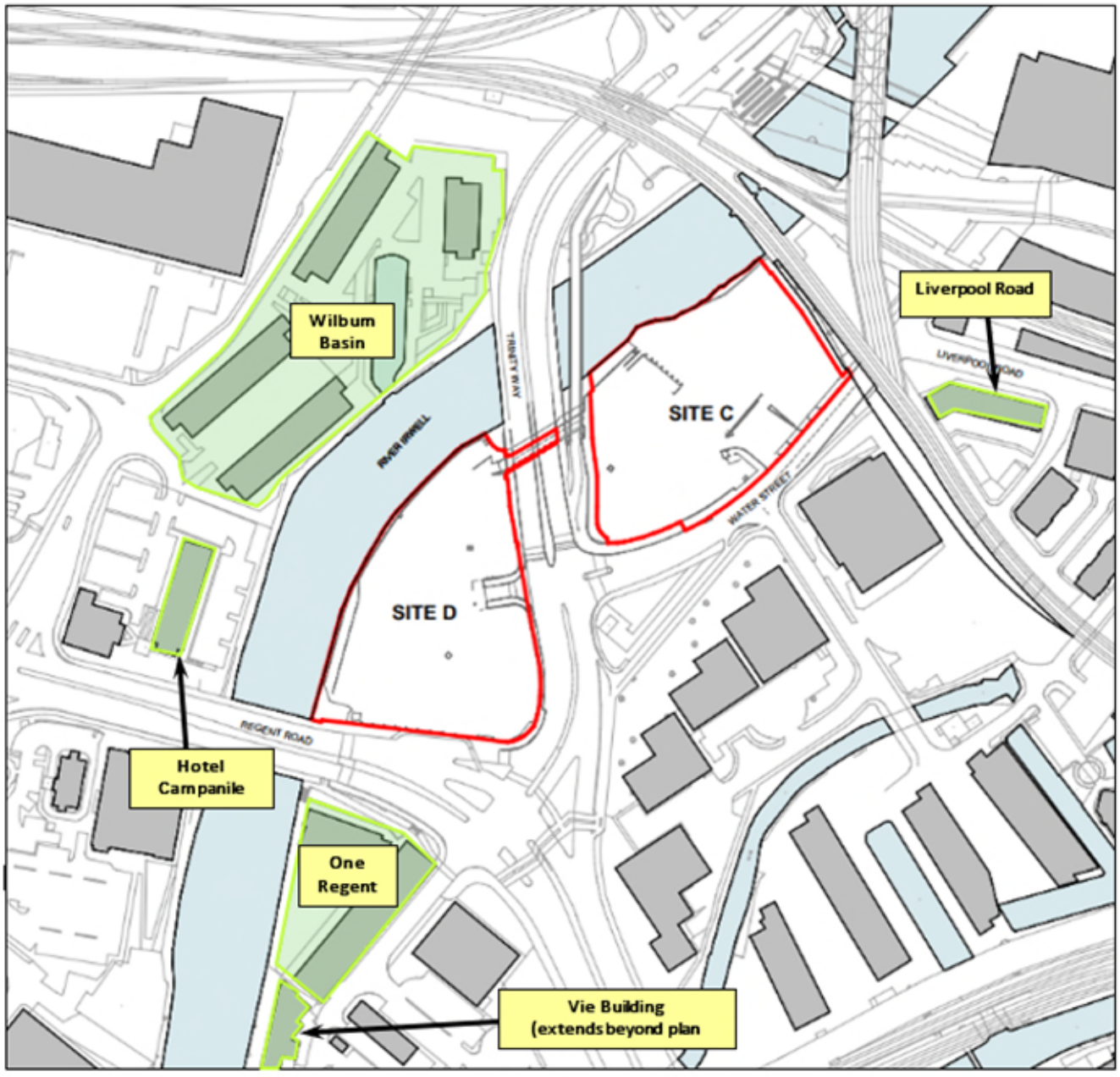
Residual Effects

11.122. Table 11.19 summarises the post-mitigation residual effects.

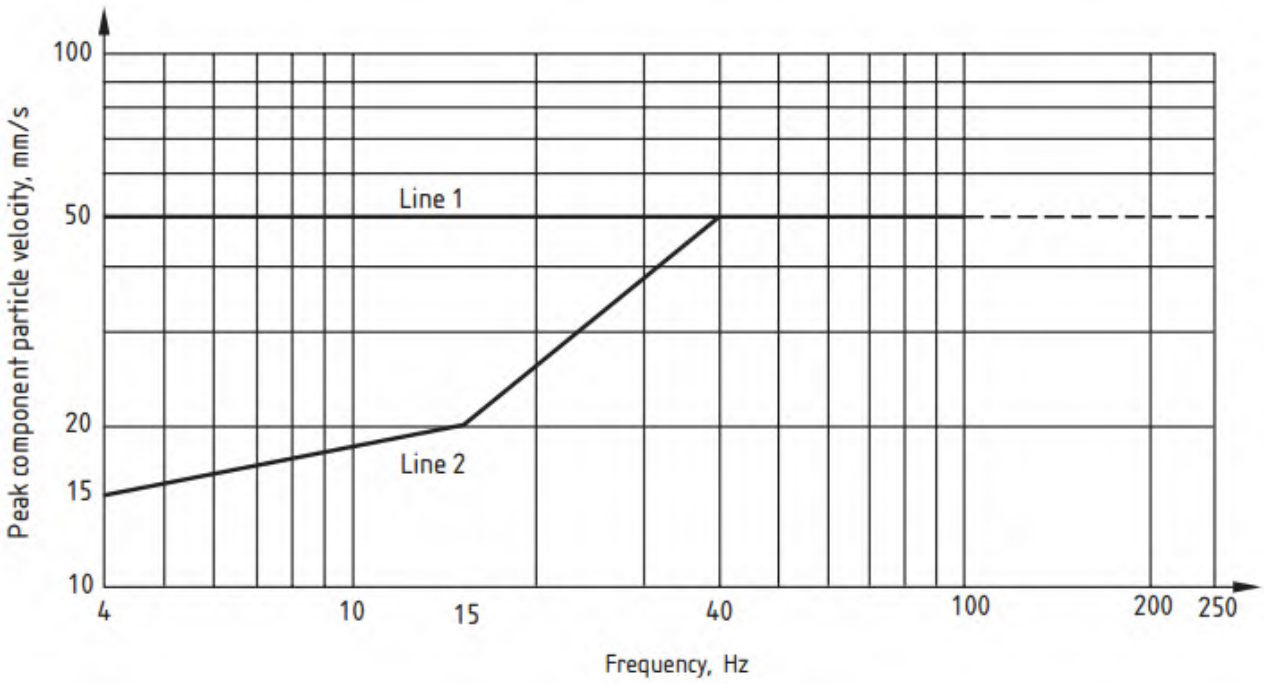
Table 11.19 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Construction Phase			
Moderate to Minor adverse construction noise	Local residents	Para. 10.113 & 10.114: Solid screening around Site.	Negligible construction noise effects

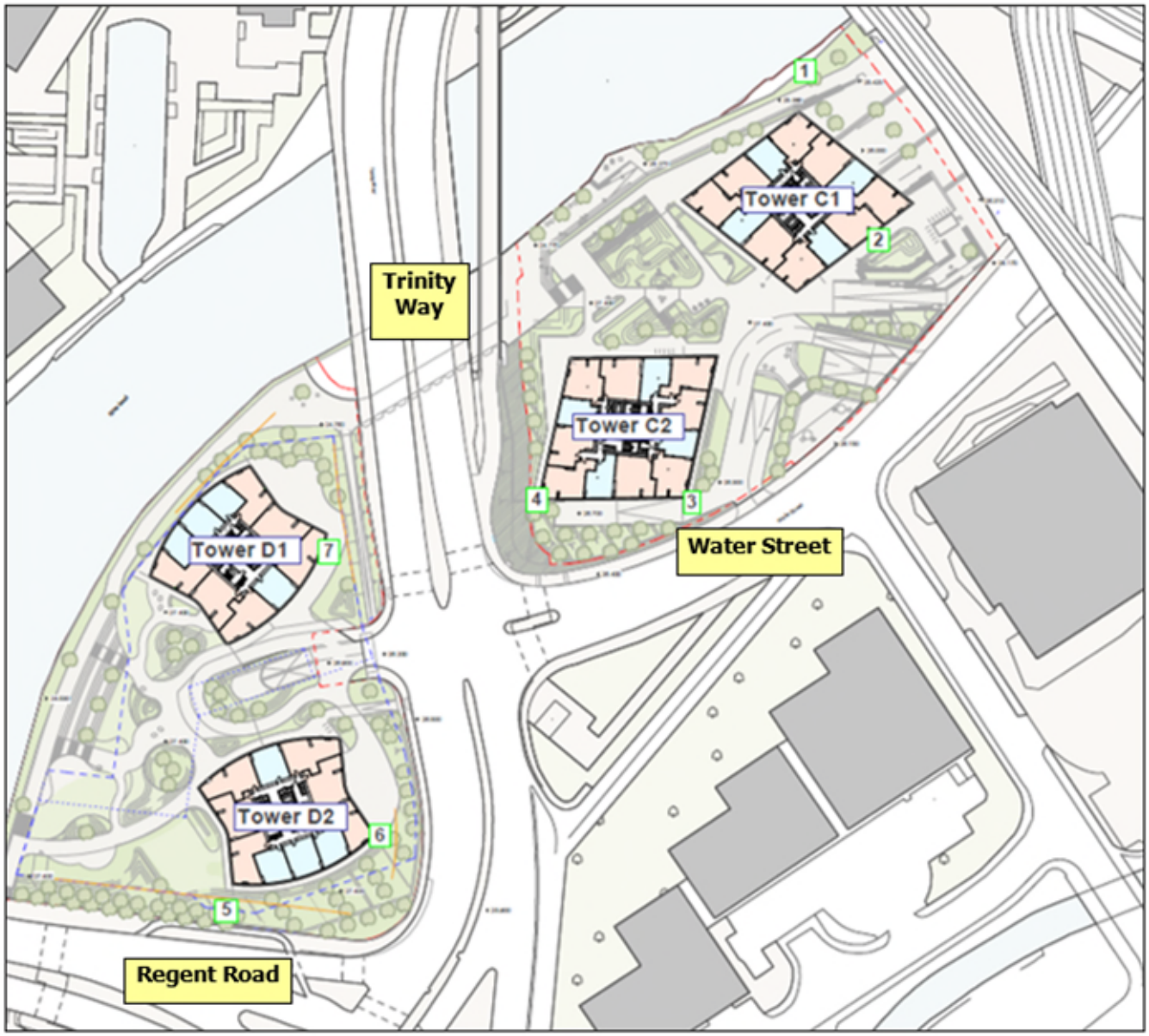
		Communication with City Council and local residents. Application of 'Best Practicable Means' and noise control guidance from BS5228.	
Operational Phase			
Negligible building services plant noise effects	Residential properties	Para. 10.104: Adherence to environmental noise limits for plant	Negligible building services plant noise effects
Negligible activity noise effects from amenity space and commercial units	Residential properties	Para. 10.110: Adherence to environmental noise limits for amenity spaces and commercial units	Negligible activity noise effects from amenity spaces and commercial units



	Title:	*Figure 11.1: Nearest noise sensitive residential premises to Plots C and D*		
	Project:	Trinity Islands		
	Date:	December 2021	Scale:	NTS



	Title:	*Figure 11.2 Transient vibration guide values for cosmetic damage*		
	Project:	Trinity Islands		
	Date:	December 2021	Scale:	NTS



	Title:	*Figure 11.3: Noise survey measurement locations*		
	Project:	Trinity Islands		
	Date:	December 2021	Scale:	NTS

12. Socio-Economic Impact

Introduction

12.1. This Chapter of the ES has been prepared by ekosgen 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. This Chapter is accompanied by one technical appendix, containing socio-economic baseline data.

12.3. This chapter has been prepared by ekosgen, economic, social and regeneration specialists, with significant experience conducting socio-economic impact assessments, profiling local economies and sectors and assessing the impacts to be secured as a result of a variety of investment proposals, including schemes designed to unlock both residential and employment sites.

Legislative and Policy Context

12.4. This section considers the national, sub-regional and local planning documents and policies of relevance to this socio-economic impact assessment.

National Planning Policy

The National Planning Policy Framework

12.5. A revised NPPF was published by Government in July 2021 sets out the Government's planning policies for England and how these should be applied. The NPPF reiterates the three overarching objectives to sustainable development: economic, social and environmental:

- an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
- a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
- an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

12.6. The NPPF also states "*Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area" and that planning policies should "seek to address potential barriers to investment, such as inadequate infrastructure, services or housing, or a poor environment*".

12.7. The updated NPPF recognises the importance of delivering a sufficient supply of homes, as well as highlighting the need to "*ensure an integrated approach to considering the location of housing, economic uses and community facilities and service*".

Sub-Regional Planning Policy

Places for Everyone Plan

12.8. Places for Everyone is the new long-term joint development plan for nine Greater Manchester districts,[31] and a Publication Draft of the document was published for consultation in Autumn 2021.

12.9. The Places for Everyone Plan will serve as a Development Plan Document, setting out the need to maximise the potential of Greater Manchester's key growth locations whilst also securing investment that raises the competitiveness of northern boroughs to deliver inclusive growth across the sub-region by ensuring that employment growth opportunities are well connected and accessible to all residents.

12.10. The plan identifies the amount of new development that will come forward and the main areas in which this will be focused. The Plan makes clear the importance of Manchester - *"higher levels of housing growth will be focused in the central and northern districts of Greater Manchester. Manchester and Salford will continue to be an appropriate location for the highest levels of new housing due to their central location, good public transport connections, proximity to the main concentrations of employment and leisure opportunities, and ability to deliver very high density developments".*

12.11. Housing requirements for 56,528 new homes between 2021 and 2037 are identified to be delivered in Manchester (3,533 per annum), equating to 34% of the nine local authorities' target of c.164,880 set to address the housing crisis and achieve its ambitions. Ensuring that health, early years and sporting facilities are available to support this scale of uplift is an important consideration for the city.

12.12. Policy JP-H 4 Density of New Housing New states that housing development should be delivered at a density appropriate to the location, reflecting the relative accessibility of the Site by walking, cycling and public transport, in accordance with minimum densities and Manchester City Centre has been designated for the highest density development.

The Greater Manchester Strategy – Our People, Our Place (2018)

12.13. The Places for Everyone Plan supports The Greater Manchester Strategy – Our People, Our Place (2018) vision is to make Greater Manchester one of the best places in the world to grow up, get on and grow old:

A place where all children are given the best start in life and young people grow up inspired to exceed expectations.

A place where people are proud to live, with a decent home, a fulfilling job, and stress-free journeys the norm. But if you need a helping hand you'll get it.

A place of ideas and invention, with a modern and productive economy that draws in investment, visitors and talent.

A place where people live healthy lives and older people are valued.

A place at the forefront of action on climate change with clean air and a flourishing natural environment.

A place where all voices are heard and where, working together, we can shape our future.

12.14. Manchester has a key role to play in both the provision of jobs for a growing population and high-quality housing close to employment locations.

[31] Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan

Local Planning Policy and Guidance

Manchester Core Strategy (2012)

12.15. Manchester's Core Strategy supports the sustainability credentials of large scale development planned at high density and on exceptionally well-connected brownfield sites where population growth is most intense - e.g. the high density housing market within the conurbation core.

12.16. The Proposed Development is located within the City Centre, recognised in the Core Strategy as an economic driver for the City Region and the area of primary economic focus in terms of development. The Strategy sets out key development principles for the City Centre, supporting high density buildings aligning with the Proposed Development. In particular the Strategy supports:

- Apartment-led residential schemes of high quality, which provide for a range of household types.
- Active ground floor uses to animate the City Centre
- New buildings with the highest standard design in terms of appearance and function.
- Accessible, diverse developments and public spaces which appeal to a wide range of people.

Residential Growth Strategy (2016)

12.17. In light of the critical relationship between housing and economic growth, Manchester City Council approved a Residential Growth Strategy in 2016, which seeks to deliver a minimum of 25,000 new homes in a ten year period between 2016 and 2025. This policy framework aims to ensure that there is the right quality, mix and type of housing in the right locations to meet demand and changing demographics, develop neighbourhoods of choice and improve equality amongst the City's residents in terms of housing choice, quality and affordability in order to develop strong communities.

The Water Street Strategic Regeneration Framework Area

12.18. The Water Street Strategic Regeneration Framework (SRF) was originally published in 2010 and was refreshed in 2016. The update focused on the 1.8ha Manchester Industrial Estate which remained undeveloped at the time the SRF was published. The SRF was updated to reflect the progress made in relation to the wider SRF 2010 area, which also included Potato Warf, and land to the west of Water Street, now referred to as Trinity Islands.

12.19. The first two phases of Potato Warf have been completed with phases 3 and 4 nearing completion. Trinity Island forms part of the wider masterplan and SRF for St Johns that was published in 2015 and updated in 2016.

The St. John's Strategic Regeneration Framework Update 2016

12.20. The St John's SRF was originally adopted in 2015 and updated in 2016 to take account of the significant progress made toward the delivery of the original proposals. The SRF (which includes the area now known as Trinity Island) had established a vision and a set of development principles for the site focused on the following key areas:

- Deliver a best in class city centre neighbourhood.
- Development that is fully integrated both functionally and physically within the city centre and adjoining city centre neighbourhoods.
- To re-establish the areas tight knit urban grain.
- A form of development that retains and re-utilises the sites key heritage assets and integrates them into the new urban form.

- A series of existing and new public landscaped spaces connecting neighbourhoods and providing enhanced access to the River Irwell.
- A scale of building form that in height and plan extends the scale of the St John's District across the site.

12.21. The intended developments that form part of this EIA pay due consideration and align to the key vision for the wider St John's area.

Our Manchester Strategy

12.22. 'Our Manchester', the Manchester Strategy for 2016 – 2025, sets out the wider strategy and long term vision for the city. The Manchester strategy outcomes include plans for Manchester to become:

A thriving and sustainable city: supporting a diverse and distinctive economy that creates jobs and opportunities

A highly skilled city: world class and home grown talent sustaining the city's economic success

A progressive and equitable city: making a positive contribution by unlocking the potential of our communities

A liveable and low carbon city: a destination of choice to live, visit, work

A connected city: world class infrastructure and connectivity to drive growth

12.23. Launched in March 2021, the latest iteration of the Our Manchester Strategy captured the views of people from across the city with over 3,800 residents, businesses, voluntary and community sector, public sector partners and wider stakeholders providing their views on what Manchester's priorities should be. As such, the draft Strategy fully reflects the priorities of residents, businesses, organisations and partners.

12.24. The refreshed Strategy incorporates feedback received from Our Manchester Forum and Executive Members but retained the original Strategy's five themes (A Thriving and Sustainable City; A Highly Skilled City; A Progressive and Equitable City; A Liveable and Zero Carbon City; and A Connected City) as well as reflecting the need to respond to COVID-19.

Assessment Methodology and Significance Criteria

Overarching Approach

12.25. The assessment has determined the baseline position for intervention, taking account of demographic, economic and key social characteristics of the area. It then moves on to consider the potential effects of the Proposed Development and the significance from a socio-economic perspective. It has been prepared to provide an understanding of the overarching impacts of development in the stated location.

12.26. This assessment evaluates the potential impacts on identified socio-economic indicators for the Proposed Development, as well as the cumulative impact of the delivery of the Proposed Development along with other committed developments in close proximity to the Site.

Significance Criteria

12.27. A staged assessment against set criteria has been completed to allow the significance of effects to be accurately and consistently tested. The process gave consideration to:

12.28. The value of the resource (international, national, regional and local level importance);

- The magnitude of the impact;
- The duration involved;

- The reversibility of the effect; and
- The number and sensitivity of receptors.

12.29. The criteria applied in each case are outlined below. The magnitude of the impact was assessed to fall under one of four categories, as outlined in the table below:

Table 12.1: Methodology for Determining Impact 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.

12.30. The sensitivity of a receptor is based on the relative importance of the receptor using the scale in the table overleaf.

Table 12.2: Methodology for Determining Sensitivity

Sensitivity	Example 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.
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.

12.31. The significance of the 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 the table below.

Table 12.3: Impact Significance Matrix

Magnitude	Sensitivity		
	High	Moderate	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

Magnitude	Sensitivity High	Moderate	Low
Minor	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor Adverse/Beneficial - Negligible
Negligible	Negligible	Negligible	Negligible

Limitations and Assumptions

12.32. As there are no recognised definitive criteria for the assessment of socio-economic impacts, ekosgen has taken a structured approach to quantifying and assessing the scale and nature of potential impacts (relative to baseline conditions) based on their knowledge of overarching guidance and experience of working in the subject area. In cases where impacts could not be quantified, a qualitative judgement has been made, drawing on professional experience.

12.33. The most up to date data from official published sources has been used, however there are some limitations in the baseline data due to ward boundary changes and the availability of ward level data. Where this is the case, ekosgen have gathered data most closely aligning to the chosen Assessment Area and clearly stated what geography the data collected refers to.

Baseline Conditions

12.34. The purpose of this section is to establish an understanding of the baseline conditions to inform the context for intervention and therefore the potential impact of the Proposed Development on local characteristics. A range of published data sources have been considered to understand both the social and economic characteristics of the area as a starting point for the assessment.

12.35. For the purpose of establishing the baseline, the Local Assessment Area has been defined to reflect the anticipated catchment of the Proposed Development sites and is defined using Lower Super Output Area (LSOA) level data for Trinity Island (where this data is available). This section sets out the current socio-economic conditions using LSOA level data to define the Local Assessment Area (where it is possible to do so), as well as covering Manchester as a whole and the Greater Manchester Sub-Region.

12.36. The Local Assessment Area covers core Manchester City Centre, which includes the LSOA the Site is located in, as well as the surrounding LSOA's in the Salford Local Authority which border the Site and Manchester City Centre.

Population

12.37. As of 2019, the Assessment Area had a resident population of 53,546, equal to 9.7% of Manchester's population, which was estimated at 552,858 people. Between 2011 and 2019 the population of the Assessment Area grew by 65.3% representing an uplift of 21,156 people, compared to 9.5% in the local authority population and 5.8% nationally.[32]

Table 12.4: Local Population

	2011	2019	Change (%)
Assessment Area	32,390	53,546	39.5%
Manchester	502,902	552,858	9.5%
Greater Manchester	2,685,386	2,835,686	5.4%
England	53,107,169	56,286,961	5.8%

[32] 2019 ONS Population Estimates

12.38. In terms of the age structure, 94.0% of the population of the Assessment Area is of working age (16-64 years), significantly higher than the proportion of the working age population at the Manchester (70.5%), Greater Manchester (63.6%) and national (62.4%) level.

12.39. This profile corresponds with small proportions of children and older people living within the Assessment Area; 3.8% of the population are children (below the age of 16), compared to around one fifth of the population across Manchester, Greater Manchester and nationally. Similarly, just 2.2% of the population are 65 and over, significantly below the Manchester (9.3%) and national share (18.2%).

Table 12.5: Population Age Profile 2019

	Assessment Area		Manchester		GM	England
	No.	%	No.	%	%	%
0-15	2,042	3.8%	111,771	20.2%	20.5%	19.2%
16-24	20,495	38.3%	97,195	17.6%	11.4%	10.6%
25-49	27,469	51.3%	219,595	39.7%	34.2%	32.8%
50-64	2,346	4.4%	101,798	18.4%	17.9%	19.0%
16-64	*50,310*	*94.0%*	*389,646*	*70.5%*	*63.6%*	*63.6%*
65+	1194	2.2%	51,441	9.3%	15.9%	18.2%
Total	**53,546**		**552,858**			

Household Composition

12.40. There were 15,095 households in the city centre[33], as of March 2020; 8,680 in the Deansgate Ward, 6,415 in Piccadilly, accounting for 6.7% of households in Manchester.

Skills/Education Levels

12.41. As of 2020 a significant proportion of Manchester's working age population held a degree or higher degree qualification, with 48.4% qualified at Level 4 and above compared to 39.2% across Greater Manchester and 42.8% nationally.

12.42. Manchester had a relatively small population with no qualification at 7.4%, marginally below the equivalent Greater Manchester proportion (7.7%) but above the and national figure (6.2%).

Table 12.6: Skills and Qualifications of the Working Age Population (2020)[34]

	Manchester		Greater Manchester		England	
Level 4 and above	187,800	48.4%	698,400	39.2%	14,886,100	42.8%
Level 3 only	58,400	15.0%	301,400	16.9%	5,945,300	17.1%
Level 2 only	38,600	9.9%	284,100	15.9%	5,396,400	15.5%
Level 1 only	37,100	9.6%	199,100	11.2%	3,435,600	9.9%
Trade apprenticeships	7,600	2.0%	57,000	3.2%	931,100	2.7%
Other qualifications	29,800	7.7%	105,600	5.9%	2,048,700	5.9%
No qualifications	28,900	7.4%	138,100	7.7%	2,153,900	6.2%

[33] Up to date intelligence on households at an LSOA level is not available therefore have used household data for Manchester city centre
[34] ONS 2020 Annual Population Survey

Economically Active and Inactive Population

12.43. At local authority level, the economically active population of Manchester was estimated at 282,000 people, or 72.5% of the working age population (ages 16 to 64), as of 2020, while the employed population was estimated at 257,800 people or 66.3% of the working age population.[35]

12.44. These rates are slightly lower in comparison to national levels, as Manchester has a higher proportion of students, most of which are treated as economically inactive. As of December 2020, 29.1% of Manchester's population is economically inactive, 113,300 people. Students account for a significantly large share of the economically inactive population (27.5%), compared to Greater Manchester (23.3%) and nationally (20.5%), reflecting the presence of two large Universities in the city, with significant student accommodation in the Assessment Area.

Unemployment

12.45. The unemployment rate for the year ending March 2021 stood at 8.7% for Manchester, above the five-year average for the local authority, reflecting the impact the Covid-19 Pandemic and lockdown restrictions have had on the economy. This remains below the post financial crisis high of 13.3% in 2009/10.

12.46. The Claimant Count measures the number of people who are receiving benefits principally because they are unemployed. From April 2015, the Claimant Count includes all Universal Credit claimants who are required to seek work and be available for work, as well as the remaining Jobseeker's Allowance claimants. As of July 2021, there were 1,100 claimants of unemployment related benefits in the Assessment Area, 2.1% of the working age population compared to 8.0% in Manchester, 6.9% in Greater Manchester and 5.5% nationally.

Table 1.7: Claimant Count (July 2021)[36]

	Assessment Area	Manchester	GM	England
Claimant Count (no.)	1,100	31,465	125,040	1,946,790
Claimant Count (% 16-64 population)	2.1%	8.0%	6.9%	5.5%

Employment – Workplace Analysis

12.47. There are 187,000 jobs in the Assessment Area, accounting for 45.4% of the total employment in Manchester, despite the Area accounting for 10.6% of Manchester's population.37 This reflects the Area's inclusion of the city centre economy. There has been 21% increase in total jobs in the Assessment Area since 2015, a greater rate of increase than Manchester (14.8%), Greater Manchester (10.8%) and England (4.7%) since 2019.

Table 1.8: Employment – Workplace Analysis (2015 - 2019)[38]

	2015	2019	Change 2015-19 (%)
Assessment Area	154,000	187,000	21.1%
Manchester	357,000	411,000	14.8%
Greater Manchester	1,254,000	1,389,000	10.8%
England	25,934,000	27,154,000	4.7%

[35] ONS 2018 Annual Population Survey
[36] ONS 2021 Claimant Count
[37] ONS 2018 Business Register and Employment Survey (BRES)
[38] ONS 2018 BRES

Employment by sector

12.48. There is a concentration of employment in professional, scientific and technical activities, which is the most prominent sector by employment within the Assessment Area – accounting for 23.1% of jobs as of 2019, above the share of employment in this sector across Manchester as a whole (13.9%) and nationally (9.2%). Administrative and support services is the next most prelavant sector by employment in the Assessment Area, accounting for 16.1% of total jobs, respectively.

12.49. Hospitality and retail are also key components of the economy, with accommodation and food services and wholesale and retail accounting for 20.7% of employment.

12.50. Finance and insurance activities are well-represented in the Assessment Area accounting for 8.8% of employment, while the sector accounts for 4.9% of city-wide employment and 3.5% of employment nationally.

12.51. Overall, the Assessment Area is a centre for high-skilled service jobs, compared to Manchester and Greater Manchester.

12.52. At local authority level, Manchester's local employment is more diverse, with significant numbers in wholesale and trade, transport and health when compared to the Assessment Area.

Table 12.9: Employment by Industry – Workplace Analysis (2019)[39]

	Assessment Area		Manchester	GM	England
	Number	%	%	%	%
Professional, scientific & technical activities	43,000	23.1%	13.9%	10.1%	9.2%
Administrative & support service activities	30,000	16.1%	11.7%	10.0%	8.9%
Accommodation & food service activities	20,000	10.5%	8.2%	6.2%	7.5%
Wholesale & retail trade	19,000	10.2%	11.8%	16.1%	15.1%
Financial & insurance activities	17,000	8.8%	4.9%	3.1%	3.5%
Public administration & defence	13,000	7.0%	4.5%	4.1%	3.9%
Information & communication	10,000	5.1%	4.6%	3.6%	4.4%
Education	9,000	4.6%	9.7%	8.2%	8.4%
Transportation & storage	6,000	2.9%	7.1%	6.1%	5.0%
Real estate activities	6,000	2.9%	2.4%	2.1%	2.0%
Arts, entertainment & recreation	4,500	2.4%	2.2%	2.4%	2.5%
Human health & social work activities	4,000	2.0%	12.2%	12.7%	12.4%
Other service activities	4,000	2.0%	1.7%	1.9%	2.1%
Construction	3,000	1.6%	1.9%	4.5%	5.0%
Manufacturing	1,000	0.6%	2.8%	7.3%	7.8%
Electricity, gas, steam & air conditioning supply	500	0.3%	0.1%	0.9%	0.4%
Water supply; sewerage, waste management & remediation	200	0.1%	0.2%	0.5%	0.6%
Mining & quarrying	30	0.0%	0.0%	0.0%	0.1%
Agriculture, forestry & fishing	20	0.0%	0.1%	0.2%	1.3%
Total	**187,000**				

[39] Ibid

GVA

12.53. Gross Value Added (GVA) is the key measure of economic output. In 2018 Manchester's GVA totalled £24.5bn in Manchester. Between 2009 and 2019 GVA grew by 56%, a faster rate of growth than across Greater Manchester (41.6%) and nationally (42.1%).

Table 1.10: GVA in millions (2009 and 2019)[40]

	2009	2019	Change 2009-19 (%)
Manchester	£15.7bn	£24.5bn	56.0%
Greater Manchester	£52.9bn	£75.0bn	41.6%
England	£1,198.0bn	£1,702.1bn	42.1%

Business Counts

12.54. In 2020, there were 22,850 businesses operating in Manchester, 21.9% of businesses in Greater Manchester.

Table 1.11: Business Count Enterprise by Size of Employment (2020)[41]

	Manchester		Greater Manchester		England	
Micro (0 to 9)	20,095	87.9%	92,960	88.9%	2,144,180	89.7%
Small (10 to 49)	2,170	9.5%	9,435	9.0%	200,445	8.4%
Medium-sized (50 to 249)	455	2.0%	1,720	1.6%	36,885	1.5%
Large (250+)	125	0.5%	435	0.4%	9,460	0.4%
Total	**22,850**		**104,550**		**2,390,970**	

Resident and Workforce Income

12.55. The median gross annual pay for residents in Manchester, as of 2020, is £23,017, below the national average of £26,055. In comparison the median gross annual pay for those working in Manchester is £27,789, notably higher than the national average.

Table 12.12: Median Annual Gross Salary – Population Analysis (2020)[42]

	Manchester	Greater Manchester	England
Resident Annual Salary	£23,017	£24,029	£26,055
Workforce Annual Salary	£27,789	£24,262	£26,062
Variance	-£4,772	-£233	-£7

Local Expenditure

12.56. While significant local income expenditure is incurred on mortgage and rents, expenditure relating to food and drink, recreation and leisure and other expenditure likely to be spent locally, is

[40] ONS Regional Accounts
[41] Ibid
[42] ONS 2020 Annual Survey of Hours and Earnings

estimated to be around £11,700 per household each year based on the average weekly household expenditure on goods and services in the UK from the 2019 ONS Family Spending Survey.

12.57. Based on the number of households in Manchester city centre[43] local expenditure per annum by households totals £179.7m.

Healthcare Facilities

12.58. A one mile radius was considered appropriate for GP's while a two mile radius was considered appropriate for dental practices (reflecting the preposition that visits to a dental practice are less medically urgent than a GP and therefore a wider radius was selected).

12.59. There are 11 GP's within 1 mile of the Site, five of which are accepting new NHS patients according to each GP profile on the NHS website. In terms of dental practices there are 31 within 2 miles of the Site, of the 8 where data is available, one is accepting new adult and child patients if they have a referral from a dentist, while the remaining seven are not accepting new adult and children patients.

12.60. See Tables 3 and 4 in the Appendix.

Educational Facilities

12.61. The assessment have been informed by National Travel Survey data which reports that on average primary school aged children travelled 1.8 miles to school as of 201944, with a five-year average (2015-2019) of 1.6 miles, while secondary school-aged children travelled on average 3.5 miles in 2019, while the five-year average was 3.4 miles. Given the city centre location of the Site, slightly smaller radius's have been considered for assessment of local educational faciltities. A 1.2 mile radius from the Site has been deemed appropriate for day nurseries and primary schools, while a three mile radius has been selected when considering the distance for secondary schools.

12.62. Within 1.2 miles from the site there are 10 day nurseries, of the six where information is accessible all have available places, although information on number of places was not readily available.

12.63. There are 14 primary schools within a 1.2 mile radius of the Proposed Development. Of the 12 where data on school places and capacity is available, 10 have additional capacity using the latest data from the Department for Education (DfE) on school capacity for the academic year 2018/2019, totalling 288 places.

12.64. Within a 3 mile radius of the Site there are 53 secondary schools including recently opened academies and independent schools, of the 21 schools were data is available on school places and capacity, 17 have additional capacity as of 2018/19, with 3,860 available places in total.

12.65. See Tables 5, 6 and 7 in the Appendix.

Crime

12.66. Looking at UK Crime Statistics for 1/4-mile radius of the Site, between July 2018 and June 2019 there were 6,431 crimes recorded. Violent crime, theft from a person and other theft accounted for around half (49.9%) of all crimes recorded.

Table 12.13: Crime recorded by type within 1/4 mile radius of the Site, July 2018 – June 2019

	No.	%
Violent crime	1,229	19.1%
Theft from person	1,125	17.5%
Other theft	854	13.3%
Anti-social behaviour	809	12.6%

[43] Up to date intelligence on households at an LSOA level is not available therefore have used household data for Manchester city centre
[44] The latest available year

	No.	%
Vehicle crime	615	9.6%
Public order	569	8.8%
Criminal dammage and arson	267	4.2%
Burgulary	234	3.6%
Robbery	203	3.2%
Shoplifting	201	3.1%
Bike theft	151	2.3%
Drugs	85	1.3%
Other	48	0.7%
Weapons	41	0.6%
Total	**6,431**	**100.0%**
Source: The Economic Policy Centre UKCrimeStats https://www.ukcrimestats.com/Postcode/M34JQ		

Open Space and Recreational Facilities

12.67. The following public green spaces within 1km radius of the Site[45] have been identified:

- St John's Gardens is within 0.3km of the Site
- Castlefield Urban Heritage Park 0.3km
- Parsongae Gardens is within 0.8km of the Site
- Hulme Park sits within 0.9km from the Site;

12.68. The following gyms and leisure/sports centres are within 1.5km of the Site:

- Barry's
- The Y Club 0.1km
- Living well Health club 0.5km
- The Gym Manchester Deansgate 0.5km
- JD Gyms Salford 0.6km
- Pure Gym 0.5km
- Transflash Gym 0.5km
- Pro-Balancen Training 0.6km
- FORM 0.7km
- Energie Fitness Deansgate 0.9km
- The Fast Gym 0.9km
- Lifestyle Fitness Mosely Street 1.1km
- Bannatyne Health Club 1.1 km

12.69. Given the urban city-centre context, it is considered that existing open space for amenity and recreation within the local area is adequately provided for.

[45] Considered an accessible walking distance

Identification and Evaluation of Significant Effects

Construction Phase

Employment and GVA Effects

12.70. Given the estimated construction cost of the Proposed Development and the average cost per FTE in the construction sector in the North West, the suggested construction of the Proposed Development will support around 4,180 FTE job years over the construction period. Based on the average GVA per FTE in the construction sector in Greater Manchester an estimated Gross Value Added (GVA) of £323.8 million will be generated, throughout the construction period for the site.

12.71. The number of construction workers onsite at any given time will vary across the construction phase dependent on workforce requirements at each stage. While national and regional construction companies often use their own workers, a proportion is expected to be drawn from the local area, especially where elements are sub-contracted. In addition, following Manchester City Council policy requirements, a Local Labour Agreement may be agreed which will further support the capture of local benefits.

12.72. Construction spend is recognised to deliver multiplier effects in terms of the indirect impacts as a result of spill-over spending through the supply chain and induced impacts through knock-on consumer spending as a result of wages being derived or spent locally. Using the CEBR construction multiplier of 1.842, suggests an additional 9,400 FTEs and GVA of £596.4m will be generated through indirect and induced impact while construction is underway.

12.73. Based on the assessment above, the impact of the construction phase on employment and GVA is considered to have a temporary short term, **minor beneficial** effect at the local authority level.

Local Expenditure

12.74. The construction workers are expected to generate local expenditure while working at the Site. The Site is located on the edge of the City Centre, close to a variety of retail and food and drink offers nearby that may see the benefits of an additional workforce being located in the area in the short term.

12.75. Lunchtime/food and drink expenditure by construction workers on site is estimated to be £3.5m assuming on expenditure of £3.69 per day per worker based on Visa research on commuters spend across the UK on lunch over the course of construction period.

12.76. Based on this assessment, the expected impact is considered to be of **minor beneficial** significance and temporary in nature.

Operational Phase

Housing

12.77. The Proposed Development will deliver a significant 1,950 new homes, making a notable contribution to Manchester's housing growth targets in the recent spatial framework (3,533 per annum), and supporting the proposed focus for much of Manchester's housing growth to be delivered in the city centre. High density development such as this also helps to ensure there remains sufficient sites available to accommodate forecast population and employment growth in the city centre, and within a short distance of the development site.

12.78. Considering the above, the impact of the Proposed Development on housing is considered to be of **moderate beneficial** significance at the Assessment Area and local authority scale.

Population

12.79. The Proposed Development will provide 1,950 new homes, comprising of 638 one-bed, 1,254 two-bed and 59 three-bed units. Assuming all units are fully occupied, and considering the unit mix, it is estimated the proposed development would accommodate circa 4,000 residents. The Proposed

Development is on an underutilised site and does not currently have any residential provision. It is therefore considered that the residents are expected to be largely additional to the area and would support a net uplift in the Assessment Areas population of 4,000, representing a 7.0% residential population uplift.

12.80. Based in the current age profile of the Assessment Area it is estimated that 3,800 residents will be of working age, helping to support the city centre workforce and growth forecasts for the city, while tax income from those working in the local authority will provide a contribution to the public purse.

12.81. It is possible that an increase in the population could lead to potential negative impacts, such as increased crowding, noise and nuisance in the immediate area. However, the plans show that the proposed development will help to regenerate an area which is currently underutilised, providing high quality accommodation close the River Irwell, helping to mitigate potential negative effects, including:

- Creation of new public realm;
- 100% cycle parking provision;
- Accessible connections to surrounding areas, including the St John's regeneration area and the city centre;
- Bringing vitality and animation to a currently underutilised gateway location into the city centre;
- Providing a range of residential amenities at the lower levels that will be accessible to all occupiers; and
- Access to the riverside walkway.

12.82. An uplift in the population will also support greater spend in the local economy, covered in more detail below.

12.83. Based on the above the impacts on population at the Site are considered to be of **moderate beneficial** significance at the Assessment Area level, and permanent in nature.

Employment and GVA Effects

12.84. The Proposed Development will deliver 379m2 (GIA) of commercial space Use Class E, expected to be occupied by food & drink operator. Applying HCA employment density guide benchmark for restaurants and cafés, suggest around 17.9 FTE jobs will be accommodated by the space, generating annual GVA of £565,000 based on the average GVA per FTE for the food & beverage serving sector for Greater Manchester .

12.85. In addition, between 25 and 30 full time jobs will be supported onsite by the residential element and maintenance of public realm, generating approximately £501,000 of GVA per annum, applying the average GVA per FTE for the services to buildings and landscape sector for Greater Manchester .

12.86. This scale of employment would represent a negligible uplift against the local employment level (+0.02%) presented in the baseline Assessment Area.

12.87. Based on this assessment the operation of the Proposed Development is expected to have a **negligible impact** of employment and GVA at the local level.

Local Expenditure

12.88. The additional households accommodated in the proposed development will support additional household spend, increasing local expenditure, including on retail, household goods, food and drink, local transport, recreation and leisure and other expenditure likely to be spent locally. Based on the 2019 ONS Family Spending Survey, it is estimated that households spend around £11,700 per household each year on goods and services in the UK. Applying this figure to the estimated

uplift in households to 1,950, annual resident local expenditure of £22.8m is estimated, a 3.6% uplift on total estimated household expenditure in the Assessment Area. The estimated annual resident local expenditure of £22.8m is sufficient to support around 160 FTEs in retailers, other services and the supply chain locally, based on the economy wide average cost per FTE in the North West , and GVA of £10.1m, based on the economy wide GVA per FTE for Greater Manchester.

12.89. The additional local expenditure by residents who are new to the area would be of **moderate beneficial** significance to the local economy, and permanent in nature.

Local Authority Income

12.90. The addition of new homes in the Assessment Area will generate additional Council Tax revenue for the City Council. While exact Council Tax bandings will not be determined until detailed site plans are known, making an assumption of a mix between Council Tax B and C properties, and taking into account single person discount for a proportion of the units, once fully built out and occupied the proposed development could generate an estimated £2.8m of annual Council Tax income. The additional £2.8m will support the delivery of services across the Local Authority and economic regeneration ambitions.

12.91. Based on this assessment, the local authority income effect is considered to be a permanent, **moderate beneficial** impact for the area.

Healthcare

12.92. The uplift in population as a result of the proposed development is anticipated to create additional demand for healthcare facilities, although a proportion of residents in the development area may already be registered at local facilities.

12.93. While information on capacity is unavailable, there are five GP's within 1 mile of the Site which are accepting new NHS patients according to each GP profile on the NHS website.

12.94. There are 31 dental practices within 2 miles of the Site, of the 8 where data is available, one is accepting new adult and child patients (if they have a referral from a dentist). A 2021 report by Greater Manchester Healthwatch has highlighted that current capacity in NHS dentists is insufficient to meet demand, and reported that there's been a 'huge increase' in the number of patients struggling to find NHS dentists in the city.

12.95. Assuming all 4,000 residents estimated to be accommodated in the four towers require a GP and Dentist (within 1 and 2 miles respectively), using the available data suggests on average each GP surgery would need to take on c.360 new patients and each dental practice would take c.130 patients.

12.96. Crown Street Phase 1, a nearby development, will however deliver a forthcoming medical facility which could potentially add 12,000 patients to capacity, helping to mitigate additional demand for GP's. It is also worth noting that and both GP and Dental Practices will take patients that are located outside of this search radius.

12.97. Given the sites close proximity to the city centre it is anticipated that the development is expected to accommodate a relatively young demographic, attracted by local employment and leisure offers. This is supported by the age profile of the Assessment Area, where 94% of the population are of working age. This suggests residents may have a lower demand for healthcare than the older population, which could help to limit the likely magnitude of the impact upon local healthcare providers. In addition not all residents will be new to the area and may already be registered with a local GP or dentist.

12.98. Given the lack of information on capacity within existing healthcare facilities and the known shortages in NHS dentists in Manchester, taking into account a worst case scenario, the assessment impacts are considered to be **minor adverse** at the local scale.

Educational Provision

12.99. Additional demand for school places is expected as a result of the uplift in residents in the proposed development, however this is anticipated to be minimal given the nature of the accommodation provided. Based on the Assessment Area's proportion of nursery, primary and secondary aged children, it is estimated that the proposed development will generate additional demand for the following:

- 33 nursery places;
- 60 primary school places; and
- 37 secondary school places.

12.100. As identified in the Baseline Assessment, there were 288 available primary school places within 1.2 miles of the site and 3,860 secondary school places within 3 miles of the site. The availability of school places in the local area, suggest that if all estimated primary and secondary school age residents were new to the area and required places at local schools there would still be additional capacity available. While data on the number of nursery places was unavailable, there are 10 day nurseries within 1.2 miles of the Site, six of which suggest they have available capacity. In addition, a primary school will be introduced as part of Crown Street Phase 2 further adding to the available capacity within the immediate surrounding area, adding 210 new primary school places and 26 nursery places.

12.101. Considering the assessment above, the impact of the Proposed Development on Education Provision is **negligible**.

Crime

12.102. The proposed development will be of high quality with high standards of building design, surveillance and building management, with associated public realm increasing connectivity, helping to animate the area, increase footfall and visibility, provide natural surveillance, reduce the sense of isolation and create a better sense of place and community. This can help to reduce some types of criminal activity. However, the increased number of residents in the neighbourhood may lead to a negligible increase in other types of crime.

12.103. Based on this assessment the proposed development would have a **negligible** impact on crime at the local scale.

Open Space and Recreational Facilities

12.104. Additional use of open spaces and demand for recreational facilities is expected as a result of the uplift in population arising from the proposed development. Given the location of the Site there is a significant range of leisure facilities including a large number of gyms and other leisure activities which support a broad population, that isn't confined to the city centre. There is also a variety of open spaces within walking distance.

12.105. The Proposed Development will create 1.29ha of new public realm improving connectivity creating a new river walkway and new connections from Salford through to St Johns and the city centre which can be used by residents and visitors. High-quality onsite residential amenities, including residents lounges, business suites, meeting spaces, gyms and exercise rooms will also be accommodated by the Proposed Development.

12.106. Based on this assessment, given the significant uplift in residents increasing use of open spaces and demand for recreational facililities as well the new public realm including a new river walkway, the impact of the Proposed Development on open space and recreational facilities is considered to be **minor beneficial to negligible**.

Mitigation Measures

12.107. There are no anticipated adverse effects arising in the Construction Phase in terms of the socio-economic assessment requiring mitigation measures, with impacts identified as minor beneficial. If

the contractor adopts a Local Labour Agreement, or makes commitments to using local suppliers, a greater share of benefits will be captured in the Manchester economy. While there are likely to be a number of mitigation measures required for the construction phase, they are not covered within this discipline and will be contained within the other chapters of the ES.

12.108. During the operational phase, once the Proposed Development is complete and occupied, there are no anticipated moderate or major adverse effects, with impacts considered ranging from minor adverse to moderate beneficial, and therefore within the socio-economic assessment there are no mitigation measures required.

Cumulative Effects

12.109. Consideration of the socio-economic effects of the proposed development alongside the delivery of wider development programmes in the surrounding area has been given, in the context of the high level of development currently taking place in Manchester. The following developments have been identified for consideration as part of the cumulative assessment that are under construction or have been granted planning permission but have not started onsite or awaiting planning permission within a 1km radius of the Proposed Development:

1. Gresham Mill, Salford 15/67048/FUL (under construction)
2. Old Granada Studios 127612/FO/2020 (under construction)
3. Middlewood locks (Plots K, L, M) 20/75275/REM (under construction)
4. Globe and Simpson 121721/FO/2018 (under construction)
5. CityView Salford (Regent Plaza) 16/68723/FUL (under construction)
6. X1 The Landmark 16/68977/FUL (under construction)
7. City Gardens 114961/FO/2017 (under construction)
8. The Sky Gardens 115211/FO/2017 (under construction)
9. Crown Street Phase I 119806/FO/2018 (under construction)
10. Middlewood Plaza 17/70615/FUL (under construction)
11. Castle Wharf 113870/FO/2016 (under construction)
12. Owen Street Phase II (Deansgate Square) 111719/FO/2016/C1 (under construction)
13. Atelier, Salford Central, (Plots E7,8) 18/71782/REM (under construction)
14. The Waterhouse - Worall Street 18/71363/FUL (under construction)
15. Crown Street Phase II 126668/FO/2020 (under construction)
16. Former Bulls Head Public House 118303/FO/2017 (under construction)
17. Viadux Residential 115871/FO/2017 (under construction)
18. Moxy Hotel 126945/FO/2020 (under construction)
19. Union T2, St Johns 126648/FO/2020 (awaiting agreement)
20. Middlewood Locks Plot N, Salford Central 14/65793/OUT (planning permission granted but no reserved matters)
21. Arundel Street, Manchester 123261/FO/2019 (planning permission granted, but not started on site)
22. Slate Wharf 113617/FO/2016 (planning permission granted, but not started on site)
23. Talbot Mill 117595/FO/2017 (planning permission granted, but not started on site)
24. St Johns Place 109660/FO/2015/C1 (awaiting decision)

25. 325-327 Deansgate 125804/FO/2019 (planning permission granted, but not started on site)
26. Plot B7, Salford Central Masterplan 20/75571/FUL (planning permission granted, but not started on site)
27. Land at Deansgate South 129406/FO/2021 (awaiting decision)
28. Great Jackson Street – Plot E 116850/FO/2017 (planning permission granted, but not started on site)
29. Plot G, 34 Great Jackson Street 129273/FO/2021 (planning permission granted, but not started on site)
30. Thorncross Close, Off Ellesmere Street, Manchester, M15 4LU 113473/FO/2016 (planning permission granted, but not started on site)
31. Embassy Village 129923/FO/21 (planning permission granted, but not started on site)
32. Cornbrook Hotel 131163/MO/2021 (awaiting decision)

12.110. There are 18 developments currently under construction which will deliver a significant share of the cumulative impacts by 2024/25, while 10 developments have planning permission but are yet to start onsite which, along with the Proposed Development will deliver cumulative impacts by 2026/27, with the remaining four developments delivering cumulative impacts by 2030/31 presuming they all proceed.

12.111. The construction of the cumulative developments will provide a boost in employment and GVA, providing a regular local expenditure from the construction workforce. However, the scale of cumulative development will require a skilled construction workforce over a sustained period. This level of activity could lead to skilled shortages over the period, although this is likely to delay rather than postpone planned investment.

12.112. Over 10,000 new homes (a large share of which will be one and two-bed apartments) are expected to be delivered by 2030/31, including the Proposed Development the developments under construction, those which have been approved but are yet to start on site and those awaiting planning permission. This will make a make a major contribution to Manchesters housing targets set out the the Places for Everyone Plan (3,555 per annum between 2021 and 2037), as well as commitments to higher density development in the city centre. Based on the assessment, the cumulative effects is considered to have a major beneficial impact on housing.

12.113. The cumulative scale of development including the Proposed Development will result in an increased population by 2031 of around 20,800, of which around 90% is expected will be of working age, making a moderate beneficial contribution to the City workforce, supporting economic growth objectives and the Manchester Industrial Strategy.

12.114. Upon completion, the delivery of new employment space and homes to support a growing workforce will support a notable uplift in employment and GVA.

12.115. An uplift in local expenditure in the Assessment Area will also be generated as a result of the additional 10,000 new homes and an uplift in the resident population of 20,800.

12.116. Local Authority Income generated through Council Tax will rise as a result of the additional homes, which can be reinvested in the local economy generating further benefits.

12.117. There is expected to be a modest increase in demand for educational faciltities with circa 82 nursery places, 151 primary school places and 93 secondary school places as a result of the delivery of all of the schemes collectively and the Proposed Development. This reflects the location and the focus of developments on one and two bedroomed apartments in high rise developments.

12.118. There are 10 nurseries within a 1.2 mile radius of the Site, there may need to be additional capacity introduced in later years to meet demand for places. Current data suggests there is enough capacity within existing primary schools and secondary schools to accommodate additional

demand, although it demand for primary school places may come under pressure in future years. The new school to be introduced as part of Crown Street Phase 2 will help to address potential shortages. The overall cumulative impact on education is **minor adverse**.

12.119. The scale of cumulative residential developments will lead to a significant influx of residents over the next five years. While many of the cumulative developments considered are expected to attract a younger working age population, which may have a lower demand for healthcare than the older population, the estimated scale of population uplift and anticipated uplift in demand is significant. There are 11 GP practices within a mile radius of the Site, five of which are currently accepting new NHS patients. A forthcoming medical facility to be delivered as part of Crown Street Phase 1 could potentially add 12,000 patients to capacity. The Manchester Strategy for Primary Medical Care, 2018-2027, recognises rising demand for primary care as a result of growing population, with particular pressures in the city centre as a result of significant recent and forecast population growth. A key vision of the strategy is for full population coverage for all Primary Care ensuring a consistent offer to Manchester patients. There are 31 dental practices within 2 miles of the Site, of the 8 where data is available, one is accepting new adult and child patients (if they have a referral from a dentist). This is reflective of a local and national shortage of dentists prepared to accept new NHS patients. The cumulative population increase likely by 2031 is likely to have a negative effect unless the NHS addresses this national issue.

12.120. Given the difficulty in assessing how existing healthcare facilities will cope with the large uplift in population due to the lack of data available on capacity within existing healthcare facilties, a cautious assessment of cumulative development on healthcare faciltities has been made, with the impact of the cumulative development expected to be **minor – moderate adverse**.

12.121. Increased pressure of local services, open space and recreational facilities is also expected from the cumulative scale of development, although a number of developments are providing additional amenity, public space and leisure facilities.

Residual Effects

12.122. There are no significant residual effects on socio-economic receptors expected as a result of the Proposed Development.

Table 1.14 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Construction Phase				
Minor beneficial on construction jobs and GVA	Employment and GVA	None	None	Minor beneficial on construction jobs and GVA (temporary)
Minor beneficial on construction workforce local expenditure	Local Expenditure	None	None	Minor beneficial on construction workforce local expenditure (temporary)
Operational Phase				

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Moderate beneficial on housing	Housing	None	None	Moderate beneficial on housing
Moderate beneficial on population	Population	None	None	Moderate beneficial on population
Negligible on jobs and GVA	Employment and GVA	None	None	Negligible on jobs and GVA
Moderate beneficial on household expenditure	Local Expenditure	None	None	Moderate beneficial on household expenditure
Moderate beneficial on council tax income	Local Authority Income	None	None	Moderate beneficial on council tax income
Minor adverse on educational provision	Educational Provision	None	None	Minor adverse on educational provision
Minor adverse on healthcare provision	Healthcare	None	None	Minor adverse on healthcare provision
Negligible on incidences of crime	Crime	None	None	Negligible on incidences of crime
Minor beneficial to negligible on open space and recreational facilities	Open Space and Recreational Facilities	None	None	Minor beneficial to negligible on open space and recreational facilities

Summary

12.123. The socio-economic assessment has assessed the likely effects of the proposed development in terms of the following issues:

- Employment and GVA;
- Local expenditure;
- Housing;
- Population;
- Local authority income;
- Educational provision;

- Healthcare;
- Crime; and

Open space and recreational facilities.

12.124. The Table below summarises the effects of the Proposed Development considering the residual effects (although no mitigating measures are expected to be required) and the cumulative effects, which takes into account relevant developments currently under construction and as well as those or awaiting planning permission that are occurring nearby.

Table 1.15 – Summary of Receptors, Residual Effects and Cumulative Effects

Receptor(s)	Residual Effect	Cumulative Effect
Construction Phase		
Employment and GVA	Minor beneficial	Moderate beneficial
Local Expenditure	Minor beneficial	Moderate beneficial
Operational Phase		
Housing	Moderate beneficial	Major beneficial
Population	Moderate beneficial	Moderate beneficial
Employment and GVA	Negligible	Moderate beneficial
Local Expenditure	Moderate beneficial	Major beneficial
Local Authority Income	Moderate beneficial	Moderate - major beneficial
Healthcare	Minor adverse	Minor - moderate adverse
Educational Provision	Negligible	Minor adverse
Crime	Negligible	Minor adverse
Open Space and Recreational Facilities	Minor beneficial to negligible	Minor adverse

Reference List

12.125. This chapter has been prepared using the following sources:

- National Planning Policy Framework (NPPF)
- Places for Everyone Plan
- The Greater Manchester Strategy – Our People, Our Place
- Manchester Core Strategy
- Residential Growth Strategy
- The Water Street Strategic Regeneration Framework Area
- The St John's Strategic Regeneration Framework Update 2016
- Our Manchester Strategy
- ONS Census
- ONS Business Register and Employment Survey (BRES)
- ONS UK Business Counts
- ONS Claimant Count
- ONS Annual Population Survey

- ONS Annual Survey of Hours and Earnings (ASHE)
- DfE Schools Capacity Data
- National Travel Survey

13. Solar Glare

Introduction

13.1. This Chapter of the ES has been prepared by GIA and assesses the likely Solar 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.

13.2. This Chapter is accompanied by one technical appendix, Solar Glare Assessment (Appendix 13.1) and the following figures:

- Figure 13.1 – Typical Stopping Distances for a car;
- Figure 13.2 – Field of Vision Diagram;
- Figure 13.3 – Sensitive viewpoints for solar glare assessment; and
- Figure 13.4 – Elevations key, as referenced within the assessment.

13.3. GIA is an independent firm of chartered surveyors and technical specialists, regulated by RICS and with over 150 members of staff is the largest specialist advisor in the UK. GIA have extensive experience in providing expert advice on daylight, sunlight, overshadowing, solar glare and light pollution. The author of this chapter is a graduate of Victoria University of Wellington, NZ with a Masters in Building Science, with over 5 years of UK experience in the technical assessment, consultancy and EIA works in relation to solar glare.

Legislative and Policy Context

13.4. There is no legislation, National or Local Planning Policy relevant to Solar Glare.

Other Relevant Policy, Standards and Guidance

Commission Internationale de L'Eclairage (CIE) 146:2002 & CIE 147:2002 Collection on glare (2002)

13.5. The CIE 146:2002 Collection on glare 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."

"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."

Building Research Establishment (BRE) – Site Layout Planning for Daylight and Sunlight: A guide to good practice (2011)

13.6. The BRE Guidelines includes the following statement with regard to the potential for reflected solar glare from a new development:

"Glare or solar dazzle can occur when sunlight is reflected from a glazed façade. This can affect road users outside and the occupants of adjoining buildings. The problem can occur either when there are large areas of reflective glass or cladding on the façade, or when there are areas of glass or cladding which slope back so that high altitude sunlight can be reflected along the ground. Thus solar dazzle is only a long term problem only for some heavily glazed (or mirror clad) buildings…"

Assessment Methodology and Significance Criteria

Methodology for Determining Sensitive Receptors

13.7. For Solar Glare, sensitive receptors are considered road users at junctions and train (or tram) drivers on tracks within the surrounding area. Viewpoints at road junctions and on train (or tram) lines within 500 metres of the Site where the Proposed Development is visible within 30° of the driver's direct line of sight have been identified and assessed. At distances greater than 500 metres from the Proposed Development, instances of solar glare would be unlikely to occur.

13.8. At each of the identified junctions, viewpoints are located at the minimum stopping distance for road users and at the driver's eye level with the focal point being a relevant traffic element, such as signals or incoming traffic. For rail drivers, viewpoints are assessed where signals are visible or at representative intervals where the Proposed Development would be visible close to the direct line of sight for a substantial stretch of track.

13.9. The identified road junctions and viewpoints assessed are considered most sensitive in relation to solar glare due to a combination of the nature of the use and proximity to the site, and therefore consideration has been given to several viewpoints at traffic junctions, train and tram lines from which the Proposed Development will be visible. The viewpoints assessed are indicated in Figure 13.3.

Methodology for Determining Demolition and Construction Effects

13.10. Owing to the evolving and changing nature of demolition and construction activities, the assessment of potential effects during demolition and construction of the Proposed Development on solar glare has not been modelled. Instead, a qualitative assessment has been undertaken using professional judgement and experience.

13.11. The potential solar glare effects relating to demolition and construction works will vary throughout the construction programme and gradually increase to the potential effects identified for the completed Proposed Development as the cladding is installed. It is therefore considered that the completed Proposed Development represents the worst-case assessment in terms of likely solar glare effects.

Methodology for Determining Operational Effects

13.12. The technical analyses carried out to inform the assessments and identify possible solar glare effects on road users and train drivers have been undertaken by creating a digital three-dimensional (3D) model of the surrounding area, based on photogrammetry survey data, and insertion of a 3D model of the Proposed Development.

13.13. The potential for reflected solar glare or dazzle from the glazed or reflective façade cladding of the Proposed Development has been assessed using specialist lighting software. The assessment shows the path of the sun for the entire year around the Proposed Development. From this, two computer generated angular images have been produced for each selected viewpoint, indicating the area which sees the reflection of the sun-path at any point during the year. A modified diagram portraying a standardised extent of human vision is then overlaid onto the image.

13.14. The fovea centralis (also generally known as the fovea) is a part of the eye, located in the centre of the macula region of the retina. The fovea is responsible for sharp central vision (also called foveal vision), which is necessary in humans for reading, watching television, driving, and any activity where visual detail is of primary importance. The macula corresponds to the central 13° of the visual field; the fovea to the central 3°.

13.15. Figure 13.2 highlights the degrees of vision corresponding to the foveal view, with a red circle of 3° of angle in order to identify the area most sensitive to reflected solar glare. Another red circle represents the incidence of the 30° radius of our typical field of view in order to identify a secondary area of sensitivity to potential reflected glare instances.

13.16. The degrees of vision provide a reference from which potential concerns can be judged. At 3°, the potential for the reflected glare to cause a hazard is high and mitigation would be required. Between 3° and 30°, there is the potential that there could be an issue and mitigation may be necessary.

13.17. As stated in the CIE 146:2002, occurrences at angles beyond 30° would be of little significance in most situations but may be relevant in exceptional circumstances. When seated in a driving seat of a typical car, for example, the limits of the windscreen would generally obstruct the driver's view at angles beyond 30° from the line of sight. Therefore, the risk of reflective solar glare causing a hazard is reduced.

Viewpoints for Road Users

13.18. As indicated previously, the assessment considers potentially sensitive viewpoints for road users surrounding the Site. The viewpoints are generally located at the minimum stopping distance and at the driver's eye level. The focal point is a relevant traffic element, such as signals or incoming traffic.

13.19. Identifying the viewpoints based on the stopping distance is calculated as the combination of thinking and braking distances, using the following formula:

$$D_{total} = D_{thinking} + D_{braking} = V*T + V^2/(2\mu*g)$$

13.20. Where each component is:

- V = Relevant vehicle speed, typically the road speed limit.
- T = Thinking time (0.67 sec)
- μ = Braking effort (considered 0.65 for cars and 0.5 for buses)
- g = Gravity acceleration.

13.21. The height of the viewpoint is considered to be 1.5m for cars and 2.0m for buses. Figure 13.1 identifies the typical stopping distance range for a car travelling at different speeds. Therefore, a viewpoint for a car driving at 30 mph (i.e. speed limit for a dense urban location) would be placed at 23m from a traffic light and 1.5m above the ground.

13.22. The assessment also considers a driver's field of vision which takes the angular extent seen at any given time, which for humans facing forwards is approximately 180 degrees.

Viewpoints for Train Drivers

13.23. In the case of a train driver, the view direction is defined by the rail tracks. The Railway Group Standard GE/RT8037 Signal Positioning and Visibility sets the eye level of the driver at 2.75 m above the rails. The viewpoint is centred between the tracks for ease of reference. Although train drivers sit slightly to the left within the cabin, this bears no material effect on the analysis of the images as the signals are visible at a distance of hundreds of metres at which point the slight shift in the cabin equates to a very small angular change.

13.24. The assessment also considers a train drivers field of vision which takes the angular extent seen at any given time, which for humans facing forwards is approximately 180 degrees.

Significance Criteria

Evaluating Effects and Significance – Solar Glare

13.25. The key terminology used to describe the magnitude of impact is as follows and is further described in the below sections of this chapter:

- Major;
- Moderate;

- Minor; and
- Negligible.

13.26. There are no quantitative criteria within the BRE Guidelines or elsewhere regarding acceptable levels of solar glare. Generally, however, solar reflections at high altitudes are less likely to cause nuisance or distraction.

13.27. Professional judgement has therefore been applied to assign the magnitude of impact for solar glare arising from the Proposed Development and to determine the criteria for assessing the significance of solar glare set out in Table 13.1.

13.28. The following guide is used to ascertain the possible initial magnitude of impact for each viewpoint assessed. Where reflections occur from multiple facades and from multiple buildings, an initial magnitude of impact is given for each instance of potential solar glare.

Table 13.1: Criteria Used for Determining the Effect of Solar Glare

Significance Guidance	Possible Factors
Negligible	No reflections are visible or if visible all occur at angles greater than 30° from the driver's line of sight and so, as stated by the CIE, will be of "little significance".
Minor	Solar reflections are visible within 30° to 10° or between 10° to 5° of the driver's line of sight for a short period of time.
Moderate	Solar reflections are visible within 10° and 5° of the driver's line of sight occurring for a long period of time.
Major	Solar reflections are visible within 5° of a driver's line of sight.
Note – mitigating factors such as alternative and unaffected signals/traffic lights and car visor angle may result in the assignment of significance which differs from the above.	

13.29. Consideration is then given to mitigating factors that could influence the likelihood of solar reflections resulting in an instance of solar glare, these may include:

- sunlight availability probability;
- area of façade off which reflections are visible, particularly where the area of reflection visible is less than 8 pixels in diameter and cannot reflect the full solar disc;
- period of time reflections are visible;
- angle at which reflections are visible from line of sight;
- views of the development being obscured; and
- the time of day at which the solar reflection will occur for example during peak traffic times.

13.30. In our 60° images, which are rendered out at a resolution of 1,000 x 1,000 pixels, the sun's disc has a diameter of 8 pixels.

13.31. Solar Glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of a proposed development. Therefore, the assessment considers the effect of the Proposed Development in absolute terms, by reference to the above criteria.

13.32. Effects in terms of solar glare can only be adverse (negative) in nature due to this not being a comparative assessment.

13.33. All road junctions and tram tracks assessed have been identified as being of high sensitivity as an action is required by a driver that is a safety concern if their visibility is impaired by solar glare. In determining the overall effect at a junction, whilst consideration is given to both controlled and uncontrolled junctions, the later, those where a driver does not have a fixed viewpoint such as a

traffic light or where no specific manoeuvres are required by a driver, are less likely to be impacted by solar glare this is a safety concern but are still considered high risk.

13.34. As the sensitive receptor is a driver approaching a road junction, multiple viewpoints at any one junction may be assessed for each of the traffic lanes or signals affected. In terms of significance criteria however, professional judgement has been used to determine the overall effect at the junction as a whole, taking into consideration the effects at all viewpoints assessed for that junction. Similarly, for train drivers, the overall effect is reported for the stretch of track assessed as a whole. Therefore, following the initial magnitude of an effect for each viewpoint and consideration of mitigating factors, a clear statement is then made as to whether the overall effect is significant or not significant. As a general rule, the following criteria is applied:

- 'Moderate' or 'major' effects are deemed to be 'significant';
- 'Minor' effects are considered to be 'not significant', although they may be a matter of local concern; and
- 'Negligible' effects are considered to be 'not significant' and not a matter of local or wider concern.

Limitations and Assumptions

13.35. Although great care is taken in identifying typical viewpoints, this does not guarantee that there are no additional sensitive locations where reflected solar glare could present a particular risk. 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. For practical reasons the area of the assessment is limited to the area surrounding the Proposed Development. The occurrence of reflected solar glare at greater distances is not the subject of this assessment.

13.36. It is also to be noted that the hours presented reflect solar time and therefore do not take Daylight Saving Hours into account.

13.37. Assessing static viewpoints portrays a worst-case scenario, whereby a view is assessed from one specific viewpoint (minimum stopping distance), looking at one set of traffic lights specifically. When in reality, owing to the dynamic nature of traffic movement, the precise view being assessed would occur for an instant of a second and any potential effects would therefore be of a temporary nature.

Scenarios

Baseline Conditions

13.38. The solar glare assessment is undertaken in the worst-case scenario. Solar Glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of the Proposed Development. Therefore, the assessment considers the effect of the Proposed Development in absolute terms.

13.39. However, it should be noted that the Proposed Development will be located on a Site where its existing state is a construction compound thus there is limited opportunity for instances of solar glare from the Site to be experienced. Solar glare from surrounding buildings is not assessed.

Scenarios Assessed

13.40. Due to the phased nature of the Proposed Development with the potential for temporary solar glare effects to occur as a result of partial delivery of the Development, it has been considered necessary to assess the interim scenarios, at the completion of each relevant phase.

13.41. The following scenarios have been technically assessed and are reported on in detail within this chapter of the ES:

- Scenario 3: Phase C1 complete;
- Scenario 4: Phases C1 and C2 complete;

- Scenario 5: Phases C1, C2 and D1 complete; and
- Scenario 6: Completed Development.

13.42. The solar glare assessment is undertaken on the worst-case scenario. Solar Glare is not a comparative assessment; the fact it may occur in the baseline does not necessarily justify its occurrence as a result of the Proposed Development. Therefore, the assessment considers the effect of the Proposed Development in absolute terms.

13.43. The solar glare effects of neighbouring schemes are expected to be assessed in isolation and reported in absolute terms as part of their application. Cumulative solar glare effects do not portray a worst-case scenario as the inclusion of neighbouring scheme may block sunlight from reaching the facades of the Proposed Development or obstruct the Proposed Development from viewpoints assessed. Solar glare effects are therefore assessed in isolation to portray the worst-case scenario and reported in absolute terms only.

13.44. These assessments have been undertaken for the Proposed Development within the context of the surrounding existing environment and committed developments that have commenced on site. Only those committed developments within 500 metres of the Site and visible within any of the sensitive viewpoints are included within the context. The following committed developments have been included within the surrounding existing environment:

- The Factory (MCC 119890/VO/2018);
- Potato Wharf Phase II (MCC 109335/FO/2015/C1);
- Union T1, St Johns (MCC 114385/FO/2016);
- Manchester Goods Yard (121511/FO/2018);
- Plot C1, Salford Central (SCC 19/73721/REM);
- Middlewood Locks Plots G & H (SCC 16/68904/REM);
- Old Grenada Studios (MCC 127612/FO/2020);
- Middlewood Locks Plots K, L & M (SCC 20/75275/REM);
- CityView Salford (SCC 16/68723/FUL);
- X1 The Landmark (SCC 16/68977/FUL); and
- Middlewood Plaza (SCC 17/70615/FUL).

Identification and Evaluation of Significant Effects

13.45. The full solar glare assessment is provided in Technical Appendix 13.1.

13.46. The assessment has been undertaken from the sensitive viewpoints on roads and rail track surrounding the Site where the proposed development is visible with a summary of results provided below. The summary tables provided for each junction outline the times of day and year that reflections would be visible from each of the relevant facades, Figure 13.4 identifies the elevations as referenced within the assessment tables.

13.47. The assessment has been undertaken in a worst-case scenario considering there is no cloud cover, so the sun is shining for all days of the year for the full duration of daylight hours.

Embedded Mitigation

13.48. Owing to the proximity of the site to several sensitive road junctions and rail tracks, as well as the highly glazed nature of the Proposed Development, a comprehensive, iterative review process was undertaken to incorporate mitigation strategies within the detailed façade design.

13.49. The iterative review process has run alongside the development of the façade from the early massing stages and has comprised of:

- Initial massing review, whereby the massing of the four phases were tested to identify which nearby junctions are most sensitive to reflections and identify any facades that would likely require strategies deployed to reduce the area and intensity of any reflections;
- Initial glare testing a façade concepts for the most sensitive junctions to establish if there was a risk of solar glare;
- Interim testing of façade strategies deployed to reduce the area of reflections and their intensities, and thus minimise the risk of solar glare; and
- Final, pre-design freeze testing of the facades to confirm that the embedded solar glare mitigation reduces the risk of solar glare as much as possible.

13.50. Numerous options were explored to break up reflections and lower the intensity of any reflections that occurred. This included the use of anodised aluminium panels with a non-specular finish and purge ventilation panels to break up reflections, fins to partially shade areas of glazing, and tilting of glazed panels so that large areas of flat glazing are avoided and that each panel is at an alternative angle from the panels next to it and above/below it thus reflecting sunlight as a slightly different time to the adjacent panel.

13.51. Embedded mitigation within the façade design includes for C1 and C2, the use of tilted glazed panels; non-specular purge ventilation panels and non-specular anodised aluminium strips. Additionally, for the facades that are visible near to the direct line of sight of a driver at a nearby junction, a frit pattern has been applied to the outer surface of back painted glazing and for vision glazing, a low Visible Light Reflectance (VLR) glazing has been selected to reduce the intensity of reflections. For D1 and D2, the facetted nature of the curved facades results in reflections occurring a slightly different times to the adjacent panel, non-specular anodised aluminium panels, non-specular purge ventilation panels, imitation purge ventilation panels and vertical fins have also been included. Additionally, the VLR of all glazing within D1 and D2 has been minimised.

13.52. Therefore, the assessments reported within this ES Chapter have been undertaken on a scheme that has been fine-tuned to address potential solar glare risks as much as possible. However, as with any tall building within a low-rise context, the Proposed Development is visible from some distance and sits within the field of view for drivers at several nearby junctions. It is likely that solar reflections may be unavoidable at all junctions, so the façade design has sought to limit the area of reflections and their intensity to minimise the risk of solar reflections resulting in an instance of solar glare being generated by the buildings' facades.

Construction & Demolition

13.53. The likely effects in relation to solar glare for the surrounding road users and train drivers would vary throughout the demolition and construction works, depending on the installation of reflective façade materials.

13.54. The effects during the demolition works is considered negligible. As construction works progress, and the facades of the Proposed Development are installed, the potential solar glare effects would be similar to those once the Proposed Development is complete and operational, as presented below. It is therefore considered that the completed Proposed Development represents the worst-case assessment in terms of likely solar glare effects.

13.55. As such, the overall effect in terms of solar glare would range from being negligible effects during demolition, then gradually changing from negligible to permanent, minor adverse and not significant, once the Proposed Development is complete, as set out in the assessment of the Proposed Development scenario below.

Scenario 3 (Phase C1 Complete)

13.56. This scenario discusses the likely effects of the Proposed Development in Scenario 3, which comprises Phase C1 complete only.

13.57. At the following junctions, Phase C1 of the Proposed Development is not visible, as such the effect in terms of solar glare is considered to be negligible:

- Rolling Street (RS);
- Water Street (WS1);
- Trinity Way/Inner Ring Road (TW3);
- Water Street (WS2);
- Regent Road (RR3);
- Regent Retail Park (RP4);
- Egerton Street/Inner Ring Road (ES1);
- Deansgate Interchange on-ramp (ES_Slip);
- Deansgate Interchange (DGI);

13.58. At the following junctions and train lines, the reflections from Phase C1 remain as per those of the Completed Development scenario and are therefore not discussed further for Scenario 3:

- Liverpool Street (LS);
- East Ordsall Lane (EOL1);
- East Ordsall Lane (EOL2);
- Hampson Street (HS);
- Trinity Way/Inner Ring Road (TW2);
- Trinity Way/Inner Ring Road (TW1);
- Liverpool Road (LR);
- New Elm Road (NER);
- Regent Road (RR1);
- Regent Retail Park (RP1);
- Regent Retail Park (RP2);
- Regent Retail Park (RP3);
- Northern Line Southbound Track 1 (N1);
- Northern Line Southbound Track 2 (N2);
- Northern Line Southbound Track 3 (N3); and
- Northern Line Northbound (N4).

13.59. The junctions and train line discussed below in detail are those where the reflections from Phase C1 differ from those reported in the Completed Development scenario.

Trinity Way/Inner Ring Road Northbound (TW4) – Junction with Water Street

13.60. Four viewpoints have been assessed at this junction, TW4a, TW4b, TW4c and TW4d, however Phase C1 is only visible within TW4c and TW4d. Viewpoint TW4a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint TW4b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint TW4c shows drivers in the central lane looking at the right traffic lights, and TW4d shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.2 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW4)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW4c	C1: South-Western	15:00 to just after 16:00 GMT	Mid-January to mid-April and mid-August to mid-November	From 16°	Minor Adverse
	C1: South-Western Podium	15:00 to 17:00 GMT	Mid-October to mid-February	From 16°	Minor Adverse
	C1: South-Western	Sunrise to 06:00 GMT	Mid-April to mid-August	From 28°	Minor Adverse
TW4d	C1: South-Western	15:00 to 17:00 GMT	Mid-January to late-March and early-September to mid-November	From 24°	Minor Adverse
	C1: South-Western Podium	15:00 to 17:00 GMT	Mid-January to mid-February and mid-October to mid-November	From 24°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.61. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections mostly occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.62. Following implementation of Phase C2, the facades of C1 would no longer be visible at this junction, as such, the reflections from Phase C1 only occur until the point in time that the superstructure of Phase C2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Trinity Way/Inner Ring Road with Water Street in Scenario 3 is considered to be short term, Minor Adverse and not significant. The overall effect in Scenario 3 is less than the Completed Development scenario.

Egerton Street/Inner Ring Road (ES2) – Junction with Regent Road

13.63. Four viewpoints have been assessed at this junction, ES2a, ES2b, ES2c and ES2d, however Phase C1 is only visible within ES2d. Viewpoint ES2a shows the view of drivers in the central turning lane looking at the right turning traffic lights, viewpoint ES2b shows the view of drivers in the right turning lane looking at the right turning traffic lights, whilst viewpoint ES2c shows drivers in the left straight ahead lane looking at the left traffic lights and viewpoint ES2d shows drivers in the right straight ahead lane looking at the right traffic lights. There are second traffic lights on the opposite side of the junction for both turning traffic and those travelling straight through, primarily for use by stationary vehicles.

Table 13.3 - Summary of Potential Reflections at Egerton Street/Inner Ring Road (ES2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES2d	C1: South-Western	16:00 to 17:00 GMT	Early-February to late-March and early-September to late-October	From 27°	Minor Adverse
	C1: Southern-Western Podium	16:00 to 17:00 GMT	Mid-January to Mid-March and mid-September to mid-November	A very small area of reflection is visible between 27° and 29°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.64. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.65. Following implementation of Phase C2, the facades of C1 would no longer be visible at this junction, as such, the reflections from Phase C1 only occur until the point in time that the superstructure of Phase C2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the location of the reflections within the field of view, the overall effect in terms of solar glare to drivers at the junction of Egerton Street/Inner Ring Road with Regent Road in Scenario 3 is considered to be short term, Negligible to Minor Adverse and not significant. The overall effect in Scenario 3 is less than the Completed Development scenario.

Water Street (WS3) – Junction with Regent Road & Egerton Street/Inner Ring Road

13.66. One viewpoint has been assessed at this junction, WS3. Viewpoint WS3 shows the view of drivers looking at the left traffic lights. There is a second traffic light on the right side of the road primarily for use by stationary vehicles.

Table 13.4 - Summary of Potential Reflections at Water Street (WS3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
WS3	C1: South-Eastern	05:00 to 06:00 GMT	Mid-April to mid-August	0° to 11°	Major Adverse
	C1: South-Western	14:00 to 16:00 GMT	Mid-September to mid-March	0° to 18°	Major Adverse
	C1: South-Western Podium	15:00 to 16:00 GMT and 16:00 to 17:00 GMT	Mid-October to mid-February	Small areas of reflections are visible from 2° to 4° and 4° to 6°	Major Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.67. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- The reflections that occur from the south-eastern façade of C1 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panels and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the south-eastern façade which lowers the intensity of reflections generated from this façade;
- The area of each panel on the south-eastern is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The majority of reflections occur outside peak traffic times;
- The probability of the sun shining at the times when reflections could occur from the south-eastern façade and from the podium is less than 30%;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The first set of traffic lights are located on slight bend in the road therefore any instances of reflection would only be visible momentary before the reflection angle changes.

13.68. Following implementation of Phase C2, the south-western facades of C1 would no longer be visible at this junction, as such, the reflections from the south-western facades of C1 only occur until the point in time that the superstructure of Phase C2 is in place. The south-eastern façade of C1 would be partially obscured following implementation of the superstructure of Phase C2, it is the areas of the south-eastern façade closest to the direct line of sight of a driver at this junction that would no longer be visible however some reflections from the south-eastern façade do remain. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Water Street with Regent Road and Egerton Street/Inner Ring Road in Scenario 3 is considered to be short term, Moderate to Major Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction. This results in a greater overall effect in Scenario 3 than the Completed Development scenario.

Regent Road (RR2) – Junction with Ordsall Lane

13.69. Three viewpoints have been assessed at this junction, RR2a, RR2b and RR2c however Phase C1 is only visible within RR2a and RR2b. Viewpoint RR2a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint RR2b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint RR2c shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.5 - Summary of Potential Reflections at Regent Road (RR2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR2a	C1: South-Western	12:00 to 13:00 GMT	Mid-October to late-November and early-January to mid-February	From 26°	Minor Adverse
RR2b	C1: South-Western	12:00 to 13:00 GMT	Mid-October to mid-February	18° to 24°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.70. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur above the driver's visor line, which would mitigate any reflections when deployed;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- The reflections occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.71. The South-western façade of C1 would be partially shaded following implementation of Phase C2, however the shaded area is the area of façade furthest from a driver's direct line of sight. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Ordsall Lane in Scenario 3 is considered to be short term, Minor Adverse and not significant. The overall effect in Scenario 3 is less than the Completed Development scenario.

Ordsall Lane (OS) – Junction with Regent Road

13.72. Two viewpoints have been assessed at this junction, OSa and OSb. Viewpoint OSa shows the view of drivers in the central lane looking at the right traffic lights, whilst viewpoint OSb shows drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road and a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.6 - Summary of Potential Reflections at Ordsall Lane (OS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
OSa	C1: South-Western	12:00 to 14:00 GMT	Mid-October to mid-February	17° to 23°	Minor Adverse
OSb	C1: South-Western	12:00 to 14:00 GMT	Mid-October to mid-February	22° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.73. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur above the driver's visor line, which would mitigate any effects when deployed;
- The reflections occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.74. The south-western façade of C1 would be partially obscured and partially shaded following implementation of the superstructure of Phase C2, however some reflections from the south-western façade do remain in Scenario 4. Once Phase D1 is implemented, no reflections would occur from C1. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Orsdall Lane with Regent Road in Scenario 3 is considered to be permanent, Minor Adverse and not significant as per the Completed Development scenario.

Tram Line (T1) – Eastbound from Cornbrook to Deansgate-Castlefield

13.75. Five viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

Table 13.7 - Summary of Potential Reflections at Tram Line (T1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: South-Eastern	05:00 to 06:00 GMT	Mid-April to mid-May and mid-July to mid-August	T1-10 T1-60	5° to 9°	Moderate Adverse
	Sunrise to 06:00 GMT	Mid-April to mid-August	T1-110 T1-160 T1-210	From 10°	Minor Adverse
C1: South-Western	15:00 to 16:00 GMT	Mid-January to mid-February and mid-October to mid-November	T1-10	4° to 9°	Major Adverse
			T1-60	5° to 9°	Moderate Adverse
			T1-110 T1-160 T1-210	From 11° to 15°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.76. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are on a bend; therefore, any instances of reflection would only be visible momentarily before the reflection angle changes;
- The reflections that occur from the south-eastern façade of C1 are generated by tilted glazing, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel; and
- There were no signals identified where visibility can be affected by reflections from the Proposed Development.

13.77. The south-western façade of C1 would be obscured following implementation of the superstructure of Phase C2, however reflections partially remain from the south-eastern façade remain. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to tram drivers on the tram line travelling eastbound from Cornbrook to Deansgate-Castlefield in Scenario 3 is considered

to be short term, Moderate Adverse and significant. This results in a greater overall effect in Scenario 3 than the Completed Development scenario.

Scenario 4 (Phases C1 and C2 Complete)

13.78. This scenario discusses the likely effects of the Proposed Development in Scenario 4, which comprises Phases C1 and C2 complete only.

13.79. At the following functions, Phases C1 and C2 of the Proposed Development are not visible, as such the effect in terms of solar glare is considered to be negligible:

- Rolling Street (RS);
- Water Street (WS1);
- Trinity Way/Inner Ring Road (TW3);
- Water Street (WS2);
- Regent Road (RR3);
- Regent Retail Park (RP4);

13.80. At the following junctions, the reflections from Phases C1 and C2 remain as per those of the Completed Development scenario and are therefore not discussed further for Scenario 4:

- Liverpool Street (LS);
- Hampson Street (HS);
- Trinity Way/Inner Ring Road (TW2);
- Trinity Way/Inner Ring Road (TW1);
- Liverpool Road (LR);
- New Elm Road (NER);
- Trinity Way/Inner Ring Road (TW4);
- Egerton Street/Inner Ring Road (ES2);
- Water Street (WS3);
- Regent Road (RR1);
- Regent Retail Park (RP1);
- Regent Retail Park (RP2);
- Regent Retail Park (RP3);
- Egerton Street/Inner Ring Road (ES1);
- Deansgate Interchange on-ramp (ES_Slip);
- Deansgate Interchange (DGI);
- Northern Line Southbound Track 2 (N2);
- Northern Line Southbound Track 3 (N3);
- Northern Line Northbound (N4); and
- Tram Line (T1).

East Ordsall Lane (EOL1) – Pedestrian Crossing

13.81. Two viewpoints have been assessed at this junction, EOL1a and EOL1b. Viewpoint EOL1a shows the view of drivers looking at the left traffic lights, whilst viewpoint EOL1b shows drivers looking at the

right traffic lights. There is a second traffic light on the left side of the junction primarily for use by stationary vehicles.

13.82. The reflections occurring from the facades of Phase C1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 4.

Table 13.8 - Summary of Potential Reflections at East Ordsall Lane (EOL1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
EOL1a	C2: Western	14:00 to 15:00 GMT	Mid-September to mid-March	3° to 17°	Major Adverse
	C2: Northern	Inter-reflections occur just before 16:00 to 17:00 GMT	Inter-reflections occur from early-February to mid-March and mid-September to late-October	Inter-reflections are visible between 1° to 23°	Major Adverse
EOL1b	C2: Western	14:00 to 15:00 GMT	Mid-September to mid-March	From 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.83. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the Western façade of C2 are generated by tilted glazing, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the northern façade of C2, particularly those within 10° of a driver's direct line of sight, are a result of inter-reflection from other blocks so are less intense and are further broken up due to their reflection off two facades;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- The reflections occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.84. The inter-reflections from the northern façade of C2 would be partially shaded following the implementation of Phase D1, therefore the area of inter-reflection reduces from the point in time when the superstructure of Phase D1 is in place. The Western façade of C2 would be largely shaded following implementation of Phase D2, as such, the reflections occurring closest to the direct line of sight only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the small, broken up nature of the reflections, the overall effect in

terms of solar glare to drivers at the East Ordsall Lane pedestrian crossing in Scenario 4 is considered to be **short term**, **Moderate Adverse** and **significant**. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction. This results in a greater overall effect in Scenario 4 than the Completed Development scenario.

East Ordsall Lane (EOL2) – Junction with Middlewood Street/Hampson Street

13.85. Two viewpoints have been assessed at this junction, EOL2a and EOL2b. Viewpoint EOL2a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint EOL2b shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.86. The reflections occurring from the facades of Phase C1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 4.

Table 13.9 - Summary of Potential Reflections at East Ordsall Lane (EOL2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
EOL2a	C2: Western	14:00 to 15:00 GMT	Mid-September to mid-March	5° to 26°	Moderate Adverse
	C2: Northern	Inter-reflections occur between 15:00 to 17:00 GMT and after 19:00 GMT	Inter-reflection occurs during mid-January to mid-March and mid-September to mid-November and mid-May to mid-July	Inter-reflections occur between 1° to 20° and 4° to 7° from a driver's direct line of sight.	Major Adverse
EOL2b	C2: Western	14:00 to 15:00 GMT	Mid-September to mid-March	12° to 29°	Minor Adverse
	C2: Northern	Inter-reflections occur between 15:00 to 17:00 GMT and after 19:00 GMT	Inter-reflection occurs during mid-January to mid-March and mid-September to mid-November and mid-May to mid-July	Inter-reflections occur between 15° to 26° and 18° to 20° from a driver's direct line of sight.	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.87. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur from the western façade of C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the northern façade of C2, particularly those within 10° of a driver's direct line of sight, are a result of inter-reflection from other blocks so are less intense and are further broken up due to their reflection off two facades;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;

- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- The reflections occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.88. The inter-reflections from the northern façade of C2 would be partially shaded following the implementation of Phase D1, therefore the area of inter-reflection reduces from the point in time when the superstructure of Phase D1 is in place. The Western façade of C2 would be largely shaded following implementation of Phase D2, as such, the reflections occurring closest to the direct line of sight only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of East Ordsall Lane with Middlewood Street/Hampson Street in Scenario 4 is considered to be short term, Minor to Moderate Adverse and significant as per the Completed Development scenario.

Regent Road (RR2) – Junction with Ordsall Lane

13.89. Three viewpoints have been assessed at this junction, RR2a, RR2b and RR2c. Viewpoint RR2a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint RR2b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint RR2c shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.90. The reflections occurring from the facades of Phase C1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 4.

Table 13.10 - Summary of Potential Reflections at Regent Road (RR2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR2a	C2: Southern	07:00 to 08:00 GMT	Mid-March to mid-May and mid-July to mid-September	21° to 26°	Minor Adverse
RR2b	C2: Southern	06:00 to 08:00 GMT	Mid-February to mid-May and mid-July to mid-October	9° to 22°	Moderate Adverse
	C2: Western	19:00 to sunset	Mid-May to mid-July	Small areas of reflection from 11° to 14°	Minor Adverse
RR2c	C2: Southern	06:00 to just after 07:00 GMT	Mid-February to mid-April and mid-August to mid-October	From 27°	Minor Adverse
	C2: Western	19:00 to sunset	Mid-May to mid-July	Small areas of reflections from 28°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.91. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the southern façade which lowers the intensity of reflections generated from this façade;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.92. The southern and lower portion of the western facades of C2 would be obscured following implementation of Phase D1, as such, the reflections from C2 only occur until the point in time that the superstructure of Phase D1 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Ordsall Lane in Scenario 4 is considered to be short term, Minor Adverse and not significant. The overall effect in Scenario 4 is less than the Completed Development scenario.

Ordsall Lane (OS) – Junction with Regent Road

13.93. Two viewpoints have been assessed at this junction, OSa and OSb. Viewpoint OSa shows the view of drivers in the central lane looking at the right traffic lights, whilst viewpoint OSb shows drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road and a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.11 - Summary of Potential Reflections at Ordsall Lane (OS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
OSa	C1: South-Western	12:00 to 13:00 GMT	Mid-October to mid-February	20° to 23°	Minor Adverse
	C2: Southern	06:00 to 08:00 GMT	Mid-February to mid-April and mid-August to mid-October	From 25°	Minor Adverse
OSb	C1: South-Western	12:00 to 13:00 GMT	Mid-October to mid-February	24° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.94. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the southern facade which lowers the intensity of reflections generated from this façade;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.95. The south-western façade of C1 would be shaded and C2 is fully obscured following implementation of Phase D1, as such, the reflections from C1 and C2 only occur until the point in time that the superstructure of Phase D1 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Ordsall Lane with Regent Road in Scenario 4 is considered to be short term, Minor Adverse and not signficant as per the Completed Development scenario.

Northern Line (N1) – Southbound from Salford Crescent to Deansgate

13.96. 10 viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

13.97. There are no reflections visible within 30° of a driver's line of sight at viewpoints N1-310, N1-360 and N1-410, as such, these viewpoints experience a Negligible effect in terms of solar glare.

13.98. The reflections occurring from the facades of Phase C1 and the northern façade of C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 4.

Table 13.12 - Summary of Potential Reflections at Northern Line (N1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C2: Western	17:00 to 18:00 GMT	Mid-March to mid-May and mid-July to mid-September	N1-10	6° to 10° below the overpass and 14° to 17° above the overpass	Moderate Adverse
		Mid-February to mid-May and mid-July to mid-October	N1-60	14° to 23°	Minor Adverse
	16:00 to 18:00 GMT		N1-110	18° to 27°	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
			N1-160 N1-210	From 22°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.99. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are partially on a bend, particularly when reflections occur within 10°, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections would be generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development.

13.100. The western façade of C2 would be partially shaded following implementation of Phase D1, as such, the full area of reflection from C2 only occurs as reported until the point in time that the superstructure of Phase D1 is in place however reflections do remain from approximately half the western facade. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the track being on a bend and the broken-up nature of the reflections, the overall effect in terms of solar glare on train drivers on the Northern train line travelling southbound from Salford Crescent to Deansgate in Scenario 4 is considered to be permanent, Minor and not significant as per the Completed Development scenario.

Scenario 5 (Phases C1, C2 and D1 Complete)

13.101. This scenario discusses the likely effects of the Proposed Development in Scenario 5, which comprises Phases C1, C2 and D1 complete only.

13.102. At the following functions, Phases C1, C2 and D1 of the Proposed Development are not visible, as such the effect in terms of solar glare is considered to be negligible:

- Water Street (WS1);
- Trinity Way/Inner Ring Road (TW3);
- Regent Road (RR3); and
- Regent Retail Park (RP4).

13.103. At the following junctions, the reflections from Phases C1, C2 and D1 remain as per those of the Completed Development scenario and are therefore not discussed further for Scenario 5:

- Liverpool Street (LS);
- Rolling Street (RS);

- Hampson Street (HS);
- Trinity Way/Inner Ring Road (TW2);
- Trinity Way/Inner Ring Road (TW1);
- Liverpool Road (LR);
- New Elm Road (NER);
- Water Street (WS3);
- Northern Line Southbound Track 2 (N2); and
- Northern Line Southbound Track 3 (N3).

East Ordsall Lane (EOL1) – Pedestrian Crossing

13.104. The reflections occurring from the facades of Phase C1, the Northern façade of Phase C2 and Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5. The reflections occurring from the Western façade of Phase C2 remain as per those reported for Scenario 4 but differ from those of the Completed Development scenario due to the shading introduced by Phase D2 and are not discussed further for Scenario 5. As there are no changes to the solar glare effects at this junction as a result of the implementation of Phase D1, the effects remain unchanged from Scenario 4.

East Ordsall Lane (EOL2) – Junction with Middlewood Street/Hampson Street

13.105. The reflections occurring from the facades of Phase C1, the Northern façade of Phase C2 and Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5. The reflections occurring from the Western façade of Phase C2 remain as per those reported for Scenario 4 but differ from those of the Completed Development scenario due to the shading introduced by Phase D2 and are not discussed further for Scenario 5. As there are no changes to the solar glare effects at this junction as a result of the implementation of Phase D1, the effects remain unchanged from Scenario 4.

Water Street (WS2) – Junction with Trinity Way/Inner Ring Road

13.106. Two viewpoints have been assessed at this junction, WS2a and WS2b. Viewpoint WS2a shows the view of drivers in the looking at the left traffic lights, whilst viewpoint WS2b shows drivers in the looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.13 - Summary of Potential Reflections at Water Street (WS2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
WS2a	D1: South-Eastern Facetted	11:00 to 16:00 GMT	Mid-September to mid-March	Thin strips of reflection visible from 23°	Minor Adverse
WS2b	D1: South-Eastern Facetted	07:00 to 16:00 GMT	Mid-August to mid-April	Thin strips of reflection visible from 5°	Moderate Adverse
	D1: South-Eastern podium	07:00 to 10:00 GMT	Mid-September to mid-March	Small areas of reflection between 16° to 21°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.107. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur almost all occur above the driver's visor line, which would mitigate the majority of the reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The area of each panel that is visible within 10° is less than 8 pixels in diameter, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The junction is on a bend therefore any instances of reflection would only be visible momentarily before the reflection angle changes.

13.108. The south-eastern façade of D1 would be partially shaded following implementation of Phase D2, as such, the areas of reflections occur as report above until the point in time that the superstructure of Phase D2 is in place and then reduce slightly once the Development is completed. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Water Street with Trinity Way/Inner Ring Road in Scenario 5 is considered to be short term, Minor to Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction. The overall effect in Scenario 5 is less than the Completed Development scenario.

Trinity Way/Inner Ring Road Northbound (TW4) – Junction with Water Street

13.109. Four viewpoints have been assessed at this junction, TW4a, TW4b, TW4c and TW4d. Viewpoint TW4a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint TW4b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint TW4c shows drivers in the central lane looking at the right traffic lights, and TW4d shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.110. The reflections occurring from the facades of Phase C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.14 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW4)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW4a	D1: South-Eastern Facetted	06:00 to 11:00 GMT	Throughout the year	Strips from 10°	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D1: South-Eastern Podium	05:00 to 10:00 GMT	Mid-August to mid-April	11° to 25°	Minor Adverse
TW4b	D1: South-Eastern Facetted	06:00 to 13:00 GMT	Throughout the year	Strips from 7°	Moderate Adverse
	D1: South-Eastern Podium	05:00 to 10:00 GMT	Mid-August to mid-April	6° to 18°	Moderate Adverse
	D1: South-Western Podium	19:00 GMT to sunset	Mid-April to mid-May and mid-July to mid-August	25° to 26°	Minor Adverse
TW4d	D1: South-Eastern Facetted	05:00 to 08:00 GMT	Mid-March to mid-September	Strips from 24°	Minor Adverse
	D1: South-Eastern Podium	05:00 to 07:00 GMT	Mid-February to mid-April and mid-August to mid-October	From 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.111. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-eastern facetted façade almost all occur above the driver's visor line, which would mitigate the reflections when deployed;
- The reflections are generated by a facetted façade where the main façade comprises vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The approach to the junction includes bends in the road therefore any instances of reflection would only be visible momentary before the reflection angle changes.

13.112. The south-eastern façade of D1 would be partially shaded following implementation of Phase D2, as such, the areas of reflections occur as report above until the point in time that the superstructure of Phase D2 is in place and then reduce slightly once the Development is completed. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Trinity Way/Inner Ring Road with Water Street in Scenario 5 is considered to be permanent, Minor to Moderate and significant as per the Completed Development scenario.

Egerton Street/Inner Ring Road (ES2) – Junction with Regent Road

13.113. Four viewpoints have been assessed at this junction, ES2a, ES2b, ES2c and ES2d. Viewpoint ES2a shows the view of drivers in the central turning lane looking at the right turning traffic lights, viewpoint ES2b shows the view of drivers in the right turning lane looking at the right turning traffic lights, whilst viewpoint ES2c shows drivers in the left straight ahead lane looking at the left traffic

lights and viewpoint ES2d shows drivers in the right straight ahead lane looking at the right traffic lights. There are second traffic lights on the opposite side of the junction for both turning traffic and those travelling straight through, primarily for use by stationary vehicles.

13.114. The reflections occurring from the facades of Phase C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.15 - Summary of Potential Reflections at Egerton Street/Inner Ring Road (ES2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES2a	D1: South-Eastern Facetted	05:00 to 11:00 GMT	Throughout the year	Strips from 5°	Moderate Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-April to mid-August	2° to 14°	Major Adverse
	D1: South-Western Inflected B	15:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 0°	Major Adverse
	D1: South-Eastern Podium	07:00 to 08:00 GMT and 15:00 to 16:00 GMT	Mid-February to mid-March and mid-September to mid-October	Small areas at 5° and 8°	Moderate Adverse
ES2b	D1: South-Eastern Facetted	05:00 to 11:00 GMT	Throughout the year	Strips from 12°	Minor Adverse
	D1: South-Eastern Podium	07:00 to 08:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area of reflection is visible from 15° to 16°	Minor Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-April to mid-August	10° to 18°	Minor Adverse
	D1: South-Western Inflected B	16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 7°	Moderate Adverse
ES2c	D1: South-Eastern Facetted	05:00 to 11:00 GMT	Throughout the year	Strips from 12°	Minor Adverse
	D1: South-Eastern Podium	07:00 to 08:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area of reflection is visible at 16°	Minor Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-April to mid-August	10° to 18°	Minor Adverse
	D1: South-Western Inflected B	16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 6°	Moderate Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES2d	D1: South-Eastern Facetted	05:00 to 11:00 GMT	Throughout the year	Strips from 0°	Major Adverse
	D1: South-Eastern Podium	06:00 to 08:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area of reflection is visible between 2° to 3°	Major Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-April to mid-August	7° to 18°	Moderate Adverse
	D1: South-Western Inflected B	16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 8°	Moderate Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.115. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The junction includes a bends in the road; therefore, any instances of reflection would only be visible momentarily before the reflection angle changes;
- The area of most panels is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected from these panels; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.116. D1 would be fully obscured following implementation of Phase D2, as such, the reflections occurring from D1 only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the area of most panels being less than 8 pixels in diameter, the overall effect in terms of solar glare to drivers at the junction of Egerton Street/Inner Ring Road with Regent Road in Scenario 5 is considered to be short term, Moderate to Major Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction. This results in a greater overall effect in Scenario 5 than the Completed Development scenario.

Regent Road (RR1) – Junction with Oldfield Road

13.117. Three viewpoints have been assessed at this junction, RR1a, RR1b and RR1c. Viewpoint RR1a shows the view of drivers in the left turning lane looking at the left traffic lights, whilst viewpoint RR1b shows drivers in the left straight ahead lane looking at the left traffic lights and viewpoint RRc shows drivers in the central straight ahead lane looking at the left traffic lights. There is an alternative set of traffic lights on the right side of the road that would not be affected by the Proposed Development and secondary traffic lights for both turning and straight through traffic primarily for use by stationary vehicles.

13.118. The reflections occurring from the facades of Phase C1, C2 and the South-Western Inflected A façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.16 - Summary of Potential Reflections at Regent Road (RR1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR1a	D1: South-Western Inflected B	09:00 to 10:00 GMT	Mid-January to mid-March and mid-September to mid-November	6° to 15°	Moderate Adverse
RR1b	D1: South-Western Inflected B	09:00 to 10:00 GMT	Mid-January to mid-March and mid-September to mid-November	8° to 16°	Moderate Adverse
RR1c	D1: South-Western Inflected B	09:00 to 10:00 GMT	Early-January to mid-March and mid-September to late-November	4° to 15°	Major Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.119. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected B façade of D1 occur predominantly above the driver's visor line, which would mitigate the majority reflections when deployed;
- The reflections from the south-western inflected B façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel of the south-western inflected B façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.120. The south-western inflected B façade of D1 would be partially shaded following implementation of Phase D2, as such, the reflections from the south-western inflected B façade of D1 occurring closest to the direct line of sight only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Oldfield Road in Scenario 5 is considered to be permanent, Moderate Adverse and significant as per the Completed Development scenario.

Regent Road (RR2) – Junction with Ordsall Lane

13.121. Three viewpoints have been assessed at this junction, RR2a, RR2b and RR2c. Viewpoint RR2a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint RR2b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint RR2c shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.122. The reflections occurring from the facades of Phase C1, C2 and the South-Western Inflected A façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.17 - Summary of Potential Reflections at Regent Road (RR2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR2a	D1: South-Western Inflected B	10:00 to 11:00 GMT	Mid-January to mid-March and mid-September to mid-November	From 19°	Minor Adverse
RR2b	D1: South-Western Inflected B	10:00 to 11:00 GMT	Mid-September to mid-March	From 9°	Moderate Adverse
RR2c	D1: South-Western Inflected B	10:00 to 11:00 GMT	Mid-September to mid-March	From 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.123. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected B façade of D1 occur predominantly above the driver's visor line, which would mitigate the majority reflections when deployed;
- The reflections from the south-western inflected B façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel of the south-western inflected B façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;

- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.124. The south-western inflected B façade of D1 would be partially shaded following implementation of Phase D2, as such, the reflections from the south-western inflected B façade of D1 occurring closest to the direct line of sight only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Oldfield Road in Scenario 5 is considered to be permanent, Moderate Adverse and significant as per the Completed Development scenario.

Ordsall Lane (OS) – Junction with Regent Road

13.125. Two viewpoints have been assessed at this junction, OSa and OSb. Viewpoint OSa shows the view of drivers in the central lane looking at the right traffic lights, whilst viewpoint OSb shows drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road and a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.126. No reflections occur from the facades of Phase C1 and C2 as reported for the Completed Development scenario and are therefore not discussed further for Scenario 5. The reflections occurring from the South-Western Inflected A façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.18 - Summary of Potential Reflections at Ordsall Lane (OS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
OSa	D1: South-Western Inflected B	11:00 to 12:00 GMT	Mid-September to mid-March	From 22°	Minor Adverse
OSb	D1: South-Western Inflected B	11:00 to 12:00 GMT	Mid-October to mid-February	From 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.127. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected B façade of D1 occur predominantly above the driver's visor line, which would mitigate the majority effects when deployed;
- The reflections from the south-western inflected B façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;

- The area of each panel of the south-western inflected B façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.128. The south-western inflected B façade of D1 would be predominantly shaded following implementation of Phase D2, as such, the reflections from the south-western inflected B façade of D1 occurring closest to the direct line of sight only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Oldfield Road in Scenario 5 is considered to be **permanent**, **Minor Adverse** and **not significant** as per the Completed Development scenario.

Regent Retail Park (RP1) – Pedestrian Crossing

13.129. One viewpoint has been assessed at this junction, RP1. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP1) shows the view of drivers look forward as they approach the pedestrian crossing. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

13.130. The reflections occurring from the facades of Phase C1, C2 and the North-Western Facetted façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.19 - Summary of Potential Reflections at Regent Retail Park (RP1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP1	D1: South-Western Inflected A	12:00 to 13:00 GMT	Mid-October to mid-February	15° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.131. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected A façade of D1 occur above the driver's visor line, which would mitigate any effects when deployed;
- The reflections from the south-western inflected A façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel of the south-western inflected A façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and

- The pedestrian crossing is not on a public road and there are no signals where visibility can be affected by reflections from the Proposed Development.

13.132. The south-western inflected A façade of D1 would be partially shaded following implementation of Phase D2, as such, the reflections from the south-western inflected A façade of D1 occurring closest to the direct line of sight only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the Regent Retail Park pedestrian crossing in Scenario 5 is considered to be **permanent**, **Minor** to **Moderate Adverse** and **significant** as per the Completed Development scenario.

Regent Retail Park (RP2) – Junction 1

13.133. One viewpoint has been assessed at this junction, RP2. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP2) shows the view of drivers look forward as they approach the first roundabout. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

13.134. The reflections occurring from the facades of Phase C1, C2 and the North-Western Facetted façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.20 - Summary of Potential Reflections at Regent Retail Park (RP2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP2	D1: South-Western Inflected A	11:00 to 12:00 GMT	Mid-September to mid-March	From 16°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.135. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected A façade of D1 occur above the driver's visor line, which would mitigate any effects when deployed;
- The reflections from the south-western inflected A façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel of the south-western inflected A façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- The junction is not on a public road and there are no signals where visibility can be affected by reflections from the Proposed Development.

13.136. The south-western inflected A façade of D1 would be partially shaded following implementation of Phase D2, as such, the reflections from the south-western inflected A façade of D1 occurring closest to the direct line of sight only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the magnitude of potential effects and the factors outlined above, particularly the broken-up nature of the reflections, the overall effect in terms of solar glare to drivers at the first Regent Retail Park roundabout in Scenario 5 is considered to be permanent, Minor to Modrate Adverse and significant as per the Completed Development scenario.

Regent Retail Park (RP3) – Junction 2

13.137. One viewpoint has been assessed at this junction, RP3. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP3) shows the view of drivers look forward as they approach the second roundabout. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

13.138. The reflections occurring from the facades of Phase C1, C2 and the North-Western Facetted façade of Phase D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.21 - Summary of Potential Reflections at Regent Retail Park (RP3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP3	D1: South-Western Inflected A	11:00 to 12:00 GMT	Mid-September to mid-March	From 17°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.139. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-western inflected A façade of D1 occur above the driver's visor line, which would mitigate any effects when deployed;
- The reflections from the south-western inflected A façade of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel of the south-western inflected A façade of D1 is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- The junction is not on a public road and there are no signals where visibility can be affected by reflections from the Proposed Development.

13.140. The south-western inflected A façade of D1 would be fully shaded following implementation of Phase D2, as such, the reflections from the south-western inflected A façade of D1 only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would

occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken-up nature of the reflections, the overall effect in terms of solar glare to drivers at the second Regent Retail Park roundabout in Scenario 5 is considered to be permanent, Minor Adverse and not significant as per the Completed Development scenario.

Egerton Street/Inner Ring Road (ES1) – Junction with Deansgate Interchange on-ramp

13.141. One viewpoint has been assessed at this junction, ES1. Viewpoint ES1 shows drivers in the right lane as they approach traffic merging from the Deansgate Interchange slip-road, this is not a controlled junction.

13.142. The reflections occurring from the facades of Phase C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.22 - Summary of Potential Reflections at Egerton Street/Inner Ring Road (ES1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES1	D1: South-Eastern Facetted	Sunrise to 11:00 GMT	Throughout the year	From 18°	Minor Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-March to mid-September	16° to 30°	Minor Adverse
	D1: South-Western Inflected B	16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	15° to 30°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.143. For this viewpoint, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.144. The south-western inflected façades and half of the south-eastern facetted facade of D1 would be obscured following implementation of Phase D2, as such, the reflections from these areas of the Proposed Development only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Egerton Street/Inner Ring Road

and the Deansgate Interchange on-ramp in Scenario 5 is considered to be **permanent**, **Minor Adverse** and **not significant** as per the Completed Development scenario.

Deansgate Interchange on-ramp (ES_Slip) – Junction with Egerton Street/Inner Ring Road

13.145. One viewpoint has been assessed at this junction, ES_Slip. Viewpoint ES_Slip. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (ES_Slip) shows the view of drivers look forward as they approach the junction.

13.146. The reflections occurring from the facades of Phase C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.23 - Summary of Potential Reflections at Deansgate Interchange on-ramp (ES_Slip)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES_Slip	D1: South-Eastern Facetted	Sunrise to 11:00 GMT	Throughout the year	13° to 27°	Minor Adverse
	D1: South-Western Inflected A	18:00 GMT to sunset	Mid-March to mid-September	12° to 26°	Minor Adverse
	D1: South-Western Inflected B	16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	11° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.147. For this viewpoint, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.148. The south-western inflected façades and half of the south-eastern facetted facade of D1 would be obscured following implementation of Phase D2, as such, the reflections from these areas of the Proposed Development only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of the Deansgate Interchange on-ramp and Egerton Street/Inner Ring Road in Scenario 5 is considered to be **permanent**, **Minor Adverse** and **not significant** as per the Completed Development scenario.

Deansgate Interchange (DGI) – Junction with Chester Road

13.149. One viewpoint has been assessed at this junction, DGI. Viewpoint DGI shows the view of drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road as well as two secondary traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.150. The reflections occurring from the facades of Phase C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.24 - Summary of Potential Reflections at Deansgate Interchange (DGI)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
DGI	D1: South-Eastern Facetted	Sunrise to 11:00 GMT	Throughout the year	6° to 15°	Moderate Adverse
	D1: South-Western Inflected B	17:00 to 19:00 GMT	Mid-February to mid-May and mid-July to mid-October	8° to 15°	Moderate Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.151. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur partially above the driver's visor line, which would mitigate the many of reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 are broken up by anodised aluminium purge ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.152. The south-western inflected façades and half of the south-eastern facetted facade of D1 would be obscured following implementation of Phase D2, as such, the reflections from these areas of the Proposed Development only occur as reported until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken-up nature of the reflections, the overall effect in terms of solar glare at the junction of the Deansgate Interchange on-ramp and Egerton Street/Inner Ring Road in Scenario 5 is considered to be permanent, Minor Adverse and not significant as per the Completed Development scenario.

Northern Line (N1) – Southbound from Salford Crescent to Deansgate

13.153. 10 viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

13.154. There are no reflections visible within 30° of a driver's line of sight at viewpoints N1-310, N1-360 and N1-410, as such, these viewpoints experience a Negligible effect in terms of solar glare.

13.155. The reflections occurring from the facades of Phase C1, C2 and the north-western facetted façade of D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.25 - Summary of Potential Reflections at Northern Line (N1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
D1: South-Western Inflected A	11:00 to 12:00 GMT	Mid-October to mid-February	N1-10 N1-60	From 21°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.156. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from south-western inflected A facade occur above the driver's visor line, which would mitigate any reflections when deployed;
- The tracks are partially on a bend, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections would be further broken-up by the anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible along this track with a greater intensity than the reflections from the Proposed Development.

13.157. The south-western inflected A façade of D1 would be partially shaded following implementation of Phase D2, as such, the reflections from the south-western inflected A façade of D1 occurring closest to the direct line of sight only occur until the point in time that the superstructure of Phase D2 is in place. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare on train drivers on the Northern line travelling southbound from Salford Central to Salford Crescent in Scenario 5 is considered to be **permanent**, **Minor Adverse** and **not significant** as per the Completed Development scenario.

Northern Line (N4) – Northbound from Deansgate to Salford Crescent/Eccles

13.158. 10 viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development and an additional 11 viewpoints have been assessed for trains approaching the signals identified within this stretch of track. The signals are visible between viewpoints N4-160 to N4-240.

13.159. There are no reflections visible within 30° of a driver's line of sight at viewpoints N4-470 and N1-480, as such, these viewpoints experience a Negligible effect in terms of solar glare.

13.160. The reflections occurring from the facades of Phase C1 and C2 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.26 - Summary of Potential Reflections at Northern Line (N4)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
D1: South-Eastern Facetted	06:00 and 14:00	Mid-August to mid-April	N4-10	Thin strips of reflection visible between 7° to 19°	Moderate Adverse
	06:00 to 09:00 GMT	Mid-September to mid-March	N4-60 N4-110	Thin strips of reflection visible between 8° to 13°	Moderate Adverse
	06:00 and 14:00	Mid-August to mid-April	N4-160 N4-170 N4-180 N4-190 N4-200 N4-210 N4-220 N4-230 N4-240 N4-260 N4-310	Thin strips of reflection visible from 10°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.161. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are partially on a bend, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections would be further broken-up by the alternating anodised aluminium panels and fins thereby reducing the duration of potential reflections;
- Facetted or angled glazing panels would also break-up reflections, reducing the duration of any reflections; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A portion of the sun's path would remain visible along this track with a greater intensity than the reflections from the Proposed Development.

13.162. The south-eastern facetted façade of D1 would be partially shaded following implementation of Phase D2, as such, the areas of reflections occur as report above until the point in time that the superstructure of Phase D2 is in place at which point they reduce slightly once the Development is completed. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect on train drivers on the Northern line travelling northbound from Deansgate to Salford Crescent/Eccles in Scenario 5 is considered to be permanent, Moderate Adverse and significant as per the Completed Development scenario.

Tram Line (T1) – Eastbound from Cornbrook to Deansgate-Castlefield

13.163. Five viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

13.164. The reflections occurring from the facades of Phase C1, C2 and the south-western inflected façades of D1 remain as per those reported for the Completed Development scenario and are therefore not discussed further for Scenario 5.

Table 13.27 - Summary of Potential Reflections at Tram Line (T1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
D1: South-Eastern Facetted	05:00 to 09:00	Mid-March to mid-September	T1-10	Thin strips of reflection visible between 9° to 17°	Moderate Adverse
			T1-60 T1-110	Thin strips of reflection visible between 13° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.165. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections from the south-eastern facetted façade of D1 occur above the driver's visor line, which would mitigate any reflections when deployed;
- The tracks are on a bend; therefore, any instances of reflection would only be visible momentarily before the reflection angle changes;
- The reflections that occur from the south-eastern façade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be further broken up by the anodised aluminium panels;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.166. The south-eastern facetted façade of D1 would be partially obstructed following implementation of Phase D2, as such, the areas of reflections occur as report above until the point in time that the superstructure of Phase D2 is in place at which point they reduce slightly once the Development is completed. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the

mitigating factors outlined above, the overall effect in terms of solar glare to tram drivers on the tram line travelling eastbound from Cornbrook to Deansgate-Castlefield in Scenario 5 is considered to be **permanent**, **Minor** to **Moderate Adverse** and **significant** as per the Completed Development scenario.

Scenario 6 (Completed Development)

13.167. The full solar glare assessment is provided in Technical Appendix 13.1.

13.168. The assessment has been undertaken from the sensitive viewpoints on roads and rail track surrounding the site where the proposed development is visible with a summary of results provided below. The summary tables below outline the times of day and year that reflections would be visible from each of the relevant facades, Figure 13.4 identifies the elevations as referenced within the assessment tables.

13.169. The assessment has been undertaken in a worst-case scenario considering there is no cloud cover, so the sun is shining for all days of the year for the full duration of daylight hours.

Liverpool Street (LS) – Junction with Oldfield Road

13.170. One viewpoint has been assessed at this junction, LS. Viewpoint LS shows the view of drivers in the right lane looking forward. The primary traffic lights are located on the left side of the road and the Proposed Development would not be visible within the field of view when view these lights. There is a second traffic lights on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.28 - Summary of Potential Reflections at Liverpool Street (LS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
LS	C1: South-Western	08:00 to 10:00 GMT	Mid-January to mid-February and mid-October to mid-November	A small area located between 17° to 19°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.171. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- The Proposed Development is located far in the distance so reflections would be very small within the field of view;
- Potential reflections occur above the driver's visor line, which would mitigate any reflections when deployed;
- The primary traffic lights used for drivers to break safely at this junction are not affected by the Proposed Development;
- The area of reflection is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development.

13.172. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare at the junction of Liverpool Street with Oldfield Road is considered to be **permanent**, **Negligible to Minor Adverse** and **not significant**.

Rolling Street (RS) – Junction with Middlewood Street

13.173. One viewpoint has been assessed at this junction, RS. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RS) shows the view of drivers look forward as they approach the junction.

Table 13.29 - Summary of Potential Reflections at Rolling Street (RS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RS	D1: North-Western Facetted	14:00 GMT to sunset	Mid-January to mid-November	Thin strips of reflections visible from 16°	Minor Adverse
	D1: North-Eastern Inflected A	06:00 to 08:00 GMT	Mid-February to mid-May and mid-July to mid-October	A small slither spanning 21°	Minor Adverse
	D2: Northern Facetted	18:00 to 19:00 GMT	Mid-April to mid-August	A small slither spanning 15° to 21°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.174. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- There are no signals where visibility can be affected by reflections from the Proposed Development;
- Potential reflections occur above the driver's visor line, which would mitigate any reflections when deployed;
- The majority of reflections that occur from D1 and D2 are generated by a facetted façade with vertical fins, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year;
- The reflections from the inflected facade of D1 are broken up by anodised aluminium ventilation panels;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- The potential reflections only occur for very small areas within a driver's field of view at any one time and are less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected.

13.175. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Rolling Street with Middlewood Street is considered to be **permanent**, **Negligible to Minor Adverse** and **not significant**.

East Ordsall Lane (EOL1) – Pedestrian Crossing

13.176. Two viewpoints have been assessed at this junction, EOL1a and EOL1b. Viewpoint EOL1a shows the view of drivers looking at the left traffic lights, whilst viewpoint EOL1b shows drivers looking at the right traffic lights. There is a second traffic light on the left side of the junction primarily for use by stationary vehicles.

Table 13.30 - Summary of Potential Reflections at East Ordsall Lane (EOL1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
EOL1a	C1: North-Eastern	06:00 to 08:00 GMT	Mid-February to mid-April and mid-August to mid-October	11° to 18°	Minor Adverse
	C1: North-Western	19:00 GMT to sunset	Mid-May to mid-July	A small section of tilted panels between 5° to 9° from a driver's direct line of sight.	Moderate Adverse
	C2: Northern	Inter-reflections occur just before 16:00 to 17:00 GMT	Inter-reflections occur from early-February to mid-March and mid-September to late-October	Inter-reflections are visible between 1° to 22°	Major Adverse
	C2: Western	14:00 to 15:00 GMT, with inter-reflections occurring at 07:00 to 09:00 GMT and after 19:00 GMT	Mid-February to mid-March and mid-September to mid-October, with inter-reflections occurring between mid-September to mid-March and mid-May to mid-July	Direct reflections are visible between 15° to 17°, inter-reflections occur between 2° and 17°	Major Adverse
	D1: North-Eastern Inflected A	07:00 to 09:00 GMT	Early-March to mid-April and mid-August to late-September	16° to 25°	Minor Adverse
	D1: North-Western Facetted	15:00 GMT to sunset	Throughout the year	Thin strips of reflections are visible from 15° to 26°	Minor Adverse
	D2: Eastern Inflected B	Just before 08:00 to 09:00 GMT	Mid-February to late-March and early-September to mid-October	13° to 18°	Minor Adverse
EOL1b	C2: Western	Inter-reflections occur at 08:00 to 10:00 GMT and after 19:00 GMT	Inter-reflections occur between mid-September to mid-March and mid-May to mid-July	From 27°	Minor Adverse
	D1: North-Eastern Inflected A	07:00 to 09:00 GMT	Early-March to mid-April and mid-August to late-September	From 18° to 27°	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D1: North-Western Facetted	15:00 GMT to sunset	Throughout the year	Thin strips of reflections are visible from 14° to 25°	Minor Adverse
	D2: Eastern Inflected B	Just before 08:00 to 09:00 GMT	Mid-February to late-March and early-September to mid-October	From 22° to 25°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.177. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur from C1 and the Western façade of C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the North-Western facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections that occur from the inflected facades of D1 and D2 are broken up by anodised aluminium, perforated ventilation and imitation panels which limit the duration of reflections;
- The majority of reflections that occur from C2, particularly those within 10° of a driver's direct line of sight, are a result of inter-reflection from other blocks so are less intense and are further broken up due to their reflection off two facades;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern and north-western façades of C1, which lowers the intensity of reflections generated from these façades;
- The area of any one direct reflection in isolation is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.178. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the areas of reflection occurring within 10° almost all occurring as a result of inter-reflections, the overall effect in terms of solar glare to drivers at the East Ordsall Lane pedestrian cross is considered to be permanent,

Minor to Moderate Adverse and **significant**. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

East Ordsall Lane (EOL2) – Junction with Middlewood Street/Hampson Street

13.179. Two viewpoints have been assessed at this junction, EOL2a and EOL2b. Viewpoint EOL2a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint EOL2b shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.31 - Summary of Potential Reflections at East Ordsall Lane (EOL2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
EOL2a	C1: North-Eastern	07:00 to just after 8:00 GMT	Mid-February to mid-April and mid-August to mid-October	14° to 27°	Minor Adverse
	C2: Northern	Inter-reflections occur between 15:00 to 17:00 GMT and after 19:00 GMT	Inter-reflection occurs during mid-January to mid-March and mid-September to mid-November and mid-May to mid-July	A thin strip of inter-reflections occurs between 1° to 19° and 4° to 6° from a driver's direct line of sight.	Major Adverse
	C2: Western	14:00 to 15:00 GMT, with inter-reflections occurring at 08:00 to 09:00 GMT and after 18:00 GMT	Mid-February to mid-March and mid-September to mid-October, with inter-reflections occurring between mid-September to mid-March and mid-April to mid-August	Direct reflections are visible between 22° to 26°, inter-reflections occur between 4° and 24° from a driver's direct line of sight.	Major Adverse
	D1: North-Eastern Inflected A	08:00 to 09:00 GMT	Mid-March to mid-April and mid-August to mid-September	From 26°	Minor Adverse
	D1: North-Western Facetted	15:00 GMT to sunset	Throughout the year	Thin strips of reflections are visible from 20°	Minor Adverse
	D2: Eastern Inflected B	08:00 to 09:00 GMT	Mid-March to mid-April and mid-August to mid-September	25° to 27°	Minor Adverse
EOL2b	C1: North-Eastern	07:00 to 8:00 GMT	Mid-February to mid-March and mid-September to mid-October	From 27°	Minor Adverse
	C2: Northern	Inter-reflections occur between 15:00 to 17:00 GMT and after 19:00 GMT	Inter-reflection occurs during mid-January to mid-March and mid-September to mid-November and mid-May to mid-July	A thin strip of inter-reflections occurs between 16° to 25° and 18° to 20° from a driver's direct line of sight.	Minor Adverse
	C2: Western	14:00 to 15:00 GMT, with inter-reflections occurring at 08:00 to 09:00 GMT and after 17:00 GMT	Mid-February to mid-March and mid-September to mid-October, with inter-reflections occurring throughout the year	Direct reflections are visible between 25° to 29°, inter-reflections occur between 10° and 25° from a driver's direct line of sight.	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D1: North-Eastern Inflected A	08:00 to 09:00 GMT	Mid-March to mid-April and mid-August to mid-September	20° to 30°	Minor Adverse
	D1: North-Western Facetted	15:00 GMT to sunset	Throughout the year	Thin strips of reflections are visible from 5°	Moderate Adverse
	D2: Eastern Inflected B	08:00 to 09:00 GMT	Mid-March to mid-April and mid-August to mid-September	20° to 23°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.180. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur from C1 and the Western façade of C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the North-Western facade of D1 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections that occur from the inflected facades of D1 and D2 are broken up by anodised aluminium, perforated rapid ventilation and imitation panels which limit the duration of reflections;
- The majority of reflections that occur from C2, particularly those within 10° of a driver's direct line of sight, are a result of inter-reflection from other blocks of the Development so are less intense and are further broken up due to their reflection off two facades;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern facade of C1, which lowers the intensity of reflections generated from these façades;
- The area of any one reflection in isolation is no greater than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected for a significant period of time;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.181. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the areas of reflection occurring within 10° almost all occurring as a result of inter-reflections, the overall effect in terms of solar glare to drivers at the junction of East Ordsall Lane with Middlewood Street/Hampson Street is considered to be **permanent**, **Minor to Moderate Adverse** and **significant**. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Hampson Street (HS) – Junction with Trinity Way/Inner Ring Road

13.182. One viewpoint has been assessed at this junction, HS. Viewpoint HS shows the view of drivers looking at the right traffic lights. There is an alternative set of traffic lights on drivers can view on the left and a second traffic lights on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.32 - Summary of Potential Reflections at Hampson Street (HS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
HS	C1: North-Eastern	06:00 to 08:00 GMT	Early-March to mid-April and mid-August to late-September	From 25°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.183. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above a driver's visor line, which would mitigate most effects when deployed;
- The reflections that occur are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern facade of C1, which lowers the intensity of reflections generated from these façades;
- The reflections mostly occur outside peak traffic times;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative, unaffected traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.184. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Hampson with Trinity Way/Inner Ring Road is considered to be **permanent**, **Negligible to Minor Adverse** and **not significant**.

Trinity Way/Inner Ring Road (TW2) – Junction with Hampson Street

13.185. Two viewpoints have been assessed at this junction, TW2a and TW2b. Viewpoint TW2a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint TW2b shows drivers in the central lane looking at the left traffic lights. There is an alternative set of traffic lights on drivers can view on the right and a second traffic lights on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.33 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW2a	C1: North-Western	17:00 to 18:00 GMT	Mid-March to late-April and early-August to mid-September	From 27°	Minor Adverse
	D1: North-Western Facetted	16:00 GMT to sunset	Mid-February to mid-October	Thin strips of reflections are visible from 8°	Moderate Adverse
	D2: Northern Facetted	16:00 GMT to sunset, with inter-reflections occurring between 07:00 to 12:00 GMT	Mid-February to mid-October, with inter-reflections also occurring during this time	Thin strips of reflections are visible from 16° to 27°, inter-reflections occur between 18° and 30° from a driver's direct line of sight.	Minor Adverse
	D2: Eastern Inflected A	09:00 to just after 10:00 GMT	Mid-September to mid-March	From 19°	Minor Adverse
	D2: Eastern Inflected B	06:00 to just after 07:00 GMT	Mid-March to mid-May and mid-July to mid-September	From 22°	Minor Adverse
TW2b	C1: North-Eastern	05:00 to 06:00 GMT	Mid-April to mid-May and mid-July to mid-August	A very small area is visible from 29°	Minor Adverse
	C1: North-Western	Just before 17:00 to 18:00 GMT	Mid-March to mid-September	From 20°	Minor Adverse
	D1: North-Western Facetted	16:00 GMT to sunset	Mid-February to mid-October	Thin strips of reflections are visible from 4°	Major Adverse
	D2: Northern Facetted	16:00 GMT to sunset, with inter-reflections occurring between 07:00 to 12:00 GMT	Mid-February to mid-October, with inter-reflections also occurring during this time	Thin strips of reflections are visible from 7° to 25°, inter-reflections occur between 11° and 26° from a driver's direct line of sight.	Moderate Adverse
	D2: Eastern Inflected A	09:00 to 11:00 GMT	Mid-September to mid-March	13° to 26°	Minor Adverse
	D2: Eastern Inflected B	06:00 to 08:00 GMT	Mid-March to mid-September	14° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.186. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of reflection when deployed;
- The reflections that occur from the north-western facade of D1 and northern façade of D2, those that fall within 10° of a driver's direct line of sight, are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections that occur from the inflected facades of D2 are broken up by anodised aluminium, perforated rapid ventilation and imitation panels which limit the duration of reflections;
- The reflections that occur from the Western façade of C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern and north-western façade of C1, which lowers the intensity of reflections generated from these façades;
- All reflections that occur within 20° of a driver's direct line of sight have an area for each panel that is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative, unaffected traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.187. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the small area of reflections visible at any one time and the broken up nature of the reflections, the overall effect in terms of solar glare to drivers at the junction of Trinity Way/Inner Ring Road with Hampson Street is considered to be permanent, Minor Adverse and not significant.

Trinity Way/Inner Ring Road (TW1) – Pedestrian Crossing

13.188. Two viewpoints have been assessed at this junction, TW1a and TW1b. Viewpoint TW1a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint TW1b shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the right side of the junction primarily for use by stationary vehicles.

Table 13.34 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW1a	C1: North-Western	16:00 to 18:00 GMT	Mid-February to mid-April and mid-August to mid-October	8° to 16°	Moderate Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	C2: South-Eastern	12:00 to 13:00 GMT	Mid-January to mid-February and mid-October to mid-November	A very small area at 26°	Minor Adverse
	D1: North-Eastern Inflected A	06:00 to 07:00 GMT	Mid-April to late-May and early-July to mid-August	20° to 24°	Minor Adverse
	D1: North-Western Facetted	16:00 GMT to sunset	Mid-February to mid-October	Thin strips of reflections are visible from 18° to 24°	Minor Adverse
	D2: Northern Facetted	15:00 GMT to sunset, with inter-reflections 09:00 and 10:00 GMT and 12:00 to 13:00 GMT	Mid-February to mid-October, with inter-reflections between mid-August to mid-April	Thin strips of reflections are visible from 15° to 19° from a driver's line of sight, inter-reflections occur between 14° and 19°	Minor Adverse
	D2: Eastern Inflected A	09:00 to 10:00 GMT	Mid-October to mid-February	13° to 17°	Minor Adverse
	D2: Eastern Inflected B	06:00 to 07:00 GMT	Mid-March to mid-May and mid-July to mid-September	13° to 17°	Minor Adverse
TW1b	C1: North-Eastern	Sunrise to 05:00 GMT	Mid-May to mid-July	Small areas between 5° to 7°	Moderate Adverse
	C1: North-Western	Just before 17:00 to 18:00 GMT	Mid-February to mid-April and mid-August to mid-October	0° to 14°	Major Adverse
	C2: South-Eastern	12:00 to 13:00 GMT	Mid-January to mid-February and mid-October to mid-November	A small area at 14°	Minor Adverse
	D1: North-Eastern Inflected A	06:00 to 07:00 GMT, with inter-reflections 19:00 GMT to sunset	Mid-April to mid-May and mid-July to mid-August, with inter-reflections between mid-April to mid-August	13° to 17°, inter-reflections occur between 6° and 8°	Moderate Adverse
	D1: North-Western Facetted	16:00 GMT to sunset	Mid-October to mid-February	Thin strips of reflections are visible from 7° to 17°	Moderate Adverse
	D2: Northern Facetted	15:00 GMT to sunset, with inter-reflections 09:00 to 13:00 GMT	Mid-February to mid-October, with inter-reflections between mid-October to mid-February	Thin strips of reflections are visible from 5° to 14°, inter-reflections occur between 3° and 14°	Major Adverse
	D2: Eastern Inflected A	09:00 to 10:00 GMT	Mid-October to mid-February	3° to 14°	Major Adverse
	D2: Eastern Inflected B	06:00 to 07:00 GMT	Mid-March to mid-May and mid-July to mid-September	2° to 14°	Major Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.189. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- The reflections that occur from the C1 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium, perforated rapid ventilation and imitation panels which limit the duration of reflections;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern and north-western façade of C1, which lowers the intensity of reflections generated from these façades;
- All reflections that occur within 20° of a driver's direct line of sight have an area for each panel that is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The probability of the sun shining when reflections could occur from the facades of C1, those behind the traffic lights in viewpoint TW1b, is less than 30%;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The pedestrian crossing is on a bend therefore any instances of reflection would only be visible momentarily before the reflection angle changes.

13.190. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the areas of reflection being unable to reflect the full solar disc at any one time, the overall effect in terms of solar glare to drivers at the Trinity Way/Inner Ring Road pedestrian crossing is considered to be **permanent**, **Moderate Adverse** and **significant**. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Water Street (WS1) – Junction with Liverpool Road

13.191. One viewpoint has been assessed at this junction, WS1. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (WS1) shows the view of drivers look forward as they approach the junction.

Table 13.35 - Summary of Potential Reflections at Water Street (WS1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
WS1	D2: Eastern Inflected A	07:00 to 08:00 GMT	Mid-February to mid-May and mid-July to mid-October	27° to 28°	Minor Adverse
	D2: Eastern Inflected B	Sunrise to 05:00 GMT	Mid-April to mid-May and mid-July to mid-August	25° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.192. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- The potential reflections only occur for small areas within the driver's field of view;
- The reflections would be further broken-up broken up by anodised aluminium, perforated rapid ventilation and imitation panels which limit the duration of reflections and the ability of the full sun disc to be reflected; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.193. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Water Street with Liverpool Road is considered to be **permanent, Negligible to Minor Adverse** and **not significant**.

Liverpool Road (LR) – Pedestrian Crossing

13.194. One viewpoint has been assessed at this junction, LR. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (LR) shows the view of drivers look forward as they approach the junction.

Table 13.36 - Summary of Potential Reflections at Liverpool Road (LR)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
LR	C1: South-Eastern	12:00 to 13:00 GMT	Mid-October to mid-February	10° to 16°	Minor Adverse
	C2: South-Eastern	07:00 to 08:00 GMT	Mid-February to mid-April and mid-August to mid-October	16° to 20°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.195. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur above the driver's visor line, which would mitigate any reflections when deployed;

- The reflections are broken up by tilted glazed panel, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The reflections occur outside peak traffic times;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.196. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the Liverpool Road pedestrian crossing is considered to be permanent, Minor Adverse and not significant.

New Elm Road (NER) – Junction with Water Street

13.197. One viewpoint has been assessed at this junction, NER. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (NER) shows the view of drivers look forward as they approach the junction.

Table 13.37 - Summary of Potential Reflections at New Elm Road (NER)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
NER	C1: South-Eastern	07:00 to 09:00 GMT	Mid-February to mid-April and mid-August to mid-October	From 18°	Minor Adverse
	C1: South-Western	17:00 to 19:00 GMT	Mid-April to mid-August	12° to 27°	Minor Adverse
	C1: South-Eastern Podium Glazing	06:00 to 08:00 GMT	Mid-January to mid-March and mid-September to mid-November	Small areas of reflection from 10°	Minor Adverse
	C1: South-Western Podium Glazing	18:00 to 19:00 GMT	Mid-March to mid-May and mid-July to mid-September	10° to 12°	Minor Adverse
	C2: South-Eastern	05:00 to 07:00 GMT	Mid-March to mid-September	From 15°	Minor Adverse
	C2: South-Eastern Podium Glazing	05:00 to 07:00 GMT	Mid-March to mid-May and mid-July to mid-September	From 10°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.198. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate most reflections when deployed;
- A frit pattern has been applied to the outer face of back painted glazing on the south-eastern facade of C1, which lowers the intensity of reflections generated from these façades;
- The reflections are broken up by tilted glazed panel, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.199. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of New Elm Road with Water Street is considered to be permanent, Minor Adverse and not significant.

Trinity Way/Inner Ring Road Southbound (TW3) – Junction with Water Street

13.200. Two viewpoints have been assessed at this junction, TW3a and TW3b. Viewpoint TW3a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint TW3b shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

13.201. No reflections are visible within 30° of a driver's line of sight in TW3a, as such, the magnitude of effect on drivers at viewpoint TW3a is Negligible.

Table 13.38 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW3b	D2: Eastern Inflected A	10:00 to 11:00 GMT	Mid-September to mid-March	From 18°	Minor Adverse
	D2: Eastern Inflected B	06:00 to 09:00 GMT	Mid-February to mid-April and mid-August to mid-October	From 14°	Minor Adverse
	D2: Northern Facetted	05:00 to 10:00 GMT	Mid-January to mid-November	Thin strips of reflections are visible from 23°	Minor Adverse
	D2: Eastern Podium	06:00 to 07:00 GMT	Mid-February to mid-March and mid-September to mid-October	Small areas of reflection from 18°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.202. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate most reflections when deployed;
- The reflections are broken up by anodised aluminium ventilation panels, facetted facades and fins, thus the reflections would only occur for a short period of time from each glazed panel;

- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.203. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Trinity Way/Inner Ring Road with Water Street is considered to be **permanent**, **Minor Adverse** and **not significant**.

Water Street (WS2) – Junction with Trinity Way/Inner Ring Road

13.204. Two viewpoints have been assessed at this junction, WS2a and WS2b. Viewpoint WS2a shows the view of drivers in the looking at the left traffic lights, whilst viewpoint WS2b shows drivers in the looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.39 - Summary of Potential Reflections at Water Street (WS2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
WS2a	D1: South-Eastern Facetted	07:00 to 08:00 GMT, 13:00 to 16:00 GMT and 17:00 to 18:00 GMT	Mid-January to mid-May and mid-July to mid-November	Thin strips of reflections are visible from 24°	Minor Adverse
	D2: Northern Facetted	18:00 GMT to sunset	Mid-April to mid-August	Thin strips of reflections are visible from 7°	Moderate Adverse
	D2: Eastern Inflected A	07:00 to 09:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 5°	Moderate Adverse
	D2: Eastern Inflected B	Sunrise to 07:00 GMT	Mid-April to mid-August	Small areas of reflection are visible from 5°	Moderate Adverse
	D2: Northern Podium	17:00 GMT to sunset	Mid-February to mid-May and mid-July to mid-October	5° to 7°	Moderate Adverse
	D2: Eastern Podium	Sunrise to 05:00 GMT	Mid-May to mid-July	A small area from 5° to 8°	Moderate Adverse
WS2b	D1: South-Eastern Facetted	07:00 to 11:00 GMT and 13:00 to 16:00 GMT	Mid-August to mid-April	Thin strips of reflections are visible from 5°	Moderate Adverse
	D1: South-Eastern podium	07:00 to 10:00 GMT	Mid-September to mid-March	16° to 21°	Minor Adverse
	D2: Northern Facetted	18:00 GMT to sunset	Mid-April to mid-August	Thin strips of reflections are visible from 12°	Minor Adverse
	D2: Eastern Inflected A	07:00 to just after 08:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 15°	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D2: Eastern Inflected B	Sunrise to 07:00 GMT	Mid-April to mid-August	From 23°	Minor Adverse
	D2: Northern Podium	17:00 GMT to sunset	Mid-February to mid-May and mid-July to mid-October	14° to 16°	Minor Adverse
	D2: Eastern Podium	Sunrise to 05:00 GMT	Mid-May to mid-July	24° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.205. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Almost all potential reflections occur above the driver's visor line, which would mitigate the majority of the reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 and the northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The probability of the sun shining at the times of day and year when reflections occur within 5° of a driver's line of sight is less than 30%;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The junction is on a bend therefore any instances of reflection would only be visible momentary before the reflection angle changes.

13.206. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Water Street with Trinity Way/Inner Ring Road is considered to be permanent, Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Trinity Way/Inner Ring Road Northbound (TW4) – Junction with Water Street

13.207. Four viewpoints have been assessed at this junction, TW4a, TW4b, TW4c and TW4d. Viewpoint TW4a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint TW4b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint TW4c shows drivers in the central lane looking at the right traffic lights, and TW4d shows drivers in the

right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.40 - Summary of Potential Reflections at Trinity Way/Inner Ring Road (TW4)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
TW4a	D1: South-Eastern Facetted	06:00 to 10:00 GMT	Mid-January to mid-November	Strips of reflection from 10°	Minor Adverse
	D1: South-Eastern Podium	05:00 to 10:00 GMT	Mid-August to mid-April	From 11°	Minor Adverse
TW4b	D1: South-Eastern Facetted	06:00 to 10:00 GMT and 17:00 to 19:00 GMT	Throughout the year	Strips of reflection from 7°	Moderate Adverse
	D1: South-Eastern Podium	05:00 to 10:00 GMT	Mid-August to mid-April	6° to 19°	Moderate Adverse
	D1: South-Western Podium	19:00 GMT to sunset	Mid-April to mid-May and mid-July to mid-August	25° to 26°	Minor Adverse
TW4c	C2: Southern	09:00 to just after 11:00 GMT	Early-September to late-March	From 12°	Minor Adverse
	C2: Southern Podium	09:00 to just after 10:00 GMT	Mid-November to mid-January	From 22°	Minor Adverse
TW4d	C2: Southern	10:00 to 12:00 GMT	Mid-September to mid-March	From 18°	Minor Adverse
	C2: Southern Podium	10:00 to 11:00 GMT	Mid-November to mid-January	A very small area of reflection is visible from 29°	Minor Adverse
	D1: South-Eastern Facetted	05:00 to 08:00 GMT	Mid-March to mid-September	Strips from 24°	Minor Adverse
	D1: South-Eastern Podium	05:00 to 07:00 GMT	Mid-February to mid-April and mid-August to mid-October	Reflections are visible from 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.208. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of the reflections when deployed;
- The reflections that occur from the south-eastern facade of D1 and the D1 podium are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections that occur from the southern façade of C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the southern facade of C2, which lowers the intensity of reflections generated from these façades;

- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The approach to the junction includes bends in the road therefore any instances of reflection would only be visible momentary before the reflection angle changes.

13.209. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of reflections and the alternative traffic lights being visible, the overall effect in terms of solar glare to drivers at the junction of Trinity Way/Inner Ring Road with Water Street is considered to be permanent, Minor to Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Egerton Street/Inner Ring Road (ES2) – Junction with Regent Road

13.210. Four viewpoints have been assessed at this junction, ES2a, ES2b, ES2c and ES2d. Viewpoint ES2a shows the view of drivers in the central turning lane looking at the right turning traffic lights, viewpoint ES2b shows the view of drivers in the right turning lane looking at the right turning traffic lights, whilst viewpoint ES2c shows drivers in the left straight ahead lane looking at the left traffic lights and viewpoint ES2d shows drivers in the right straight ahead lane looking at the right traffic lights. There are second traffic lights on the opposite side of the junction for both turning traffic and those travelling straight through, primarily for use by stationary vehicles.

Table 13.41 - Summary of Potential Reflections at Egerton Street/Inner Ring Road (ES2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES2a	C2: Southern	11:00 to 12:00 GMT	Mid-November to mid-January	Very small areas of reflection are visible from 29°	Minor Adverse
	D1: South-Western Inflected B	17:00 to 18:00 GMT	Mid-February to mid-March and mid-September to mid-October	Small strips between 0° and 2°	Major Adverse
	D2: Southern Facetted	06:00 to 15:00 GMT	Mid-July to mid-May	Strips from 6°	Moderate Adverse
	D2: Southern Podium	09:00 to 10:00 GMT	Mid-November to mid-January	A very small area at 7°	Moderate Adverse
ES2b	D1: South-Western Inflected B	17:00 to 18:00 GMT	Mid-February to mid-March and mid-September to mid-October	Small strip at 8°	Moderate Adverse
	D2: Southern Facetted	06:00 to 15:00 GMT	Mid-July to mid-May	Strips from 11°	Minor Adverse
	D2: Southern Podium	08:00 to 09:00 GMT	Mid-November to mid-January	Very small area at 15°	Minor Adverse
ES2c	D1: South-Eastern Facetted	05:00 to 08:00 GMT	Mid-February to mid-May and mid-July to mid-October	Small strip at 18° to 20°	Minor Adverse
	D2: Southern Facetted	06:00 to 15:00 GMT	Mid-July to mid-May	Strips from 10°	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D2: Southern Podium	08:00 to 10:00 GMT	Mid-November to mid-January	14° to 15°	Minor Adverse
ES2d	C2: Southern	Just before 11:00 to 12:00 GMT	Mid-September to mid-March	From 21°	Minor Adverse
	C2: Southern Podium	15:00 to 16:00 GMT	Mid-January to mid-February and mid-October to mid-November	A very small area of reflection is visible at 27°	Minor Adverse
	D1: South-Eastern Facetted	05:00 to 07:00 GMT	Mid-March to mid-April and mid-August to mid-September	Small strips of reflection are visible from 1° to 3°	Major Adverse
	D2: Southern Facetted	07:00 to 15:00 GMT	Mid-July to mid-May	Strips from 3°	Major Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.211. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the southern facade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the southern facade of C2, which lowers the intensity of reflections generated from these façades;
- The reflections generated by the podium facades and the D1 facetted facade are very small in area and would therefore be of low intensity;
- The junction includes bends in the road; therefore, any instances of reflection would only be visible momentarily before the reflection angle changes;
- The area of most panels is limited to no more than 8 pixels in diameter within the view, as such, the full sun's intensity can only be reflected for a very short period of time at the precise viewing angle assessed;
- The probability of the sun shining when reflection occur within 5° of the drivers' line of sight from the facetted façade of D2 is less than 30%; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.212. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the low probability of the sun shining where reflections occur close to a drivers direct line of sight, the overall effect in terms

of solar glare to drivers at the junction of Egerton Street/Inner Ring Road with Regent Road is considered to be permanent, Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Water Street (WS3) – Junction with Regent Road & Egerton Street/Inner Ring Road

13.213. One viewpoint has been assessed at this junction, WS3. Viewpoint WS3 shows the view of drivers looking at the left traffic lights. There is a second traffic light on the right side of the road primarily for use by stationary vehicles.

Table 13.42 - Summary of Potential Reflections at Water Street (WS3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
WS3	C1: South-Eastern	05:00 to 06:00 GMT	Mid-April to mid-August	2° to 11°	Major Adverse
	C2: Southern	09:00 to 11:00 GMT	Mid-August to mid-April	From 0°	Major Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.214. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the south-western facade of C1 and the southern façade of C2, which lowers the intensity of reflections generated from these façades;
- In almost all instances, the area of each panel is 8 pixels in diameter or less within the view, as such, it is unlikely the full sun's intensity would be reflected and if it was, it would only occur at the precise viewing point and angle assessed from any one panel at any one time;
- The probability of the sun shining at the times when reflections could occur within 5° of a driver's direct line of sight is 20%;
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon; and
- The first set of traffic lights are located on slight bend in the road therefore any instances of reflection would only be visible momentary before the reflection angle changes.

13.215. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and the probability of the sun shining, the overall effect in terms of solar glare to drivers at the junction of Water Street with Regent Road and Egerton Street/Inner Ring Road is considered to be permanent, Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Regent Road (RR3) – Junction with Egerton Street/Inner Ring Road

13.216. Two viewpoints have been assessed at this junction, RR3a and RR3b. Viewpoint RR3a shows the view of drivers in the left lane looking at the left traffic lights, whilst viewpoint RR3b shows drivers in the central lane looking at the left traffic lights. There is an alternative traffic lights on the right side of the road that is not affected by the Proposed Development and two second traffic lights on either side of the road, primarily for use by stationary vehicles.

Table 13.43 - Summary of Potential Reflections at Regent Road (RR3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR3a	D2: Southern Facetted	06:00 to 08:00 GMT	Mid-March to mid-May and mid-July to mid-September	Strips from 24°	Minor Adverse
	D2: Podium	05:00 to 07:00 GMT and 16:00 to 18:00 GMT	Mid-February to mid-May and mid-July to mid-October	20° to 29°	Minor Adverse
RR3b	D2: Southern Facetted	06:00 to 09:00 GMT	Mid-February to mid-May and mid-August to mid-October	Strips from 20°	Minor Adverse
	D2: Podium	05:00 to 07:00 GMT and 17:00 to 18:00 GMT	Mid-February to mid-May and mid-August to mid-October	17° to 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.217. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the southern facade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and reflections would be broken up by the anodised aluminium panels; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.218. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Egerton Street/Inner Ring Road is considered to be permanent, Minor Adverse and not significant.

Regent Road (RR1) – Junction with Oldfield Road

13.219. Three viewpoints have been assessed at this junction, RR1a, RR1b and RR1c. Viewpoint RR1a shows the view of drivers in the left turning lane looking at the left traffic lights, whilst viewpoint RR1b shows drivers in the left straight ahead lane looking at the left traffic lights and viewpoint RRc shows drivers in the central straight ahead lane looking at the left traffic lights. There is an alternative set of traffic lights on the right side of the road that would not be affected by the Proposed Development and secondary traffic lights for both turning and straight through traffic primarily for use by stationary vehicles.

Table 13.44 - Summary of Potential Reflections at Regent Road (RR1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR1a	C1: South-Western	16:00 to 17:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area from 5° to 6°	Moderate Adverse
	C2: Western	18:00 GMT to sunset	Mid-April to mid-August	2° to 7°	Major Adverse
	D1: South-Western Inflected A	13:00 to 14:00 GMT	Mid-October to mid-February	7° to 15°	Moderate Adverse
	D1: South-Western Inflected B	09:00 to 10:00 GMT	Mid-January to mid-March and mid-September to mid-November	12° to 15°	Minor Adverse
	D2: Northern Facetted	Very small areas of inter-reflection throughout the day	Throughout the year	Thin strips of inter-reflections are visible from 9° to 15°	Moderate Adverse
	D2: Western Inflected A	16:00 to 17:00 GMT	Mid-February to late-March and early-September to mid-October	12° to 17°	Minor Adverse
	D2: Western Inflected B	12:00 to 13:00 GMT	Mid-October to mid-February	12° to 16°	Minor Adverse
RR1b	C1: South-Western	16:00 to 17:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area at 16°	Minor Adverse
	C2: Western	18:00 GMT to sunset	Mid-April to mid-August	12° to 15°	Minor Adverse
	D1: South-Western Inflected A	13:00 to 14:00 GMT	Mid-October to mid-February	8° to 16°	Moderate Adverse
	D1: South-Western Inflected B	09:00 to 10:00 GMT	Mid-January to mid-March and mid-September to mid-November	14° to 17°	Minor Adverse
	D2: Northern Facetted	Very small areas of inter-reflection throughout the day	Throughout the year	Thin strips of inter-reflections are visible from 2° to 13°	Major Adverse
	D2: Western Inflected A	16:00 to 17:00 GMT	Mid-January to late-March and early-September to mid-November	0° to 13°	Major Adverse
	D2: Western Inflected B	12:00 to 13:00 GMT	Mid-October to mid-February	7° to 13°	Moderate Adverse
RR1c	C1: South-Western	16:00 to 17:00 GMT	Mid-February to mid-March and mid-September to mid-October	A small area at 9°	Minor Adverse
	C2: Western	18:00 GMT to sunset	Mid-May to mid-July	6° to 10°	Moderate Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D1: South-Western Inflected A	13:00 to 14:00 GMT	Mid-October to mid-February	7° to 16°	Moderate Adverse
	D1: South-Western Inflected B	09:00 to 10:00 GMT	Mid-January to mid-March and mid-September to mid-November	13° to 16°	Minor Adverse
	D2: Northern Facetted	Very small areas of inter-reflection throughout the day	Throughout the year	Thin strips of inter-reflections are visible from 5° to 15°	Moderate Adverse
	D2: Western Inflected A	16:00 to 17:00 GMT	Mid-January to late-March and early-September to mid-November	7° to 16°	Moderate Adverse
	D2: Western Inflected B	12:00 to 13:00 GMT	Mid-October to mid-February	10° to 15°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.220. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections generate by C1 are very small in area and would therefore be low intensity;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The inter-reflections that occur from the northern facade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- The probability of the sun shining at the times when reflections could occur are 20% or less from the façade of C2 and from the western inflected A façade less than 40%; and

- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.221. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and their small area, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Oldfield Road is considered to be **permanent**, **Moderate Adverse** and **significant**. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Regent Road (RR2) – Junction with Ordsall Lane

13.222. Three viewpoints have been assessed at this junction, RR2a, RR2b and RR2c. Viewpoint RR2a shows the view of drivers in the left lane looking at the left traffic lights, viewpoint RR2b shows the view of drivers in the central lane looking at the left traffic lights, whilst viewpoint RR2c shows drivers in the right lane looking at the right traffic lights. There is a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.45 - Summary of Potential Reflections at Regent Road (RR2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RR2a	C1: South-Western	12:00 to 13:00 GMT	Mid-October to late-November and early-January to mid-February	26° to 28°	Minor Adverse
	D1: South-Western Inflected A	13:00 to 14:00 GMT	Mid-September to mid-March	From 15°	Minor Adverse
	D1: South-Western Inflected B	Inter-reflections occurring between 15:00 and 16:00	Inter-reflections occurring mid-March to mid-May and mid-July to mid-September	Small slithers of reflections are visible from 21° to 30°	Minor Adverse
	D2: Western Inflected A	15:00 to 17:00 GMT	Mid-February to mid-May and mid-July to mid-October	0° to 29°	Major Adverse
	D2: Western Inflected B	Just before 13:00 to 14:00 GMT	Mid-September to late-November and early-January to mid-March	9° to 30°	Moderate Adverse
RR2b	C1: South-Western	12:00 to 13:00 GMT	Mid-October to mid-February	18° to 22°	Minor Adverse
	D1: South-Western Inflected A	13:00 to just after 14:00 GMT	Early-September to late-March	From 7°	Moderate Adverse
	D1: South-Western Inflected B	10:00 to 11:00 GMT and inter-reflections occurring between 16:00 and 18:00	Mid-February to late-March and early-September to mid-October, with inter-reflections occurring mid-March to mid-May and mid-July to mid-September	Direct reflections are visible from 27° with small slithers of inter-reflections visible from 8° to 27°	Moderate Adverse
	D2: Northern Facetted	Inter-reflection throughout the day	Inter-reflection throughout the year	Thin strips of inter-reflection are visible from 0° to 28°	Major Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	D2: Western Inflected A	15:00 to just after 17:00 GMT	Mid-February to mid-May and mid-July to mid-October	5° to 30°	Moderate Adverse
	D2: Western Inflected B	13:00 to 14:00 GMT	Mid-September to late-November and early-January to mid-March	9° to 30°	Moderate Adverse
RR2c	D1: South-Western Inflected A	13:00 to 15:00 GMT	Mid-September to mid-March	From 25°	Minor Adverse
	D1: South-Western Inflected B	Inter-reflections occur between 17:00 GMT and sunset	Inter-reflections occur mid-February to mid-May and mid-July to mid-October	Small slithers of reflections are visible from 27°	Minor Adverse
	D2: Northern Facetted	07:00 to 08:00 GMT, 17:00 GMT to sunset, and very small areas of inter-reflection in the mornings	Mid-March to mid-September, and very small areas of inter-reflection throughout the year	Thin strips of reflections are visible from 17°	Minor Adverse
	D2: Western Inflected A	15:00 to just after 17:00 GMT	Mid-February to mid-May and mid-July to mid-October	From 11°	Minor Adverse
	D2: Western Inflected B	13:00 to 14:00 GMT	Mid-September to late-November and early-January to mid-March	From 15°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.223. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from the northern facade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of almost all panels is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected from those panels;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development;
- The probability of the sun shining at the times when reflections could occur is 40% or less from the western inflected A façade; and

- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.224. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Regent Road with Ordsall Lane is considered to be permanent, Moderate Adverse and significant. Given the dynamic nature of traffic movement, the potential effects as reported would only occur momentarily when looking precisely at the affected traffic lights, 23 metres from the junction.

Ordsall Lane (OS) – Junction with Regent Road

13.225. Two viewpoints have been assessed at this junction, OSa and OSb. Viewpoint OSa shows the view of drivers in the central lane looking at the right traffic lights, whilst viewpoint OSb shows drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road and a second traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.46 - Summary of Potential Reflections at Ordsall Lane (OS)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
OSa	D1: South-Western Inflected A	14:00 to 15:00 GMT	Mid-September to mid-March	From 24°	Minor Adverse
	D1: South-Western Inflected B	11:00 to 12:00 GMT and inter-reflections occurring between 18:00 GMT and sunset	Mid-September to mid-March, with inter-reflections occurring mid-April to mid-August	From 22°	Minor Adverse
OSb	D1: South-Western Inflected A	14:00 to just after 15:00 GMT	Mid-October to mid-February	From 28°	Minor Adverse
	D1: South-Western Inflected B	11:00 to 12:00 GMT and inter-reflections occurring between 18:00 GMT and sunset	Mid-October to mid-February, with inter-reflections occurring mid-April to mid-August	From 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.226. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The reflections occur outside peak traffic times; and
- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.227. Based on professional judgement, in consideration of the magnitude of potential effects and the factors outlined above in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Ordsall Lane with Regent Road is considered to be **permanent**, **Minor Adverse** and **not significant**.

Regent Retail Park (RP1) – Pedestrian Crossing

13.228. One viewpoint has been assessed at this junction, RP1. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP1) shows the view of drivers look forward as they approach the pedestrian crossing. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

Table 13.47 - Summary of Potential Reflections at Regent Retail Park (RP1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP1	C1: South-Western	10:00 to 11:00 GMT	Mid-November to mid-January	14° to 17°	Minor Adverse
	C2: Northern	05:00 to 07:00 GMT	Early-April to late-May and early-July to late-August	7° to 18°	Moderate Adverse
	C2: Western	17:00 to 19:00 GMT	Mid-March to mid-September	6° to 18°	Moderate Adverse
	D1: North-Western Facetted	18:00 GMT to sunset	Mid-April to mid-August	Thin strips of reflection are visible from 8° to 20°	Moderate Adverse
	D1: South-Western Inflected A	12:00 to 13:00 GMT and inter-reflections occurring in the evenings	Mid-January to mid-February and mid-October to mid-November, with inter-reflections occurring mid-April to mid-August	Direct reflections are visible from 24° to 27°, with inter-reflections occurring from 8° to 24° but with only small slithers visible within 10°	Moderate Adverse
	D2: Northern Facetted	16:00 to 19:00 GMT and very small slithers of inter-reflection occurring in the mornings	Mid-January to mid-April and mid-August to mid-November, with very small slithers of inter-reflection occurring during the mid-seasons and summer months	Thin strips of reflections are visible 10° to 26°	Minor Adverse
	D2: Western Inflected A	15:00 to 16:00 GMT	Mid-January to mid-March and mid-September to mid-November	15° to 27°	Minor Adverse
	D2: Western Inflected B	11:00 to 12:00 GMT	Mid-October to mid-February	18° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.229. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;

- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the northern-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.230. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the Regent Retail Park pedestrian crossing is considered to be permanent, Minor to Moderate Adverse and significant.

Regent Retail Park (RP2) – Junction 1

13.231. One viewpoint has been assessed at this junction, RP2. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP2) shows the view of drivers look forward as they approach the first roundabout. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

Table 13.48 - Summary of Potential Reflections at Regent Retail Park (RP2)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP2	C1: South-Western	10:00 to 11:00 GMT	Early-November to late-January	14° to 18°	Minor Adverse
	C2: Northern	05:00 to 07:00 GMT	Early-April to late-May and early-July to late-August	8° to 20°	Moderate Adverse
	C2: Western	17:00 to 19:00 GMT	Mid-March to mid-September	7° to 20°	Moderate Adverse
	D1: North-Western Facetted	17:00 GMT to sunset	Mid-April to mid-August	Thin strips of reflection are visible from 12° to 22°	Minor Adverse
	D1: South-Western Inflected A	11:00 to 12:00 GMT and inter-reflections occurring in the evenings	Early-February to mid-March and mid-September to late-October, with inter-reflections occurring mid-April to mid-August	Direct reflections are visible from 26°, with inter-reflections occurring from 12° to 26°	Minor Adverse
	D2: Northern Facetted	15:00 to 17:00 GMT and small slithers of reflection occurring between sunrise and 09:00 GMT	Mid-February to mid-April and mid-August to mid-October, with very small slithers of reflection occurring throughout the year	Thin strips of reflection occur from 12° to 28°	Minor Adverse
	D2: Western	14:00 to 16:00 GMT	Mid-January to mid-March and mid-	17° to 30°	Minor Adverse

	Inflected A		September to mid-November		
	D2: Western Inflected B	11:00 to 12:00 GMT	Early-October to late-February	20° to 30°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.232. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.233. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction first Regent Retail Park roundabout is considered to be permanent, Minor to Moderate Adverse and significant.

Regent Retail Park (RP3) – Junction 2

13.234. One viewpoint has been assessed at this junction, RP3. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP3) shows the view of drivers look forward as they approach the second roundabout. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

Table 13.49 - Summary of Potential Reflections at Regent Retail Park (RP3)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP3	C1: South-Western	10:00 to 12:00 GMT	Mid-October to mid-February	14° to 23°	Minor Adverse

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	C2: Northern	05:00 to 07:00 GMT	Mid-April to mid-August	12° to 24°	Minor Adverse
	C2: Western	17:00 to 19:00 GMT	Mid-April to mid-August	12° to 24°	Minor Adverse
	D1: North-Western Facetted	17:00 to 19:00 GMT	Mid-April to mid-August	Thin strips of reflection are visible from 16° to 24°	Minor Adverse
	D1: South-Western Inflected A	Very small areas of inter-reflections occur from 19:00 GMT to sunset	Very small areas of inter-reflections occur mid-April to mid-August	Very small areas of inter-reflections occur from 17° to 19°	Minor Adverse
	D2: Northern Facetted	16:00 to 17:00 GMT and small slithers of reflection occurring between sunrise and 09:00 GMT	Mid-February to mid-April and mid-August to mid-October, with very small slithers of reflection occurring throughout the year	Thin strips of reflections are visible from 16°	Minor Adverse
	D2: Western Inflected A	14:00 to 15:00 GMT	Mid-January to mid-March and mid-September to mid-November	From 24°	Minor Adverse
	D2: Western Inflected B	11:00 to 12:00 GMT	Mid-October to mid-February	From 23°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.235. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur above the driver's visor line, which would mitigate the reflections when deployed;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible at this junction with a greater intensity than the reflections from the Proposed Development; and
- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.236. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction first Regent Retail Park roundabout is considered to be **permanent**, **Minor Adverse** and **not significant**.

Regent Retail Park (RP4) – Junction with Ordsall Lane

13.237. One viewpoint has been assessed at this junction, RP4. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (RP4) shows the view of drivers look forward as they approach the junction. It is also worth noting that this viewpoint is not located on a public road but has been assessed due to the likely traffic volumes.

Table 13.50 - Summary of Potential Reflections at Regent Retail Park (RP4)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
RP4	D2: Western Inflected A	14:00 to 15:00 GMT	Early-October to mid-November and mid-January to late-February	A small slither of reflections is visible from 27°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.238. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- There are no signals where visibility can be affected by reflections from the Proposed Development;
- Potential reflections occur above the driver's visor line, which would mitigate any effects when deployed; and
- The area of the façade visible is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected.

13.239. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Regent Retail Park with Ordsall Lane is considered to be **permanent**, **Negligible** and **not significant**.

Egerton Street/Inner Ring Road (ES1) – Junction with Deansgate Interchange on-ramp

13.240. One viewpoint has been assessed at this junction, ES1. Viewpoint ES1 shows drivers in the right lane as they approach traffic merging from the Deansgate Interchange slip-road, this is not a controlled junction.

Table 13.51 - Summary of Potential Reflections at Egerton Street/Inner Ring Road (ES1)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES1	C2: Southern	12:00 to 13:00 GMT	Mid-November to mid-January	Reflections from a couple of panels are visible at 30°	Minor Adverse
	D1: South-Eastern Facetted	Sunrise to 08:00 GMT	Early-March to late-September	From 20°	Minor Adverse

	D2: Southern Facetted	07:00 to 15:00 GMT	Mid-August to mid-April	Reflections are visible from 17°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.241. At this junction, for the viewpoint assessed, the following considerations have informed professional judgement on the magnitude of effect:

- There are no signals where visibility can be affected by reflections from the Proposed Development;
- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections occur from facetted facades where the area of each glazed panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- Reflections are broken up by alternating anodised aluminium panel, thus the reflections would only occur for a short period of time from each glazed panel.

13.242. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Egerton Street/Inner Ring Road with Deansgate Interchange on-ramp is considered to be **permanent**, **Minor Adverse** and **not significant**.

Deansgate Interchange on-ramp (ES_Slip) – Junction with Egerton Street/Inner Ring Road

13.243. One viewpoint has been assessed at this junction, ES_Slip. Viewpoint ES_Slip. There is just one lane of traffic, and this is not a controlled junction, therefore the viewpoint assessed (ES_Slip) shows the view of drivers look forward as they approach the junction.

Table 13.52 - Summary of Potential Reflections at Deansgate Interchange on-ramp (ES_Slip)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
ES_Slip	C2: Southern	12:00 to 13:00 GMT	Mid-October to mid-February	From 24°	Minor Adverse
	D1: South-Eastern Facetted	Sunrise to 08:00 GMT	Mid-February to mid-October	16° to 28°	Minor Adverse
	D2: Southern Facetted	07:00 to 15:00 GMT	Mid-August to mid-April	14° to 28°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.244. At this junction, for both viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- There are no signals where visibility can be affected by reflections from the Proposed Development;
- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of reflections when deployed;

- The reflections occur from facetted facades or facades with alternating angled glazing where the area of each glazed panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- Reflections from the facetted facades are further broken up by alternating anodised aluminium panel, thus the reflections would only occur for a short period of time from each glazed panel.

13.245. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to drivers at the junction of Deansgate Interchange on-ramp with Egerton Street/Inner Ring Road is considered to be **permanent**, **Minor Adverse** and **not significant**.

Deansgate Interchange (DGI) – Junction with Chester Road

13.246. One viewpoint has been assessed at this junction, DGI. Viewpoint DGI shows the view of drivers in the right lane looking at the right traffic lights. There is an alternative set of traffic lights on the left side of the road as well as two secondary traffic light on the opposite side of the junction primarily for use by stationary vehicles.

Table 13.53 - Summary of Potential Reflections at Deansgate Interchange (DGI)

Viewpoint	Facade	Times of the day that reflections occur	Times of the year that reflections occur	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
DGI	C2: Southern	13:00 to 14:00 GMT	Mid-October to mid-February	3° to 9°	Major Adverse
	D1: South-Eastern Facetted	Sunrise to 08:00 GMT	Mid-February to mid-October	6° to 14°	Moderate Adverse
	D2: Southern Facetted	07:00 to 15:00 GMT	Mid-September to mid-March	7° to 16°	Moderate Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.247. At this junction, for the viewpoints assessed, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The reflections that occur from C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the south-eastern facade of D1 and southern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The reflections that occur within 5° of a driver's direct line of sight occur outside of peak traffic times; and

- Alternative traffic lights are visible within the field of view that a driver approaching this junction can rely upon.

13.248. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and small area of each panel visible within the field of view, the overall effect in terms of solar glare to drivers at the junction of Deansgate Interchange with Chester Road is considered to be **permanent**, **Minor Adverse** and **not significant**.

Northern Line (N1) – Southbound from Salford Crescent to Deansgate

13.249. 10 viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

13.250. There are no reflections visible within 30° of a driver's line of sight at viewpoints N1-310, N1-360 and N1-410, as such, these viewpoints experience a Negligible effect in terms of solar glare.

Table 13.54 - Summary of Potential Reflections at Northern Line (N1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: South-Western	09:00 to 10:00 GMT	Mid-October to mid-February	N1-60 N1-110	13° to 18°	Minor Adverse
		Mid-January to mid-February and mid-October to mid-November	N1-160 N1-210	18° to 24°	Minor Adverse
		Early-February to mid-March and mid-September to late-October	N1-260	27° to 30°	Minor Adverse
C1: North-Eastern	07:00 to 09:00 GMT	Mid-January to mid-February and mid-October to mid-November	N1-460	From 28°	Minor Adverse
C2: Western	17:00 to 18:00 GMT	Mid-March to mid-May and mid-July to mid-September	N1-10	6° to 8° below the overpass and 14° to 16° above the overpass	Moderate Adverse
		Mid-February to mid-May and mid-July to mid-October	N1-60	14° to 22°	Minor Adverse
	16:00 to 18:00 GMT		N1-110 N1-160 N1-210	From 18°	Minor Adverse
C2: Northern	Sunrise to 06:00, with a small area of inter-reflection between 13:00 to 14:00 GMT	Mid-April to mid-August, with a small area of inter-reflections from mid-November to mid-January	N1-60	Direct reflections from 13° to 16°, with a small area of inter-reflection occurring at 17°	Minor Adverse
		Mid-May to mid-July, with a small area of inter-reflections from mid-November to mid-January	N1-110	Direct reflections from 17° to 18°, with inter-reflection occurring between 20° to 22°	Minor Adverse
	Sunrise to 06:00 GMT, with an		N1-160	Direct reflections from 20° to 21°,	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	area of inter-reflection between 12:00 to 14:00 GMT			with inter-reflection occurring between 23° to 25°	
	Inter-reflections are visible between 12:00 to 14:00 GMT	Inter-reflections are visible from mid-October to mid-February	N1-210	Inter-reflections occur between 25° to 28°	Minor Adverse
D1: North-Western Facetted	17:00 to 19:00 GMT	Mid-March to mid-September	N1-10 N1-60	Thin strips from 20°	Minor Adverse
D1: South-Western Inflected A	11:00 to 12:00 GMT	Mid-January to mid-February and mid-October to mid-November	N1-10	24° to 25°	Minor Adverse
D2: Northern Facetted	06:00 to 10:00 GMT and 15:00 to 16:00 GMT	Mid-January to mid-November	N1-10	Thin strips from 22° to 24°	Minor Adverse
	Sunrise to 09:00 GMT and from 15:00 and sunset		N1-60	Thin strips from 27°	Minor Adverse
D2: Western Inflected A	14:00 to 15:00 GMT	Mid-October to mid-November and mid-January to mid-February	N1-10	24° to 27°	Minor Adverse
D2: Western Inflected B	12:00 to 13:00 GMT	Mid-October to mid-February	N1-10	23° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.251. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections predominantly occur above the driver's visor line, which would mitigate the majority of reflections when deployed;
- The tracks are partially on a bend, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections that occur from the north-eastern façade of C1 and northern façade of C2 are generated by titled glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;

- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern facade of C1, which lowers the intensity of reflections generated from these façades;
- The area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible along this track with a greater intensity than the reflections from the Proposed Development; and
- There are not understood to be any signals where visibility can be affected by reflections from the Proposed Development.

13.252. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, the overall effect in terms of solar glare to train drivers on the Northern line travelling southbound from Salford Crescent to Deansgate is considered to be **permanent**, **Minor Adverse** and **not significant**.

Northern Line (N2) – Southbound from Salford Central to Salford Crescent

13.253. Six viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development and an additional six viewpoints have been assessed for trains approaching the signals identified within this stretch of track. The signals are visible between viewpoints N2-110 to N2-180.

Table 13.55 - Summary of Potential Reflections at Northern Line (N2)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: North-Eastern	Sunrise to 06:00 GMT	Mid-April to mid-August	N2-10	6° to 17°	Moderate Adverse
			N2-60 N2-110 N2-120	2° to 16°	Major Adverse
			N2-130	9° to 20°	Moderate Adverse
			N2-140 N2-150 N2-160 N2-170 N2-180	10° to 30°	Minor Adverse
C1: North-Western	17:00 to 18:00 GMT	Mid-March to mid-April and mid-August to mid-September	N2-10	5° to 16°	Moderate Adverse
		Mid-March to mid-May and mid-July to mid-September	N2-60 N2-110 N2-120	3° to 2°	Major Adverse
			N2-130 N2-140 N2-150	5° to 26°	Moderate Adverse
	16:00 to 18:00 GMT		N2-160 N2-170 N2-180 N2-210	12° to 30°	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C2: Southern	12:00 to 13:00 GMT	Mid-October to mid-February	N2-10 N2-60	16° and 18°	Minor Adverse
D1: North-Western Facetted	15:00 GMT and sunset	Mid-January to mid-November	N2-10	Thin strips of reflection visible between 6° to 18°	Moderate Adverse
			N2-60 N2-110 N2-120	Thin strips of reflection visible between 13° to 25°	Minor Adverse
			N2-130 N2-140	Thin strips of reflection visible between 6° to 23°	Moderate Adverse
			N2-150 N2-160 N2-170 N2-180	Thin strips of reflection visible between 0° to 25°	Major Adverse
			N2-210	Thin strips of reflection visible between 9° to 27°	Moderate Adverse
			N2-260	Thin strips of reflection visible from 20°	Minor Adverse
D1: North-Eastern Inflected A	06:00 to 07:00 GMT with inter-reflections occurring from 18:00 to sunset	Mid-April to mid-May and mid-July to mid-August, with inter-reflections occurring during mid-April to mid-August	N2-10	Direct reflections between 15° to 18°, inter-reflections occur between 5° and 13°	Moderate Adverse
			N2-60 N2-110	Direct reflections between 18° to 25°, inter-reflections occur between 12° and 17°	Minor Adverse
		Mid-April to mid-August, with inter-reflections also occurring during this time	N2-120 N2-130 N2-140	Direct reflections between 17° to 25°, inter-reflections occur between 12° and 16°	Minor Adverse
			N2-150 N2-160 N2-170 N2-180	Direct reflections between 17° to 25°, inter-reflections occur between 0° and 11°	Major Adverse
			N2-210	Direct reflections between 22° to 27°, inter-reflections occur between 11° and 15°	Minor Adverse
D2: Northern Facetted	06:00 and 09:00, and 17:00 GMT and sunset	Throughout the year	N2-10	Thin strips of reflection visible between 2° to 16°	Major Adverse
			N2-60 N2-110 N2-120	Thin strips of reflection visible between 6° to 20°	Moderate Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
			N2-130 N2-140 N2-150 N2-160	Thin strips of reflection visible between 1° to 21°	Major Adverse
			N2-170 N2-180	Thin strips of reflection visible between 5° to 23°	Moderate Adverse
			N2-210 N2-260	Thin strips of reflection visible from 16°	Minor Adverse
D2: Eastern Inflected A	09:00 to 10:00 GMT	Mid-October to mid-February	N2-10	7° to 16°	Moderate Adverse
			N2-60	10° to 17°	Minor Adverse
			N2-110 N2-120 N2-130 N2-140 N2-150 N2-160	7° to 21°	Moderate Adverse
		Mid-September to mid-March	N2-170 N2-180 N2-210	10° to 28°	Minor Adverse
D2: Eastern Inflected B	06:00 to 07:00 GMT	Mid-February to mid-April and mid-August to mid-October	N2-10	2° to 16°	Major Adverse
		Mid-February to late-April and early-August to mid-October	N2-60 N2-110 N2-120	5° to 18°	Moderate Adverse
		Early-March to mid-May and mid-July to late-September	N2-130 N2-140 N2-150	2° to 20°	Major Adverse
			N2-160 N2-170	6° to 23°	Moderate Adverse
			N2-210	18° to 28°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.254. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are partially on a bend, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections that occur from C1 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern and north-western façade of C1, which lowers the intensity of reflections generated from these façades;

- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The area of each panel within 10° is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain for this stretch of track with a greater intensity than the reflections from the Proposed Development.

13.255. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and their relative size within 10°, the overall effect in terms of solar glare to train drivers on the Northern line travelling southbound from Salford Central to Salford Crescent is considered to be **permanent**, **Moderate Adverse** and **significant.** Given the dynamic nature of train movement travelling along a set of tracks, the potential effects as reported would only occur momentarily when at each of the precise viewpoints assessed.

Northern Line (N3) – Southbound from Salford Central to Deansgate

13.256. Seven viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development and an additional six viewpoints have been assessed for trains approaching the signals identified within this stretch of track. The signals are visible between viewpoints N3-110 to N3-180.

13.257. There are no reflections visible within 30° of a driver's line of sight at viewpoints N3-310 and N1-360, as such, these viewpoints experience a Negligible effect in terms of solar glare.

Table 13.56 - Summary of Potential Reflections at Northern Line (N3)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: North-Eastern	Sunrise to 06:00 GMT	Mid-April to mid-August	N3-10	7° to 17°	Moderate Adverse
			N3-60 N3-110 N3-120 N3-130 N3-140 N3-150 N3-160 N3-170 N3-180	2° to 16°	Major Adverse
			N3-210	5° to 14°	Moderate Adverse
			N3-260	11° to 15°	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: North-Western	17:00 to 18:00 GMT	Early-March to mid-April and mid-August to late-September	N3-10	5° to 17°	Moderate Adverse
		Early-March to mid-May and mid-July to late-September	N3-60	3° to 17°	Major Adverse
	16:00 to 18:00 GMT		N3-110 N3-120 N3-130 N3-140 N3-150 N3-160 N3-170 N3-180 N3-210	5° to 28°	Moderate Adverse
			N3-260	From 13°	Minor Adverse
C2: Southern	12:00 to 13:00 GMT	Mid-November to mid-January	N3-10 N3-60	At 17°	Minor Adverse
D1: North-Western Facetted	Between 15:00 GMT and sunset	Mid-January to mid-November	N3-10	Thin strips of reflection visible between 4° to 17°	Major Adverse
			N3-60 N3-110 N3-120 N3-130 N2-140 N3-150 N3-160 N3-170 N3-180 N3-210 N3-260	Thin strips of reflection visible from 14°	Minor Adverse
D1: North-Eastern Inflected A	06:00 to 07:00 GMT with inter-reflections occurring from 18:00 to sunset	Mid-April to mid-August	N3-10	Direct reflections between 14° to 17°, inter-reflections occur between 3° and 13°	Major Adverse
			N3-60 N3-110 N3-120 N3-130 N3-140 N3-150 N3-160 N3-170 N3-180	Direct reflections 17° to 28°, inter-reflections occur between 12° and 20°	Minor Adverse
		Mid-May to mid-July	N3-210	Direct reflections are visible between 27° to 30°, inter-reflections occur between 22° and 24°	Minor Adverse
D2: Northern Facetted	Between 05:00 and 09:00, and 16:00 GMT to sunset	Throughout the year	N3-10	Thin strips of reflection visible between 1° to 16°	Major Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
			N3-60	Thin strips of reflection visible between 8° to 19°	Moderate Adverse
			N3-110 N3-120 N3-130 N3-140 N3-150 N3-160 N3-170 N3-180 N3-210	Thin strips of reflection visible between 12° to 27°	Minor Adverse
			N3-260	Thin strips of reflection visible from 19°	Minor Adverse
D2: Eastern Inflected A	09:00 to 10:00 GMT	Mid-October to mid-February	N3-10	7° to 16°	Moderate Adverse
			N3-60 N3-110 N3-120 N3-130 N3-140 N3-150 N3-160	11° to 23°	Minor Adverse
		Mid-September to mid-March	N3-170 N3-180 N3-210 N3-260	13° to 22°	Minor Adverse
D2: Eastern Inflected B	06:00 to 07:00 GMT	Early-March to mid-April and mid-August to late-October	N3-10	2° to 16°	Major Adverse
			N3-60	7° to 17°	Moderate Adverse
		Mid-March to mid-May and mid-July to mid-September	N3-110 N3-120	9° to 21°	Moderate Adverse
			N3-130 N3-140 N3-150 N3-160	10° to 23°	Minor Adverse
	Just before 06:00 to 07:00 GMT		N3-170 N3-180 N3-210	11° to 26°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.258. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are partially on a bend, therefore any instances of reflection occurring when on the bend would only be visible momentarily before the reflection angle changes;
- The reflections that occur from C1 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;

- A frit pattern has been applied to the outer face of back painted glazing on the north-eastern and north-western façade of C1, which lowers the intensity of reflections generated from these façades;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The reflections that occur from the north-western facade of D1 and northern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- Approaching the signals, the area of each panel is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- The reflections occurring from the north-eastern façade of C1 do so in the very early mornings in the summer months when the probability of the sun shining is 30% or less; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible along this track with a greater intensity than the reflections from the Proposed Development.

13.259. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and their relative size when approaching the signals, the overall effect in terms of solar glare to train drivers on the Northern line travelling southbound from Salford Central to Deansgate is considered to be **permanent**, **Moderate Adverse** and **significant**. Given the dynamic nature of train movement travelling along a set of tracks, the potential effects as reported would only occur momentarily when at each of the precise viewpoints assessed.

Northern Line (N4) – Northbound from Deansgate to Salford Crescent/Eccles

13.260. 10 viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development and an additional 11 viewpoints have been assessed for trains approaching the signals identified within this stretch of track. The signals are visible between viewpoints N4-160 to N4-240.

13.261. There are no reflections visible within 30° of a driver's line of sight at viewpoints N4-470 and N1-480, as such, these viewpoints experience a Negligible effect in terms of solar glare.

Table 13.57 - Summary of Potential Reflections at Northern Line (N4)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: South-Eastern	10:00 to 11:00 GMT	Mid-October to mid-February	N4-10 N4-110 N4-160 N4-170 N4-180 N4-190	10° to 22°	Minor Adverse
		Mid-September to mid-March	N4-200 N4-210 N4-220	10° to 28°	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
			N4-230 N4-240 N4-260		
	09:00 to 11:00 GMT		N4-310 N4-360	From 5°	Moderate Adverse
			N4-410	From 12°	Minor Adverse
	10:00 to 11:00 GMT	Mid-October to mid-February	N4-440 N4-450 N4-460	From 19°	Minor Adverse
C2: Eastern	05:00 to 07:00 GMT	Mid-March to mid-May and mid-July to mid-September	N4-10	2° to 16°	Major Adverse
		Mid-March to mid-April and mid-August to mid-September	N4-60	A small area between 1° to 11°	Major Adverse
			N4-110	2° to 9°	Major Adverse
		Mid-March to mid-September	N4-160	2° to 21°	Major Adverse
	05:00 to 08:00 GMT		N4-170 N4-180 N4-190 N4-200 N4-210 N4-220 N4-230 N4-240 N4-260	2° to 30°	Major Adverse
			N4-310	From 8°	Moderate Adverse
	06:00 to 08:00 GMT		N4-360	From 22°	Minor Adverse
C2: Western	16:00 to 17:00 GMT	Mid-January to mid-March and mid-September to mid-November	N4-10 N4-60	4° to 16°	Major Adverse
			N4-110	5° to 9°	Moderate Adverse
	15:00 to 17:00 GMT	Mid-January to mid-April and mid-August to mid-November	N4-160 N4-170 N4-180 N4-190 N4-200 N4-210 N4-220 N4-230 N4-240 N4-260	5° to 30°	Moderate Adverse
	16:00 to 17:00 GMT	Mid-February to mid-April and mid-August to mid-October	N4-310	From 17°	Minor Adverse
D1: South-Eastern Facetted	06:00 and 15:00, with inter-reflections occurring from 18:00 GMT to sunset	Mid-August to mid-April, with inter-reflections occurring mid-March to mid-September	N4-10	Thin strips of reflection visible between 8° to 19°	Moderate Adverse
	06:00 to 09:00 GMT, with inter-reflections	Mid-September to mid-March, with inter-reflections	N4-60 N4-110	Thin strips of reflection visible between 8° to 14°	Moderate Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
	occurring from 18:00 GMT to sunset	occurring mid-February to mid-April and mid-August to mid-October			
	Between 06:00 and 15:00, with inter-reflections occurring from 18:00 GMT to sunset	Mid-August to mid-April, with inter-reflections occurring mid- March to mid-September	N4-160 N4-170 N4-180 N4-190 N4-200 N4-210 N4-220 N4-230 N4-240 N4-260 N4-310	Thin strips of reflection visible between 10° to 30°	Minor Adverse
D2: Eastern Inflected A	Sunrise to 06:00 GMT	Mid-April to mid-August	N4-10 N4-110 N4-160 N4-170 N4-180 N4-190 N4-200 N4-210	13° to 17°	Minor Adverse
	05:00 to 06:00 GMT	Mid-March to mid-September	N4-220 N4-230 N4-240 N4-260	19° to 29°	Minor Adverse
D2: Southern Facetted	11:00 to 18:00 GMT	Mid-August to mid-April	N4-10 N4-60 N4-160 N4-170 N4-180 N4-200 N4-210 N4-220 N4-230 N4-240 N4-260	Thin strips of reflection visible from 16°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.262. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The reflections that occur from C1 and C2 are generated by glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the south-eastern facade of C1 and southern façade of C2, which lowers the intensity of reflections generated from these façades;
- The reflections from the inflected facade of D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;

- The reflections that occur from the south-eastern facade of D1 and southern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- Approaching the signals, the area of each panel visible within 10° is less than 8 pixels in diameter within the view, as such, it is not possible for the full sun's intensity to be reflected;
- Reflections occurring from the western façade of C2 are at a glancing angle and therefore the area of each panel is very small within the field of view; and
- The sun's path sits within the field of view of a driver at this junction, once implemented the Proposed Development will partially obscure the direct view of the sun. Any reflections visible from the Proposed Development would be significantly less intense than a view of the direct sun as is currently experienced, that would be blocked once the Proposed Development is implemented. A large portion of the sun's path would remain visible along the track with a greater intensity than the reflections from the Proposed Development.

13.263. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and their relative size within 10°, the overall effect in terms of solar glare to train drivers on the Northern line travelling northbound from Deansgate to Salford Crescent/Eccles is considered to be **permanent**, **Moderate Adverse** and **significant**. Given the dynamic nature of train movement travelling along a set of tracks, the potential effects as reported would only occur momentarily when at each of the precise viewpoints assessed.

Tram Line (T1) – Eastbound from Cornbrook to Deansgate-Castlefield

13.264. Five viewpoints have been assessed along this set of tracks at 50 metre intervals commencing approximately 500 metres from the Proposed Development. There are not understood to be any signals visible within this stretch of track.

Table 13.58 - Summary of Potential Reflections at Tram Line (T1)

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
C1: South-Eastern	05:00 to 06:00 GMT	Mid-April to mid-May and mid-July to mid-August	T1-10 T1-60	5° to 9°	Moderate Adverse
	Sunrise to 06:00 GMT	Mid-April to mid-August	T1-110 T1-160 T1-210	From 10°	Minor Adverse
C2: Southern	09:00 to 10:00 GMT	Mid-October to mid-February	T1-10 T1-60	5° to 13°	Moderate Adverse
			T1-110 T2-160 T1-210	From 11°	Minor Adverse
D1: South-Eastern Facetted	05:00 to 08:00	Mid-February to mid-October	T1-10	Thin strips of reflection visible between 9° to 17°	Moderate Adverse
			T1-60 T1-110	Thin strips of reflection visible between 13° to 25°	Minor Adverse

Facade	Times of the day that reflections occur	Times of the year that reflections occur	Viewpoint	Location within 30° of driver's line of sight	Initial Magnitude of Effect*
D1: Western Inflected A	17:00 to 18:00	Mid-March to late-April and early-August to mid-September	T1-10	9° to 17°	Moderate Adverse
		Mid-March to mid-May and mid-July to mid-September	T1-60 T1-110	From 13°	Minor Adverse
D1: Western Infected B	14:00 to 15:00	Mid-October to mid-February	T1-10	8° to 17°	Moderate Adverse
			T1-60	12° to 20°	Minor Adverse
		Early-October to late-February	T1-110	21° to 27°	Minor Adverse
D2: Southern Facetted	Sunrise to 11:00 GMT	Throughout the year	T1-10 T1-60	Thin strips of reflection visible between 5° to 18°	Moderate Adverse
			T1-110 T1-160	Thin strips of reflection visible from 12°	Minor Adverse
D2: Eastern Inflected A	17:00 to 18:00	Mid-March to mid-April and mid-August to mid-September	T1-10	8° to 17°	Moderate Adverse
		Mid-March to mid-May and mid-July to mid-September	T1-60 T1-110 T1-160	From 12°	Minor Adverse
**Prior to consideration of any mitigating factors outlined below.*					

13.265. For this stretch of track, the following considerations have informed professional judgement on the magnitude of effect:

- Potential reflections occur predominantly above the driver's visor line, which would mitigate the majority of effects when deployed;
- The tracks are on a bend; therefore, any instances of reflection would only be visible momentarily before the reflection angle changes;
- The reflections that occur from C1 and C2 are generated by tilted glazing at alternating angles, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at slightly different times of the day and year from each individual panel;
- A frit pattern has been applied to the outer face of back painted glazing on the south-eastern facade of C1 and southern façade of C2, which lowers the intensity of reflections generated from these façades;
- The reflections from the inflected facades of D1 and D2 are broken up by anodised aluminium ventilation and imitation panels which limit the duration of reflections;
- The reflections that occur from the south-eastern facade of D1 and southern façade of D2 are generated by a facetted façade with vertical fins and anodised aluminium panels, whereby each glazed panel is at a slightly different angle to the adjacent panel and would therefore result in the reflections occurring at different times of the day and year and would reflections would be broken up by the anodised aluminium panels;
- The area of each panel visible is less than 8 pixels in diameter within the views, as such, it is not possible for the full sun's intensity to be reflected and

- There are no signals where visibility can be affected by reflections from the Proposed Development.

13.266. Based on professional judgement, in consideration of the times of day and year when reflections would occur, their location in proximity to a driver's direct line of sight and the mitigating factors outlined above, particularly the broken up nature of the reflections and their relative size, the overall effect in terms of solar glare to tram drivers on the tram line travelling eastbound from Cornbrook to Deansgate-Castlefield is considered to be **permanent**, **Minor to Moderate Adverse** and **significant**. Given the dynamic nature of train movement travelling along a set of tracks, the potential effects as reported would only occur momentarily when at each of the precise viewpoints assessed.

Mitigation Measures

Temporary Mitigation

13.267. Short term Moderate to Major Adverse effects have been reported at two junctions, one in Scenario 3 (Water Street, WS3) and the other in Scenario 5 (Egerton Street/Inner Ring Road, ES2). The effects at these junctions are reduced to Moderate Adverse following the implementation of the superstructure of the following Phase which are intended to have commenced prior to completion. In the instance that the commencement of Phase C2 or Phase D2 are delayed, it will be necessary to include temporary mitigation measures to reduce the reflections from Moderate to Major Adverse effects as reported, to Moderate Adverse.

13.268. For Water Street (WS3) it is necessary to mitigate reflections from the lower southern corner of the south-western façade of C1. The area of reflections is the lowest nine floors (excluding the podium) and for 17 metres from the southern corner, reflections would need to be mitigated if C1 is completed but the superstructure of C2 is not in place between mid-October and mid-February.

13.269. For Egerton Street/Inner Ring Road (ES2) it is necessary to mitigate reflections from the western corner panels only for the lowest five floors if D1 is complete but the superstructure of D2 is not in place between mid-February and mid-March, and mid-September and mid-October.

13.270. Mitigation of the short-term Moderate to Major Adverse effects could include, but is not limited to:

- Temporary tree screens;
- Adhesive non-reflective films applied to the affected panels; or
- Shading structures located between the junction and the Proposed Development.

13.271. The screening size and location are yet to be designed as they are only necessary in the unlikely event that C2 or D2 do not come forward according to the intended construction programme. The screening would need to be located directly between the relevant area of façade and the affected viewpoint. The location dictates the scale of the screen necessary, where screening located closest to the junction would be the smallest in scale. It is recommended that the requied mitigation should be secured by a planning condition.

Embedded Mitigation

13.272. As detailed in para 13.48 to 13.52 of this chapter, the design has evolved with solar glare effects in mind through the inclusion of titled glazing, non-specular anodised aluminium panels and vertical fins to break up potential reflections. As such, potential effects have been mitigated by design to be lower intensity, reducing the potential for the reflections to result in an occurrence of solar glare and there are no further mitigation measures available for solar glare from the Proposed Development.

13.273. Whilst permanent, significant adverse effects are predicted to occur for a driver at 11 road junctions and on four train/tram tracks, given the location of the site and scale of the development, potential for reflections from the Proposed Development is unavoidable. It should be noted that the assessment considers a scenario whereby the sun shines on every day of the year to consider

all potential circumstances in which reflections will occur (i.e. 'worst case'). According to the sunlight availability protractor, based on UK weather data, the sunshine probability will be significantly reduced and therefore the likelihood of the instances of reflections are considerably reduced. The probability of the sun shining during the times of the year when potential reflections are expected to occur ranges from 10% in the early mornings/late afternoons from the mid-seasons through winter months, up to 50% in the summer months from mid-morning until early afternoon.

13.274. Furthermore, the assessment does not include the sun itself within any viewpoints which would also cause very intense glare to drivers at many of the affected viewpoints. For the majority of viewpoints, the sun would be directly visible at other times of the day if the Proposed Development were not present as seen in the solar glare assessment in Appendix 13.1. In comparison, the reflections from the Proposed Development would appear less intense and would not cause significantly worse effects when compared with a direct view of the sun.

13.275. Due to the design of the facades already including extensive mitigation, there are no further façade design mitigation measures proposed for the Completed Development. Further detailed analysis should be undertaken once reflective materials have been specified to determine the intensity of reflections. The only remaining mitigation measues would be to install glazing with a lower Visible Light Reflectance (VLR) value that would reduce the intensity of reflections and would be determined through an assessment of the Veiling Luminance.

Cumulative Effects

13.276. Cumulative schemes are not assessed as the solar glare assessment is a worst-case scenario. Additional developments could obscure the view of the Proposed Development from certain viewpoints and therefore reduce instances of solar reflections.

Residual Effects

13.277. The likely significant effects of solar glare from the Proposed Development described above are considered a worst-case scenario. All solar glare effects are considered high sensitivity, and the effects are permanent, therefore the residual effects are the same as during the operational stage.

Table 13.59 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect (Pre-Mitigation)	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation **Residual Effect** – Significance and Duration (i.e. Temporary/Permeant)
Construction Phase				
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	None	N/A	Negligible to Moderate adverse and not significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	None	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 3				
Negligible to Moderate to Major Adverse and significant effects on Solar Glare	Road users at nearby junctions	Temporary screening of the one Moderate to Major Adverse junction should the superstructure of C2 not have commenced construction prior to completion of Phase C1. For all remaining junctions, mitigation is	N/A	Negligible to Moderate and significant effects on Solar Glare

Likely Significant Effect (Pre-Mitigation)	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation **Residual Effect** – Significance and Duration (i.e. Temporary/Permeant)
		embedded in the design and no further façade design mitigation is proposed (Para 13.267-13.270).		
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 4				
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 5				
Negligible to Moderate to Major Adverse and significant effects on Solar Glare	Road users at nearby junctions	Temporary screening of the one Moderate to Major Adverse junction should the superstructure of D2 not have commenced construction prior to completion of Phase D1. For all remaining junctions, mitigation is embedded in the design and no further façade design mitigation is proposed (Para 13.267-13.270).	N/A	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Operational Phase (Scenario 6)				
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare

13.278. Permanent, significant adverse effects are predicted to occur for a driver at 11 road junctions and on four train/tram tracks, given the location of the site and scale of the development, potential for reflections from the Proposed Development are is unavoidable. Due to the façade design and dynamic nature of road and rail user's movement, whilst Moderate Adverse effects occur, they are not considered to present a safety concern.

Reference List

13.279. This ES Chapter has been prepared by reference to the following:

- Commission Internationale De L'Eclairage (CIE), CIE 146:2002 & CIE 147:2002 - Collection on Glare, CIE, 2002
- Building Research Establishment (BRE), Site Layout Planning for Daylight and Sunlight: A guide to good practice, Second Edition, BRE, 2011
- Rail Group Standard, GE/RT8037 Signal Positioning and Visibility, Rail Safety and Standards Board, 2003

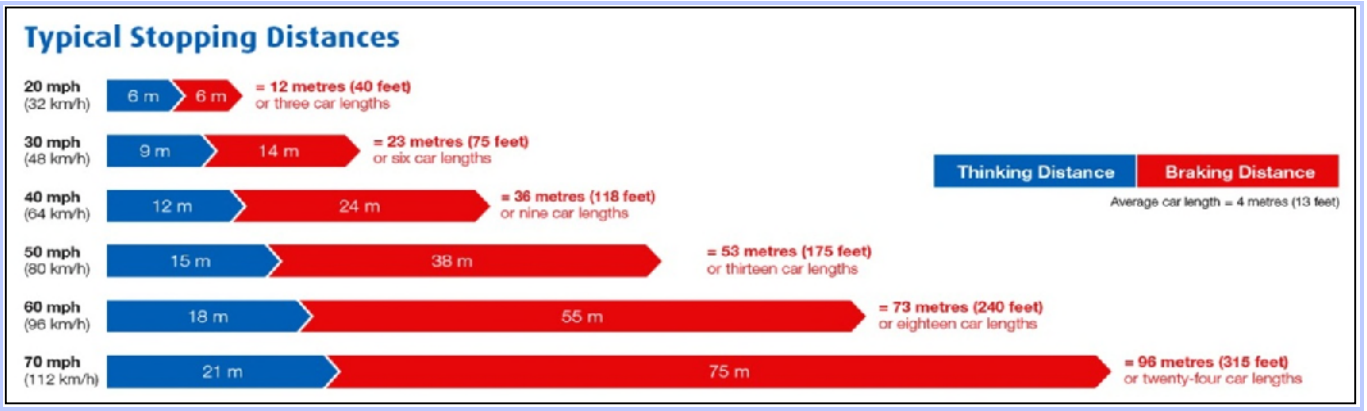


	Figure:	13.1		
	Title:	Typical Stopping Distances for a car		
	Project:	Trinity Islands		
	Date:	06/09/2021	Scale:	N/A

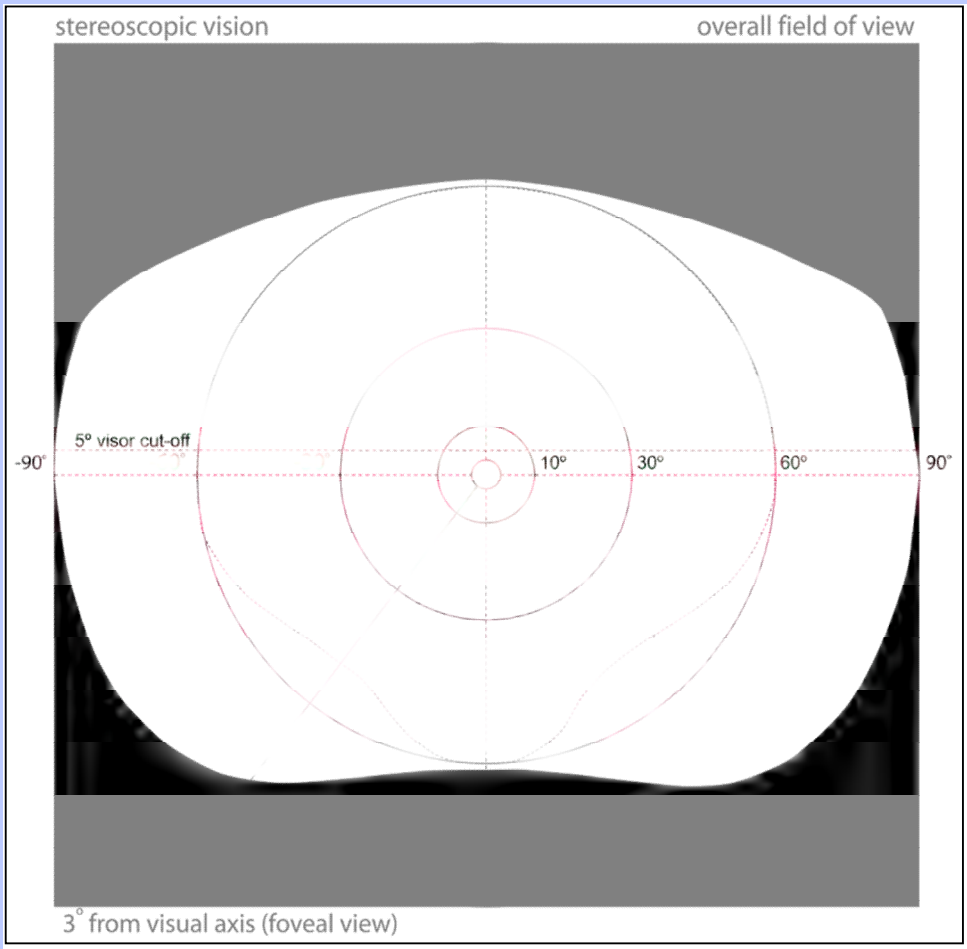


Figure:	13.2		
Title:	Field of Vision Diagram		
Project:	Trinity Islands		
Date:	06/09/2021	Scale:	N/A

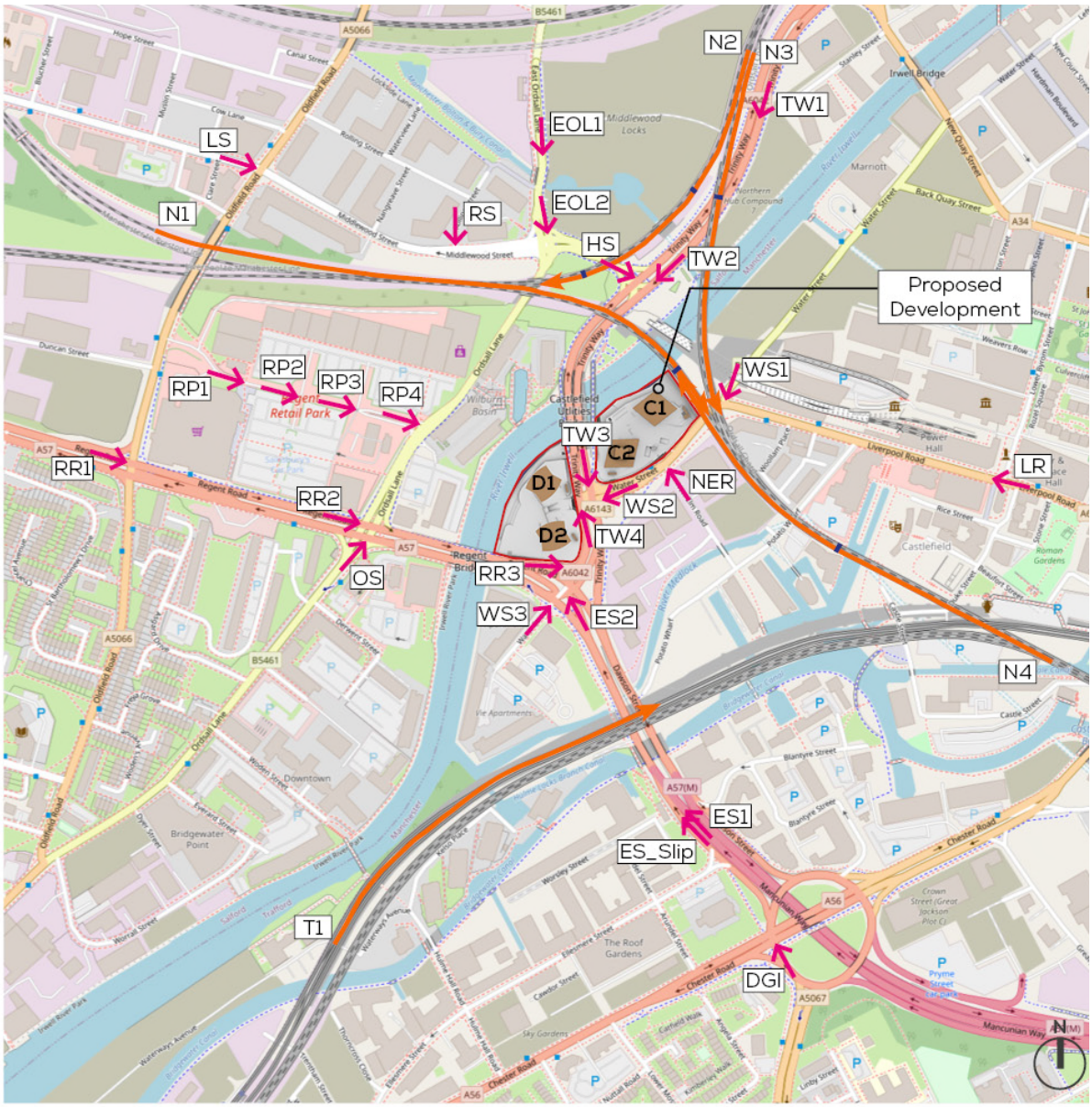


Figure:	13.3		
Title:	Viewpoints assessed for solar glare assessment		
Project:	Trinity Islands		
Date:	06/09/2021	Scale:	N/A

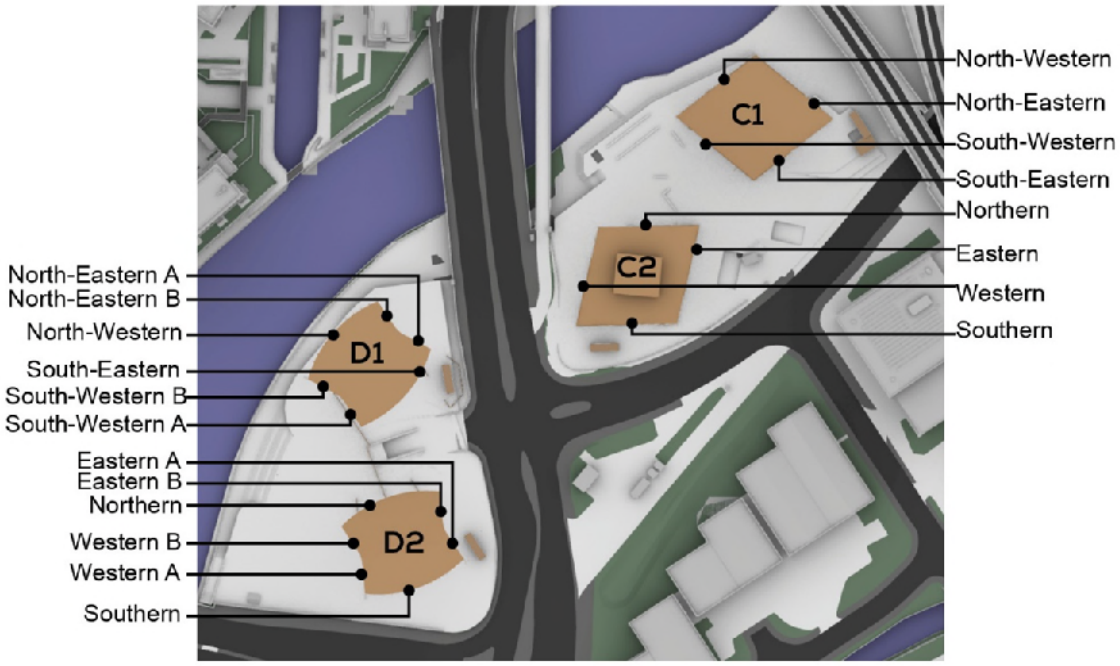


Figure:	13.4		
Title:	Elevations referenced within the assessment		
Project:	Trinity Islands		
Date:	17/10/2021	Scale:	N/A

14. Townscape and Visual Impacts

Introduction

14.1. 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 character and visual amenity. The Townscape and Visual Impact Assessment (TVIA) describes the methods used to assess the effects; the baseline conditions at the Proposed Development Site and surrounding area; mitigation measures, cumulative effects and the likely residual effects. Technical appendices also support this assessment and consist of the following:

- Appendix 8.1: Maps
- Appendix 8.2: Viewpoint and townscape photographs including AVR and block images.
- Appendix 8.3 Visualization methodology

About the Author

14.2. Chris Burnett BSC BLD CMLI, is principal partner of Chris Burnett Associates, a registered practice of landscape architects, who specializes 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 23 tall buildings all of which have received planning consent, in Manchester and Salford including Beetham Hilton, Owen Street (Deansgate Square) and New Wakefield Street and others UK wide in Brighton, London, Leicester, Reading and Liverpool.

Legislative and Policy Context

Legislation

14.3. The European Landscape Convention (ELC, 2000)[46] 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.

14.4. 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 organize European co-operation on landscape issues.

National Planning Policy

14.5. The National Planning Policy Framework[47] 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

[46] Ref 8.1 The European Landscape Convention (ELC 2000)
[47] Ref 8.2 National Planning Policy Framework 2021 Dept Communities and Local Government

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.

14.6. Key aspects of the NPPF, revised in 2021, which apply to the Townscape and Heritage 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:

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;

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

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);

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;

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

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

14.7. The following relevant policies are set out below as extracts from Manchester City Council's Core Strategy[48]:

"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.

Relevant Policies include:

Policy EN 1 - Design Principles and Strategic Character Areas

All development in Manchester will be expected to follow the seven principles of urban design, as identified in national planning guidance and listed above and have regard to the strategic character area in which the development is located. Opportunities for good design to enhance the overall

[48] Manchester City Council Core Strategy 2012

image of the City should be fully realised, particularly on major radial and orbital road and rail routes. Design and Access Statements submitted with proposals for new development must clearly detail how the proposed development addresses the design principles, reinforces and enhances the local character of that part of the City and supports the achievement of the Core Strategy Strategic Objectives."

14.8. The City Centre Character Area is of relevance to the Proposed Development. This area has been broken down into distinct townscape character zones by Manchester City Council and the extent and nature of the impact of the Proposed Development on these zones is described in more detail later in this chapter. The Core Strategy also refers to tall buildings:

Policy EN2 - Tall Buildings

Tall buildings 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 where it can be demonstrated that they

- *Are of excellent design quality,*
- *Are appropriately located,*
- *Contribute positively to sustainability,*
- *Contribute positively to place making, for example as a landmark, by terminating a view, or by signposting a facility of significance, and*
- *Will bring significant regeneration benefits.*

A fundamental design objective will be to ensure that tall buildings complement the City's key existing building assets and make a positive contribution to the evolution of a unique, attractive and distinctive Manchester, including to its skyline and approach views.

Suitable locations will include sites within and immediately adjacent to the City Centre with particular encouragement given to non-conservation areas and sites which can easily be served by public transport nodes.

Elsewhere within Manchester tall building development will only be supported where, in addition to the requirements listed above, it can be shown to play a positive role in a coordinated place-making approach to a wider area. Suitable locations are likely to relate to existing district centres. The height of tall buildings in such locations should relate more to the local, rather than the City Centre, urban context.

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.

It will be necessary for the applicant/developer to demonstrate that proposals for tall buildings are viable and deliverable"

14.9. Significantly, the Core Strategy offers further guidance in relation to the development of tall buildings as follows:-

Tall Buildings can provide a sense of place and distinctiveness, however as high development can have a substantial impact on an area careful consideration should be given to each proposal.

The NPPF requires local authorities to have regard to best practice in design, such as "By Design - Urban Design in the Planning System: Towards better practice" and "By Design – Better places to live". Policies are not to be overly prescriptive but, amongst other things, should concentrate on

guiding height in relation to neighbouring buildings and the local area in general. Innovation should not be stifled but local distinctiveness should be reinforced. PPS4 directs planning authorities to set flexible policies for their centres which can respond to changing economic circumstances and encourage where appropriate high density development accessible by public transport, walking and cycling.

In the context of ensuring sustainable development, the City Centre is clearly a location that requires the prudent use of scarce land resources. It is generally well served by public transport and one where a high density of development is consistent with its distinctive character. The City Centre is, in general, considered an appropriate area for tall buildings. The growth of the City Centre is still evolving, particularly in relation to the development of fringe sites, and proposals need to be considered having regard to the character of the places in which they are proposed. Therefore, whilst some parts of the City Centre are more or less likely to be suitable for tall buildings, the Council does not consider a site specific policy that identifies detailed locations for a tall building to be appropriate. The Council is aware that over the 15 year plan period there is a need to be flexible and to be able to respond to changing economic conditions. The above criteria based policy is therefore set out, which will together with other design policies, form the policy context against which all proposals for tall buildings will be considered.

Elsewhere across the City, District Centres may be appropriate locations for "tall" buildings. Being generally accessible to the local population and well served by public transport, they are natural foci for developments that attract a larger number of people. The definition of tall as being in relation to neighbouring buildings should be noted, however, as the scale of development acceptable within a District Centre is unlikely ever to match that within the City Centre.

Tall buildings by their very nature can dominate the street scene and be highly visible over long distances. They can also have an impact on the local micro-climatic conditions, for example, by creating wind tunnels. It is for these reasons that it is considered particularly important that they are designed to the highest quality, both in terms of appearance and their impact on the functioning of surrounding space."

Policy EN3 - Heritage

Throughout the City, the Council will encourage development that complements and takes advantage of the distinct historic and heritage features of its districts and neighbourhoods, including those of the City Centre.

New developments must be designed so as to support the Council in preserving or, where possible, enhancing the historic environment, the character, setting and accessibility of areas and buildings of acknowledged importance, including scheduled ancient monuments, listed buildings, registered parks and gardens, conservation areas and archaeological remains.

Proposals which enable the re-use of heritage assets will be encouraged where they are considered consistent with the significance of the heritage asset."

Assessment Methodology and Significance Criteria

14.10. This section of the ES chapter describes the study area, how baseline information has been gathered, and the method of assessing the significance of effects.

Study Area

14.11. The study area for this assessment comprises an area of approximately 1km in radius focussed on the Proposed Development Site which is an appropriate area in these circumstances. It includes Manchester City Centre and areas to the south of the A57 (M) Mancunian Way such as St Wilfrid's Park.

Baseline Surveys

Desk Based Research

14.12. 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

14.13. Field surveys were undertaken to explore the current baseline of Manchester City Centre Townscape Character Zones, confirm the ZTV and establish a series of Representative Viewpoints for assessment including those subject to Accurate Visual Representation (AVR).

Consultations

14.14. MCC were consulted on the initial selection of viewpoints and agreed their scope in July 2021.

Method of Assessing Significance

14.15. 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.[49]

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

14.16. 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.

14.17. 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."

14.18. 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:

14.19. 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 Fig 8.2, which is located at Appendix 8.1.

14.20. 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.

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

- Guidance on tall buildings published by Historic England: Advice Note 4[50]
- History in the View prepared for English Heritage by LUC in 2011
- Manchester Residential Quality Guidance [51]

14.22. 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

[49] Ref 8.4 Guidelines for Landscape and Visual Impact Assessment 3rd Edition 2013 landscape Institute and Institute of Environmental Management and Assessment
[50] Ref 8.5 Historic England note on Tall Buildings 2015
[51] Ref 6.6 Manchester Residential Quality Guidance MCC 2017

standard of architectural quality is maintained throughout the process of procurement, detailed design, and construction, through the use of 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

14.23. The assessment of the Proposed Development on Townscape Character has been based on Manchester and Salford City Centre Strategic Character Areas and City Centre Zones. (See Fig 2.1 in MCC Core Strategy). 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 zones which could be potentially affected by the Proposed Development include those that surround the Proposed Development:

Manchester City Centre Character Zones

- Petersfield
- Great Jackson Street
- Civic Quarter
- St. John's
- Castlefield
- Water Street
- Hulme

Salford. Neighbourhood Character Areas (derived from 2020 Local Plan.)

- Wilburn Basin
- New Bailey
- Chapel Wharf
- Chapel Street and Islington
- Ordsall
- Salford

14.24. Their extent is defined on Figure 8.2: Inner City Zones and Viewpoints (**Appendix 8.1**) and they are described in more detail in the corresponding baseline condition section.

14.25. 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

14.26. 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 Lidar DSM data combined with 10K base mapping to produce a Zone of Theoretical Visibility (ZTV) or Viewshed map, Fig 8.1 **Appendix 8.1**, and then confirmed as part of the field work exercise. It covers the area immediately surrounding the Proposed Development to a distance of approximately 0.5km with a focus on the city centre. The Proposed Development, with four towers: C1 (146.9m AOD); C2 (173.3m AOD); D1 (210.4m AOD) and D2 (196.15m AOD) situated in 2 plots either side of Trinity Way and ranging from 39 to 60 storeys in height.

14.27. 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 8.1** on Fig 8.1 ZTV and viewpoints and Fig. 8.2 Inner City Zones and Viewpoints and illustrated by way of baseline photographs and Accurate Visual Representation (AVR)s, or verified views, taken from these viewpoints which are represented in **Appendix 8.2.**

14.28. Viewpoints were selected to cover a number of different locations and category of receptor to reflect the experience of different types of visual receptor and viewing distance. Accordingly, viewpoints ranged from immediate proximity to the Proposed Development to surrounding neighbourhoods. Viewpoints included: streets, public parks, footpaths and main approach roads.

14.29. During the main field assessment process which occurred in June 2021, baseline viewpoint photographs were taken using a Canon EOS RP DSLR camera, but then subsequently retaken by Ambiente using a Canon 5DMkII FFS with a Canon 24 TS-E 24mm lens. Full justification for the use of this camera and lens, together with recommendations on presentation and viewing distance are contained in **Appendix 8.3 Visualization** which is based on LI Technical Advice note 06/19.[52]

14.30. 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 Ambiente in the form of Accurate Visual Representations (AVR) images.

Defining Significance of Effect

14.31. 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

14.32. 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.

14.33. 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, para 5.40). A description of how susceptibility would be evaluated for each receptor type is included below:

[52] Landscape Institute Technical Advice note 06/19 Visual Representation of Development Proposals

Table 14.1 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.

14.34. 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 14.2 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.

14.35. 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

14.36. 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 14.3 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.

Category	Criteria
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 adverse 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.

14.37. 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.

14.38. 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

14.39. 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
- 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.
- 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.

14.40. 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 14.4 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 ssurroundings are an important part of the experience; • Communities where views contribute to the townscape setting eenjoyed 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 • 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 14.5 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

14.41. 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 14.6 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.
No change	The proposals will cause no change to the view.

14.42. 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

14.43. 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

14.44. 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 14.7 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 14.7: Significance of Effect

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

14.45. The effects on both townscape and visual receptors is examined in each case where the effect of the Proposed Development, accurately modelled as a Type 4 AVR 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 Effect Significance Matrix in Table 8.7 and then a judgement made as to whether the effect is **significant** or **not significant** in EIA regulation terms. 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.

14.46. 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.

14.47. The visual impact of the Proposed Development will demonstrably change as it is constructed. As the construction phase is likely to be a very short period in relative terms in the context of its lifecycle, 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

14.48. In terms of mitigation for the Proposed Development this has been derived by the architects Simpson Haugh 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

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

Baseline Conditions

Townscape Baseline

14.50. A summary set out below describes the main attributes and characteristics of each of the Inner City Zones and Representative Viewpoints that may be potentially affected by the Proposed Development as existing at the time of this assessment in 2021. Each character area is referenced on Fig 8.2: Inner City Zones and Viewpoints (**Appendix 8.1**). Only those areas which have the potential to be affected by the Proposed Development are included.

14.51. There is no doubt that Manchester has been going through a major phase of new development in recent years with construction which affects most of the inner city character zones in some form or other. Some development, but not all, will have the capacity to alter the visual and townscape baseline significantly. In terms of the baseline assessment the GLVIA advises that '*existing schemes and those under construction should be included in the baseline for both landscape* (townscape in this case) *and visual effects baseline* 'and that '*the baseline for assessing cumulative landscape (townscape) effects should include those schemes, and in addition potential schemes, that are not yet present in the landscape but are at various stages in the development and consenting process*.'.

14.52. For the purposes of this assessment therefore, the baseline conditions that prevail at the current time (2021) 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 of any remaining development, including the Proposed Development, either proposed or coming forwards is dealt with in the Cumulative Effects section.

14.53. Affected Townscape Character Zones include:

Manchester City Centre Townscape Zones:

Medieval Core

14.54. 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. It is also a major retail and leisure area with the development of the Corn Exchange, Urbis, now the National Football Museum, AO 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 from the 15th century. To the south and east of the Cathedral Yard lie the Victorian commercial buildings of the impressive Corn and Produce Exchange which enclose Exchange Square. 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 Viewpoints 20

St. John's

14.55. The area comprises a variety of buildings associated with the former ITV Quay Street estate, some of which have been brought back into short term use comprising of a range of uses including office, café, filming and event space. 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 also contains a number of non-designated heritage assets. It also lies adjacent to a number of listed structures, including the Grade I Liverpool Road Station, 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. The area contains a number of natural assets, including riverside frontages and a mature garden that faces the existing St. John Street public gardens.

14.56. The eastern fringe of this zone, however, is not of good townscape quality. Much of the area is now vacant due to previously demolished buildings and forms an extensive area of hardstanding to the west of Water Street. Large stands of naturally regenerating willow form a haphazard green edge to the river and prevents views across the river. The river itself, as elsewhere in Manchester, is deeply channelled and largely obscured from view.

14.57. The Ordsall Chord has now been completed and stands as a dramatic, corten steel structure on the western margins of this zone.

14.58. Immediately to the north of Liverpool Rd, and to the west of Deansgate, are the low rise Georgian streets of the St Johns quarter, home to the chambers and practices of Manchester's legal and medical professions and the St Johns Conservation Area. The quiet oasis of St Johns 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: 3,4,15,19, 21

Water Street

14.59. 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. The Trinity Island development lies within this zone on vacant land below road level.

Representative viewpoints 1

Great Jackson Street

14.60. Situated between Oxford Road and Chester Road, this area has been and is the focus of considerable regeneration in recent years. Tall buildings have become key components of the townscape character of this zone and include Deansgate Square, Crown Street Phase 1 and River Street. It is bounded by the inner ringer road, the Mancunian Way, to the south and the river Medlock to the north.

Representative Viewpoints: 16

Castlefield

14.61. 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.

14.62. 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.

14.63. 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. The Mancunian way passes through this area and links with the inner ring road affording occasional interrupted views of the City centre. New development is coming forward with 20 storey development overlooking the basin on Chester Road.

Representative Viewpoints: 1,9,10,11,12,13,14

Hulme

14.64. 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.

Representative viewpoints 17

Salford. Neighbourhood Character Areas (derived from 2020 Local Plan)

14.65. Chapel Wharf. This area has a diverse mix of uses and range of heritage assets, providing an important link between Greengate and New Bailey, and is a key connection between the Salford and Manchester parts of the City Centre.

14.66. Chapel Street and Islington Chapel Street is a key corridor into the core of the City Centre, with high quality public realm and flanked by historically important buildings. And numerous heritage assets.

14.67. New Bailey including New Bailey West. The area has recently been the focus of considerable amounts of new development. It is characterised by office, leisure and tourism uses, forming part of the commercial core of the City Centre, with excellent connections across the river to Spinningfields in Manchester. Significant improvements to Salford Central rail station are planned which should further enhance the attractiveness of the area.

14.68. Middlewood, New Bailey West and Wilburn Basin – These areas are focussed on residential-led mixed-use neighbourhoods that make the most of the waterfront settings (the Manchester, Bolton and Bury Canal, the River Irwell and Wilburn Basin, respectively).

Representative viewpoints 2,5,6,7,8

Ordsall

14.69. This is largely a residential district consisting, at its core, of large areas of low rise housing, much of it terraced with gardens and cul de sacs and open areas of public open space.. There are two features which make significant contributions to the townscape of this zone: Ordsall Park and Ordsall Hall. The first of these is a large rectilinear park in the heart of this zone with a network of paths, mature trees, play and recreational facilities that has just been recently restored and serves the local community. The second is Ordsall Hall. This is Salford's oldest building and dates back to

1177. It is Grade 1 listed and has also been recently restored but both these assets lie to the south west part of this zone well away from the Proposed Development site. The urban grain is generally open and small in scale for this townscape character zone and views out are plentiful.

Representative viewpoints 18

Assessment of effects

Limitations and Assumptions

14.70. 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 the maximum This does not represent therefore, a worst case scenario but, as the population of street trees in Manchester is low this effect should only become apparent in a limited number of views.

Embedded Mitigation

14.71. 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 Simpson Haugh and has evolved through consultation with the Local Planning Authority and others.

Sources of effects

Demolition and construction phases

14.72. The construction of this building on a site on the outskirts of Manchester City Centre 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. 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
- Connections to existing services

Assessment of Construction Phase Effects

14.73. The construction phase effects, 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 immediately adjacent to the Proposed Development Site namely: Salford zones such as Salford, Ordsall and Wilburn Basin and Manchester zones such as Water Street and St Johns. The effects of such construction activity on the character of this zone in the immediate vicinity is predicted to be moderate to minor adverse for the duration of the construction period depending on proximity to the Proposed Development Site. This is due to demolition 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

14.74. 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 ZVT demonstrates, but less so within the core of Manchester 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. 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 the significance of effect is judged to be **moderate** to **minor adverse** in the following Zones: Salford zones such as Salford, Ordsall, Middlewood, New Bailey West and Wilburn Basin and Manchester zones such as Water Street, Castlefield and St Johns but **negligible** elsewhere where views are limited.

Operational phases

14.75. 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.

Assessment of Operational Phase Effects

Effects of completed Development on Townscape Character and Views

14.76. The visual and townscape effects of the completed Proposed Development are now summarized with respect to the effects of the Proposed Development on the Townscape Character through a narrative description of the nature of the effect on each of the Representative Viewpoints which lie within each character area.

14.77. The ZTV confirms that the Proposed Development will have a limited effect in the core city centre zones largely due to the presence of Deansgate Square, Crown Street, Elizabeth Tower and Axis developments. This situation applies to the following Manchester and Salford city centre zones:

- Victoria
- Northern Quarter
- Piccadilly Gardens
- Central Business District
- Eastern Gateway
- The Village
- China town
- Corridor Manchester
- Spinningfields
- Greengate
- Crescent
- Meadow
- Adelphi
- Old Trafford

The operational effects are now considered on a zonal basis.

Salford City Centre character zones:

Wilburn Basin

Viewpoint 2 Regent road

14.78. This viewpoint has a direct view across towards Manchester city centre with its varied skyline. The river Irwell appears tranquil below and the vacant site in the foreground is the site of D1 and D2 of the Proposed Development. The Proposed Development will have a dramatic impact on this view albeit obscuring all of the city centre view in the process but this view is a dynamic view associated as it with the A57 Regent road, one of Manchester's principal approach roads and receptor sensitivity is judged to be low as a result. Both townscape and visual sensitivity are judged to be low in the context of an incoherent townscape character, lack of designations or key viewpoint. Magnitude of effect is judged to be major but beneficial in the context of a vacant site which is close to the city centre but consistent with high-density development such as the Wilburn Street development and Water Street towers. The significance value is judged to be moderate beneficial as a result which is significant in EIA regulation terms.

New Bailey

Viewpoint 5 Footbridge over R Irwell

14.79. This axial niche view down the river Irwell looking south from the pedestrian bridge offers a framed view of the Proposed Development. Townscape susceptibility, and sensitivity, is judged to be low in the context of so much recent riverside development and the fact that the viewpoint lies outside any conservation area. Visual receptor susceptibility is judged to be low as the viewpoint is on a busy pedestrian route but sensitivity is raised to medium in the context of the multiplicity of surrounding residential apartments. Magnitude of effect is judged to be moderate as the Proposed Development achieves a good fit in townscape terms and similarly as visual interest is noticeably improved with the addition of a new focal point the magnitude of effect for visual receptors is judged to be moderate also. This translates into significance of effect values of minor beneficial significance for townscape receptors and moderate beneficial significance for visual receptors which is not significant and significant respectively in EIA regulation terms.

Viewpoint 6 Bridge St

14.80. In this view the Proposed Development will become a major new landmark. The low mass of the Marriott Hotel and the Albert Shed in the foreground will be framed by the cluster of towers which offer a varied skyline profile. New developments on Water Street, in the foreground, and also the emerging Factory, and background, have made a notable contribution and the same applies to the major development at Salford Central on the west bank of the river but the Proposed Development will eclipse them both in form and scale and create a new landmark on the horizon. Townscape receptor sensitivity therefore judged to be low with the ability to accommodate development high. Visual receptor sensitivity is low as this is a niche view and the neighbouring hotel will be occupied largely by transient receptors. The Proposed development makes a significant impact in this view and will increase visual diversity markedly. It is supported however, by the presence of Salford Central and the cluster, from this perspective separates into 2 with the slender broken profile of C1 providing additional visual interest. Magnitude of effect in both visual and townscape receptor terms is moderate beneficial. Significance of effect is therefore recorded as minor beneficial which is not significant in EIA regulation terms.

Chapel Street and Islington

Viewpoint 7 Chapel Street

14.81. A quiet pocket park just south of the A6 this viewpoint is surrounded by residential blocks but most low level views are curtailed by the railway viaduct. Trees soften and add to the sense of enclosure. Visual receptor sensitivity is medium in this small area of public open space where the view is part of the wider experience. This is a small local but important green space so townscape sensitivity is

judged to be medium also. In terms of magnitude if effect Salford Central is already making a contribution to the baseline. The Proposed Development will be largely concealed by trees in this location and set back on the horizon. Magnitude of effect values are therefore judged to be minor beneficia. This translates to a significance of effect value of minor beneficial which is not significant in EIA regulation terms.

Chapel Wharf

Viewpoint 8 Chapel St / Trinity Way junction

14.82. This viewpoint is located on the busy junction between Chapel Street and Trinity Way, the Inner Ring road. It is a busy junction dominated by a constant stream of traffic in all directions with limited pedestrian activity. Receptor sensitivity is low, both in visual receptor and townscape receptor sensitivity terms as the character of the junction dominates although several apartment blocks are situated at this interchange and in the immediate vicinity. Magnitude of effect however, is judged to be moderate beneficial for both categories as the new cluster of towers rises above the railway viaduct and alters the skyline completely improving visual interest and adding to the contributions made by the Wilburn Street and Water Street developments both of which are recent additions to the horizon in this view. The significance of effects value is judged to be minor beneficial as a result which is not significant in EIA regulation terms.

Ordsall

Viewpoint 18 A57

14.83. Located on the busy A57 this viewpoint illustrates the effects on one of the major approach roads into Manchester. Townscape sensitivity is judged to be low here as this point is dominated by a supermarket and a filling station although low rise housing surrounds it. The character of the baseline has also changed in recent years with the emergence of the Gt Jackson St cluster demonstrating a capacity to absorb development without undue harm. Visual receptor sensitivity is also judged to be low here as the viewpoint is on a busy traffic route. Magnitude of effect is judged to be major beneficial however, for both receptor categories with the four towers of the Proposed Development making a dramatic impact on the skyline to the north of the A57. In doing so they balance the Gt Jackson St cluster and establish a new gateway into central Manchester from the west. Visually the four towers interrelate with each other successfully establishing a hierarchy of height which consolidates the composition from this perspective. This translates into a significance of effect of moderate beneficial significance which is significant in EIA regulation terms.

Manchester City Centre Townscape Zones:

Medieval Core

Viewpoint 20

14.84. This viewpoint explores a niche view on the Salford / Manchester boundary looking down the River Irwell from an elevated position. Townscape susceptibility is judged to be low in the context of existing recent and emerging development but as the viewpoint lies within the Cathedral Conservation area townscape sensitivity is judged to be medium. Visual receptor susceptibility is low as most receptors are derived from user groups in transit where the view is fleeting or incidental to their journey and this is very much a niche view. However, visual receptor value is raised to medium here despite the absence of cultural or designated viewpoints as Victoria square which is nearby has recently been the subject of a high quality regeneration scheme. Visual receptor sensitivity is therefore also recorded as medium. In terms of magnitude of effect, the Proposed Development will form a distant feature without materially affecting the quality or character of the townscape or view from this viewpoint. A value of negligible beneficial is therefore

recorded for both visual and townscape receptors. This translates into a value of negligible beneficial for significance of effect which is not significant in EIA terms

St Johns

Viewpoint 3 Liverpool Road

14.85. The Grade 1 Liverpool Road Railway Station complex is a critical and valuable component in this view. The street is low rise with a principal focus on historic character and strong links to Manchester's past as the Heritage Chapter describes in more detail. There are no other modern intrusions into this section of historic townscape and the skyline remains largely clean, uncluttered and low with the exception of the Water Street towers and Wilburn Street development. Townscape receptor sensitivity is high in this context and the fact that the viewpoint is located in the Castlefield Conservation Area. Visual receptor sensitivity is also high as this is a quiet residential street. The Proposed Development rises up dramatically and, in terms of scale, has an overwhelming effect on visual and townscape receptors especially the Railway Complex buildings despite the recently completed Wilburn Street scheme. In so doing the proposed development introduces a series of major new elements into the baseline in an overwhelming way that is inconsistent with low rise surrounding townscape character at this point. The magnitude of effect is judged therefore, to be moderate adverse as a result for both categories of receptor. Such a dramatic and immediate juxtaposition cannot be regarded as having a major beneficial effect on the townscape character and receptors of both categories alike. i.e. 'the development does not fit well with the scale, landform and pattern of the townscape and bring substantial enhancements to the townscape or view.' particularly in the context of the Grade 1 Liverpool Road Railway Station building and railway viaduct. For these reasons, the significance of effect is judged to be moderate adverse which is significant in EIA regulation terms.

Viewpoint 4 Liverpool Road

14.86. A similar effect is recorded here which illustrates the entrance to the Museum of Science and Industry. Once again, the principal focus of the view is a group of low rise historic buildings which dominate the street together with an uncluttered skyline. The Site is one of Manchester's principal visitor attraction and receptor sensitivity for both townscape, where the character is coherent and strong, and visual receptors whose focus will be influenced by the building's historic status and designation, are likely to be high. However, the scale of change is not as dramatic as Viewpoint 3 as the Proposed Development is more distant and foreground buildings and vegetation obscure much of it. Accordingly, in terms of magnitude of effect a value of minor is recorded in this context. This translates to a significance of effect value of moderate adverse which is significant in EIA regulation terms.

Viewpoint 15 Liverpool Road

14.87. The view down Liverpool Road at its intersection with Deansgate reveals the Proposed Development set apart from the Science and Industry Museum complex. The townscape character is more mixed here with contemporary development co dominant feature of the urban grain. The viewpoint, however, lies on the edge of the Castlefield Conservation Area so townscape sensitivity is judged to be medium. Visual receptor sensitivity is medium as townscape character is strong here with a high level of heritage asset. In terms of magnitude of effect the Proposed Development has a more background influence and clearly separated from the primary heritage assets of the MOSI complex. The Proposed Development also steps down towards the street acknowledging the dominant axial perspective in this view. As a consequence, the magnitude of effect for both categories is minor beneficial which translates to a value of minor beneficial significance which is not significant in EIA regulation terms.

Viewpoint 19 Water Street

14.88. The townscape character of this street has changed radically as the Factory development emerges as a modern concert venue. The towers rise up above the Marriott Hotel as a single cluster. The Proposed Development reinforces the geometry of the street in this view and become a principal focus on the skyline. Townscape receptor sensitivity is medium at this point as although there are no listed buildings or other designated heritage assets in the view the viewpoint is on the edge of the Castlefield Conservation Area but recent development demonstrates the area's substantial capacity to absorb development successfully. Visual receptor sensitivity is judged to be low with most receptors in transit or at their place of work but the Castlefield Conservation Area designation raises it to medium. In terms of magnitude of effect, the Proposed Development establishes itself as a cluster of varied form and height which enhances the view and fits well with the increasing amounts of contemporary development in close proximity. A judgement of minor beneficial is made here for magnitude of effect which translates to a minor beneficial significance of effect for both townscape and visual receptors which is not significant in EIA regulation terms.

Viewpoint 21 MOSI

14.89. This viewpoint sits deep within the Science and Industry Museum and explores the impact of the collection of towers on the relatively small space in the centre of the museum. Several tall buildings are affecting the baseline: Water Street towers and the Wilburn Street development, but these are not of the same scale as the Proposed Development. However, the major new concert facility, the Factory is in construction in close proximity. Both visual and townscape receptor sensitivity are judged to be high here as MOSI is a key tourist attraction and contains many heritage assets within its boundaries. In terms of magnitude of effect, as with Viewpoints 3 and 4 the scale of the Proposed Development is large and, to a degree, overwhelming in terms of the significant heritage assets that form the core of this historic site. Magnitude of effect is therefore judged to be moderate adverse for both categories which translates into a moderate adverse significance of effect which is significant in EA regulation terms.

Great Jackson Street

Viewpoint 16 Mancunian Way / A56 interchange

14.90. Located on the busy A56 roundabout junction (aka Chester Road roundabout) over the Mancunian Way the Proposed Development will consolidate the existing foreground development in a positive way and add to the cluster of residential buildings on the edge of the roundabout. Townscape sensitivity is low here as it lies outside the Castlefield Conservation Area and on a major traffic interchange with many disparate elements which contribute to an incoherent sense of townscape character. Visual receptor sensitivity is also low here as this is a busy road junction with most receptors in transit. In terms of magnitude of effect the Proposed Development is largely concealed by foreground development with the result that the fit with the existing townscape character is complementary and to a degree seamless. Values of minor beneficial are registered here for both categories which translates to a significance of effect value of negligible beneficial which is not significant in EA regulation terms.

Castlefields

Viewpoint 1 Inner Ring Road

14.91. Located at the side of one of the principal traffic routes around Manchester, the Inner Ring road this viewpoint affords an uninterrupted, close up view of the Proposed Development. In terms of townscape sensitivity it is located within the bounds of the Castlefield Conservation Area but townscape susceptibility is judged to be low at this location influenced as it is by a significant quantum of recent development including Derwent Street and Wilburn Basin with sensitivity medium overall. Visual receptor sensitivity is low, conversely, as the viewpoint is located adjacent to the Inner Ring road and bordered by commercial development. Visual receptor sensitivity is therefore registered as low. Clearly the Proposed Development will have a significant impact as it is in such close proximity to it. However, the effects are judged to be beneficial both in townscape

and visual terms as the Proposed Development acts as a new gateway feature straddling Trinity Way with the curved face of towers D2 and D1 actively deflecting the view and supporting the split of the roads at this point. The composition is further improved by the varied heights of all the towers allowing them to step down as distance increases. Overall, the magnitude of effect is judged to be major beneficial for both categories of receptor leading to significance of effect values of moderate beneficial for both categories which is significant in EIA terms.

Viewpoint 9 Events Arena

14.92. One of Manchester's significant open air event spaces the focus is directed outwards to a small, enclosed space with views out across the surrounding rooflines to the west. The canal basin also provides a focal point of interest and the railway viaduct crosses both this space and the canal. This location is also centrally located in relation to the boundaries of the Castlefield Conservation area. Cafes and restaurant together with a few residential apartments add to the mixed use nature of this area whose sensitivity in both townscape character and visual terms is judged to be medium as a combination of historic space and modern development provides much of the context here. In terms of magnitude of effect all four towers are clearly visible here in a simple elevation which consolidates the amphitheatre effect. Visually, all four towers are clearly separate but rise to a central high point which strengthens the composition of the cluster as a whole from this perspective. As a result, the magnitude of effect, in both townscape and visual receptor terms is judged to be moderate beneficial. This infers that the significance of effect is moderate beneficial which is significant in EA regulation terms.

Viewpoint 10 Castle St

14.93. A similar view to Viewpoint 9 but located to the south of one of the principal railway viaducts. Recent development is once again dominant in the foreground above which the Proposed Development rises in extended elevation. The varied forms of each of the towers are more clearly discernible in this view. Receptor sensitivity and magnitude of effect remain the same for both categories as for Viewpoint 9 so significance of effect values of moderate beneficial remain also which is significant in EA regulation terms.

Viewpoint 11 Castlefield pedestrian bridge

14.94. The Proposed Development will emerge as a new focal cluster rising up behind the railway viaduct, a listed structure and a key part of Castlefield's industrial heritage, and changing the nature of this niche view. Townscape sensitivity in the context of the historic Cornbrook viaduct over the Bridgewater canal, and in recognition of its designation as a Conservation Area are judged to be high as it has limited capacity to accept development without undue harm. Visual sensitivity is equally high as this area is a tranquil destination for tourists and visitors alike influenced by the high heritage quality of the surrounding townscape. Magnitude of effect involves the introduction elements which are partially uncharacteristic to the attributes of the receiving townscape which is dominated by heritage assets. A value of moderate adverse for both receptor categories is registered for this viewpoint which translates in terms of significance of effect to a value of moderate adverse which is significant in EA regulation terms.

Viewpoint 12 Castlefield basin

14.95. This viewpoint focuses on the canal, the railway viaduct and the surrounding low rise apartment buildings most of which are modern in origin. The row of towers change the baseline here radically and introduces a row of vertical elements into the skyline in a very prominent way. Both townscape and visual receptor sensitivity are high here for the reasons outline above. Heritage assets are less dominant and balanced to some extent by modern elements such as the foreground development and the recent footbridge. Townscape character is more heterogeneous as a result. The composition of the proposed development in terms of both height and location echo the shape and form of the basin to some degree, albeit at a higher level, and add depth and variety to the view. The magnitude of effect therefore for both receptor categories is judged to be moderate

beneficial. Accordingly, a significance of effect value of moderate beneficial is recorded for this viewpoint

Viewpoint 13 Castlefield basin

14.96. This viewpoint is softer in character by virtue of the trees on either side of the tow path and two of the towers is concealed to some extent by one of them. The Water Street tower is more prominent in this view. Nonetheless, the Proposed Development represents a major new feature on the horizon introducing slender vertical elements which build upon low rise recent development in the foreground. Receptor sensitivity for both categories remains high and magnitude of effect values are similarly high at moderate beneficial with the faceted faces of the southernmost two towers, D1 and D2 balancing each other and enhancing the visual interest in this view but not to the detriment of the historic townscape character. The significance of effect values therefore are judged to be moderate beneficial for both categories which is significant in EA regulation terms.

Viewpoint 14 A56 Chester Road

14.97. This viewpoint affords an excellent overview of the Castlefield basin and its mills, wharves, canals and bridges. The Proposed Development will be prominent in this view introducing new architectural elements into a skyline comprised almost entirely of historical elements apart from Water Street which rises as a slender bit low tower in the centre of this view. The four towers of the Proposed Development introduce new elements to a townscape character dominated by historic features and buildings. Receptor sensitivity is reduced to medium as the viewpoint is located on the busy A56. The change to the baseline and the consequent effect on the view and the townscape character of the basin is very noticeable from this viewpoint despite the fact that the tower on Grocers warehouse obscures much of the development. Nonetheless, magnitude of effect is judged to be minor adverse accordingly. This translates to a significance of effect value of minor adverse which is not significant in EA regulation terms.

Hulme

Viewpoint 17 St Wilfrids Park

14.98. St Wilfrid's 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 taken in the middle of the park offers expansive views across the park and also illustrates the manner in which the view is changing dramatically as the Deansgate Square and Crown Street towers emerge as the principal focus of the view. Receptor sensitivity is judged to be medium here for townscape as it has some capacity to accommodate change and medium also for visual receptors as this is a valued local park. In terms of magnitude of effect much of the Proposed Development is concealed behind Crown Street and is low on the horizon. A judgement of minor beneficial is made with respect to magnitude of effect for both receptor categories which translates to a minor beneficial significance of effect which is not significant in EA regulation terms.

Assessment of Cumulative Effects

14.99. The cumulative effect of the Proposed Development is now examined in relation to intra- project and inter-project cumulative effects.

Intra- project cumulative effects

14.100. It is judged that there are no intra- project cumulative effects arising in relation to other environmental topics under consideration in this assessment.

Inter-project cumulative effects

14.101. 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

Development Site, there are developments that cumulatively, are considered to affect the significance values for townscape and views. Table 14.9 summarises these schemes. Details of the Cumulative schemes are outlined in the ES Appendices.

Table 14.9 Cumulative schemes

Planning reference	Cumulative Scheme	No of storeys
125804/FO/2019	325-327 Deansgate	22
20/75571/FUL	Salford Central B7	10
129406/FO/2021	Land at Deansgate South	28
06/52762/OUT	Middlewood Locks	13-32
126668/FO/2020	Blade and Circle	51 and 51
114385/FO/2016	Union T1 St Johns Street	36 and 8
116850/FO/2017	Transition (deTrafford)	32, 26, 18
123261/FO/2019	Arundel Street	8, 9, 11, 23
111003/FO/2016/C1	Whitworth St West	35
115871/FO/2017	Bauer Millet / Viadux	40 and 14
114385/FO/2016	Union Street Tower 1	36 and 8
126648/FO/2020	Union Street Tower 2	36
113617/FO/2016	Slate Wharf	4
109660/FO/2015/C1	ST Johns Street Z3	Ground plus 17
21/78277/FUL	Irwell Quays / Ralli Quays	16 and 12
19/74465/HYBEIA	Greengate Plot H & J	50
121721/FO/2018	St Johns Street Z2 / Globe and Simpson	9

14.102. 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 Manchester. In order, therefore, to assess the cumulative effect in a more systematic way, Table 14.10, has been compiled to summarise the effect of the Proposed Development on its own and then in respect of the relevant cumulative scheme on a viewpoint by viewpoint basis. Where a cumulative scheme is predicted to have an effect on a particular viewpoint or townscape character then the effect values are reassessed and adjusted accordingly to take the scheme or schemes into account, if it is judged that there is, in fact, a cumulative effect.

14.103. 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 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 Development completely which occurs in a few cases.

Table 14.10 Trinity Islands TVIA Cumulative Impact Assessment summary table

(Note. 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)

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
1 Mancunian way			
Sensitivity (VR)	Medium	Union St Tower 1	
Sensitivity (T)	Low	Union St Tower 2	
Magnitude (VR)	Major beneficial	St Johns St Z1	
Magnitude (T)	Major beneficial		Moderate beneficial
Significance of effect	Moderate beneficial		
2 Regent Road		Irwell quays	
Sensitivity (VR)	Low	Salford Central B7	
Sensitivity (T)	Low	St Johns Z3	
Magnitude (VR)	Major beneficial	Greengate PlotH&J	
Magnitude (T)	Major beneficial	Salford Central A3	
Significance of effect	Moderate beneficial	Bauer Millet Site	Moderate beneficial
3 Liverpool Road			
Sensitivity (VR)	High		
Sensitivity (T)	High	None	
Magnitude (VR)	Moderate adverse		
Magnitude (T)	Moderate adverse		Moderate adverse
Significance of effect	Moderate adverse		
4 Liverpool Road			
Sensitivity (VR)	High		
Sensitivity (T)	High		
Magnitude (VR)	Minor adverse	None	
Magnitude (T)	Minor adverse		Moderate adverse
Significance of effect	Moderate adverse		
5 Footbridge over R Irwell			
Sensitivity (VR)	Medium		
Sensitivity (T)	Low	Union St Tower 3	

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
Magnitude (VR)	Moderate beneficial	St Johns St Z1	
Magnitude (T)	Moderate beneficial	St Johns St Z3	
Significance effect (T)	Moderate beneficial	Irwell Quays	
Significance effect (VR)	Minor beneficial		Negligible beneficial
6 Bridge St			
Sensitivity (VR)	Low		
Sensitivity (T)	Low	Union St Tower 1	
Magnitude (VR)	Moderate beneficial	Union St Tower 2	
Magnitude (T)	Moderate beneficial	St Johns St Z1	
Significance of effect	Minor beneficial	Irwell Quays	Negligible beneficial
7 Chapel St POS			
Sensitivity (VR)	Medium	Union St Tower2	
Sensitivity (T)	Medium	Irwell Quays	
Magnitude (VR)	Minor beneficial	Middlewood Locks	
Magnitude (T)	Minor beneficial		
Significance of effect	Minor beneficial		Negligible beneficial
8 Chapel St/ Trinity Way			
Sensitivity VR	Low		
Sensitivity T	Low	Middlewood Locks	
Magnitude VR	Moderate beneficial		
Magnitude T	Moderate beneficial		Minor beneficial
Significance of effect	Minor beneficial		
9 Castlefield Events Arena			
Sensitivity (VR	Medium	None	
Sensitivity (T)	Medium		
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		Moderate beneficial
Significance of effect	Moderate beneficial		
10 Castle St			
Sensitivity (VR)	Medium		
Sensitivity (T)	Medium	None	
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		Moderate beneficial

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
Significance of effect	Moderate beneficial		
11 Castlefield Basin			
Footbridge			
Sensitivity (VR)	High	Middlewood Locks	
Sensitivity (T)	High		
Magnitude (VR)	Moderate adverse		
Magnitude (T)	Moderate adverse		Moderate adverse
Significance of effect	Moderate adverse		
12 Castlefield Basin			
Sensitivity (VR)	High		
Sensitivity (T)	High	Slate Wharf	
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		
Significance of effect	Moderate beneficial		Moderate beneficial
13 Castlefield Basin			
Sensitivity (VR)	High		
Sensitivity (T)	High	Slate Wharf	
Magnitude (VR)	Moderate beneficial		
Magnitude (T)	Moderate beneficial		Moderate beneficial
Significance of effect	Moderate beneficial		
14 Bridgewater viaduct			
Sensitivity (VR)	Medium		
Sensitivity (T)	Medium	Slate Wharf	
Magnitude (VR)	Minor adverse		
Magnitude (T)	Minor adverse		
Significance of effect	Minor adverse		Minor adverse
15 Liverpool Road			
Sensitivity (VR)	Medium	None	
Sensitivity (T)	Medium		
Magnitude (VR)	Minor beneficial		
Magnitude (T)	Minor beneficial		
Significance of effect	Minor beneficial		Minor beneficial
16 Mancunian Way/			
A56 Interchange			
Sensitivity (VR)	Low	Arundel St	

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
Sensitivity (T)	Low	St Johns Z1	
Magnitude (VR)	Minor beneficial	Union St T1	
Magnitude (T)	Minor beneficial	Union St T2	
Significance of effect	Negligible beneficial		Negligible beneficial
17 Hulme Park			
Sensitivity (VR)	Medium	Blade and Circle	
Sensitivity (T)	Medium	De Trafford	
Magnitude (VR)	Minor beneficial	Salford Central B7	
Magnitude (T)	Minor beneficial	St Johns Z1	
Significance of effect	Minor beneficial		Negligible beneficial
18 Regent			
Road/Oldfield Road		Blade and circle	
Sensitivity (VR)	Low	Gt Jackson St	
Sensitivity (T)	Low	Deansgate south	
Magnitude (VR)	Major beneficial	Middlewood Locks	
Magnitude (T)	Major beneficial	St Johns Z1	
Significance of effect	Moderate beneficial	Union St T1	Moderate beneficial
		Union St T2	
19 Water Street			
Sensitivity (VR)	Medium	Union St T1	
Sensitivity (T)	Medium	Union St T2	
Magnitude (VR)	Minor beneficial	St Johns T3	
Magnitude (T)	Minor beneficial		
Significance of effect	Minor beneficial		No impact
20 Cathedral Approach			
Sensitivity (VR)	Medium	St Johns Z1	
Sensitivity (T)	Medium	Irwell quays	
Magnitude (VR)	Negligible beneficial		
Magnitude (T)	Negligible beneficial		Negligible beneficial
Significance of effect	Negligible beneficial		
21 MOSI			
Sensitivity (VR)	High		
Sensitivity (T)	High		
Magnitude (VR)	Moderate adverse	None	
Magnitude (T)	Moderate adverse		

Location	Development Only	Relevant Cumulative Scheme	Cumulative Effect
Significance of effect	Moderate adverse		Moderate adverse

Mitigation Measures

Mitigation of effects during the construction phase.

14.104. 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

14.105. Mitigation measures for the operational phase are focussed on embedded mitigation measures which are an integral part of the design of the building 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 neighbouring buildings and its location.

Residual Effects

14.106. 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 14.2 represent the accurate definition of the location and mass of the component parts of the Proposed 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 8.10 above.

Summary

14.107. This Townscape and Visual Impact Assessment examines the impact that the Proposed Development will have on the townscape of Manchester and Salford City Centres and on the townscape character of the city centre zones immediately surrounding the Proposed Development in particular. It does so in a systematic, rational and objective way using established methodologies and practices contained in GLVIA 3. The impact of the Proposed Development on its own is explored and then in conjunction with consented and committed development in a Cumulative Assessment.

14.108. A computer modelling process was employed to provide an accurate series of Type 4 verified (AVR) images and wirelines which illustrate and inform the nature of the impact that the Proposed Development will have on a series of selected Representative Viewpoints, and on the surrounding townscape, on a 360 degree basis.

14.109. Although it is not possible to provide one single summary value for the impact the Proposed Development will have on Manchester City Centre it is possible to summarise the effects in general terms.

14.110. In this regard, Table 8.10 records that in over half of cases, the Proposed Development will have a significant effect. In most cases the effects are recorded as beneficial, but in a proportion of cases, where the historic character is the dominant feature of the townscape character, the effects are predicted to be adverse in nature as the scale of the change is significant and inconsistent with the existing character or view. This is largely confined to the area surrounding MOSI or specific elements of Castlefield Basin. Elsewhere, the effects are recorded as not significant and beneficial. These impacts are consistent with the conclusions of the Heritage chapter, which has assessed the proposals in accordance with the NPPF. Within this context, a Public Benefits Statement has been submitted as part of the Planning Statement, which sets out the range of

public benefits that the scheme will deliver to outweigh any occasional instances of perceived harm to the setting of heritage assets.

14.111. In terms of cumulative effects the effects are diminished in most cases due to the large amount of proposed cumulative development.

References

Ref . No.	Reference
14.1	The European Landscape Convention (ELC, 2000)
14.2	National Planning Policy Framework 2021 Dept Communities and Local Government
14.3	Manchester City Council Core Strategy 2012
14.4	Guidelines for Landscape and Visual Impact Assessment 3rd Edition 2013 landscape Institute and Institute of Environmental Management and Assessment
14.5	Historic England note on tall building 2014
14.6	Manchester Residential Quality Guidance MCC 2017
14.7	Landscape Institute Technical Guidance Note TG 06/19

15. Traffic and Transport

Introduction

15.1. This Chapter of the ES has been prepared by Vectos and assesses the likely Traffic & Transport 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.

15.2. This Chapter is accompanied by two technical appendices, a Transport Assessment (Appendix 15.1) and Framework Travel Plan (Appendix 15.2).

15.3. The authors of the chapter (Gareth Davis and Oliver Mclaughlin) have extensive experience in preparing Traffic & Transport Chapters for EIA developments. We regularly provide input to Environmental Impact Assessments focussing specifically on traffic and transport. Gareth Davis, BSc (Hons), MSc, CMILT, MCIHT has 30 years of experience as a Transport Planner and Highways Engineer advising clients on development planning, masterplanning, transportation planning policy and traffic engineering and preparing the Traffic and Transport Chapters of EIA's. Oliver McLaughlin BSc (Hons), MSc, MCIHT has over 8 years of Transport Planning experience and frequently prepares the Traffic and Transport Chapters of Environmental Impact Assessments.

Legislative and Policy Context

15.4. The following transport policy and guidance has been considered in the preparation of this Chapter:

- The National Planning Policy Framework (2021)
- The Manchester Core Strategy (2012)
- Guide to Development in Manchester SPD (2007)
- Greater Manchester Transport Strategy 2040 (2017 and revised 2021)
- Manchester Residential Quality Guidance (2017)
- St Johns Strategic Regeneration Framework (2016)
- Water Street Strategic Regeneration Framework (2016)

Legislation

15.5. There is currently no specific legislation relating to the assessment of traffic and transport in an ES.

National Planning Policy

National Planning Policy Framework (2021)

15.6. The latest National Planning Policy Framework (NPPF) was published in July 2021 by the Ministry of Housing, Communities and Local Government, replacing the previous versions published in 2012, 2018 and 2019. The NPPF sets out the government's planning policies for England and how these are expected to be applied. At the heart of the Framework is a presumption in favour of sustainable development.

15.7. As part of promoting sustainable transport, paragraph 110 of the revised NPPF states that in assessing applications for development, it should be ensured that:

a) appropriate opportunities to promote sustainable transport modes can be – or have been –taken up, given the type of development and its location;

b) safe and suitable access to the site can be achieved for all users;

c) the design of streets, parking areas, other transport elements and the content of associated standards reflects current national guidance, including the National Design Guide and the National Model Design Code; and

d) any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.

15.8. With regards to applications for development, the NPPF at para. 111 states that:

Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

15.9. Finally, the NPPF notes that travel plans can form an important part of development, and a Framework Travel Plan has been prepared in support of this application, to form the basis of a long-term management strategy for the site delivering sustainable transport objectives and promoting opportunities.

Local Planning Policy and Guidance

15.10. Relevant transport planning policy and guidance at the local level is contained within the Manchester Core Strategy document, the Guide to Development in Manchester SPD and Planning Guidance and the Greater Manchester Transport Strategy and the Manchester Residential Quality Guidance (2017). The specific planning guidance for this site is presented in the St Johns and Water Street Strategic Regeneration Framework Areas.

Manchester Core Strategy

15.11. The Core Strategy forms the key document in Manchester's Local Development Framework and was adopted in 2012. It sets out a number of strategic policies that will guide the development of the city. Policy SP1 sets out the spatial principles that will guide development to 2027. One of these principles is as follows:

New development will maximise the potential of the City's transport infrastructure, in particular promoting walking, cycling and the use of public transport,

15.12. In addition, the policy goes on to state that developments in all parts of the city should *'improve access to jobs, services and education and open space by being located to reduce the need to travel and provide good access to sustainable transport provision'.*

15.13. This is reinforced through Policy DM 1 of the Core Strategy, which concerns development management. This states that all developments should have regard to specific issues including the access to new development by sustainable transport modes and vehicular access and car parking.

15.14. Policy T1 of the Core Strategy concerns sustainable transport. It states that the Council will support proposals that:

- Improve choice by developing alternatives to the private car.
- Take account of the needs of road users according to a broad hierarchy consisting of, in order of priority:

  1. Pedestrians and disabled people,

  2. Cyclists, public transport,

3. Commercial access,

4. General off-peak traffic,

5. General peak time traffic.

15.15. The development proposals are in line with these policy objectives, ensuring that the Site will be accessible to all users by a range of different transport modes.

15.16. Policy T2 states that the Council will actively manage the pattern of development to ensure that new development:

- Is located to ensure good access to the City's main economic drivers, including the Regional Centre, the Oxford Road Universities and Hospitals and the Airport and to ensure good national and international connections
- Is easily accessible by walking, cycling and public transport; connecting residents to jobs, centres, health, leisure, open space and educational opportunities

15.17. With regards to parking standards, the Core Strategy states that the 'maximum standards for car parking do not apply to the City Centre as each development in the City Centre will be considered on a case-by-case basis.'

Guide to Development in Manchester SPD & Planning Guidance

15.18. This document brings together the development principles that will apply to new developments in Manchester. Paragraph 2.22 of the document states that:

In order to reduce reliance on the car, residents and workers should be within easy walking distance of facilities such as clinics, corner shops, newsagents and public transport.

15.19. The Proposed Development is well aligned with this goal, being located close to a range of different facilities. The guidance goes on to describe the need for Travel Plans in new developments, stating:

A Travel Plan is a package of measures and actions aimed at reducing the need to travel by car by providing alternative choices and encouraging walking, cycling, and public transport use. At the planning stage consideration should be given to the proximity of the development to existing travel facilities and services, site layout, suitable density, cycling, pedestrian facilities and potential for parking restraint.

Greater Manchester Transport Strategy 2040

15.20. Transport for Greater Manchester (TfGM) has developed a 2040 Transport Strategy that sets out ambitions for a radical new approach to planning Manchester's transport system in support of long-term needs and aspirations.

15.21. The vision is for Greater Manchester to have 'World class connections that support long-term, sustainable economic growth and access to opportunity for all. The Transport Vision aims are as follows:

- Supporting Sustainable Economic growth
- Protecting Our Environment
- Improving Quality of Life for All
- Developing an Innovative City Region

15.22. The 2040 Vision is supported by policies and proposals for improving the transport network in the medium term up to 2025 structured around spatial themes.

15.23. The Delivery Plan of Transport measures to 2025 is wide ranging package, includes reformation of the bus market, further expansion of the Metrolink network and its capacity, Rail Capacity improvements including improving the capacity on the Castlefield Corridor, Princess

Parkway/Mancunian Way roundabout improvements, Cycle Improvements on the Chorlton-Manchester Corridor among a wider package of cycle and pedestrian improvements as part of the Mayors Challenge Fund.

15.24. The development proposals aspire to conform to the vision and goals as set out within the 2040 Vision Document by ensuring that the site is accessible by a variety of sustainable transport modes in order to deliver a quality development that enhances the environment.

Revised City Centre Transport Strategy

15.25. A report was presented to the MCC Executive in October 2019 that set out proposals for a revised City Centre Transport Strategy (CCTS), aligned to the Greater Manchester Transport Strategy 2040.

15.26. The new strategy is considered necessary to take account of the predicted growth of the city centre, changes in the policy context since the previous strategy in 2010, and the outcomes of the City Centre Transport Strategy Conversation that took place in 2018.

15.27. It will set out ambitious targets for the city centre in the wider context of the GMSF, emerging Local Plan, Climate Change Policy and Clean Air proposals, including the ambition to be a zero-carbon city by 2038 at the latest. The focus is upon significant shifts to sustainable transport modes, which will require enhancements to the walking and cycling networks, providing additional Metrolink capacity in the city centre and increasing electric vehicle charging points. Additionally, the ambition is for a shift in car parking spaces over time from the centre to the periphery.

Manchester Residential Quality Guidance

15.28. The Manchester Residential Quality Guidance was adopted in March 2017 and is a material consideration in the determination of planning applications. This document outlines the considerations, qualities, and opportunities that will help to deliver high quality residential development as part of successful and sustainable neighbourhoods across Manchester. It contains guidance for developers in relation to design standards, and new proposals are expected to comply with the guidance.

15.29. The guidance states that *'residential development within Manchester should aim to offer true modal choice, prioritising walking and cycling in the first instance as a key component in developing sustainable neighbourhoods and healthy communities.'*

15.30. It goes on to state that the sustainable development of Manchester depends on reducing dependence on the car, suggesting that residential development should consider the manner in which they encourage access to the wider public transport network.

15.31. In relation to parking, the guidance states that *'there is no one size fits all approach to car parking, and it should be considered on a site by site basis.'* It also goes on to note that car parking demand will be influenced by the availability of public transport. Whilst the guideline parking provision for city centre apartment sites is identified at 30-40%.

St Johns and Water Street Strategic Regeneration Framework Area

15.32. The St Johns Strategic Regeneration Framework (SRF) was adopted by MCC in February 2015 and further updated in November 2016. The SRF sets out key goals and principles within the St John's area which encompasses the Proposed Development.

15.33. The St Johns SRF recognises the comprehensive public transport network available locally and aims to ensure that the framework area remains permeable for both pedestrians and cyclists.

15.34. The site also forms part of the Water Street Strategic Regeneration Framework (SRF). This SRF provides a framework for the mixed-use regeneration of this part of Manchester City Centre

Assessment Methodology and Significance Criteria

15.35. The development is capable of being delivered in phases sequentially and without overlap. Sites C and D can be delivered independently of each other. Buildings C1 and D1 would be the first

buildings to be developed on each plot with Buildings C2 and D2 following on. The Phases are described below:

- Phase C1 – Building C1, whole basement for site C, operational C1 car parking and temporary landscaping works
- Phase C2 – Building C2, operational C2 car parking and final landscaping works
- Phase D1 – Building D1, whole basement for site D, operational D1 car parking, and temporary landscaping works
- Phase D2 – Building D2, operational D2 car parking and final landscaping works.

15.36. In traffic terms we have tested the worst-case scenario with all phases being developed.

15.37. An environmental impact can arise through the extra vehicle trips that might be generated by at a site and from new transport infrastructure. The potential implications that may arise from additional traffic have been described in the Institute of Environmental Assessment (IEMA) '*Guidelines for the Environmental Assessment of Road Traffic'* (1993) and include:

- Driver Delay;
- Public Transport Users Delay;
- Pedestrian Delay;
- Pedestrian Amenity;
- Fear and Intimidation;
- Severance; and
- Accidents and Road Safety.

15.38. The assessment presented in this Chapter considers the above factors during the construction and operational phases of development.

15.39. The IEMA guidelines state that in scoping out the extent of the assessment for the operational and construction phases, it suggests that *"two broad rules of thumb could be used as a screening process to delimit the scale and extent of the assessment*". Those Rules are:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

15.40. The IEMA Guidelines go on to state that any increases in traffic flows of less than 10% are generally accepted as having negligible impact as daily variance in traffic flows can be of equal magnitude. The 30% threshold relates to the level at which humans may perceive change and there may therefore be an effect. Impacts above this level therefore do not suggest that there is a significant impact, only that further consideration is required to assess the significance.

15.41. The supporting Transport Assessment for the Proposed Development will determine whether the traffic flows exceed the 10% or 30% threshold will be exceeded.

Assessment Methodology

15.42. The assessment methodology follows the methodology provided by IEMA for the environmental assessment of road traffic and by Department for Transport on preparing Transport Assessments and Travel Plans. The methodology also complies with the guidance given by MCC and confirmed in the scoping of the Transport Assessment.

15.43. The assessment methodology has been discussed and agreed with MCC and Transport for Greater Manchester (TfGM) in an email dated 23rd June 2021 and meetings held on 6th May 2021 and 12th

August 2021. Full details of this methodology can be found in the supporting Transport Assessment included in **Appendix 15.1**.

Significance Criteria

15.44. The IEMA's aforementioned guidance sets out the broad principles of how to assess the magnitude of the effect for each category. This is summarised below:

15.45. Severance – The guidance states that "severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery". Further "changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively". However, the guidance acknowledges that the measurement and prediction of severance is extremely difficult. The assessment of severance pays full regards to specific locations, in particular the location of pedestrian routes to key local facilities and whether or not crossing facilities are provided.

- Driver Delay – such delays "… are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system".
- Pedestrian delay – "Changes in the volume, composition or speed of the traffic may affect the ability of people to cross the roads". The guidance suggests that assessors "… use their judgement to determine whether pedestrian delay is a significant impact".
- Pedestrian amenity – broadly defined as the relative pleasantness of a journey, it is affected by traffic flow, traffic composition and pavement width/ separation from traffic. The guidance suggests a tentative threshold for judging the significance of changes in pedestrian amenity of where traffic flow (or its lorry component) is halved or doubled.
- Fear and intimidation – the impact of this is dependent upon the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors a narrow pavement width. The guidance states that there are no commonly agreed thresholds for estimating this from known traffic and physical conditions, but it does nevertheless suggest some threshold which could be used, based on previous research, and are shown in **Table 15.1** overleaf.

Table 15.1 – Fear and Intimidation Thresholds

Magnitude	Environmental Impact Fear & Intimidation	
	Increase in Average 18hr Vehicle Flows	Total 18-hour HGV flows
Major	+1800	+3000
Moderate	1200-1800	2000-3000
Minor	600-1200	1000-2000
Negligible	200-600	200-1000
Neutral	Below 200	Below 200

- Accidents and safety – the guidance suggests that "Professional judgement will be needed to assess the implications of local circumstances, or factors, which may elevate or lessen risks of accidents, e.g. junction conflicts".

15.46. The guidance makes it clear that "a critical feature of environmental assessment in determining whether a given impact is significant". Further, "for many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor backed up by data or quantified information whenever possible. Such judgements will include the assessment of the number of people experiencing a change in environmental impact…".

Magnitude of Impact

15.47. The magnitude of potential impact (both beneficial and adverse) on environmental baseline conditions will be identified through the detailed consideration of the Proposed Development, taking into account the following:

- Relevant legislation, policy or guidelines (i.e. IEMA Guidelines for the Environmental Assessment of Road Traffic (1993);
- The degree to which the environment is potentially affected for example, whether the quality is enhanced or impaired;
- The scale or degree of change from baseline conditions as a result of the Proposed Development;
- The duration of the effect for example, whether it is temporary or permanent; and
- The reversibility of the effect.

15.48. The magnitude of impacts will be assessed and reported for the construction and operational phases using the criteria presented within Table 15.2. These have been established with reference to the various guidance quoted in this document or through professional experience and judgement.

Table 15.2: Magnitudes of Impact

Magnitude of Effect	Effect On	Definition of Magnitude
Major	Driver delay	Over 4 minute increase, averaged over all arms at a junction.
	Public transport users	Over 90% increase in traffic flow on relevant links
	Pedestrian delay	Over 150% increase in traffic flows on relevant links
	Pedestrian/ cycle amenity	Over 150% increase in traffic flows on relevant links
	Fear and intimidation	Change in degree of hazard from moderate to extreme.
	Severance	Over 90% increase in traffic flows on relevant links
	Accidents and road safety	Factor of observed accident rates and national averages (100 is equal to the national average) above 160. Predicted increase in accidents resulting from the development on a link above 0.9 per annum
Moderate	Driver delay	Between 3 – 4 minute increase in delay, averaged over all arms at a junction.
	Public transport users	60% - 90% increase in traffic flow on relevant links
	Pedestrian delay	100% - 150% increase in traffic flows on relevant links
	Pedestrian/ cycle amenity	100% - 150% increase in traffic flows on relevant links
	Fear and intimidation	Change in degree of hazard from great to extreme.
	Severance	Between 60%-90% increase in traffic flows on relevant links.
	Accidents and road safety	Factor of observed accident rates and national averages (100 is equal to the national average) between 130-160 Predicted increase in accidents resulting from the development on a link between 0.6-0.9 per annum
Minor	Driver delay	Between 2 - 3 minute increase in delay, averaged over all arms at junction.
	Public transport users	30% - 60% increase in traffic flow on relevant links
	Pedestrian delay	50% - 100% increase in traffic flows on relevant links
	Pedestrian/ cycle amenity	50% - 100% increase in traffic flows on relevant links
	Fear and intimidation	Change in degree of hazard from moderate to great.
	Severance	Between 30%-60% increase in traffic flows on relevant links.

Magnitude of Effect	Effect On	Definition of Magnitude
	Accidents and road safety	Factor of observed accident rates and national averages (100 is equal to the national average) between 100-130 Predicted increase in accidents resulting from the development on a link between 0.3-0.6 per annum
Negligible	Driver delay	Less than 2 minute increase in delay, averaged over all arms at a junction.
	Public transport users	Less than 30% increase in traffic flow on relevant links
	Pedestrian delay	Less than 50% increase in traffic flows on relevant links
	Pedestrian/ cycle amenity	Less than 50% increase in traffic flows on relevant links
	Fear and intimidation	No change in degree of hazard.
	Severance	Less than 30% increase in traffic flows on relevant links.
	Accidents and road safety	Factor of observed accident rates and national averages (100 is equal to the national average) below 100 Predicted increase in accidents resulting from the development on a link below 0.3 accidents per annum.

Sensitivity of Receptors

15.49. The sensitivity of a receptor is defined as the degree to which it responds to a change in its environment. For these particular developments, this predominantly relates to the effects of an increase in road traffic near a particular receptor.

15.50. Given the study area is the urban area of Manchester, the potential environmental receptors affected by the Proposed Development are human, and these receptors include residents living in close to the highway network, vulnerable road users of pedestrians and cyclists and drivers on the network. These parties will tend to be affected by the different environmental impacts to different degrees. For example, pedestrians are more impacted upon due to accidents than car drivers.

15.51. Overall, the receptors of the environmental impacts are considered to be Low or Local as the site is within an urban area that is already characterised by traffic movement. The importance of each receptor is considered in **Table 15.3** overleaf:

Table 15.3: Designation of Potentially Sensitive Receptors

Designation	Receptors
High (e.g. National/ International)	None
Medium (e.g. Regional / County)	None
Low (e.g. Local)	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street Drivers using Study Network Vulnerable Road Users
Negligible	None

Very High (e.g. International)	None

Significance of Effect

15.52. The magnitude of impact and the sensitivity of the affected receptors are combined to reach an assessment of the overall significance of effect utilising the matrix presented in **Table 15.4**.

Table 15.4: Significance of Effect Matrix

Magnitude of Effect	Sensitivity of Receptor			
	High	Moderate	Low	Negligible
Major	Major	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Negligible
Minor	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

15.53. Major effects on driver and public transport user delay will be considered to be significant in EIA terms based on Paragraph 111 of the NPPF.

15.54. A minor effect or above on road safety will be considered significant in EIA terms.

15.55. Effects on pedestrian/cycle delay and amenity, fear and intimidation and severance that are moderate or above will be considered to be significant in EIA terms.

Limitations and Assumptions

15.56. The assessment undertaken in this Chapter is based on design information available at the time of assessment. No limitations or difficulties have been identified.

15.57. The Site has lawful consent to operate as a car park, in the event that planning permission were not secured for the Proposed Development it is assumed that the land would return to use as an operational car parking facility.

Baseline Conditions

Existing Conditions

15.58. The Site comprises two distinct plots of land, Site C to the north and Site D to the south, divided by the A6042 Trinity Way which forms part of the Inner Relief Road. The Site is currently configured as a surface level car park providing for 645 cars.

15.59. The Site is bounded by the River Irwell to the north, Water Street to the east, the A6402 and A57 to the south and the River Irwell to the west.

15.60. The Site contains and lies adjacent to a number of natural assets, including riverside frontages and vegetation on the edges of the Site.

15.61. The A6042 Trinity Way runs in an approximate north-south alignment crossing the River Irwell via a bridge on the northern side of the Site.

15.62. In the vicinity of the site, Trinity Way is a dual carriageway subject to a 30mph speed restriction. This section of highway forms part of the Manchester and Salford Inner Relief Road which forms an inner ring road around the regional centre.

15.63. Trinity Way forms a signalised junction with Water Street which is positioned between the eastern boundary of Site D and the south western boundary of Site C. Further to the south, Trinity Way forms a signalised interchange with the A57 Regent Road. Both junctions were subject to

significant improvement works in recent years to enhance capacity and improve provision for cyclists and pedestrians.

15.64. Site D is accessed by vehicles and pedestrians from the Trinity Way and the Site C from Water Street.

15.65. There is a link between the two sites underneath the Trinity Way Bridge that permits pedestrians and cars to cross from one Site to the other.

15.66. The site as part of the Granada Studios operation previously attracted traffic movements. The Site was well used by ITV employees. The site has more recently been used as a site compound for Network Rail's Ordsall Chord works.

15.67. Observations of pedestrian footways and crossing points in the vicinity of the Site indicate that existing pedestrian movements in the area are relatively low as there are few land uses that either generate or attract pedestrian movements in the area.

Accessibility by Walking

15.68. The development is located within an 'acceptable' walking distance, (based on guidance by the Chartered Institution of Highways and Transportation) for pedestrians to walk to the many employment and education opportunities. A 2km walk covers the entire Regional Centre and its many employment opportunities as well two primary schools, Oasis Academy and Salford University. All routes are on standard footways which are lit and there are appropriate safe crossings of the roads to meet desire lines.

15.69. An acceptable walking distance for a shopping trip is less and the preferred maximum walk distance for this type of journey is 800m. Pedestrians can access Regent Road Retail Park with a 650m walk to access Sainsburys, Boots, TKMaxx and JD Gyms.

15.70. A Sainsbury's Local and Tesco Express store on Quay Street, are around 800m from the site and there are, or will be a wide range of retail, cafes and restaurants available within a short walk as well as the major new cultural development 'Factory'.

Accessibility by Cycle

15.71. Cycling has the potential to replace short car journeys, particularly those under 5km and a journey of this length, around 25 minutes would cover the whole of the City Centre and much of the surrounding conurbation.

15.72. Water Street benefits from on street cycle lanes and has a 20mph speed limit. There are a number of designated cycle routes and facilities including National Cycle Route 6 that passes close to the site, crossing the River Irwell and then crossing Water Street before heading along Liverpool Road. A cycle bridge runs parallel to Trinity Way and lands next to Site C offering a cycle route alongside the Inner Relief Road. Currently cyclists need to dismount in order to cross at the Trinity Way/Water Street signals

15.73. TfGM is also developing cross city cycleways and the nearest scheme is the Bridgewater Canal scheme that follows the canal and arrives at Deansgate close to the Station just south of Liverpool Road.

Accessibility by Bus

15.74. The Greater Manchester Accessibility Index is given in Figure 1 below. It can be seen that Site C1 is within Accessibility Level 7 which is one step below the maximum. Site C2 is on the boundary of Level 7 and Level 6. This map also shows that the sites are adjacent to a bus route linking Manchester City Centre, Salford and Worsley and the bus stops are within 50m.

15.75. There are standard bus services passing immediately adjacent past the site. The 33 bus service connects the site with Manchester, Eccles, Brookhouse and Wigan. The adjacent bus stops are simple flag poles.

15.76. Other services are available within a short walk of the site although this is beyond the 400m distance recommended as convenient to promote bus use. The site is within a 450-700m walk of the Free Bus Service on Liverpool Road/Lower Byrom Street (depending on the Site/Stop). It is a free service that covers the key interchanges and destinations in the city.

15.77. On Bridge Street 550m to the north there are several services reaching Salford, Bolton and the western quadrant of the Greater Manchester Conurbation.

15.78. Other services can be reached on Deansgate about a 600m walk from the site where a number of services serve Trafford and the south.

15.79. Overall, it can therefore be concluded that the existing bus service operating adjacent to the site provide the opportunity for many residents to travel to work in Manchester an Salford.

Accessibility by Rail

15.80. Salford Central railway station is located a 10-15 minute walk away from the site. This station has been improved to provide a main commuting station for the western part of the conurbation and benefits from increased TransPennine Express services there serving Liverpool and Leeds in particular.

15.81. Deansgate Railway Station is located to the south, a 10 minute walk away. Both of these nearby stations offer access to frequent services to Lancashire, Merseyside and Bolton.

15.82. Manchester Victoria and Piccadilly Stations are accessible by a longer walk but both are readily accessible by Free Bus and provide links both nationally and across the conurbation.

Accessibility by Metrolink

15.83. Deansgate-Castlefield is the closest Metrolink stop for residents, and this is about a 10 minutes' walk away. Metrolink services currently cover a broad area of Manchester and its outlying residential districts. The new Trafford Park line was completed recently and offers a fast frequent service across the conurbation.

Accessibility to Car Clubs /Taxis

15.84. There are 4 Enterprise Car Club vehicles available within 600m of the site. Enterprise Car Club operates all over Manchester and offers a low-cost alternative to owning a car. Users pay a modest up front annual fee then an hourly charge from as low as £4.60 per hour plus a fuel charge (as low as 5p per mile for electric cars). There are other discounts available subject to age usage and type of vehicle required. Co-Wheels cars are located a bit further from the site with two cars 1200m away.

15.85. Manchester benefits from high levels of taxi availability and this is a convenient mode for moderate length journeys.

Existing Land Use

15.86. The proposed development site has previously operated as a surface level car park. The Site is therefore able to lawfully resume these operations at any time and should the Proposed Development not be granted planning permission then it is conceivable that the site owners would revert the site to this use.

15.87. As previously described, the existing car parking across Sites C and D provides capacity for up to 645 vehicles and was well utilised when in operation. Clearly this level of parking provision would have the potential to generate significant vehicle movements in the AM and PM peak periods.

15.88. To quantify the likely level of traffic associated with the extant use at the site, reference has been made to surveys undertaken of the nearby Owen Street car park in support of a planning application for the Crown Street Phase 1 scheme in Manchester (planning ref: 119806/FO/2018).

15.89. A survey at the Owens Street car park some time ago was undertaken. This previously provided 401 parking spaces and was located adjacent to the Ring Road and is a similar distance from the City Centre. The trip rates per parking spaces derived from surveys of the former Owens Street car park are summarised in Table 15.5. While historic, these trip rates are comparable with other similar car parks in Manchester.

Table 15.5: Extant Development – Trip Rates per Parking Space (Former Owens Street Car Park Surveys)

	AM Peak			PM Peak		
	Arr	Dep	Total	Arr	Dep	Total
Trip per Parking Space	0.423	0.025	0.448	0.045	0.360	0.405

15.90. Using these trip rates derived from a nearby car parking facility, the trip generation potential of the extant use at the proposed site has been forecast. A summary of the vehicle movements for the 645 space car park across Sites C and D is provided in Table X.6.

Table 15.6: Extant Development –Trip Generation

Existing Car Parking	AM Peak			PM Peak		
	Arr	Dep	Total	Arr	Dep	Total
645	273	16	289	29	232	261

15.91. As shown in Table X.6, the existing lawful consent at the site permits vehicle movements well in excess of those forecast for the proposed residential scheme. The traffic impact of the development proposals must therefore be considered in this context.

Baseline Traffic Surveys

15.92. Manual classified turning count surveys were undertaken on Tuesday 15th June 2021 for the local highway network between the hours of 07:00-10:00 and 16:00-19:00. It was agreed with TfGM that these surveys would provide a robust baseline for traffic flows on the local highway network. TfGM confirmed that traffic had returned to pre-Covid 19 pandemic conditions.

15.93. The following peak hours were identified from the surveyed traffic data and have been adopted for the traffic impact assessment presented in this report:

- AM Peak Hour 08:00-09:00
- PM Peak Hour 17:00-18:00

Accidents and Safety

15.94. Traffic collision data has been obtained from TfGM for the surrounding area. Data has been provided for a period of five years, between March 2015 and February 2020 for the area bounded by Deansgate, Quay Street, New Quay Street, the Inner Relief Road Regent Road and Mancunian Way. While more recent accident data is available the decision was taken to exclude this from the analysis due to the impact of the Covid-19 pandemic on overall traffic volumes in the vicinity of the proposed site.

15.95. The adopted study area is identical to that adopted in the supporting TA for the previous application at the site.

15.96. In total, there have been 56 accidents in the identified area. This consists of 50 which are categorised as slight and six which are categorised as serious. There were no fatal accidents recorded during the selected five-year period.

15.97. At the Trinity Way/ Water Street junction, a total of six accidents have recorded. Of these accidents, five were recorded as slight in severity and one as serious. Of the contributory factors listed in the record, all are attributable to driver error with no highway features identified.

15.98. At the Trinity Way/ Regent Road junction, a total of nine injury accidents were reported. Of these, seven were classified as slight in severity and two as serious. Of the contributory factors listed, none were attributable to the layout of the highway and were instead associated with driver error.

15.99. On Water Street itself, three accidents were recorded of which two were slight in severity and one serious. Again, driver error was recorded as contributing to these incidents.

15.100. In summary, the review of accident data reveals no evidence of underlying highway safety issues. It is therefore concluded that there are no existing accident blackspots on the highway network in the vicinity of the site.

Future Baseline and Committed Developments

15.101. A future year of 2026 had been adopted for this assessment which represents an assessment year five years post-application registration.

15.102. The following committed schemes have been considered in the assessment as they have a direct impact upon on traffic flows in the vicinity of the Proposed Development:

- Manchester Goods Yard (MCC ref: 121511/FO/2018)
- Globe and Simpson (MCC ref: 121721/FO/2018)
- Middlewood Locks Plot N, Salford Central (SCC ref: 14/65793/OUT)
- St Johns Place (MCC re 109660/FO/2015/C1)

15.103. The above committed developments were agreed as they were judged to have a direct impact on the study network and assessment time periods. It was agreed that all other committed schemes in the vicinity of the site would be accounted for in the agreed approach to background traffic growth factors. However, in subsequent discussions with MCC and TfGM it was accepted that no growth factors were required for the assessment.

15.104. The baseline traffic flows and committed development flows have been combined to generate the adopted Future Baseline for the study area.

Identification and Evaluation of Significant Effects

15.105. Potential environmental impacts can arise due to changes in traffic flow and the design/ operation of the transport measures employed.

Assessment of Construction Phase Effects

15.106. During construction, the primary factors that lead to potential environmental impacts are:

- Transportation of construction materials and equipment to/from Site
- Travel to/from the site by construction workers
- Movement of materials and staff around the Site
- Disruption and disturbance caused by construction traffic and heavy goods vehicles (HGVs)
- Increases in proportion of HGVs on local roads causing detrimental impacts to residential amenity

15.107. The principal contractor for the scheme will be Renaker Build Limited. They have prepared a Construction Management & Phasing Plan. The overall construction period for the Proposed Development is expected to be nine years and will be delivered in phases. An indicative programme for the construction of the site is provided below:

- Phase 1 – Towers C1 & C2 with residents car park and public realm– construction estimated to take 4 ½ years; commencing in Spring 2022 and completing in September 2026
- Phase 2 – Towers D1 & D2 with Residents car park and Public Realm. construction estimated to take 4 ½ years; commencing in September 2026 and completing in March 2031
- Final public realm (for example, reinstating highway post construction and landscaping around the perimeter of the Site) and Section 278 Highways works – completion targeted for Late 2030 – Early 2031

15.108. The number and type of construction vehicle arriving at the Site depends according to the nature of the works. This activity includes groundworks where material may be imported/exported, foundations, concrete pour, steelwork/superstructure, cladding and fit out all of which have different levels of activity and different types of vehicle needing access.

15.109. Notwithstanding the variability of activities on the Site, as a rough guide we might expect between 20 to 40 HGVs a day plus say 10 smaller Light Goods Vehicle deliveries. There is a practical limit to the number of vehicles that can be accepted on Site, and they are staged across the day as it often takes between 10- 30 minutes for a vehicle to undertake its activity on Site. Given this, the figure of 40 HGV daily movements is a robust forecast during the busier periods such as the cut and fill and concrete pours.

15.110. The largest regular vehicles would be articulated HGVs delivering steel but the need to set up cranes on Site means there are likely large cranes arriving under escort and controlled conditions, possibly with temporary road closures timed to arrive in off peak periods. On top of this are contractors' cars needing to park up, but for the early phases there is scope to park on vacant parts of the site and there are offsite parking options available.

15.111. An early estimate suggests that daily trips of HGVs will be less than 40 per day, which would not significantly affect the existing traffic flows or cause the proportion of HGVs to exceed the Rule 1 criteria and require assessment. The arrival of contractor cars or light goods vehicles is also considered to be low and less than the traffic activity under its existing /extant parking activity.

15.112. In considering the sensitivity of the receptor and scale of impact, the significance of the effect is considered to be Minor Adverse across the range of potential environmental implications. The scale of increases in traffic on all other routes considered, is such that there would be no significant environmental impacts from construction traffic.

15.113. In conclusion, the environmental impacts of the construction phase would not be significant in respect of pedestrian delay, pedestrian amenity, fear and intimidation, severance, and accidents and safety.

Assessment of Operational Phase Effects

15.114. This section considers the operational traffic impacts with development. The trip generation by the development is described in the TA and this shows that this is limited by the number of parking spaces. A modest total of 79 vehicles (two way) is forecast in the AM peak and 99 in the PM peak. When compared against the extant traffic forecasts in Table X.6 it is reasonably concluded that with development the nett traffic generations are lower either historically or with its extant as a public car park. Once distributed onto the network the traffic spreads out and the traffic increases at any one location are reduced even further.

15.115. These forecast traffic flows, the traffic modelling and the percentage increase in trips compared to background traffic flows are described in the TA and form the basis if assessment.

Severance

15.116. The Institute of Environmental Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (1993), advises that severance occurs when there is difficulty experienced in crossing a heavily trafficked road.

15.117. Table 15.7 provides an indication of the level of change in severance between the Future Baseline and the Operational Phase scenario.

Table 15.7 – Change in Severance as a Result of the Proposed Development

Link	AADT 24hr			
	Future Baseline	Operational Phase	% change	Magnitude
A6042 Trinity Way (N)	23520	23726	1%	Negligible
Water St (E of Trinity Way)	8738	9229	6%	Negligible
A6042 Trinity Way (S)	28628	29413	3%	Negligible
A57 Egerton St	68728	69192	1%	Negligible
Water St (S)	979	979	0%	Negligible
A57 Regent Rd	53431	53757	1%	Negligible
Water St (W of New Elm Rd)	8727	8974	3%	Negligible
Water St (E of New Elm Rd)	7909	8155	3%	Negligible
New Elm Rd	1022	1022	0%	Negligible
Water St (E)	7909	7955	1%	Negligible

15.118. Severance particularly impacts upon vulnerable road users. These users have been identified as a low sensitivity receptor.

15.119. Table 15.7 indicates that none of the links within the study area are forecast to experience an increase in traffic flows of over 30%. On this basis a negligible magnitude of impact is identified which corresponds to a **negligible** impact which is not significant in environmental impact terms.

Driver Delay

15.120. The relevant guidance suggests that Driver Delay is only likely to be significant where the traffic on the network is likely to be at or close to the capacity of the system.

15.121. To determine the impact of the Proposed Development on driver delay junction, a capacity assessment has been undertaken at the Trinity Way/ Water Street and a summary of the modelling outputs Is provided in this Chapter. Full details of this assessment can be found in the Transport Assessment included as **Appendix 2** of this report.

15.122. Site D is proposed to take access directly from the Trinity Way/ Water Street signalised junction. In order to assess the operation of this junction once the development begins operations, a model of the junction has been created in the industry-standard modelling software package LinSig 3.2.

15.123. A model representing the existing configuration of the junction has been run in the first instance to establish a baseline operation before the addition of the site access arm. A summary of the capacity results generated for the junction using the 2026 Baseline 'Without Development' traffic flows is provided in **Table 15.8**.

15.124. Results are presented as Degree of Saturation (DoS), Mean Max Queue (MMQ) and Practical Reserve Capacity (PRC).

Table 15.8: Trinity Way/ Water Street (Existing Layout) – 2026 Baseline 'Without Development

Junction Arm	AM Peak			PM Peak		
	DoS (%)	Ave Delay s/veh (pcu)	MMQ (PCUs)	DoS (%)	Ave Delay s/veh (pcu)	MMQ (PCUs)
Trinity Way (North)	72.7	32	16	71.7	38	13
Water Street (East)	70.8	57	7	78.9	34	15
Trinity Way (South)	60.0	36	13	79.4	37	19
PRC (%)		22.4			13.4	
Cycle Time (s)		100			100	

15.125. As shown in **Table 15.8**, the junction is forecast to operate within capacity in both the AM and PM peaks under 2026 Baseline 'Without Development' traffic conditions.

15.126. Having established the baseline operation of the junction, a model which includes the Site access arm into Site D has been developed and run using the 2026 Baseline 'With Development' traffic flows.

15.127. The Site access arm has been added to the phasing and staging of the junction. At the request of TfGM and MCC, the Site access arm has been run in its own stage to avoid conflict with the Water Street arm opposite. In the PM peak, the site access arm phase has been run every other cycle which is considered representative of the likely demand for this phase during this period as only 18 vehicles are forecast to leave the site.

15.128. The results of the exercise are summarised in **Table 15.9**.

Table 15.9: Trinity Way/ Water Street (Proposed Layout – with Site D Access) – 2026 Baseline 'With Development

Junction Arm	AM Peak			PM Peak		
	DoS (%)	Ave Delay s/veh (pcu)	MMQ (PCUs)	DoS (%)	Ave Delay s/veh (pcu)	MMQ (PCUs)
Trinity Way (North)	87.1	39	20	85.0	53	16
Water Street (East)	82.4	63	8	84.6	40	7
Trinity Way (South)	84.8	40	18	79.5	39	18
Site Access (West)	20.2	135	1	25.0	126	1
PRC (%)		3.3			5.9	
Cycle Time (s)		100			200 (double cycled)	

15.129. As shown in **Table 15.9** even with the addition of the Site D access arm, the Trinity Way/ Water Street junction is forecast to operate with a modest increase of queuing and an increase in Driver Delay of up to 7 seconds per vehicle in the AM peak on Trinity Way and 15 seconds in the PM Peak. This change in represents a **negligible** magnitude of impact on Driver Delay and a corresponding negligible significance of effect.

Public Transport Users

15.130. There is no industry guidance on the assessment of public transport users. The assessments of driver delay will be used to establish any increased delays to bus users by considering the bus routes and services within the study area.

15.131. The junction capacity assessment of the Trinity Way/ Water Street junction, as presented in **Tables 15.8 and 15.9**, demonstrates that there will be minimal increases in queuing and delay as a result of traffic from the Proposed Development. On this basis it is also reasonable to assume that there will be no material additional delay to public transport users.

15.132. Public transport users have been identified as a low sensitivity receptor. Based upon the results of the capacity assessment at the Trinity Way/ Water Street junction the magnitude of impact has been identified as **negligible**.

Pedestrian Delay

15.133. The Proposed Development will provide improvements to the pedestrian environment compared with the baseline including the widening of footways at the proposed Site D access junction and high quality public realm within the Site itself. This additional infrastructure will improve pedestrian connectivity.

15.134. The proposed Trinity Way/ Water Street junction arrangement will provide formal crossing facilities across the Site D access arm of the junction.

15.135. Pedestrians have been identified as a low sensitivity receptor and the significance of effects has been identified as **negligible**.

Pedestrian/ Cyclist Amenity

15.136. Negative changes in pedestrian amenity are assumed to be significant where traffic flows (or HGV component) double or more.

15.137. The Proposed Development itself will provide high quality public realm including riverside frontages. This internal provision for pedestrians and cyclist will be complemented by enhancements to external highway network, including footway widening and improvements to cycle facilities.

15.138. As previously outlined pedestrians have been identified as a low sensitivity receptor. Given none of the links considered have been shown to experience a doubling of flows, it is concluded that the magnitude of impact is negligible. The Proposed Development will also deliver enhancements to pedestrian and cyclist amenity and on this basis the significance of effects is also identified as **minor beneficial.**

Fear and Intimidation

15.139. The level of fear and intimidation experienced by vulnerable road users has been established with reference to the Institute of Environmental Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (1993).

15.140. **Table 15.9** provides a summary of the change in traffic flows predicted to occur between the Future Baseline and Operational Phase within the study network. The magnitude of impact on each link is also identified.

Link	AAWT 18Hr			
	Future Baseline	Operational Phase	Change	Effect
A6042 Trinity Way (N)	24217	24423	206	Negligible
Water St (E of Trinity Way)	8928	9419	491	Negligible
A6042 Trinity Way (S)	29408	30192	784	Minor
A57 Egerton St	70722	71187	465	Negligible

Water St (S)	1008	1008	0	Negligible
A57 Regent Rd	54986	55312	327	Negligible
Water St (W of New Elm Rd)	8917	9164	247	Negligible
Water St (E of New Elm Rd)	8074	8321	247	Negligible
New Elm Rd	1053	1053	0	Negligible
Water St (E)	8074	8121	46	Negligible

15.141. As shown in **Table 15.9**, with reference to the previously identified criteria, the significance of effect of the Proposed Development on fear and intimidation is considered to be **negligible** on the majority of identified highway links.

15.142. A **minor negative** significance of effect is forecast for the section of Trinity Way immediately to the south of the Trinity Way/ Water Street junction. However, as previously described the site has operated as a car park in post and if operations at the site were to resume for this land use the operational phase traffic flows would be significantly higher than for the Proposed Development. On this basis, when compared with the lawfully permitted land use at the site, the Proposed development has an overall net benefit to fear and intimidation levels.

Accidents and Safety

15.143. As previously described in the Baseline Conditions section of this Chapter, a review of accident data provided by TfGM has revealed that there are no accident blackspots on the highway network in the vicinity of the site.

15.144. There is therefore no evidence to suggest that there are any underlying highway safety issues on the local highway network and no evidence to suggest that traffic from the Proposed Development would increase the risk of accidents. All proposed Site access junctions and other supporting works are designed to the relevant guidelines and will be subject to safety audits from independent third parties. The significance of effect of the Proposed Development on accidents is safety is therefore concluded to be **negligible**.

Mitigation Measures

During Construction

15.145. The potential effects of construction will be short term with a minor adverse impact, which is not considered to be significant. No mitigation for increase in traffic is therefore proposed to be necessary. However, a variety of management measures will be in place to mitigate the impact of construction activity which will be managed by a Construction Transport Management Plan (CTMP).

15.146. The construction programme is based on normal working hours in line with MCC guidance of 07:30-18:00 Monday to Friday and 08:00-14:00 on Saturdays. 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.

15.147. The Site is served well from the A6042 Ring Road and Water Street and these in turn link to the main city arteries that are Regent Road and The Mancunian Way. It is envisaged that deliveries will traverse from the Mancunian Way A57(M) or Ring Road (A6042) then enter the Site via the existing junction on Water Street. For deliveries for phase 2, to avoid turning right into the site and the potential traffic delays, all deliveries will arrive from the Regent Road/Egerton St direction. Traffic

will return to the Mancunian Way via Egerton Street. Flexibility in the access/egress points from site will minimise congestion on the neighbouring roads.

15.148. This approach negates the need for traffic to access via the city centre.

- 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.

15.149. In preparation of the above document, Renaker Build Limited Protocol of timed and booked deliveries, off peak deliveries and prefabrication will be incorporated.

15.150. Delivery routes for the major materials and items of plant will be as per the section above, they will access from the Regent Road and Mancunian Way and will endeavour to deliver outside of peak traffic hours to minimise local disruption and the normal workings of the surrounding properties. The concrete supply will be from our Great Jackson St batching plant which due to its very close proximity to the site, minimises disruption to the road network.

15.151. There will be a limited number of visitor and key staff parking within the compound area. Site personnel will be encouraged to utilise the extensive public transport options available to them. Any personnel who have to attend by car will be asked to avoid parking in residential areas and instead utilise formal surface car parks within the local area.

During Operation

15.152. As well as being accessible to many local amenities and public transport as described as part of the baseline conditions a range of sustainable transport improvements are proposed as indicated below:

- A riverside walkway with public realm enhancements along the river frontages of both sites C and Site D.
- Pavement upgrade on Water Street with quality Yorkstone surfacing.
- Improved signage for pedestrians.
- Pavement widening at the signalised crossings of Trinity Way into Site D.

- The existing cycle lanes over the River Irwell bridge and along Water Street are terminated close to the signals at the Trinity Way junction with 'Cyclist Dismount' signs. The development will provide additional width for a continuous shared cycle lane/footway to connect the cycle lanes without the need to dismount.
- The development will provide new footways and public realm through the site for the benefit for residents and the general public.
- Subject to agreement with TfGM to upgrade exiting flagpole bus stops to Quality Bus Stops with Shelters.

15.153. In addition, a Framework Travel Plan accompanies the planning application for the Proposed Development. This document will be developed into a full Travel Plan which will outline the strategy for ensuring the uptake of sustainable transport options is maximised amongst future site users. The principal aims to the Travel Plan are as follows:

- Reduce the number of single occupancy car journeys to and from the site primarily by residents and staff but also visitors;
- Increasing pedestrian and cycle trips by residents working within an agreed distance of the site while also doing the same for staff working within the commercial element of Trinity Islands;
- Increasing car sharing between staff who either live in similar areas or those who reside on a similar route to work while facilitating the same approach for residents as they commute;
- Increasing bus, rail, and tram usage of those residents and staff that currently live/work within a short walk of existing and proposed public transport infrastructure;
- Increasing the use of sustainable transport modes for visitors to Trinity Islands.

15.154. A range of measures will be considered and implemented to achieve the above aims.

16. Water Resources

Introduction

16.1. This Chapter of the ES has been prepared by Curtins Consulting and assesses the likely Flood Risk, Drainage and water environment impacts of the Proposed Development 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.

16.2. The Water Resources chapter reviews the risks associated from and risks to the water environment. In line with the Environmental Statement Scoping Report the following will be assessed in this chapter.

Table 16.4 - Summary of Receptors

Receptor	Impact	Potential Effect	Scoped In / Out
Proposed development site and site end user	Flooding from the River Irwell.	Damage and risk to site and end user	✓
Wider Catchment area	Flooding from the surface water discharge from the development	Damage and risk to wider catchment area and occupants	✓
Local Watercourses	Pollution during construction and operation	Damage to water quality and wildlife	✓
Water Supply and Sewer Infrastructure	Pollution during construction and operation	Damage to Water Quality	✓
Groundwater Quality	Pollution during construction and operation	Damage to Groundwater Quality	✓

16.3. This Chapter is accompanied by one technical appendix, a Flood Risk Assessment and Drainage Strategy Report (Appendix A) and hereafter referred to as the "FRA".

16.4. The author of the chapter has a BEng Civil Engineering and Ph.D. qualification in the Hydraulic Modelling/Engineering and flood risk and experience in preparing four ES chapters for EIA developments to date.

Legislative and Policy Context

16.5. The following legislation and policies are relevant to Flood Risk and Drainage Strategy for the development.

Legislation

- Water Resources Act, 1991. Sets out the regulatory controls and restrictions that provide protection to the water environment through controls on abstraction, impounding and discharges as well as identifying water quality and drought provisions.

- Land Drainage Act, 1991. Places responsibility for maintaining flows in watercourses on landowners.
- Environmental Act, 1995. Establishes basic terms of reference for the Environment Agency.
- Water Act, 2003. Formalises the Government's commitment to the sustainable management and use of water resources.
- The Water Environment (Water Framework Directive (2000/60/EC) WFD) (England & Wales) Regulations, 2003. These Regulations establish a framework for protecting the water environment, with the aim of achieving chemical and ecological water quality targets.
- Floods Directive (2007/60/EC), 2007. Its aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage, and economic activity.
- Building Regulations Part H (Drainage and Waste Disposal), 2010. Statutory guidance for building drainage and sewerage.

National Planning Policy

- National Planning Policy Framework, 2019 sets out the national framework for delivering sustainable development, Chapter 14 "Meeting the challenge of climate change, flooding and coastal change" para 148 to 165.
- National Planning Policy Framework Technical Guidance to the National Planning Policy Framework (2019), provides additional guidance to ensure the effective implementation of the planning policy for development in areas at risk of flooding.
- Flood Risk and Coastal Change Planning Practice Guidance (PPG), 2014 provides guidance on how the suitability of incorporating SuDS into a new development should be assessed within a planning application's site-specific Flood Risk Assessment. Para 051, 079 & 080.
- Non-Statutory Sustainable Drainage Technical Standards (2015) provides a set of technical standards for which all future SuDS are recommended to be designed to in order to achieve the aims (in relation to surface water management and flood risk) of current National planning policy.
- House of Commons: Written Statement (HCWS161) – Sustainable Drainage (2014), strengthens existing planning policy relating to the use of SuDS within 'major' planning applications. From the 6th April 2015, all 'major' planning applications (as defined by Town and Country Planning (Development Management Procedure) (England) Order 2010) will be required to consider using SuDS as part of the development's management of surface water run-off, unless it can be demonstrated to be inappropriate.

Local Planning Policy

- Manchester Core Strategy – relevant policies (EN*, EN14, EN17, DM1).
- Manchester City Council Strategic Flood Risk Assessment (SFRA) 2011 provides guidance on local flood risk and surface water management issues as well as local policy requirements for managing surface water run-off from proposed development sites.

Assessment Methodology and Significance Criteria

Technical Scope

16.6. The ES Chapter will be based on the FRA and the Drainage Strategy and the following issues will be addressed:

- Flood Risk (fluvial, surface water, Reservoir Breach, and ground water)

- Drainage Infrastructure (surface and foul water); and
- Water Quality

16.7. The FRA scope has been carried out in accordance with the National Planning Policy Framework document (NPPF) which provides technical guidance on how flood risk should be assessed during the planning and development process. The intention is to ensure that development planning decisions are made in a manner that deliver sustainable development in terms of current and future flood risk.

16.8. In April 2015, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SuDS) a material consideration in the determination of planning applications for 'major' developments.

16.9. This Flood Risk Assessment and Drainage Strategy reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- UK Government Flood Warning Information Service maps for surface water flooding and reservoir flooding.
- Manchester City, Salford City and Trafford Councils Level 1 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2011.
- Preliminary Flood Risk Assessment (PFRA) for Manchester County Council dated May 2011.
- Manchester City Council SuDS Requirements for New Developments.
- Environment Agency Flood Level Data – Manchester Ship Canal Study 2018
- United Utilities Public Sewer Records Extract.
- CCTV Drainage Survey of CSO completed by IWJS dated December 2020.
- Topographical Survey completed by Survey Operations dated December 2020.
- CIRIA SuDS Manual 2015

16.10. The following consultations have been carried out and reported in Appendix B and F of the Flood Risk Assessment;

- United Utilities
- Peel Holdings
- Manchester LLFA
- Environment Agency

Flood Risk

16.11. The assessment of the impact of flood risk is based on the Flood Risk Assessment (FRA) prepared for the Site in accordance with the NPPF. The FRA has been included in Appendix 16. In accordance with the requirements of the NPPF, the FRA identifies and quantifies the risk to and from the site from a variety of sources. The FRA uses information both freely available online and the purchased information obtained from the Environment Agency, Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessments and the BGS.

16.12. The risk associated with fluvial, and Reservoir Breach has been assessed using available information. The risk of flooding from other sources is considered lower therefore it has been scoped out of the assessment.

16.13. In accordance with the requirements of the Environmental Statement, Table 16.5 and Table 16.6 has been used to summarise the significance criteria and the impact on receptor sensitivity respectively.

Table 16.5 - Flood Risk Management Hierarchy

Significance of Effect	Fluvial	Surface Water	Reservoir Breach
Major	Change of more than one flood zone classification	Change in surface water flows and/or routing affecting properties internally	Change in extent of inundation affecting properties internally
Moderate	Change of a single flood zone classification	Change in surface water flows and/or routing affecting external areas around properties	Change in extent of inundation affecting external areas around properties
Minor	Change in risk but no change in flood zone classification	Change in risk that does not affect properties	Change in risk that does not affect properties
Negligible	No change in fluvial Flood Risk	No Change in surface water flood risk	No change in reservoir breach flood risk.

Table 16.6 - Flood Risk impact on receptor sensitivity - Impact of flood risk/water level

Sensitivity	Watercourse
High	Increase in water levels and changes flood zone
Moderate	Increase in water levels which does not result in flood zone change
Low	No noticeable change in water level

Drainage Infrastructure

16.14. The Drainage infrastructure includes a separate private surface and foul network within the site and the public combined water sewerage systems which run parallel to the site outside of the boundary. United Utilities, The Manchester Ship Canal Company, the EA, and Manchester City Council have been consulted on the proposals. The FRA provides details of the existing conditions and the proposed water strategy, therefore will be used as the basis to assess the impact of the Proposed Development on the local surface water strategy.

16.15. A summary of the significance criteria used to assess the effect on the water supply and a sewer infrastructure in Table 16.7 and the receptor sensitivity in Table 16.8.

Table 16.7 - Drainage infrastructure magnitude of change assessment criteria

Significance of Effect	Fluvial
Major	Potential change in the flooding behaviour of the existing systems

Moderate	Potential change in the surcharging behaviour of the existing systems
Minor	Change in the flow behaviour within the system but hydraulic performance is unchanged
Negligible	No changes needed to the existing system

Table 16.8 - Drainage Infrastructure impact on receptor sensitivity - Impact on the Performance of the Sewer

Sensitivity	Watercourse
High	Surface flooding of the system and the operation of the Combined Sewer Overflows is more frequent with storms of a magnitude less than the 1 in 30-year storm event.
Moderate	Surface Flooding of the system and the operation of the Combined Sewer Overflows is more frequent with storms of a magnitude less than 1 in 100-year storm events
Low	Operation of the network is visually unaffected. No Increase in the levels of the frequency of surface water flooding.

Water Quality

16.16. The assessment of the likely effect of the Proposed Development on water quality considers both watercourses and groundwater.

16.17. The water quality within the local watercourses has been assessed based on the guidance set out in the CIRIA SuDS Manual 2015. To date, no intrusive ground investigation works have been undertaken therefore the groundwater quality is unknown. The assessment is based on best practice and information provided by the EA and the British Geological Society (BGS).

16.18. The assessment of the likely effects of the Proposed Development on water quality will be assessed based on the criteria set out in Table 16.9 and corresponding receptors sensitivity in Table 16.10.

Table 16.9 - Water Quality Magnitude of change assessment criteria

Significance of Effect	Water course	Groundwater
Major	Change in both ecological and chemical water quality	Change in both ecological and chemical water quality
Moderate	Change in either ecological or chemical water quality	Change in either ecological or chemical water quality
Minor	Minor change in water quality	Minor change in water quality
Negligible	No change in quality	No change in quality

Table 16.10 - Water Quality Impact on receptor sensitivity

Sensitivity	Water Quality
High	Detrimental effect on the water Quality leading to a change in water quality designation of 2 or more classifications

Moderate	Detrimental effect on the water Quality leading to a change in water quality designation of 1 classification.
Low	Water quality remains unaffected, with no change in the water quality classification.

Impact Significance.

16.19. The Significance of an environmental impact if 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 16.11.

Table 16.11 - Impact Significance

	Sensitivity (adverse/beneficial)		
Magnitude	High	Moderate	Low
Major	Major – High	Major - Moderate	Major-Low
Moderate	Moderate-High	Moderate	Moderate - Low
Minor	Minor - High	Minor – Moderate	Minor - Low
Negligible	negligible	negligible	negligible

Limitations and Assumptions

16.20. The findings are limited to information available. The EA water levels are used to determine the flood level and is assumed based on the latest information available.

16.21. Intrusive ground investigate has not been carried out.

16.22. The ground water and quality baseline and impacts are based on engineering judgement.

Baseline Conditions

Flood Risk

16.23. This section summaries the existing flood risk that is experienced by the Proposed Development in its current condition and surrounding area. Full details are provided in the FRA. Only the flooding sources that have been identified as presented a specific risk on the Proposed Development and within the surrounding area has been considered.

Fluvial Flooding

16.24. The Environment Agency Flood Map indicates that the Proposed Development has areas located with Flood Zone 2 associated with the River Irwell which flows on the northern boundary of the site. Drawing reference 078567-CUR-XX-XX-DR-C-92000-P01 in the FRA shows the flood zone 1 (great than a 1 in 100 year) and flood zone 2 (less than 1 in 100 and greater than 1 in 1000 year) mapping based on the EA modelling the River Irwell/Manchester Ship Canal. The EA level data set shows that the maximum water level across the site assuming the Undefended scenario in the 1 in 100 year is 24.13mAOD and the 1 in 1000-year event is 25.82mAOD.

16.25. The existing topography on Site C generally falls towards the River Irwell is approximately 24.500mAOD along the boundary with the watercourse. And a plateau level of 25.000mAOD raising to 26.000mAOD at the site entrance. The water level from modelling shows that flooding occurs between the 1 in 100 year and the 1 in 1000-year event. This gives rise to water levels of up to approximately 1.2m during the 1 in 1000year undefended modelling simulation.

16.26. The existing topography in Site D generally falls towards the River Irwell to the western boundary. A Plateau of approximately 25mAOD is prevalent across most of the site, with levels ranging from approximately 24.5m AOD at the boundary to 26.3mAOD at the site entrance. This gives rise to water levels of up to approximately 1.2m during the 1 in 1000year undefended modelling simulation.

Reservoir Breach

16.27. Online information available from the Environment Agency details that the site is susceptible to flooding from a breach occurring in the wider Reservoir network. The breach water is conveyed using the River Irwell channel and the resultant flooding covers a larger area than the Flood zone 2. This is due to the conveyance channels provided by the roads and the low-lying land used to form the docks and the Bridgewater Canal to the south.

Infrastructure

16.28. An extract from the public sewer records has been obtained for the development site and is shown in Figure 2 for the Flood Risk Assessment.

16.29. The public sewer records indicate the following public sewers within the proposed development boundary:

- Site C shows and 1000mm diameter combined sewer overflow pipe crossing the north-east of the site and discharging into the River Irwell.

16.30. However, following receipt of installed drainage and sewer survey works as part of the Ordsall Chord development works east of Site D, this confirms that the CSO pipe has been surveyed and located outside of the Trinity Islands site boundary and not as shown on the United Utilities mapping. Figure 3 for the FRA shows the indicative route of the CSO pipe, and this is mapped based on the survey setting out points provided. A CCTV Survey was also commissioned which confirms the location of the CSO pipeline outside of the Trinity Islands site boundary. The CCTV Survey is enclosed in the FRA document.

16.31. The information has been issued to United Utilities and they have confirmed that they are happy with the conclusions from this information and concur that the United Utilities mapping is incorrect. The correspondence with United Utilities is also enclosed in Appendix B for the FRA.

16.32. The following public sewers are shown within the vicinity of the site:

- There is a 520 x 800mm combined public sewer crossing south-west to north-east under Regent Road which flows in a north-easterly direction towards Water Street where the sewer is mapped as a 600 x 920mm sewer up to the junction with Liverpool Road.
- There is a 225mm combined sewer within Regent Road flowing in an easterly direction which connects to the 520 x 800mm combined public sewer noted above.
- There is an existing public sewer shown (in black) on the records south of the site parallel with the 600 x 90mm above mentioned sewer. This suggests a historical sewer has been formally abandoned and likely to be removed.

16.33. There are further sewers within the vicinity of the site, but they are not considered of relevance to the development.

16.34. There is evidence from the Topographical Survey that there are various manhole covers and gullies located within the development boundary. This is likely to be associated with the former use of the site and is likely to be used in its current condition as surface level drainage.

16.35. Information from the clients suggests that there may be historical drainage across both sites as shown in Figure 4 of the FRA. This information suggests that there is:

- A possible foul drainage connection (size and depth unknown) within Site D which crosses under the Trinity Way Bridge through Site C and connects towards Regent Road – as denoted by the blue dashed line.

- A possible foul drainage connection approximately 2m below ground level (size unknown) within Site C and connects towards Regent Road – as denoted by the red line.

16.36. The FRA notes that further CCTV surveying is required to confirm the location, route, size, depth, condition, and connectivity of all existing drainage within the site. It is appropriate to carry this out at detailed design stage.

Water Quality

Watercourses

16.37. The River Irwell is one of the 55% of UK Rivers that failed to reach the standards required under the Water Framework Directive (WFD). The main reasons cited for not achieving good status/potential area the result of diffuse pollution from contaminated land, transport and other urban sources and point source from intermittent discharges.

Ground Water

16.38. No intrusive testing has been carried out on site at the time of writing. The whole site Is not within a groundwater protection zone. The bedrock is described as Chester Formation – Sandstone with nearby boreholes available through the BGS website mapping suggest that the primary material identified is sands and clays over sandstone.

Committed developments

16.39. In line with the guidance set out in the NPPF, no development shall adversely impact the surrounding catchment by increasing flood risk due to the development. In addition, the surface water/combined sewer network is activity managed by United Utilities (UU) who are responsible for dealing with the additional run off from any development.

Identification and Evaluation of Significant Effects

16.40. This section is split into two distinct phases: Construction Phase and Operational Phase. The effects described in this section are based on a pre-mitigation scenario. Mitigation will be described later in this chapter.

16.41. The proposed site drainage strategy is to create a private surface water network discharging into the nearby River Irwell. Peak flows will not be restricted but the velocity at the point of discharge into the River Irwell cannot exceed 2m/s. This proposal has been discussed and agreed with the with the Manchester Ship Canal Company who considers that they can accommodate a discharge of this nature. The FRA reports the full details of the proposed drainage strategy.

16.42. Existing connections to the combined sewer are unknown, however the proposed drainage strategy removed all onsite surface water drainage from the combined sewer leaving only the foul discharge to be accommodated by United Utilities.

Fluvial Flooding

Construction

16.43. During construction, the preparation of the ground is readiness for the commencement of construction will impact the levels on Site. There will be an excavation to basement level before construction of the basement to create a plateau.

16.44. These changes will create a plateau which is higher than the 1 in 1000year undefended level. Thereby removing most of the site from flood zone 2 to flood zone 1. On this basis, the pre-mitigation effect significance for fluvial flood risk during construction to the site and the wider catchment area is considered to be Moderate-Low adverse.

Operation

16.45. The Proposed Development will have the same impermeable area compared to the current condition. Therefore, the volume of surface water generated by the Site will be unchanged. The

proposed drainage strategy is designed to manage the runoff from the site and provides a discharge to the River Irwell. The only water entering the sewerage network will be the foul water. The increase flow to the River Irwell due to the outfall of surface water could have potential to increase flooding. This will be reviewed by the Manchester Ship Canal and it necessary the flows attenuated to prevent an increase in the risk of flooding.

16.46. All buildings onsite are built on the plateau above the water level of the 1 in 1000 undefended level therefore the threshold levels to the building are situated outside of the floodplain. The site consists of two levels of basements which are to be used for car parking with access from the plateau.

16.47. On this basis, the operational pre-mitigation effect signification for fluvial flood risk to the site and the wider catchment area is considered to be Moderate-High Beneficial.

Reservoir Breach

16.48. The flooding which results from a reservoir breach manifests itself in a similar way as the flood mapping. The building levels will be significantly above the water level set out in the 1 in 1000year undefended level therefore on this basis both the construction and operational pre-mitigation effect significance for reservoir breach to the site and the wider catchment area is considered to be Negligible.

Combined Sewer

Construction

16.49. The primary impact on off-site surface water sewerage during construction is silt and other debris being washed into the pipework on site. Debris may accumulate over time and progressively reduce flow capacity within the pipeline which could lead to surcharging and possible flooding from the upstream system.

16.50. Structural damage from construction traffic is also possible. Searches and CCTV has proved the CSO does not transverse the site and the network in the surrounding area is relatively deep and is expected to have adequate protection due to the position under an unrestricted road.

16.51. The construction site welfare facilities will generate foul water flows which are expected to be discharged in the local foul water sewerage network. The flow rates are expected to be lower than the proposed design rates.

16.52. On this basis, the pre-mitigation effect signification at construction on the Water Supply and Sewer Infrastructure is considered to be Minor-Low Adverse.

Operation

16.53. The Proposed drainage solution will remove 100% of the surface water flows on site and discharge to the Watercourse. Providing there is existing connections to the combined sewer, this will improve the operation of the adopted sewer network by freeing up the available capacity within the network, which will reduce the flood risk on the wider network catchment.

16.54. The Proposed Development will increase the amount of foul water discharging to the sewerage system compared to the existing situation. This will result in an increase of foul water flow rates to the Water Supply and Sewer Infrastructure. This is offset by the potential reduction in surface water flow that will not be entering the system once the surface water network is operational.

16.55. On this basis, the operational pre-mitigation effect signification on the Water Supply and Sewer Infrastructure is considered to be Minor-Low Beneficial.

Water Quality – Water Course

Construction

16.56. The Construction activities adjacent to the River Irwell will have the potential to pollute the watercourse. Run-off from the Site can reach the river via overland flows dictated by the natural and proposed topography on the Site. Potential pollutants include silt, fuel, oil and hydraulic fluid from construction plant, cement, concrete, and other construction related chemicals. These will have an adverse impact on the ecology of the watercourse but to the potential to change the chemical quality.

16.57. On this basis, the pre-mitigation effect signification at construction on the Local Watercourses is considered to be **Moderate**.

Operation

16.58. The proposed development has limited opportunities to pollute the watercourse as the majority of the site is covered by pedestrian only areas of buildings. The site does consist of a small area of road that will drain to the watercourse however this is expected to be uses primarily for drop offs. The carparking are built in the basement and will be drained to the foul water system via a pumped network.

16.59. On this basis, the operational pre-mitigation effect signification on the Local Watercourses is considered to be **Negligible**

Water Quality – Groundwater

Construction

16.60. During construction, there is a potential risk to groundwater quality as a result of pollutants from construction operations and materials able to infiltrate into the ground. Construction dig may create a more direct flow path for any contaminants to reach the groundwater. As the ground conditions, namely the coefficient of infiltration is currently unknown and is dependent on the excavation depth therefore the exact rate at which a contaminant can reach the ground water cannot be determined.

16.61. On this basis, the pre-mitigation effect signification at construction on the Ground water is considered to be **Moderate**.

Operation

16.62. The proposed development completely covers the site in impermeable material and there is no opportunity for water/contaminants to enter the ground water table. All areas are positively drained via the surface and foul water networks and infiltration is not considered as a disposal technique.

16.63. On this basis, the operational pre-mitigation effect signification on the Groundwater is considered to be **Negligible**

Mitigation Measures

Fluvial Flooding

Construction

16.64. During construction of the Proposed Development, there must be an excavation to basement formation level in the area of the Flood Zone 2. There is a chance that the construction may be impacted by a significant storm event. The time in which the construction level is below ground is minimal therefore this process can be managed by a construction management plan and the construction environmental management plan (CEMP). This plan should include an early warning method (Sign up to the EA flooding warning service) and a robust evacuation plan which should be included in the site induction pack.

16.65. Once the building breaks ground and the basement levels are constructed. The proposed plateau level is set at 27.400mAOD which is significantly above the 1 in 1000-year undefended level.

16.66. On this basis, the proposed mitigation measures allow the construction impact to remain at **Minor-Moderate adverse.**

16.67. Operation

16.68. As the pre-mitigation impact significance for fluvial flooding is considered to be **Moderate-High Beneficial**, no further mitigation is required.

Reservoir Breach Flooding

16.69. As the pre-mitigation impact significance for Reservoir flooding is considered to be **Negligible** no further mitigation is required.

Combined Sewer

Construction

16.70. The control of flow routes on site is the primary mitigation measure required to minimise silt and sediment from entering the sewer network. Areas where silt build up is expected, such as material stockpiles or at the bottom of slopes additional monitoring should take place and where required control measures such as traps and settlement plant installed. Additionally, to control the quantity of sediment washing into the wider network, a regime of road sweeping in conjunction with wheel washing for all construction vehicles will be implemented at all Site accesses.

16.71. The combined water sewers should be monitored by the Contractor using CCTV and lifting manholes to check from debris accumulation and any structural deformation or other defects. As required, debris can be removed by jetting and disposing of the resultant material appropriately. Appropriate remedial actions can be put in place to address structural issues.

16.72. On this basis, the proposed mitigation measures allow the construction impact to be reduced from a Minor-Low Adverse to **Negligible.**

Operation

16.73. As the pre-mitigation impact significance for Sewer network is considered to be **Minor-Low Beneficial**, no further mitigation is required.

Water Quality – Watercourses

Construction

16.74. During construction, measures will be put in place to limit the amount of silt and other pollutants that are able to reach the River Irwell. Silt can be controlled using traps and measures implemented to reduce the amount of material that could be washed into the Watercourse via overland flows. The use of cut off trenches to intercept the overland flow routes will also prevent pollution.

16.75. The risk of fuel and other oils entering the watercourse can be controlled by designating specific areas where refuelling and maintenance occurs. There should be spill kit's location around the site in easy reach and appropriate training included in the site induction/toolbox talk on how to effectively use the kits.

16.76. Storage of materials should be located an appropriate distance away from the watercourse to ensure there is limited flow routes for contamination to use to get the River Irwell.

16.77. All the proposed mitigation measures must be incorporated into the CEMP and recorded as part of the CDM requirements.

16.78. The mitigation is generally reliant on regular maintenance and appropriate training procedures onsite to allow each operative to understand their role should a spill occur.

16.79. On this basis, the proposed mitigation measures allow the construction impact to be reduced from Moderate to **Minor-Moderate adverse.**

Operational

16.80. As the pre-mitigation impact significance for Water quality in the watercourse is considered to be **Negligible** no further mitigation is required.

Water Quality – Ground Water.

Construction

16.81. During construction, controls must be put in place to reduce the risk of pollutants such as oil, diesel and other construction related chemicals being spilled on the ground surface and then infiltrating. The risk can be controlled by limiting refuel/maintenance activities to an area where impermeable membranes and spill trays should be considered. Static plant placed through the site should have spill trays and be subjected to regular maintenance to minimise leaks and rectify as soon as possible.

16.82. Care should be taken when choosing material storage areas. Appropriate containment and monitoring should be in place to limit the degree to which infiltration can occur. Impermeable membranes may be considered, and spill kits located throughout the site from use if required.

16.83. All the proposed mitigation measures must be incorporated into the CEMP and recorded as part of the CDM requirements.

16.84. This mitigation measures are reliant on the operatives locating the issue and timely and correctly implementing the protection. There remains a risk that this is not carried out however the risk post mitigation can be reduced from Moderate to **Minor-Moderate adverse.**

Operation

16.85. As the pre-mitigation impact significance for Groundwater contamination is considered to be **Negligible** no further mitigation is required.

Cumulative Effects

Fluvial Flooding

Construction

16.86. The cumulative effect on fluvial flood risk that other developments located in proximity pose to the Proposed Development are considered **Negligible**. It is assumed that the developments will implement their respective CEMP's and mitigation set out the NPPF which will ensure no increase in flood risk.

Operation

16.87. The operational cumulative effects of developments in proximity to the Proposed Development on fluvial flood risk is considered **Negligible**. It is assumed the developments are subject to the requirements of the NPPF and have the necessary approvals in place with United Utilities, the LLFA and where required The Manchester Ship Canal to ensure their developments do not increase the risk to any development outside of their respective redline boundaries.

Reservoir Flooding

Construction

16.88. The cumulative effects on the reservoir breach flooding that developments within or in close proximity pose to the development are considered **Negligible**. It is assumed that the developments will implement their respective CEMP's and mitigation set out the NPPF which will ensure no increase in flood risk.

Operation

16.89. The operational cumulative effects of developments in proximity to the Proposed Development of Reservoir Flooding is considered **Negligible**. It is assumed the developments are subject to the requirements of the EA and those included in the Manchester SFRA in terms of Flood Risk.

Combined Sewer

Construction

16.90. The cumulative effects of the developments in the vicinity of the Proposed Development during construction on combined water sewerage are considered Negligible. During Construction it is expected that each site follows an approved CEMP. Any connection to the sewer is managed by United Utilities therefore the cumulative impact of all developments is assumed to be **Negligible**.

Operation

16.91. United Utilities have confirmed there is sufficient capacity in the network to accept the foul water flows from the Proposed Development without restriction. It is assumed all nearby developments have discussed the discharge with United Utilities and are following the guidance provided. To that end, the cumulative impact to the network from the developments is considered **Negligible**.

Water Quality - Watercourses

Construction

16.92. The cumulative effect during construction of the developments in the vicinity of the Proposed Development on the water quality of local watercourses is considered **negligible**. It is assumed that each development has a CEMP and is followed to ensure protection is achieved.

Operation

16.93. The operational cumulative effects of developments in the vicinity of the Proposed Development on the water quality of watercourses is expected to be **negligible**. Each development must comply with the EA guidance and have an approved strategy to minimise the risk of contamination.

Water Quality – Ground Water

Construction

16.94. The cumulative effects of developments in the vicinity of the Proposed Development on groundwater quality are expected to be **negligible**. The underlying conditions are unknown therefore a direct pathway to the water table cannot be ruled out. The implementation of impermeable barriers will prevent cross contamination. It is assumed that the surrounding developments have a CEMP that minimises ground water contamination and is followed on site.

Operation

16.95. The cumulative effects of developments in the vicinity of the Proposed Development on groundwater quality are expected to be **negligible**. The underlying conditions are unknown therefore a direct pathway to the water table cannot be ruled out. It is assumed that the surrounding schemes limit contamination entering the watercourse in line with the guidance by the EA.

Residual Effects

16.96. Table 16.12 shows the summary of the effects, mitigation measures and the residual effects.

Table 16.12 - Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e., Temporary/Permanent)
Fluvial Flooding – Operation Phase **Moderate-High Beneficial**	Proposed development site and site end user	The finished floor levels of the building are set in excess of the 1 in 1000-year gate closed scenario	Mitigation through design	**Moderate-High Beneficial** **Permanent Impact**
Fluvial Flooding - Construction Phase **Moderate adverse.**	Onsite Construction staff Wider Catchment area	During construction there is a negligible chance of fluvial flooding during construction. An onsite Evacuation plan linked to the EA warning is required. Positions of the Compound, site welfare and storage should be at higher elevations on site.	An onsite Evacuation plan linked to the EA warnings. Positions of compound and site storage at higher elevations on site.	**Minor-Moderate adverse.** **Temporary Impact**
Reservoir Flooding – Operation Phase **Negligible**	Proposed development site and site end user	A robust flood evacuation plan developed in line with the Emergency services and future building management.	An onsite Evacuation plan linked to the EA warnings.	**Negligible**
Reservoir Flooding – Construction Phase **Negligible**	Onsite Construction Staff	A robust flood evacuation plan developed as part of the CEMP by the contractor.	Development of the Flood Evacuation Plan as part of the CEMP.	**Negligible**
Combined Sewer Construction Phase **Minor-Low Adverse**.	Local sewer network	Onsite control of silt and sediment	Monitor wider network, CCTV, and surveys Placement of storage areas away from entrances to the network.	**Negligible**
Combined Sewer Operation Phase **Minor-Low Beneficial**,	Local Sewer network	None	None	**Minor-Low Beneficial**, **Permanent Impact**
Groundwater Contamination – Construction Phase **Moderate**	Wider Catchment area Groundwater Quality Local Watercourses	Ensuring leachate from the material stores and spillages do not enter the groundwater table by ensuring material storage is anyway from the watercourse and the monitored to ensure no runoff is seen.	Contractor led CEMP	**Minor-Moderate adverse.** **Temporary Impact**
Groundwater Contamination – Operational Phase **Negligible**	Wider Catchment area Groundwater Quality Local Watercourses	None	None	**Negligible**
Watercourse contamination – Construction Phase **Moderate**	Wider Catchment area	Ensure the Leachate/sediment from materials storage does not enter the watercourse. To do this the material stores should be located away from the watercourse and the monitored	Contractor Lead CEMP	**Minor-Moderate adverse.** **Temporary Impact**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e., Temporary/Permanent)
	Groundwater Quality Local Watercourses	to ensure no runoff gets to the watercourse. Care should be taken when working near the watercourse to make sure no material falls into the water		
Watercourse Contamination – Operational Phase **Negligible**	Wider Catchment area Groundwater Quality Local Watercourses	None	None	**Negligible**

Reference List

16.97. This ES Chapter has been prepared by reference to the following:

- Flood Risk Assessment and Drainage Strategy for the development.
- Environment Agency flood maps for rivers and sea flooding.
- UK Government Flood Warning Information Service maps for surface water flooding and reservoir flooding.
- Manchester City, Salford City and Trafford Councils Level 1 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010.
- Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) published in March 2011.
- Preliminary Flood Risk Assessment (PFRA) for Manchester County Council dated May 2011.
- Manchester City Council SuDS Requirements for New Developments.
- Environment Agency Flood Level Data – Manchester Ship Canal Study 2018
- United Utilities Public Sewer Records Extract.
- CCTV Drainage Survey of CSO completed by IWJS dated December 2020.
- Topographical Survey completed by Survey Operations dated December 2020.

Non-Technical Summary

16.98. The scope of the assessment is based on the guidance set out in the National Planning Policy Framework, Planning Practice Guidance, and the Non-statutory Sustainable Drainage Technical standards (2015). An assessment of the flood risk to and from the site has been carried out and mitigation recommended to ensure flood protection.

16.99. The process includes assessing the freely available flood maps from the Environment Agency, correspondence with stakeholders and purchased CCTV surveys to assess the flood risk to the development. A drainage strategy has been developed in accordance with NPPF, PPG and the Non-

Statutory Sustainable Drainage Technical standards and Building Regulations Part H (Drainage and Waste Disposal), 2010. Statutory guidance for building drainage and sewerage. Correspondence with stakeholders has led to a scheme that allows a free volume discharge but a potentially limited velocity to the River Irwell.

16.100. Site C comprises of brownfield land is bounded by the River Irwell to the north, Trinity Way to the west, Water Street to the south and a railway viaduct to the east. The Site can be accessed by vehicle or foot via Water Street on the southern boundary. The Site slopes downwards to the north towards the River Irwell and there is a limited amount of vegetation running along this boundary.

16.101. Site D comprises of brownfield land is bounded by the River Irwell to the north and west, Regent Road to the south and Trinity Way to the east. The Site can be accessed by vehicle or foot via Trinity Way on the eastern boundary. The Site slopes downwards to the north and west towards the River Irwell and there is a limited amount of vegetation running along this boundary.

16.102. Both Sites sit in a Flood Zone 2 and at a residual risk of Reservoir flooding. The potential environmental impacts relate to flood risk to and from the site and potential for increased contamination risk in the operational and construction phase.

16.103. The receptors considered for the Environmental Statement chapter are:

- The Proposed Development sit and site end user
- Wider Catchment Area
- Local Watercourses
- Water supply and Sewer infrastructure
- Groundwater Quality

16.104. Each receptor has been assessed against the significant environmental risks identified for the proposed development and given a pre-mitigation risk status. Mitigation is then recommended for each risk and receptor to reduce the impact of the scheme on the environment.

16.105. The environment impacts of the scheme are higher in the construction phase. These are typically related to material storage, waste management and maintenance/refuelling activities on plant. As such the risk can be monitored and mitigated by regular maintenance and site set up. Once the scheme is in place, the risk to the water environment is reduced by design as recommended by the EA, LLFA and set out in the SuDS guidance.

16.106. Following the mitigation, the risk to the environment is considered negligible for the operational phase and the maximum risk during the construction phase is Minor-Moderate adverse and will be managed through on-site monitoring and site management.

17. Wind Microclimate

Introduction

17.1. This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to Wind Microclimate. 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 negative effects; and the likely residual effects after these measures have been adopted.

17.2. This Chapter is intended to be read along with "Appendix 17.1 – Wind Microclimate Technical Report".

17.3. The authors of this Chapter are Stefano Cammelli (Technical Director – Wind Engineering at WSP) and Elvin Hii (Senior Engineer – Wind Engineering at WSP). Stefano is a wind engineering specialist with 18 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 6 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 an Associate Member of the Institution of Mechanical Engineers and a Member of the UK Wind Engineering Society.

Legislative and Policy Context

Legislation

17.4. There is no specific national legislation or planning policy guidance dealing with wind microclimate in terms of pedestrian comfort. However, the 'Lawson Criteria' - which are used to benchmark the pedestrian wind microclimate - are well-established in the UK and discussed below under Guidance.

Local Planning Policy

17.5. 'Manchester's Local Development Framework - Core Strategy Development Plan Document' 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.

17.6. 'Policy EN 2' on Tall Buildings specifically 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.*"

17.7. Paragraph 12.14 of the Policy EN 2 on Tall Buildings states that: "*Tall buildings by their very nature can dominate the street scene and be highly visible over long distances. They can also have an impact on the local micro-climatic conditions, for example, by creating wind tunnels. It is for these reasons that it is considered particularly important that they are designed to the highest quality, both in terms of appearance and their impact on the functioning of surrounding space.*"

Guidance

17.8. The following guidance documents have been used during the preparation of this Chapter.

Guidelines for CFD Simulations

17.9. The following references have been used as technical references for the execution of the CFD simulations conducted as part of this assessment:

- "Best Practice Guideline for the CFD Simulation of Flows in the Urban Environment - Quality Assurance and Improvement of Microscale Meteorological Models", European COST Action 732.
- "Guidebook for Practical Applications of CFD to Pedestrian Wind Environment around Buildings", Architectural Institute of Japan (AIJ).
- "AIJ benchmarks for validation of CFD simulations applied to pedestrian wind environment around buildings", Architectural Institute of Japan (AIJ).

The Lawson Criteria

17.10. The Lawson Criteria are well-established in the UK for quantifying wind conditions in relation to build developments and, although not a UK 'standard', the criteria are recognised by local authorities as a suitable benchmark for wind assessments. The Lawson Criteria have been adopted for this assessment.

The Historic England Advice Note

17.11. 'The Historic England Advice Note 4' (2015), updates previous guidance by English Heritage and the Commission for Architecture and Built Environment (CABE), produced in 2007. It seeks to guide people involved in planning for and designing tall buildings so that they may be delivered in a sustainable and successful way through the development plan and development management process.

17.12. The relevant paragraphs states that:
4.7 "*Planning applications for tall buildings are likely to require an environmental impact assessment (EIA), which would be expected to address matters in respect of both the proposed building and its cumulative impact, including: … e. Other relevant environmental issues, particularly sustainability and environmental performance, eg the street level wind environment*".
4.10 "*…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.*"

Assessment Methodology and Significance Criteria

17.13. The scope of this Chapter of the ES has been agreed within the Scoping Opinion.

Defining the Baseline

17.14. A location plan of the Proposed Development is shown in Figure 17.1.

17.15. 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 17.2 includes the existing Site and all the existing buildings within an approximate 500m radius of the Site: beyond this radius the impact of the Proposed Development with regard to pedestrian level winds is expected to be negligeable.

17.16. Results of the assessment of the baseline conditions are presented in Section 3 of the Wind Microclimate Technical Report (Appendix 17.1) and are also discussed in Paragraphs 17.40 to 17.44 further on in this document.

Impact Assessment Methodology

Enabling and Construction

17.17. 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.

17.18. 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

17.19. 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.

17.20. 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.

17.21. 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.

17.22. The assessment of the wind microclimate impacts comprised the following nine (9) scenarios:

- *Scenario 1*: assessment of the wind conditions across the Site in its present conditions in the context of the existing surroundings, i.e. the Baseline.
- *Scenario 2*: as per 'Scenario 1' but with the addition of Building C1 (Phase 1).
- *Scenario 3*: as per 'Scenario 2' but with the addition of future developments with planning consent in the surrounding area which may influence the local wind conditions across the site.
- *Scenario 4*: as per 'Scenario 2' but with the addition of Building C2 (Phase 2).
- *Scenario 5*: as per 'Scenario 4' but with the addition of future developments with planning consent in the surrounding area which may influence the local wind conditions across the site.

- *Scenario 6*: as per 'Scenario 4' but with the addition of Building D1 (Phase 3).
- *Scenario 7*: as per 'Scenario 6' but with the addition of future developments with planning consent in the surrounding area which may influence the local wind conditions across the site.
- *Scenario 8*: as per 'Scenario 6' but with the addition of Building D2 (Phase 4).
- *Scenario 9*: as per 'Scenario 8' but with the addition of future developments with planning consent in the surrounding area which may influence the local wind conditions across the site.

17.23. A list of the cumulative schemes assessed within the study area of the wind assessment is provided later in this ES Chapter.

Assessment Criteria

17.24. 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 17.1. 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.

17.25.

17.26. 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 17.1 – 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.

17.27. 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 17.2 below.

Table 17.2 – 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

17.28. 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 17.1).

Limitations and Assumptions

17.29. 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 for 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.

Methodology for Defining Effects

Reporting of the Environmental Effect and Significance Criteria

17.30. 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 17.3 (this is consistent with what specified in the City of London wind microclimate guidelines).

Table 17.3 – 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	No

	one comfort category) as a result of the Proposed Development but remain 'suitable' for the intended pedestrian activity.	
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

17.31. 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 17.4 (this is consistent with what specified in the City of London wind microclimate guidelines).

Table 17.4 – 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

17.32. 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

17.33. 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.

17.34. 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.

17.35. Beneficial effects that are moderate or major in scale are not considered to be 'significant' or a material consideration for planning.

Receptors and Receptor Sensitivity

17.36. The wind assessment has been undertaken for several existing and introduced receptors at street and elevated levels. The location of these receptors is shown in Figure 17.2 and Figure 17.3. The full list of receptors is included in Table 17.5.

Table 17.5 – List of Receptors for The Assessment

Receptor ID	Description	On-site / Off-site
1	Main entrance to Building C1	On-site
2	Entrance to commercial space (Building C1)	On-site
3	Entrance to commercial space (Building C1)	On-site
4	Main entrance to Building C2	On-site
5	Entrance to commercial space (Building C2)	On-site
6	Thoroughfare (Site C)	On-site
7	Recreational space / sitting area (Site C)	On-site
8	Recreational space / sitting area (Site C)	On-site
9	Recreational space / sitting area (Site C)	On-site
10	Recreational space / sitting area (Site C)	On-site
11	Thoroughfare near Building C1	On-site
12	Thoroughfare (riverside, Site C)	On-site
13	Main entrance to Building D1	On-site
14	Main entrance to Building D2	On-site
15	Secondary entrance to Building D2	On-site
16	Drop-off (Site D)	On-site
17	Recreational space / sitting area (Site D)	On-site
18	Recreational space / sitting area (Site D)	On-site
19	Recreational space / sitting area (Site D)	On-site
20	Recreational space / sitting area (Site D)	On-site
21	Thoroughfare (riverside, Site D)	On-site
22	Thoroughfare (riverside, Site D)	On-site
23	Thoroughfare (riverside, Site D)	On-site
24	Pavement (Ring Road)	Off-site
25	Pedestrian crossing point (Ring Road)	Off-site
26	Pedestrian crossing point (Ring Road)	Off-site
27	Pedestrian crossing point (Water Street)	Off-site
28	Pedestrian crossing point (Water Street)	Off-site
29	Pedestrian crossing point (Ring Road)	Off-site
30	Pedestrian crossing point (Ring Road)	Off-site
31	Pavement (Water Street)	Off-site
32	Pavement (Water Street)	Off-site
33	Car park north of New Elm Road	Off-site
34	Car park north of New Elm Road	Off-site
35	Pavement (Ring Road)	Off-site
36	Pavement (Egerton Street)	Off-site
37	Pedestrian crossing point (Egerton Street)	Off-site
38	Pedestrian crossing point (Egerton Street)	Off-site
39	Pedestrian crossing point (Egerton Street)	Off-site
40	Pedestrian crossing point (Egerton Street)	Off-site
41	Pedestrian crossing point (Egerton Street)	Off-site
42	Pedestrian crossing point (Egerton Street)	Off-site
43	Pedestrian crossing point (Egerton Street)	Off-site
44	Pedestrian crossing point (Egerton Street)	Off-site
45	Pedestrian crossing point (Egerton Street)	Off-site
46	Pedestrian crossing point (Water Street)	Off-site
47	Pedestrian crossing point (Water Street)	Off-site
48	Pedestrian crossing point (Regent Road)	Off-site
49	Pedestrian crossing point (Regent Road)	Off-site
50	Pedestrian crossing point (Regent Road)	Off-site

Receptor ID	Description	On-site / Off-site
51	Bus stop (Regent Road)	Off-site
52	Main entrance to 'One Regent'	Off-site
53	Townhouse entrances (One Regent)	Off-site
54	Courtyard (One Regent)	Off-site
55	Thoroughfare (riverside near 'One Regent')	Off-site
56	Bus stop (Regent Road)	Off-site
57	Entrance to 'Hotel Campanile'	Off-site
58	Car park (Hotel Campanile)	Off-site
59	Car park (Hotel Campanile)	Off-site
60	Main entrance to 'Wilburn Basin - Block C'	Off-site
61	Car park (Wilburn Basin)	Off-site
62	Main entrance to 'Wilburn Basin - Block B'	Off-site
63	Recreational space / sitting area (Wilburn Basin)	Off-site
64	Recreational space / sitting area (Wilburn Basin)	Off-site
65	Main entrance to 'Wilburn Basin - Block A'	Off-site
66	Pavement (Ring Road)	Off-site
67	Pavement (Ring Road)	Off-site
68	Footbridge (Ring Road)	Off-site
69	Entrance to the 'The Factory'	Off-site
70	Pavement (Water Street)	Off-site
71	Pavement (Water Street)	Off-site
72	Pavement (Water Street)	Off-site
73	Thoroughfare (under the railway)	Off-site
74	Pavement (Liverpool Road)	Off-site
75	Pavement (Liverpool Road)	Off-site
76	Car park (west of Woollam Place)	Off-site
77	Pavement (Water Street)	Off-site
78	Entrance (Big Yellow Self Storage)	Off-site
A	Wellness terrace (Building C1)	On-site
B	Gym terrace (Building C1)	On-site
C	Gym terrace (Building C1)	On-site
D	Gym terrace (Building C1)	On-site
E	Wellness terrace (Building C2)	On-site
F	Gym terrace (Building C2)	On-site
G	Gym terrace (Building C2)	On-site
H	Gym terrace (Building C2)	On-site
I	External terrace (lounge, Building D1)	On-site
J	External terrace (lounge, Building D1)	On-site
K	External terrace (gym, Building D1)	On-site
L	Roof terrace (Building D2)	On-site
M	External terrace (gym, Building D2)	On-site
N	External terrace (lounge, Building D2)	On-site

Baseline Conditions

17.37. The Baseline (Scenario 1) 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 17.1).

Pedestrian Safety Assessment

17.38. In the Baseline scenario - within the boundary of the Site - there no exceedances of the pedestrian *safety* criteria.

17.39. In the Baseline scenario - within the areas surrounding the Site - only one localised exceedance of the pedestrian *safety* criteria occurs at receptor '55' (riverside location within the 'One Regent' development).

Pedestrian Comfort Assessment

17.40. In the Baseline scenario - within the boundary of the Site - wind conditions rate - at worst - as suitable, in terms of *comfort*, for 'walking' during the winter months.

17.41. In the Baseline scenario - within the areas surrounding the Site - wind conditions across most of the receptors are suitable, in terms of *comfort*, for their intended pedestrian uses. Exceedances of the pedestrian comfort criteria occur at receptors '51' and '56' (bus stops along Regent Road) and at receptor '55' (riverside location within the 'One Regent' development).

Identification and Evaluation of Significant Effects

Demolition and Construction

17.42. 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 work 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.

17.43. 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 – General

17.44. Due to the complexity and size of the Proposed Development, wind conditions across the Site and its vicinity have been continuously assessed right from the start of the design process: this integrated approach allowed the design team to consider and take on board 'wind microclimate' input whilst the design was evolving. Wind-related considerations - in fact - influenced the relative distance between the four buildings, their orientation and led to the introduction of the open terraces across their respective first floors. This process also allowed wind mitigation measures to become an integral part of the architectural and landscaping design of the Proposed Development: for this reason - within this Chapter of the ES - the wind microclimate conditions across and in the vicinity of the finalised version of the Proposed Development have been presented with its fully integrated wind mitigation strategy in place.

Completed Development – Scenario 2

17.45. The completed Proposed Development (Building C1 only) has been modelled to represent the conditions in and around the Site within the existing context. 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 17.1). The 3D model of the completed Proposed Development in the context of the existing surroundings is shown in Figure 17.4 below.

Pedestrian Safety Assessment

17.46. With the introduction of 'Building C1' part of the Proposed Development (Scenario 2), there are no exceedances of the pedestrian *safety* criteria at street level within the boundary of the Site. The nature and scale of the effects are **Negligible** and are therefore considered **Not Significant**.

17.47. Wind conditions across the four (4) terraces under 'Building C1' are rated as safe for the general public except for receptor 'A' (west-facing 'wellness terrace'): the nature and scale of the effects for this receptor are **Major Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across this space to mitigate these adverse wind conditions. Alternatively, access to this space should be restricted when windy conditions are forecasted in the area.

17.48. Within the areas surrounding the Site, with the introduction of 'Building C1' part of the Proposed Development (Scenario 2), the localised exceedance of the pedestrian *safety* criteria at receptor '55' (riverside location within the 'One Regent' development) persists: the nature and scale of the effects for this receptor are **Negligible** and are therefore considered **Not Significant**.

Pedestrian Comfort Assessment

17.49. With the introduction of 'Building C1' part of the Proposed Development (Scenario 2), wind conditions across all street level receptors within the boundary of the Site are suitable - in terms of *comfort* - for their intended pedestrian uses. Wind conditions across the recreational spaces / sitting areas within 'Site C' are suitable - at worst - for 'standing / short period of sitting' during the summer months. The nature and scale of the effects are **Negligible** and are therefore considered **Not Significant**.

17.50. Wind conditions across the four (4) terraces under 'Building C1' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'A' (west-facing 'wellness terrace') which - in parts - only rates as suitable for 'walking' in summer: the nature and scale of the effects for this receptor are **Moderate Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across this space in order to promote the local wind microclimate conditions to be suitable for - at least - 'standing / short period of sitting' during the summer months.

17.51. Within the areas surrounding the Site, with the introduction of 'Building C1' part of the Proposed Development (Scenario 2), the exceedances of the pedestrian *comfort* criteria at receptors '51' and '56' (bus stops along Regent Road) and at receptor '55' (riverside location within the 'One Regent' development) persist: the nature and scale of the effects for these receptors are **Negligible** and are therefore considered **Not Significant**. As a result of the introduction of 'Building C1', more wind is channeled under the railway arches to the east of 'Site C': because of this, wind conditions at receptors '72', '73' and '77' (pavement locations along Water Street) deteriorate by one comfort category during the winter months but remain suitable for their intended use: the nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Not Significant**.

Completed Development – Scenario 4

17.52. The completed Proposed Development (Building C1 and Building C2 only) has been modelled to represent the conditions in and around the Site within the existing context. The results are discussed below and further detail of the quantification of the results is provided in Section 6 of the Wind Microclimate Technical Report (Appendix 17.1). The 3D model of the completed Proposed Development in the context of the existing surroundings is shown in Figure 17.5 below.

Pedestrian Safety Assessment

17.53. With the introduction of 'Building C1' and 'Building C2' part of the Proposed Development (Scenario 4), there no exceedances of the pedestrian *safety* criteria at street level within the

boundary of the Site. The nature and scale of the effects are **Negligible** and are therefore considered **Not Significant**.

17.54. Wind conditions across the four (4) terraces under 'Building C1' are rated as safe for the general public except for receptor 'D' (southwest-facing 'gym terrace'). Also, wind conditions across the four (4) terraces under 'Building C2' are rated as safe for the general public except for receptor 'E' (northwest-facing 'wellness terrace'). The nature and scale of the effects for these receptors are **Major Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across these spaces to mitigate the adverse wind conditions. Alternatively, access to these spaces should be restricted when windy conditions are forecasted in the area.

17.55. Within the areas surrounding the Site, with the introduction of 'Building C1' and 'Building C2', the localised exceedance of the pedestrian *safety* criteria at receptor '55' (riverside location within the 'One Regent' development) persists: the nature and scale of the effects for this receptor are **Negligible** and are therefore considered **Not Significant**.

Pedestrian Comfort Assessment

17.56. With the introduction of 'Building C1' and 'Building C2' part of the Proposed Development (Scenario 4), wind conditions across all street level receptors within the boundary of the Site are suitable - in terms of *comfort* - for their intended pedestrian uses. The nature and scale of the effects are therefore **Negligeable** and considered **Not Significant**.

17.57. Wind conditions across the four (4) terraces under 'Building C1' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'B' (east-facing 'gym terrace') and receptor 'D' (southwest-facing 'gym terrace') which - in parts - only rate as suitable for 'walking' in summer. Also, wind conditions across the four (4) terraces under 'Building C2' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'G' (southwest-facing 'gym terrace') which - in parts - only rate as suitable for 'walking' in summer. The nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across these spaces in order to promote the local wind microclimate conditions to be suitable for - at least - 'standing / short period of sitting' during the summer months.

17.58. Within the areas surrounding the Site, with the introduction of 'Building C1' and 'Building C2', the exceedances of the pedestrian *comfort* criteria at receptors '51' and '56' (bus stops along Regent Road) and at receptor '55' (riverside location within the 'One Regent' development) persist: the nature and scale of the effects for these receptors are **Negligible** and are therefore considered **Not Significant**. As a result of the introduction of 'Building C1' and 'Building C2', more wind is channeled under the railway arches to the east of 'Site C' part of the Proposed Development: because of this, wind conditions at receptors '72', '73' and '77' (pavement locations along Water Street) deteriorate by one *comfort* category during the winter months but remain suitable for their intended use. The nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Not Significant**.

Completed Development – Scenario 6

17.59. The completed Proposed Development (Building C1, Building C2 and Building D1 only) has been modelled to represent the conditions in and around the Site within the existing context. The results are discussed below and further detail of the quantification of the results is provided in Section 8 of the Wind Microclimate Technical Report (Appendix 17.1). The 3D model of the completed Proposed Development in the context of the existing surroundings is shown in Figure 17.6 below.

Pedestrian Safety Assessment

17.60. With the introduction of 'Building C1', 'Building C2' and 'Building D1' part of the Proposed Development (Scenario 6), there no exceedances of the pedestrian *safety* criteria at street level within the boundary of the Site. The nature and scale of the effects are **Negligible** and are therefore considered Not **Significant**.

17.61. Wind conditions across the four (4) terraces under 'Building C1' are rated as safe for the general public except for receptor 'B' (east-facing 'gym terrace') and for receptor 'D' (southwest-facing 'gym terrace'). Wind conditions across the four (4) terraces under 'Building C2' are rated as safe for the general public except for receptor 'G' (southwest-facing 'gym terrace'). Also, wind conditions across the four (4) terraces under 'Building D1' are rated as safe for the general public except for receptor 'J' (northwest-facing 'lounge') and for receptor 'K' (southwest-facing 'gym'). The nature and scale of the effects for these receptors are **Major Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across these spaces to mitigate the adverse wind conditions. Alternatively, access to these spaces should be restricted when windy conditions are forecasted in the area.

17.62. Within the areas surrounding the Site, with the introduction of 'Building C1', 'Building C2' and 'Building D1', the localised exceedance of the pedestrian *safety* criteria at receptor '55' (riverside location within the 'One Regent' development) persists: the nature and scale of the effects for this receptor are **Negligible** and are therefore considered **Not Significant**.

Pedestrian Comfort Assessment

17.63. With the introduction of 'Building C1', 'Building C2' and 'Building D1' part of the Proposed Development (Scenario 6), wind conditions across all street level receptors within the boundary of the Site are suitable - in terms of *comfort* - for their intended pedestrian uses. Wind conditions across the recreational spaces / sitting areas within 'Site C' are suitable for 'standing / short period of sitting' during the summer months. The nature and scale of the effects are therefore **Negligeable** and considered **Not Significant**.

17.64. Wind conditions across the four (4) terraces under 'Building C1' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'B' (east-facing 'gym terrace') and receptor 'D' (southwest-facing 'gym terrace') which - in parts - only rate as suitable for 'walking' in summer. Wind conditions across the four (4) terraces under 'Building C2' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'G' (southwest-facing 'gym terrace') which - in parts - only rate as suitable for 'walking' in summer. Also, wind conditions across the four (4) terraces under 'Building D1' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'K' (southwest-facing 'gym') which - in parts - only rate as suitable for 'walking' in summer. The nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across this space in order to promote the local wind microclimate conditions to be suitable for - at least - 'standing / short period of sitting' during the summer months.

17.65. Within the areas surrounding the Site, with the introduction of 'Building C1', 'Building C2' and 'Building D1', the exceedances of the pedestrian *comfort* criteria at receptors '51' and '56' (bus stops along Regent Road) and at receptor '55' (riverside location within the 'One Regent' development) persist: the nature and scale of the effects for these receptors are **Negligible** and are therefore considered **Not Significant**. As a result of the introduction of 'Building C1', 'Building C2' and 'Building D1', more wind is channeled under the railway arches to the east of 'Site C' part of the Proposed Development: because of this, wind conditions at receptors '72', '73' and '77' (pavement locations along Water Street) deteriorate by one *comfort* category during the winter months but remain suitable for their intended use. Also, wind conditions at receptor '24' (pavement along the Ring Road), receptors '27' and '28' (pedestrian crossings along Water Street), receptors '29' and '30' (pedestrian crossings along the Ring Road), receptor '32' (pavement along Water Street) and receptor '33' (car park north of New Elm Road) deteriorate by one *comfort* category during the winter months but remain suitable for their intended use. The nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Not Significant**.

Completed Development – Scenario 8

17.66. The completed Proposed Development (Building C1, Building C2, Building D1 and Building D2) has been modelled to represent the conditions in and around the Site within the existing context. The results are discussed below and further detail of the quantification of the results is provided in Section 10 of the Wind Microclimate Technical Report (Appendix 17.1). The 3D model of the completed Proposed Development in the context of the existing surroundings is shown in Figure 17.7 below.

Pedestrian Safety Assessment

17.67. With the introduction of 'Building C1', 'Building C2', 'Building D1' and 'Building D2' part of the Proposed Development (Scenario 8), there no exceedances of the pedestrian *safety* criteria at street level within the boundary of the Site. The nature and scale of the effects are **Negligible** and are therefore considered **Not Significant**.

17.68. Wind conditions across the four (4) terraces under 'Building C1' are rated as safe for the general public except for receptor 'D' (southwest-facing 'gym terrace'). Wind conditions across the four (4) terraces under 'Building C2' are rated as safe for the general public except for receptor 'G' (southwest-facing 'gym terrace'). Wind conditions across the four (4) terraces under 'Building D1' are rated as safe for the general public except for receptor 'J' (northwest-facing 'lounge') and for receptor 'K' (southwest-facing 'gym'). Also, wind conditions across the four (4) terraces under 'Building D2' are rated as safe for the general public except for receptor 'L' (southwest-facing roof terrace) and for receptor 'M' (north-facing external terrace). The nature and scale of the effects for these receptors are **Major Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across these spaces to mitigate the adverse wind conditions. Alternatively, access to these spaces should be restricted when windy conditions are forecasted in the area.

17.69. Within the areas surrounding the Site, with the introduction of 'Building C1', 'Building C2', 'Building D1' and 'Building D2', the localised exceedance of the pedestrian *safety* criteria at receptor '55' (riverside location within the 'One Regent' development) disappears: the nature and scale of the effects for this receptor are **Major Beneficial** and are therefore considered **Not Significant**.

Pedestrian Comfort Assessment

17.70. With the introduction of 'Building C1', 'Building C2', 'Building D1' and 'Building D2' part of the Proposed Development (Scenario 8), wind conditions across the recreational spaces / sitting areas of both 'Site C' and 'Site D' are suitable - at worst - for 'standing / short period of sitting' during the summer months. The nature and scale of the effects are therefore **Negligeable** and considered **Not Significant**.

17.71. Wind conditions across the four (4) terraces under 'Building C1' are suitable - at worst - for 'standing / short period of sitting' during the summer months. Wind conditions across the four (4) terraces under 'Building C2' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'G' (southwest-facing 'gym terrace') which - in parts - only rate as suitable for 'walking' in summer. Wind conditions across the four (4) terraces under 'Building D1' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'K' (southwest-facing 'gym') which - in parts - only rate as suitable for 'walking' in summer. Also, wind conditions across the four (4) terraces under 'Building D2' are suitable - at worst - for 'standing / short period of sitting' during the summer months except for receptor 'L' (southwest-facing roof terrace) and for receptor 'M' (north-facing external terrace) which - in parts - only rate as suitable for 'walking' in summer. The nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Significant**. Bespoke wind mitigation measures will need to be introduced across this space in order to promote the local wind microclimate conditions to be suitable for - at least - 'standing / short period of sitting' during the summer months.

17.72. Within the areas surrounding the Site, with the introduction of 'Building C1', 'Building C2', 'Building D1' and 'Building D2', the exceedance of the pedestrian *comfort* criteria at receptor '56' (bus stops along Regent Road) disappears: the nature and scale of the effects for this receptor are **Moderate Beneficial** and are therefore considered **Not Significant**. The exceedances of the pedestrian *comfort* criteria at receptor '51' (bus stops along Regent Road) and at receptor '55' (riverside location within the 'One Regent' development) persist: the nature and scale of the effects for these receptors are **Negligible** and are therefore considered **Not Significant**. Also, wind conditions at receptors '26', '29' and '30' (pedestrian crossings along the Ring Road), receptors '27' and '28' (pedestrian crossings along Water Street), receptor '32' (pavement along Water Street), receptor '33' (car park north of New Elm Road), receptors '48', '49' and '50' (pedestrian crossings along Regent Road), receptor '59' (Hotel Campanile car park) and receptors '72', '73' and '77' (pavement locations along Water Street) deteriorate by one *comfort* category during the winter months but remain suitable for their intended use: the nature and scale of the effects for these receptors are **Moderate Adverse** and are therefore considered **Not Significant**.

Mitigation Measures

17.73. As anticipated in Paragraphs 17.47 of this document - within this Chapter of the ES - the wind microclimate conditions across and in the vicinity of the finalised version of the Proposed Development have only been presented with its fully integrated wind mitigation strategy in place.

17.74. The integrated approach followed through the entire duration of the design process allowed the design team to consider and take on board 'wind microclimate' input whilst the design was evolving. Wind-related considerations - in fact - influenced the relative distance between the four buildings, their orientation and led to the introduction of the open terraces across their respective first floors. This process also allowed wind mitigation measures (which included: trees in soft landscape; trees in hard landscape; instant hedges; and 50% porous baffles) to become an integral part of the architectural and landscaping design of the Proposed Development.

17.75. Details of the wind mitigation measures can be found in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1). It should be noted that, conservatively, no landscaping across the terrace spaces at the bottom of the buildings part of the Proposed Development have been taken into account in the wind simulations.

Cumulative Effects

17.76. 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:

- Union T2, St. John's [Ref.: 126648/FO/2020]
- Arundel Street [Ref.: 123621/FO/2019]
- Slate Wharf [Ref.: 113614/FO/2016]
- St. John's Place [Ref.:109660/FO/2015]
- Embassy Village [Ref. 129923/FO/21]

Cumulative Assessment – Scenario 3

17.77. The completed Proposed Development (Building C1 only) 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 17.1).

Pedestrian Safety Assessment

17.78. On-site and off-site wind conditions in 'Scenario 3' are - in terms of *safety* - not appreciably different from the ones of 'Scenario 2'.

Pedestrian Comfort Assessment

17.79. On-site and off-site wind conditions in 'Scenario 3' are - in terms of *comfort* - not appreciably different from the ones of 'Scenario 2'.

Cumulative Assessment – Scenario 5

17.80. The completed Proposed Development (Building C1 and Building C2 only) 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 7 of the Wind Microclimate Technical Report (Appendix 17.1).

Pedestrian Safety Assessment

17.81. On-site and off-site wind conditions in 'Scenario 5' are - in terms of *safety* - not appreciably different from the ones of 'Scenario 4'.

Pedestrian Comfort Assessment

17.82. On-site and off-site wind conditions in 'Scenario 5' are - in terms of *comfort* - not appreciably different from the ones of 'Scenario 4'.

Cumulative Assessment – Scenario 7

17.83. The completed Proposed Development (Building C1, Building C2 and Building D1 only) 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 9 of the Wind Microclimate Technical Report (Appendix 17.1).

Pedestrian Safety Assessment

17.84. On-site and off-site wind conditions in 'Scenario 7' are - in terms of *safety* - not appreciably different from the ones of 'Scenario 6'.

Pedestrian Comfort Assessment

17.85. On-site and off-site wind conditions in 'Scenario 7' are - in terms of *comfort* - not appreciably different from the ones of 'Scenario 6'.

Cumulative Assessment – Scenario 9

17.86. The completed Proposed Development (Building C1, Building C2, Building D1 and Building D2) 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 11 of the Wind Microclimate Technical Report (Appendix 17.1).

Pedestrian Safety Assessment

17.87. On-site and off-site wind conditions in 'Scenario 9' are - in terms of *safety* - not appreciably different from the ones of 'Scenario 8'.

Pedestrian Comfort Assessment

17.88. On-site and off-site wind conditions in 'Scenario 9' are - in terms of *comfort* - not appreciably different from the ones of 'Scenario 8'.

Residual Effects

17.89. The completed Proposed Development (Phase 1 only) in the context of both the existing and the cumulative surrounds - with the inclusion of the proposed landscaping strategy / wind mitigation measures - results in residual effects primarily ranging between **Moderate Adverse** and **Negligible** - which are **Not Significant**. The only exception is the west-facing 'wellness terrace' part of Building

C1 for which the residual effects range between **Moderate Adverse** and **Major Adverse** - which are are **Significant**.

17.90. The completed Proposed Development (Phase 1 and Phase 2) in the context of both the existing and the cumulative surrounds - with the inclusion of the proposed landscaping strategy / wind mitigation measures - results in residual effects primarily ranging between **Moderate Adverse** and **Negligible** - which are **Not Significant**. The only exceptions are: the southwest-facing 'gym terrace' part of Building C1 and the northwest-facing 'wellness terrace' part of Building C2 for which the residual effects are **Major Adverse** - which are are **Significant**; the east-facing 'gym terrace' part of Building C1, the southwest-facing 'gym terrace' part of Building C1 and the southwest-facing 'gym terrace' part of Building C2 for which the residual effects are **Moderate Adverse** - which are are **Significant**.

17.91. The completed Proposed Development (Phase 1, Phase 2 and Phase 3) in the context of both the existing and the cumulative surrounds - with the inclusion of the proposed landscaping strategy / wind mitigation measures - results in residual effects primarily ranging between **Moderate Adverse** and **Negligible** - which are **Not Significant**. The only exceptions are: the east-facing 'gym terrace' and the southwest-facing 'gym terrace' part of Building C1, the southwest-facing 'gym terrace' part of Building C2 and the northwest-facing 'lounge' and southwest-facing 'gym' part of Building D1 for which the residual effects are **Major Adverse** - which are are **Significant**; the east-facing 'gym terrace' and the southwest-facing 'gym terrace' part of Building C1, the southwest-facing 'gym terrace' part of Building C2 and the southwest-facing 'gym' part of Building D1 for which the residual effects are **Moderate Adverse** - which are are **Significant**.

17.92. The completed Proposed Development (Phase 1, Phase 2, Phase 3 and Phase 4) in the context of both the existing and the cumulative surrounds - with the inclusion of the proposed landscaping strategy / wind mitigation measures - results in residual effects primarily ranging between **Moderate Beneficial** and **Negligible** - which are **Not Significant**. The only exceptions are: the southwest-facing 'gym terrace' part of Building C1, the southwest-facing 'gym terrace' part of Building C2, the northwest-facing 'lounge' and the southwest-facing 'gym' part of Building D1 and the southwest-facing roof terrace and the north-facing external terrace part of Building D2 for which the residual effects are **Major Adverse** - which are are **Significant**; the southwest-facing 'gym terrace' part of Buiding C2, the southwest-facing 'gym' part of Building D1, the southwest-facing roof terrace and the north-facing external terrace part of Building D2 for which the residual effects are **Moderate Adverse** - which are are **Significant**.

Table 17.6 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

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				
Negligible	-	None	-	Not Significant / Temporary
Operational Phase (Phase 1 only)				
Major Adverse	'Receptor A'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1 and Phase 2)				
Major Adverse	'Receptors D and E'	None specifically	-	Significant / Permanent

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Moderate Adverse	'Receptors B and G'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1, Phase 2 and Phase 3)				
Major Adverse	'Receptors B, D, G, J and K'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 27, 28, 29, 30, 32, 33, 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1, Phase 2, Phase 3 and Phase 4)				
Major Adverse	'Receptors D, G, J, K, L, M'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 26, 27, 28, 29, 30, 32, 33, 48, 49, 50, 59, 72, 73 and 77''	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Major Beneficial	'Receptor 55'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Moderate Beneficial	'Receptor 56'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent

Reference List

17.93. This ES Chapter has been prepared by reference to the following:

- Lawson, T.V., "Building Aerodynamics". Imperial College Press, 2001.
- https://secure.manchester.gov.uk/info/200074/planning/6573/core_strategy_2012-2027.
- Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B., 2007. Best Practice Guideline for the CFD Simulation of Flows in the Urban Environment - Quality Assurance and Improvement of Microscale Meteorological Models", European COST Action 732.

- Architectural Institute of Japan (AIJ), 2007, Guidebook for Practical Applications of CFD to Pedestrian Wind Environment around Buildings, AIJ.
- Architectural Institute of Japan (AIJ), 2016. Benchmarks for validation of CFD simulations applied to pedestrian wind environment around buildings, (AIJ).
- https://historicengland.org.uk/images-books/publications/tall-buildings-advice-note-4/heag037-tall-buildings.
- https://www.cityoflondon.gov.uk/assets/Services-Environment/wind-microclimate-guidelines.pdf.

18. Summary of Residual Impacts

Air Quality

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				
The IAQM guidance does not recommend determining pre-mitigation effects	Construction Phase Fugitive Dust Emissions Dust Soiling and Human Health	Table 6.24: The Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	.Such measures will be included with in a Construction Phase Environmental Management Plan(CEMP).	Negligible dust impacts to property and people on a temporary basis
	Existing Residential and Educational Use	Sustainable construction phase travel plan to reduce HGV movements during construction		Minor Adverse impacts upon existing sensitive uses on a temporary basis
Operational Phase				
Negligble	Existing Baseline Road Vehicle Traffic Exhaust Emissions	Not required	Not required.	Negligible exposure to elevated pollutant concentrations on a permanent basis
	Proposed Residential Use	Best practice measures	Section 6.123 to 6.126: Proposed Development will consider a significant level of offsetting measures in the form of sustainable transport principles. The provision of EVC charging facilities (10% provision) as well as cycle parking facilities (100% provision) will secure a suitable reduction in development related road vehicle exhaust emissions	Negligible impact upon existing sensitive uses on a permanent basis

Climate Change

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect
Construction Phase							
Whole Life Embodied emissions (incl. construction transport)	High	Adverse	Minor	**Moderate-Minor Adverse**	For enhancement only: Whole life carbon and construction	Minor	**Moderate-Minor Adverse**

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect
					reduction measures and further optimisation of the construction transport schedule further explored in later design stages, where possible		
Operational Phase							
Operational Building emissions	High	Adverse	Minor	**Moderate-Minor Adverse**	For enhancement only: A+++ whitegoods and appliances	Minor	**Moderate-Minor Adverse**
Operational Transport emissions	High	Adverse	Moderate	**Major - Moderate Adverse**	On demand EV Charging up to 20%	Minor	**Moderate - Minor Adverse**

Daylight, Sunlight and Overshadowing

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation **Residual Effect** – Significance and Duration (i.e Temporary/Permenant)
Construction Phase				
Daylight	Scoped Out	-	-	-
Sunlight	Scoped Out	-	-	-
Overshadowing	Scoped Our	-	-	-
Operational Phase				
Daylight	Surrounding Residential Properties	None required	-	Negligible to Moderate Permanent Adverse (Non-Significant Effect)
Sunlight	Surrounding Residential Properties	None required	-	Negligible to Minor Permanent Adverse (Non-Significant Effect)
Overshadowing	Surrounding Amenity Areas	None required	-	Permanent Negligible

Heritage

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Construction Phase				
Minor adverse	Castlefield Railway Viaduct (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Minor Adverse	Manchester South Junction and Altrincham Railway Viaduct (setting)	Construction methodology and programme	n/a	Minor Adverse (temporary)
Operational Phase				
Negligible adverse	Railway Bridge Over River Irwell to Former Liverpool Road Station	Public benefits	n/a	Negligible adverse
Minor adverse	Former Canal Flour Mills	Public benefits	n/a	Minor adverse
Negligible adverse	Colonnaded Railway Viaduct at Former Liverpool Road Goods Depot	Public benefits	n/a	Negligible adverse
Negligible adverse	Railway Viaduct Over River Irwell Leading to Lower Byrom Street Warehouse	Public benefits	n/a	Negligible adverse
Minor adverse	Former Commercial Hotel	Public benefits	n/a	Minor adverse
Negligible adverse	Railway Viaduct Linking Bridge Over Irwell to Liverpool Road Station	Public benefits	n/a	Negligible adverse
Moderate adverse	Former Liverpool Road Railway Station, Station Masters House	Public benefits	n/a	Moderate adverse
Negligible adverse	Church Of St George	Public benefits	n/a	Negligible adverse
Neutral	Churchyard Walls, Gate Piers and Gates at Church of St George	n/a	n/a	Neutral
Minor-to-moderate adverse	Power Hall of Museum of Science and Industry	Public benefits	n/a	Minor-to-moderate adverse
Minor adverse	Former Grape Street Railway Bonded Warehouse	Public benefits	n/a	Minor adverse
Negligible adverse	Castlefield Railway Viaduct From G-Mex to Dawson Street	Public benefits	n/a	Negligible adverse

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Moderate adverse	Old Warehouse to North of Former Liverpool Road Railway Station	Public benefits	n/a	Moderate adverse
Minor adverse	123, Liverpool Road	Public benefits	n/a	Minor adverse
Negligible adverse	Albert Warehouse Quay on West Side Fronting River Irwell Victoria Warehouse	Public benefits	n/a	Negligible adverse
Minor adverse	Merchants Warehouse	Public benefits	n/a	Minor adverse
Minor adverse	Museum Of Science and Industry, Air and Space Museum	Public benefits	n/a	Minor adverse
Minor adverse	Manchester Museum of Science and Industry, Former Lower Byrom Street Warehouse	Public benefits	n/a	Minor adverse
Negligible adverse	Irwell Street Bridge (That Part in Salford Civil Parish)	Public benefits	n/a	Negligible adverse
Minor adverse	MSJ&AR Viaduct	Public benefits	n/a	Minor adverse
Minor adverse	Castlefield Conservation Area	Public benefits	n/a	Minor adverse
Negligible adverse	St Johns Conservation Area	Public benefits	n/a	Negligible adverse

Human Health

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				
Socioeconomics: jobs & GVA	Employment & GVA	None	None	Minor Beneficial on employment & GVA
Construction workforce local expenditure	Local expenditure	None	None	Minor Beneficial on local expenditure
Air Quality	Fugitive Dust - Dust Soiling & Human Health	Table 6.24: The Proposed Development will incorporate the specific construction phase mitigation measures outlined in the IAQM guidance.	Construction Phase Environmental Management Plan (CEMP)	Negligible dust impacts to property and people on a temporary basis

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Air Quality	Existing Residential and Educational Use	Sustainable construction phase travel plan to reduce HGV movements during construction	Construction Phase Environmental Management Plan (CEMP)	Minor Adverse impacts upon existing sensitive uses on a temporary basis
Built Heritage	Settings of Railway Bridge & Viaducts	None	None	Minor Adverse
TVIA	Nearby residents & visitors	Use of hoardings & community engagement	Construction Phase Environmental Management Plan (CEMP)	Minor Adverse
Traffic & Transport – driver delay - accidents & safety	Drivers using network	Construction Transport Management Plan CTMP	CTMP to be developed & agreed with relevant consultees	Negligible Temporary
Traffic & Transport – public transport, pedestrian delay, pedestrian/cycling amenity, fear & intimidation, severance	Residential on Liverpool St & vulnerable road users	Construction Transport Management Plan CTMP	CTMP to be developed & agreed with relevant consultees	Negligible Temporary
Noise & Vibration	5 residential sensitive receptors	Solid screening around site, CEMP	CEMP	Negligible Temporary
Solar Glare	31 road user & 6 rail track locations	Embedded in design facades	None	Negligible/Minor Adverse
Solar Glare	6 road user & 3 rail track location	Embedded in design facades	None	Moderate Adverse but no issues for safety
Climate Change – whole life embodied emissions	Climate Change & carbon targets	Materials – whole life reduction Construction Traffic - CEMP	CEMP	Moderate to Minor Adverse
Water – fluvial flooding; reservoir flooding	Onsite workers	Robust flood evacuation plan	CEMP	Negligible
Water – contamination	Groundwater & surfacewater	Storage & use of materials	CEMP	Negligible
Wind Microclimate – pedestrian safety & comfort	Residents & visitors	None	None	Negligible
Operational Phase				
Socioeconomics: Housing	Housing	None	None	Minor Beneficial on Housing
Socioeconomics: Population	Population	None	None	Moderate Beneficial on Population
Socioeconomics: Jobs & GVA	Employment & GVA	None	None	Negligible on employment & GVA
Socioeconomics: household expenditure	Local expenditure	None	None	Moderate Beneficial on local expenditure
Socioeconomics: council tax income	LA income	None	None	Moderate Beneficial on LA income
Socioeconomics: educational provision	Educational provision	None	None	Minor Adverse on educational provision

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Socioeconomics: health care provision	Healthcare	None	None	Minor Adverse on healthcare provision
Socioeconomics: crime	Crime	None	None	Negligible on crime
Socioeconomics: open space & recreation facilities	Open space & recreational facilities	None	None	Minor Adverse on open space & recreational facilities
Air Quality	Road Vehicle Traffic Exhaust Emissions	None	None	Negligible exposure to elevated pollutant concentrations on a permanent basis
Air Quality	Residential Use	Best practice measures	Section 6.123 to 6.126: Proposed Development will consider a significant level of offsetting measures in the form of sustainable transport principles. The provision of EVC charging facilities (up to 20% provision) as well as cycle parking facilities (100% provision) will secure a suitable reduction in development related road vehicle exhaust emissions	Negligible impact upon existing sensitive uses on a permanent basis
Built Heritage	Setting of the MSI complex	Embedded into design	Embedded into design	Moderate – Minor Adverse
Built Heritage	Castlefield Conservation Area	Embedded into design	Embedded into design	Negligible
TVIA	Viewpoint Nos: 16, 20	Embedded into design	Embedded into design	Negligible
TVIA	Viewpoint Nos: 5, 6, 7, 8, 15, 17, 19	Embedded into design	Embedded into design	Minor Beneficial
TVIA	Viewpoint Nos: 1,2 9, 10, 12, 13, 18	Embedded into design	Embedded into design	Moderate Beneficial
TVIA	Viewpoint Nos: 14	Embedded into design	Embedded into design	Minor Adverse
TVIA	Viewpoint Nos: 3, 4, 11, 21	Embedded into design	Embedded into design	Moderate Adverse
Traffic & Transport – driver delay - accidents & safety	Drivers using network Public transport users	Enhancement to capacity at Trinity Way/Water St junction	Secured by condition & implemented prior to occupation of Site D	Negligible

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Traffic & Transport –pedestrian delay, pedestrian/cycling amenity	Residential on Liverpool St & vulnerable road users	Provision of high quality public realm in the site & improvements to existing footways and cycleways	Publicrealm as part of proposals; improvements to pedestrian & cycle facilities to be by condition	Negligible
Traffic & Transport – fear & intimidation, severance	Residential on Liverpool St & vulnerable road users	None	None	Negligible
Noise & Vibration – building services; activity/amenity noise	5 residential sensitive receptors	Design of building services, amenity spaces & commercial units	None	Negligble
Solar Glare	31 road & 6 rail track users	Embedded into design of facades	Embedded into design	Negligible/Minor Adverse Not Signficant
Solar Glare	6 road & 3 rail track users	Embedded into design of facades	Embedded into design	Moderate Adverse & Significant but no issues for safety
Building Emissions	Climate Change	Measures suggested in Energy Strategy	Energy Strategy	Moderate to Minor Adverse
Transport Emissions	Climate Change	Measures suggestd in Travel Plan	Travel Plan	Moderate to Minor Adverse
Water – surfacewater flooding	Site & occupants	Development will include positive surfacewater drainage system to minimise discharge into local sewerage system	Designed into system	Negligible
Water – fluvial flooding	Site & occupants	Finished floor levels; flood resilient construction; flood evacuation plan	Designed into building Flood evacuation plan	Negligible
Water – reservoir flooding	Site & occupants	Flood evacuation plan	Flood evacuation plan	Negligible
Daylight & Sunlight	Surrounding residential properties	None	None	Negligible to Moderate Adverse
Overshadowing	Surrounding amenity areas	None	None	Negligible to Minor Adverse
Wind Microclimate – pedestrian safety & comfort	Receptors D, G, J, K, L, M	None specifically	None	Major Adverse
	Receptor 6	Section 2 Appendix 17.1	-	Moderate Adverse – Significant
	Receptors 26-30, 32-3, 48-50, 59, 72-73, 77	Section 2 Appendix 17.1	-	Moderate Adverse – Not Significant
	Receptor 55	-	-	Major Beneficial – Not Significant
	Receptor 56	-	-	Moderate Beneficial – Not Significant
	All other receptors	Section 2 Appendix 17.1	-	Negligible

Noise

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect

Construction Phase			
Minor to Moderate adverse construction noise	Local residents	Para. 10.113 & 10.114: Solid screening around Site. Communication with City Council and local residents. Application of 'Best Practicable Means' and noise control guidance from BS5228.	Negligible construction noise effects
Operational Phase			
Negligible building services plant noise effects	Residential properties	Para. 10.104: Adherence to environmental noise limits for plant	Negligible building services plant noise effects
Negligible activity noise effects from amenity space and commercial units	Residential properties	Para. 10.110: Adherence to environmental noise limits for amenity spaces	Negligible activity noise effects from amenity spaces and commercial units

Socio-Economics

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Construction Phase				
Minor beneficial on construction jobs and GVA	Employment and GVA	None	None	Minor beneficial on construction jobs and GVA
Minor beneficial on construction workforce local expenditure	Local Expenditure	None	None	Minor beneficial on construction workforce local expenditure
Operational Phase				
Moderate beneficial on housing	Housing	None	None	Moderate beneficial on housing
Moderate beneficial on population	Population	None	None	Moderate beneficial on population
Negligible on jobs and GVA	Employment and GVA	None	None	Negligible on jobs and GVA
Moderate beneficial on household expenditure	Local Expenditure	None	None	Moderate beneficial on household expenditure
Moderate beneficial on council tax income	Local Authority Income	None	None	Moderate beneficial on council tax income
Minor adverse on educational provision	Educational Provision	None	None	Minor adverse on educational provision
Minor adverse on healthcare provision	Healthcare	None	None	Minor adverse on healthcare provision
Negligible on incidences of crime	Crime	None	None	Negligible on incidences of crime
Minor beneficial to negligible on open space and	Open Space and	None	None	Minor beneficial to negligible on open space and recreational facilities

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
recreational facilities	Recreational Facilities			

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permeannt)
Construction Phase				
Minor beneficial on construction jobs and GVA	Employment and GVA	None	None	Minor beneficial on construction jobs and GVA
Minor beneficial on construction workforce local expenditure	Local Expenditure	None	None	Minor beneficial on construction workforce local expenditure
Operational Phase				
Moderate beneficial on housing	Housing	None	None	Moderate beneficial on housing
Moderate beneficial on population	Population	None	None	Moderate beneficial on population
Negligible on jobs and GVA	Employment and GVA	None	None	Negligible on jobs and GVA
Moderate beneficial on household expenditure	Local Expenditure	None	None	Moderate beneficial on household expenditure
Moderate beneficial on council tax income	Local Authority Income	None	None	Moderate beneficial on council tax income
Minor adverse on educational provision	Educational Provision	None	None	Minor adverse on educational provision
Minor adverse on healthcare provision	Healthcare	None	None	Minor adverse on healthcare provision
Negligible on incidences of crime	Crime	None	None	Negligible on incidences of crime
Minor beneficial to negligible on open space and recreational facilities	Open Space and Recreational Facilities	None	None	Minor beneficial to negligible on open space and recreational facilities

Solar Glare

Likely Significant Effect (Pre-Mitigation)	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e. Temporary/Permeant)
Construction Phase				

Likely Significant Effect (Pre-Mitigation)	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e. Temporary/Permeant)
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	None	N/A	Negligible to Moderate adverse and not significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	None	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 3				
Negligible to Moderate to Major Adverse and significant effects on Solar Glare	Road users at nearby junctions	Temporary screening of the one Moderate to Major Adverse junction should the superstructure of C2 not have commenced construction prior to completion of Phase C1. For all remaining junctions, mitigation is embedded in the design and no further façade design mitigation is proposed (Para 13.267-13.270).	Planning Condition	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 4				
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Scenario 5				
Negligible to Moderate to Major Adverse and significant effects on Solar Glare	Road users at nearby junctions	Temporary screening of the one Moderate to Major Adverse junction should the superstructure of D2 not have commenced construction prior to completion of Phase D1. For all remaining junctions, mitigation is embedded in the design and no further façade design mitigation is proposed (Para 13.267-13.270).	Planning condition	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare
Operational Phase (Scenario 6)				
Negligible to Moderate Adverse and significant effects on Solar Glare	Road users at nearby junctions	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Negligible to Moderate and significant effects on Solar Glare
Minor to Moderate Adverse and significant effects on Solar Glare	Train/Tram drivers on nearby tracks	Para 13.267-13.270: Mitigation is embedded in the design and no further façade design mitigation is proposed.	N/A	Minor to Moderate Adverse and significant effects on Solar Glare

Traffic and Transport

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				
Negligible effects on driver delay	Drivers using study network	CTMP	CTMP to be developed prior to commencement of construction phase and agreed with relevant consultees	Negligible – Temporary
Negligible effects on public transport users	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			Negligible – Temporary
	Vulnerable Road Users			
Negligible effects on pedestrian delay	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			Negligible – Temporary
	Vulnerable Road Users			
Negligible effects on pedestrian/ cyclist amenity	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			Negligible – Temporary
	Vulnerable Road Users			
Negligible effects on fear and intimidation	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			Negligible – Temporary
	Vulnerable Road Users			
Negligible effects on severance	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			Negligible – Temporary
	Vulnerable Road Users			
Negligible effects on accidents and road safety	Drivers using study network			Negligible – Temporary
Operational Phase				
Negligible effects on driver delay	Drivers using study network	Enhancements to capacity at the Trinity Way/ Water Street junction including dedicated right-turn facilities for southbound traffic on Trinity Way. Upgrade of Flag Bus Stops to Quality Bus Stop standard	Construction of junction improvements to be secured by condition and be implemented via S278 agreement prior to occupation of Site D	Negligible – Permanent
Negligible effects on public transport users	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street			
	Vulnerable Road Users			
Negligible effects on pedestrian delay	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street	Provision of high-quality public realm on Site Riverside walkway Pavement improvements to adjacent footways.	Public realm to be delivered as part of Proposed Development site. Improvements on the highway to be	Negligible – Permanent
	Vulnerable Road Users			

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
Negligible effects on pedestrian/ cyclist amenity	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street Vulnerable Road Users	Cycle link to connect Trinity Way & Water St . Improved Signage	conditioned and delivered by S278 to agreed timescales.	Negligible – Permanent
Negligible effects on fear and intimidation	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street Vulnerable Road Users	None	n/a	Negligible – Permanent
Negligible effects on severance	Residential Properties on Liverpool Street between junction with Water Street and Lower Byrom Street Vulnerable Road Users			Negligible – Permanent
Negligible effects on accidents and road safety	Drivers using study network			Negligible – Permanent

Townscape and Visual Impact

18.1. 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 8.2** represent the accurate definition of the location and mass of the component parts of the Proposed 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 8.10 above.

Water Resources

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e., Temporary/Permanent)
Fluvial Flooding – Operation Phase **Moderate-High Beneficial**	Proposed development site and site end user	The finished floor levels of the building are set in excess of the 1 in 1000-year gate closed scenario	Mitigation through design	**Moderate-High Beneficial** **Permanent Impact**
Fluvial Flooding - Construction Phase **Moderate adverse.**	Onsite Construction staff Wider Catchment area	During construction there is a negligible chance of fluvial flooding during construction. An onsite Evacuation plan linked to the EA warning is required. Positions of the Compound, site welfare and storage should be at higher elevations on site.	An onsite Evacuation plan linked to the EA warnings. Positions of compound and site storage at higher elevations on site.	**Minor-Moderate adverse.** **Temporary Impact**
Reservoir Flooding – Operation Phase **Negligible**	Proposed development site and site end user	A robust flood evacuation plan developed in line with the Emergency services and future building management.	An onsite Evacuation plan linked to the EA warnings.	**Negligible**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e., Temporary/Permanent)
Reservoir Flooding – Construction Phase **Negligible**	Onsite Construction Staff	A robust flood evacuation plan developed as part of the CEMP by the contractor.	Development of the Flood Evacuation Plan as part of the CEMP.	**Negligible**
Combined Sewer Construction Phase **Minor-Low Adverse**.	Local sewer network	Onsite control of silt and sediment	Monitor wider network, CCTV, and surveys Placement of storage areas away from entrances to the network	**Negligible**
Combined Sewer Operation Phase **Minor-Low Beneficial**,	Local Sewer network	None	None	**Minor-Low Beneficial**, **Permanent Impact**
Groundwater Contamination – Construction Phase **Moderate**	Wider Catchment area Groundwater Quality Local Watercourses	Ensuring leachate from the material stores and spillages do not enter the groundwater table by ensuring material storage is anyway from the watercourse and the monitored to ensure no runoff is seen.	Contractor led CEMP	**Minor-Moderate adverse.** **Temporary Impact**
Groundwater Contamination – Operational Phase **Negligible**	Wider Catchment area Groundwater Quality Local Watercourses	None	None	**Negligible**
Watercourse contamination – Construction Phase **Moderate**	Wider Catchment area Groundwater Quality Local Watercourses	Ensure the Leachate/sediment from materials storage does not enter the watercourse. To do this the material stores should be located away from the watercourse and the monitored to ensure no runoff gets to the watercourse. Care should be taken when working near the watercourse to make sure no material falls into the water	Contractor Lead CEMP	**Minor-Moderate adverse.** **Temporary Impact**
Watercourse Contamination – Operational Phase **Negligible**	Wider Catchment area Groundwater Quality Local Watercourses	None	None	**Negligible**

Wind Microclimate

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				
Negligible	-	None	-	Not Significant / Temporary
Operational Phase (Phase 1 only)				
Major Adverse	'Receptor A'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1 and Phase 2)				
Major Adverse	'Receptors D and E'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors B and G'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1, Phase 2 and Phase 3)				
Major Adverse	'Receptors B, D, G, J and K'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 27, 28, 29, 30, 32, 33, 72, 73 and 77'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Operational Phase (Phase 1, Phase 2, Phase 3 and Phase 4)				
Major Adverse	'Receptors D, G, J, K, L, M'	None specifically	-	Significant / Permanent
Moderate Adverse	'Receptors 26, 27, 28, 29, 30, 32, 33, 48, 49, 50, 59, 72, 73 and 77''	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Major Beneficial	'Receptor 55'	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent
Moderate Beneficial	'Receptor 56'	As described in Section 2 of the Wind Microclimate	-	Not Significant / Permanent

Likely Significant Effect	Receptor(s)	Mitigation Measure	Means of Implementation of Mitigation	Post Mitigation Residual Effect – Significance and Duration (i.e Temporary/Permanent)
		Technical Report (Appendix 17.1)		
Negligible	All other receptors	As described in Section 2 of the Wind Microclimate Technical Report (Appendix 17.1)	-	Not Significant / Permanent

19. Type 1 Cumulative Impacts

Introduction

19.1. This section gives consideration to 'Type 1' cumulative effects.

19.2. The assessment is informed by the results of the technical assessments as set out in Chapter 6 - 17 of the ES.

19.3. Type 1 cumulative effects are also known as 'inter-project' effects, which are the combined effects arising from the Proposed Development upon a set of defined sensitive receptors.

19.4. 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. The standalone assessment is based on the professional opinion and experience of Deloitte, in its capacity as the EIA coordinator.

Legislation, Policy and Guidance

Legislation

19.5. 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'.

19.6. The EIA Regulations require 'a description of the likely significant effects', including cumulative effects.

19.7. 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

19.8. 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

19.9. 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.

19.10. 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'.

19.11. 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

19.12. 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.

19.13. 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.

19.14. 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.

19.15. 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.

19.16. 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.

19.17. 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

19.18. 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.

19.19. 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

19.20. 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.

19.21. 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

Construction Phase

19.22. Based on the methodology detailed above, Table 19.1 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.

Table 19.1: Type 1 Cumulative Effects – Construction Phase

Sensitive Receptor Group	Construction Phase Residual Effects	Likely Significant Cumulative Effects
Construction site workers	Noise: Potential minor adverse noise, vibration on construction workers during construction works.	No likely significant Type 1 cumulative effects
Neighbouring users	Noise: Short term minor adverse impacts arising from construction noise and vibration, and transport.	No likely significant Type 1 cumulative effects
Local Highway and Public Transport	Solar Glare: Negligible to moderate adverse effects on road users from Solar Glare. Minor to moderate adverse effect on train/tram drivers from solar glare.	No likely significant Type 1 cumulative effects
Local watercourses and ground water	Water Courses: Minor to moderate adverse possibility of leachate or sediment entering a watercourse	No likely significant Type 1 cumulative effects
Views, visual setting, and townscape	Townscale and Visual Impact: Minor to moderate adverse impacts on townscape character	No likely significant Type 1 cumulative effects
Heritage Assets	Built Heritage: Temporary minor adverse impacts on the setting of two listed assets (railways viaducts)	No likely significant Type 1 cumulative effects
Job Creation and Economic Benefits	Socio-Economics: Minor beneficial impact on construction job creation, expenditure and Manchester GVA.	No likely significant Type 1 cumulative effects
Carbon Emissions	Climate Change: Minor to moderate adverse impacts when considered whole life carbon emissions in relation to RIBA 2030.	No likely significant Type 1 cumulative effects

19.23. Table 19.1 shows that there is unlikely to in-combination construction phase Type 1 cumulative effects. The proposals construction methods are typical of an urban construction project and the ES has identified a number of key mitigation measures to be employed during the construction phase to mitigate and minimise construction impacts. These mitigation measures are expected to be secured by a Construction and Environmental Method Plan, which is standard construction best practice, to be agreed between the Applicant and MCC as a planning condition.

Operational Phase

19.24. Based on the methodology detailed above, Table 19.2 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 19.2: Type 1 Cumulative Effects – Operational Phase

Sensitive Receptor Group	Operational Phase Residual Effects	Likely Significant Cumulative Effects
Neighbouring residential properties	Daylight and Sunlight: Negligible to Moderate adverse on impacts on daylight and sunlight of surrounding properties.	No likely significant Type 1 cumulative effects
Local highway, and public transport	Solar Glare: Negligible to moderate adverse effects on road users from Solar Glare. Minor to moderate adverse effect on train/tram drivers from solar glare	No likely significant Type 1 cumulative effects
Views, visual setting, and townscape	Towncape and Visual Impact: Moderate adverse to moderate beneficial impacts on select views.	No likely significant Type 1 cumulative effects
Proposed Residential Population	Wind Microclimate: Major adverse impact on for users of the terraces. Which will be mitigated at detailed design state.	No likely significant Type 1 cumulative effects
Pedestrians and Cyclists	Wind Microclimate: Moderate aderse impacts on thoroghfares, but still stuiable for intended use. Moderate to major beneficial impact on a throughfare and bus stop.	No likely significant Type 1 cumulative effects
Local watercourses	Water Courses: moderate to major beneficial impact on fluvial flooding.	No likely significant Type 1 cumulative effects
Local Highway and Public Transport	Solar Glare: Negligible to moderate adverse effects on road users from Solar Glare. Minor to moderate adverse effect on train/tram drivers from solar glare.	No likely significant Type 1 cumulative effects
Job Creation and Economic Benefits	Socio-Economics: Minor to moderate beneficial impacts on the local economy and provision of housing. Minor adverse impacts on educational and healthcare facilities.	No likely significant Type 1 cumulative effects
Heritage Assets	Built Heritage: Minor to moderate adverse impacts on the setting of 10 heritage assets.	No likely significant Type 1 cumulative effects

Sensitive Receptor Group	Operational Phase Residual Effects	Likely Significant Cumulative Effects
Carbon Emissions	Climate Change: Minor to moderate adverse impacts in relation to operational carbon emissons in relation to RIBA 2030 targets.	No likely significant Type 1 cumulative effects

19.25. Table 19.2 shows that there is unlikely to be in-combination operational phase Type 1 cumulative effects to arise. This is due to the extensive technical assessments throughout the design process and the identified mitigation in-built into the design.

Mitigation Measures

19.26. Where relevant, the individual residual effects which contribute to the potential cumulation have been considered within the ES and mitigated where necessary and feasible.

19.27. No mitigation is proposed for the identified Type 1 cumulative effects.

Deloitte.

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