Factory, Manchester

Environmental Statement – Volume 1

October 2016

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1 Introduction

1.1 This Environmental Statement (the "Statement") has been prepared in support of an application for Full Planning Permission submitted by Manchester City Council ('the Applicant') for the proposed new ultra-flexible arts space known as Factory, Manchester, which will become the centrepiece of the new cultural and creative district of St John's in Manchester City Centre.

1.2 The application site (hereafter referred to as the "Site") covers 1.80 hectares (ha) of previously developed land in total, located east of the River Irwell on Water Street. The Site is identified on Figure 1.1.

1.3 The Site is located entirely within the Castlefield Conservation Area and within the former ITV Quay Street Estate in Manchester City Centre. The Site forms part of a wider Masterplan and Strategic Regeneration Framework for the area, which is known as St. John's.

1.4 The Site lies within the administrative area of Manchester City Council (MCC).

1.5 The latest iteration of the St. John's Masterplan is provided at Figure 1.2.

1.6 The EIA assesses the scheme in order to provide a robust assessment and understanding of the overall impacts of the development.

1.7 The Proposed Development comprises the demolition of existing buildings on the Site, and construction of a circa 13,500 sq. m. (GIA) building and works to facilitate public realm provision, landscaping, and highways upgrades. The application for Planning Permission is also supported by an application for Listed Building Consent given the works required to the Grade II Listed Colonnaded Viaduct.

1.8 This Environmental Statement (ES) sets out the findings of a full Environmental Impact Assessment (EIA) carried out for the development of the Site.

1.9 Other phases within the St. John's Masterplan that already have the benefit of Planning Permission and / or form part of the adopted Masterplan are included as part of the assessment of cumulative effects, on the basis of design information as available at the time of assessment during July and August 2016.

1.10 The assessment of cumulative effects (Table 2.6) includes consideration of a proposed Energy Centre, which would comprise a gas-fired Combined Heat and Power facility, in order to enable the

District Heat Network that forms the basis of the energy strategy for St. John's.

1.11 The assessment of cumulative effects has been undertaken on the basis of proposals for conversion of the existing Stage 2 building within the St. John's Masterplan, which was the subject of an application for Planning Permission at the time the assessment work for the Proposed Development was undertaken.

1.12 The application for the Energy Centre has now been withdrawn; however, the cumulative assessment is still presented on the basis of the Energy Centre proposals, given that they were live at the time of assessment and it provides an understanding of the potential cumulative impacts associated with an energy centre of this scale. It is likely that the energy strategy will ultimately be delivered through re-use, enhancement and extension of existing plant located within the former HQ Building on Atherton Street.

1.13 The energy strategy for the Proposed Development is not reliant on the District Heat Network; the details of the proposed energy strategy are set out within the Energy Statement prepared by Buro Happold and submitted in support of the application.

1.14 The proposed development as outlined at Chapters 4 and 5 of this ES is hereafter referred to as the "Proposed Development".

EIA Process

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

1.16 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 and construction, and when the Proposed Development is operational.

1.17 The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended) (the "EIA Regulations") require that any proposed development falling within the description of a 'Schedule 2 development' (as defined within the meaning of the Regulations), will be subject to an Environmental Impact Assessment where such development is likely to have 'significant' effects on the environment by virtue of such factors as its nature, size or location (Regulation 2(b)).

1.18 The Proposed Development falls under the category of "urban development projects" (Schedule 2, 10, (b)) where:

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

1.19 A formal EIA scoping request was submitted to Manchester City Council on 15 July 2016, requesting confirmation as to the proposed scope of the Environmental Impact Assessment required in respect of the Proposed Development. It should be noted that the scoping request was based upon the Town and Country Planning (Environmental Impact Assessment) (England) Regulations 2011, as amended on 6 April 2015.

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

> A description of the Proposed Development comprising information about its nature, size and scale;
>
> The data necessary to identify and assess the main effects that the Proposed Development is likely to have on the environment;
>
> A description of the likely significant effects, direct and indirect, on the environment, explained by reference to the Proposed Development's possible impact on human beings, flora, fauna, soil, water, air, climate, cultural heritage, landscape and the interaction between any of the foregoing material assets;
>
> Where significant adverse effects are identified with respect to any of the foregoing, mitigation measures have been proposed in order to avoid, reduce or remedy those effects; and
>
> Summary, in non-technical language, of the information specified above.

Project Team

1.21 Details of the Project Team are set out in Table 1.1 below

Table 1-1 - Project Team

Organisation	Expertise
Manchester City Council	Applicant
Manchester Quays Limited	Development Manager
OMA	Architect
Gillespies	Landscape Architect
Our Studio	Visualisations

Organisation	Expertise
Hilson Moran	Air Quality
Buro Happold	Ground Conditions and Contamination, Energy
Arup	Noise and Vibration
RoC	Water Resources and Drainage
Heritage Architecture	Historic Environment
Chris Burnett Associates	Townscape and Visual Impact
Vectos	Transport
Urban Microclimate	Wind Microclimate
Salford Archaeology	Archaeology
Greater Manchester Police	Crime Impact Statement
Indigo	Arboriculture
GTech	Television Reception
ERAP	Ecology
Watts	Sunlight and Daylight
Deloitte	Planning and EIA Co-ordination

Organisation of the Environmental Statement

1.22 This ES comprises 14 chapters and is supported by figures (located at the back of each chapter within Volume 1), technical appendices (within a separate Volume 2), and a stand-alone Non-Technical Summary (NTS).

1.23 Figures have been referenced using the chapter number as a prefix followed by the number of the figure within a given chapter. Appendices have been referenced in the same way but due to their size they are contained separately in Volume 2.

1.24 Table 1.2 below sets out the structure of the ES.

Table 1-2 - ES Structure

Chapter No.	Chapter Title	Description
Volume 1		
1	Introduction	Introduction to the ES, EIA requirements, details of project team, ES organisation and availability.
2	EIA Methodology	Methods use to prepare each chapter, description of ES structure and content, generic significance criteria, scoping and consultation.

Chapter No.	Chapter Title	Description
3	Site and Development Description	Site description and details of the Proposed Development. Summary of effects with respect to climate change, energy and sustainability.
4	Construction Methodology	Details of indicative or anticipated programme for development and construction methodology.
5	Alternatives and Design Evolution	Outline of the main alternatives considered by the Applicant.
6	Townscape and Visual Impact	Effects of the Proposed Development on townscape and visual amenity.
7	Historic Environment	Assessment of effects on built heritage resources.
8	Air Quality	Effects of the Proposed Development on air quality.
9	Noise and Vibration	Assessment of effects relating to noise and vibration.
10	Wind Microclimate	Effects of the Proposed Development on microclimate, in terms of wind, including pedestrian comfort levels and safety.
11	Traffic and Transport	Traffic and transportation effects relating to driver severance and delay, pedestrian severance and delay, pedestrian amenity, accidents and safety, hazardous and dangerous loads, dust and dirt.
12	Ground Conditions	Assessment of the effects on ground conditions with respect to potential land contamination.
13	Water Resources and Drainage	Assessment of the effects on water quality, including effects relating to drainage and flood risk.
14	Summary of Residual Impacts	Summary of the effects that remain after mitigation.
Volume 2	Technical Appendices	Technical data and reports to support the chapters in Volume 1.
Standalone Documents:		
Non-Technical Summary		Summary of the ES in non-technical language.

1.25 A number of other documents will be submitted to Manchester City Council in support of the planning application. These include:

- Planning application forms, certificates and notices.
- Planning Application Fee.
- Site Plan (1:1250).
- Existing and proposed plans, section and elevations and demolition plan.
- Design and Access Statement.
- Public Realm Strategy, incorporating Lighting Strategy.
- Planning Statement.
- Statement of Consultation.
- Archaeological Desk-Based Assessment.

- Energy Statement.
- Environmental Standards Statements and BREEAM pre-assessment.
- Ecological Assessment and Bat Survey.
- Crime Impact Statement.
- Travel Plan.
- Site Waste Management and Servicing Strategy.
- TV Reception Survey.
- Ventilation Strategy.
- Event Management Strategy.
- Sunlight and Daylight Assessment.
- Tree Survey.

Environmental Statement Availability

1.26 The ES is available for public viewing online at www.manchester.gov.uk or during normal office hours at the following address:

Manchester City Council
Town Hall
Albert Square
Manchester
M60 2LA

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

Volume 1: ES Main Text & Figures - £150

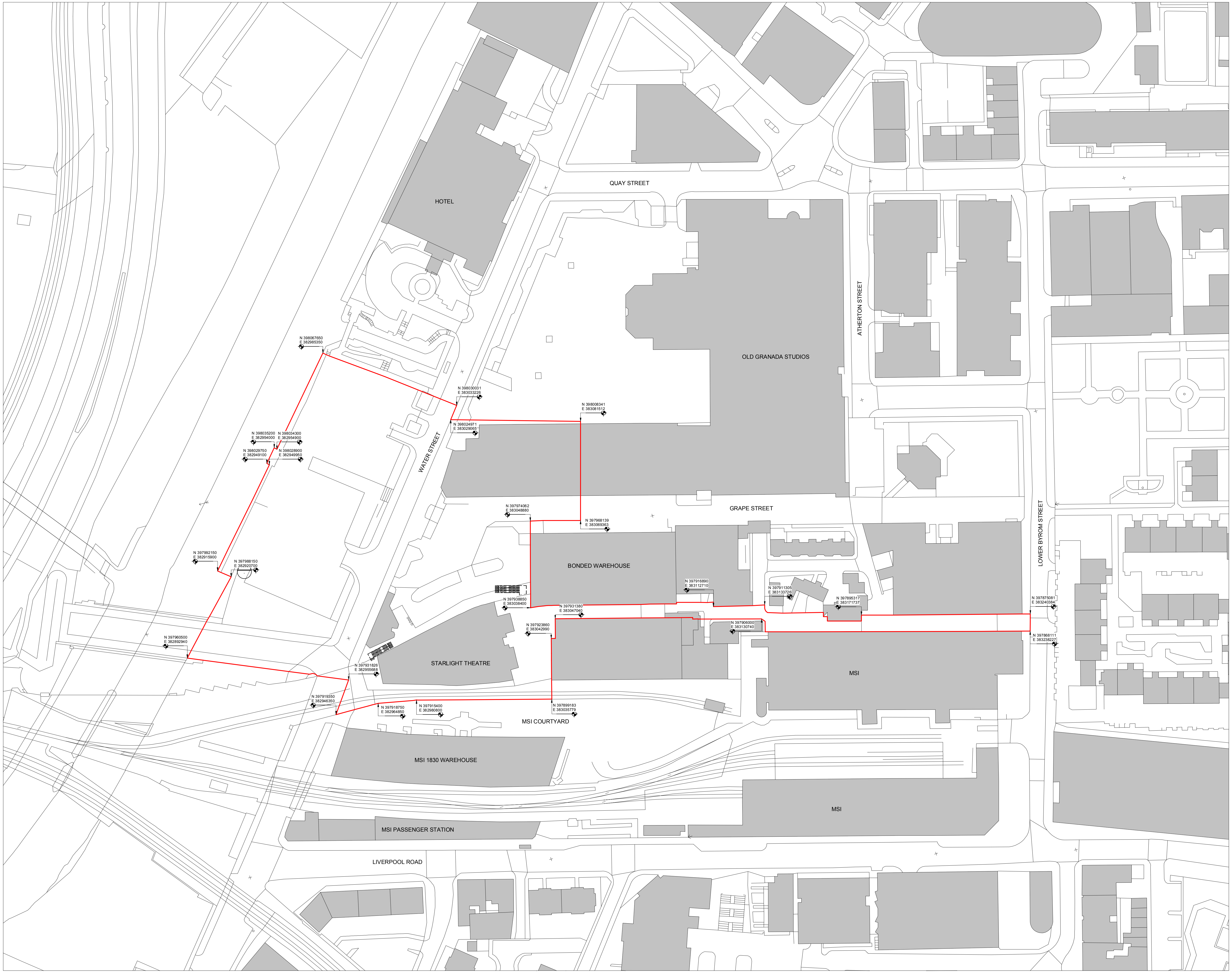
Volume 2: ES Appendices - £150

Non-Technical Summary (NTS) - £15

Full copy (Volumes 1, 2 and Non-Technical Summary) of the ES on CD - £15

1.28 For copies of any of the above please contact the Manchester Planning Team at Deloitte Real Estate:

Factory Project Team
Deloitte Real Estate
Planning Team
2 Hardman Street
Spinningfields
Manchester
M3 3HF



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REV	STAT	DATE	DESCRIPTION
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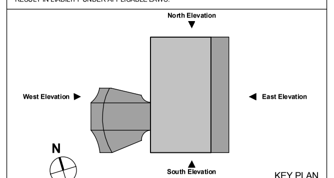

KEY PLAN

DRAWN BY Author	CHECKED BY Checker	APPROVED BY Approver

EXISTING SITE PLAN
SITE BOUNDARY

DRAWING NAME

PHASE

P0
REVISION

PROJ. NR.	SCALE	FORMAT	DATE
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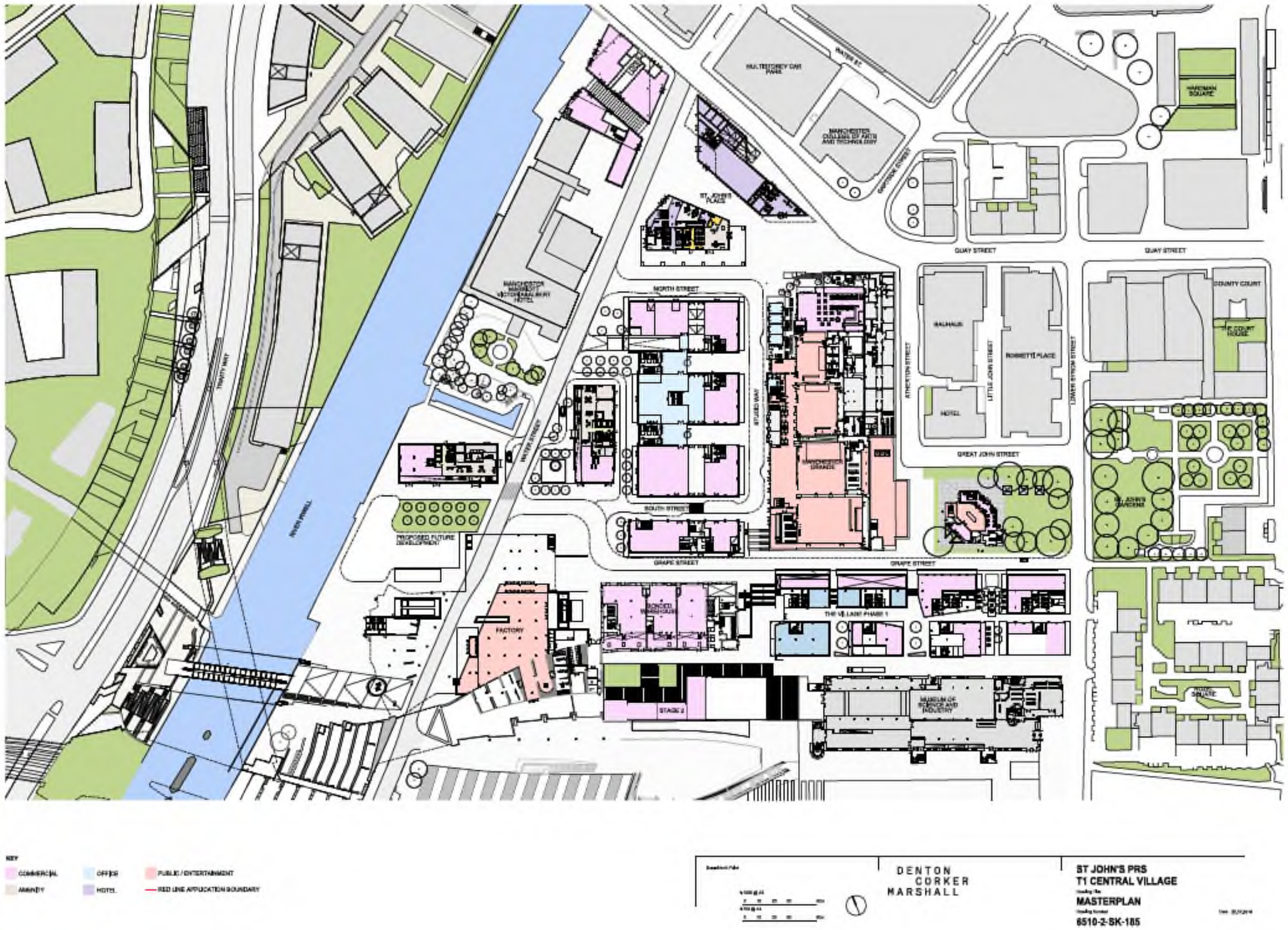

Figure:	**1.2**		
Title:	**St. John's Masterplan Indicative (October 2016)**		
Project:	**Factory, Manchester**		
Date:	**October 2016**	**Scale:**	**NTS**

2 EIA Methodology

Introduction

2.1 This chapter explains the methodology used to prepare each chapter of this Environmental Statement (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 (as defined in Chapter 1 and described in detail in Chapter 4 and 5 of this ES) on the environment.

General Approach

2.2 The ES has been prepared to comply with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended) ('the EIA Regulations'), which implement European Council Directive No. 85/337/EEC as amended by Directive 2011/92/EU.

2.3 The amended Environmental Impact Assessment (EIA) Directive (2014/52/EU) entered into force on 15 May 2014. Member States have to apply these rules as from 16 May 2017 at the latest, although they have not yet been transposed to UK Legislation. Therefore, this EIA complies with Directive 2011/92/EU.

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

- National Planning Practice Guidance – Department for Communities and Local Government, March 2014 (and updated as relevant);
- Impact Assessment Guidelines and ES Review Criteria, Institute of Environmental Management and Assessment (IEMA), 2004;
- Tower Hamlets Council EIA Scoping Guidance, January 2012;
- Guidance on EIA, EIS Review, European Commission, June 2001;
- Guidance on EIA Scoping, European Commission, June 2001; and
- Guidance on Transport Assessment, DCLG and DfT, March 2007.

Scoping

2.5 EIA Scoping has been undertaken to identify the likely significant effects on the environment that may arise from the construction and operational phases of the Proposed Development. This was done with reference to best practice guidance, outlined in paragraph 2.4 above.

2.6 The results of the scoping exercise have determined the subject areas of the EIA, set out in Table 2-1 overleaf.

Table 2-1: EIA Subject Areas

EIA Subject Areas
Townscape and Visual Impact
Historic Environment
Air Quality
Noise and Vibration
Wind Microclimate
Traffic and Transport
Ground Conditions
Water Resources and Drainage

2.7 A scoping request was submitted to Manchester City Council on 15 July 2016. A formal EIA Scoping Opinion is still awaited from Manchester City Council; however, the technical consultants have been in dialogue with stakeholders and this dialogue has informed the approach to assessment.

2.8 The submitted Scoping Report is included at Appendix 2.1.

2.9 The following disciplines do not form part of the EIA, in accordance with the conclusions of the EIA Scoping process and are covered within the overall supporting application documentation and are therefore not included in the ES. An explanation for each discipline is provided below.

Socio-Economic

2.10 The Proposed Development is for a new ultra-flexible arts space, with associated facilities, public realm and access arrangements, which is fully in accordance with adopted planning policy and proposed uses planned for the St. John's Masterplan area.

2.11 The socio-economic effects will be considered in detail as part of the supporting planning justification for the Proposed Development, set out in the Planning Statement.

Ecology and Nature Conservation

2.12 The Site has been assessed for its ecological significance and biodiversity. An Ecological Assessment and Bat Survey has been prepared and submitted with the planning application as a standalone technical report to identify any potential ecological features, protected species and habitats, including those relating to the River Irwell.

2.13 In conclusion, the report demonstrates that the Site is of low ecological importance and therefore this topic area has been formally scoped out of the EIA.

2.14 Redevelopment at the site will provide an opportunity to secure ecological enhancement for fauna typically associated with urban areas.

Telecommunications

2.15 New buildings and structures could disrupt wireless services by physically blocking the signal or reflecting signals from the sides of the structure. However, in the United Kingdom, TV signals switched over to digital during 2012 and are less susceptible to interference.

2.16 The Proposed Development is supported by a TV reception survey prepared by GTech Surveys Limited, which concludes that interference to analogue television service reception would not be possible and severe widespread interference to DTT service reception is not expected.

2.17 Any potential impacts can be mitigated through antenna work and no long-term residual effects are expected. Therefore, this discipline has been formally scoped out of the EIA.

Daylight and Sunlight

2.18 A Daylight and Sunlight assessment has been prepared by Watts and will be submitted as part of the application to demonstrate the impact of the Proposed Development on daylight and sunlight levels on neighbouring properties and spaces, which are commercial in nature.

2.19 The Site has no existing nearby habitable rooms and therefore the impact of the Proposed Development will be negligible in regard to residential receptors.

2.20 In addition, the assessment concludes that there will be no overshadowing impact upon nearby public spaces and the impact upon the one affected elevation of the 1830s Warehouse will be minimal in the context of the City Centre location of the Site.

2.21 Daylight and Sunlight impacts have therefore been scoped out of the EIA.

Archaeology

2.22 An Archaeological Desk-Based Assessment and Watching Brief Report has been prepared in support of the planning application by Salford Archaeology.

2.23 The Assessment identified four sites of potential archaeological interest located within, or partially within, the Site. It concludes that none of the sites are afforded statutory designation, and are thus not considered to necessarily merit preservation in-situ, albeit they may warrant preservation by record.

Arboriculture

2.24 The Proposed Development involves the loss of four trees, none of which are considered to be of ecological significance, as identified by the Tree Survey prepared and submitted in support of the planning application. The Survey concludes that two of the trees are of moderate quality and two of the trees are of low quality; the removal of all trees can be mitigated by replacement planting. High quality soft landscaping is included within the Proposed Development, which will act as a potential habitat for flora and fauna.

Odour

2.25 The Proposed Development and associated land uses are not considered to present any significant issues with regards to odours. Any potential odour impacts would be controlled by the use of appropriate odour abatement and stacks on individual uses. The landlord should have a lease clause to ensure that all odorous fumes are treated so as not to cause a local nuisance. Furthermore, it would be an offense to cause an odour problem and the Local Authority has a statutory duty to prevent such odours happening.

Agricultural Circumstances

2.26 The Site is entirely on brownfield land so there are no likely significant effects with respect to agriculture. This discipline can therefore be scoped out of the EIA.

2.27 The detailed planning application is the culmination of an extensive design process which has involved thorough and continuous consultation with statutory and non-statutory consultees.

Consultation Summary

2.28 The Proposed Development has been developed in consultation with the Local Planning Authority, Officers at Manchester City Council (Highways, Conservation, Flood Risk, Environmental Health, and Access), and Statutory Consultees including Historic England, Transport for Greater Manchester and Greater Manchester Archaeology Advisory Service, Local Ward Councillors, Greater Manchester Police, Places Matter! Design Review Panel, as well as adjoining owners and occupiers, other local stakeholders and the general public.

2.29 Public consultations were also conducted through the forum of public exhibitions, and attended by various members of the project and design team. These were held at the Site:

- St. John's Masterplan update held on 28 July 2016 (Development Office, HQ Building).
- Factory consultation held on 8 September 2016 (Studio 2, OGS).

2.30 Through the various forums, members of the design team were able to share design ideas and gain an insight into the views and ideas of local residents. The consultations provided important information and ideas which proved crucial in the refinement of the proposals.

2.31 A detailed description of the Public Consultation undertaken is set out in the Statement of Consultation that supports the planning application.

Approach to Technical Studies

2.32 Various technical studies were commenced at an early stage in the development process. The findings of these 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.

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

2.34 Where appropriate, assessments involved consultations with statutory and non-statutory bodies, desk-based research, site inspections and surveys, impact prediction and mitigation.

2.35 The assessment and conclusions of the ES are based on the description of the Proposed Development as defined in Chapters 4 and 5 and accompanying plans. Where limitations and uncertainties exist, the technical assessments conclude the "worst case" effects that would arise from the application.

Structure of Technical Chapters

2.36 Each technical chapter of the ES (Chapters 6-13) has been set out broadly in line with Table 2.2.

2.37 Chapter 5 provides information to allow the demolition and construction phase of the Proposed Development to be assessed by the disciplines set out in Chapters 6-13.

Table 2-2 - Chapter Structure

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 explains its purpose in the context of the Proposed Development and the ES.
Assessment Methodology & Significance Criteria	This section describes the method or approach employed in the assessment of impacts, the criteria against which the significance of effects has been evaluated, the sources of information used and any technical difficulties encountered. Relevant legislation is also identified.
Baseline Conditions	This section describes and evaluates the baseline environmental conditions i.e. the current situation and anticipated changes over time assuming the Site remains unchanged. This is a critical part of the EIA process as it provides a measure against which potential environmental effects can be assessed.
Identification and Evaluation of Key Impacts	This section identifies the likely significant effects on the environment resulting from the Proposed Development. A description of the likely effects of the Proposed Development and an assessment of their predicted significance is provided. The assessment of effect significance has been undertaken using appropriate national and international quality standards. Where no such standards exist, the

Technical Chapter Structure	
	judgments that underpin the attribution of significance are described. The guidelines, methods and techniques used in the process of determining significance of effects are contained within each of the technical chapters presented.
Mitigation Measures	One of the main aims of the EIA process is to develop suitable mitigation measures to avoid, reduce or compensate for any significant adverse effects of a project. This section of each technical chapter describes the measures which would be implemented to mitigate potential adverse effects. Where possible, enhancement measures have also been proposed.
Cumulative Effects	This section considers the cumulative effects of the Proposed Development identified within the vicinity of the Site. Any likely significant effects on the environment arising in this respect are set out in this section. There are two distinct types of cumulative effects: Type 1 - Cumulative effects are the interactions between effects of the Proposed Development on a single receptor. Type 2 - Cumulative effects are those that arise from incremental changes caused by other consented or reasonably foreseeable activities ('committed developments') together with the Proposed Development.
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.

Identification and Evaluation of Likely Significant Effects

2.38 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

2.39 The methodology for determining the scale or magnitude of an effect is set out in Table 2.3.

Table 2-3 - Methodology for assessing Magnitude

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

Sensitivity

2.40 The sensitivity of a receptor is based upon the relative importance of the receptor using the scale in Table 2.4.

Table 2-4 - Methodology for assessing Sensitivity

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

Significance

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

Table 2-5: 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
Minor	Moderate-Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

2.42 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'. For example, the Noise and Vibration assessment has been carried out using a methodology developed by the Acoustic Consultant, which has been used by the Acoustic Consultant in respect of other EIA for major development and is explained within the methodology for the Chapter (Chapter 9).

2.43 For the purposes of this Environmental Statement, an effect will be considered to be 'significant' if it is classed as either 'moderate' or 'major'.

Baseline Conditions

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

2.45 The baseline includes nearby schemes under construction (see 'Cumulative Effects' below), including the Ordsall Chord rail link.

2.46 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

2.47 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; and
- Enhancement.

2.48 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.

2.49 Mitigation recommended during the demolition and construction phase would 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 Chapter5: Construction Methodology and Programme. Mitigation measures to be implemented during the operational phase would be secured through planning conditions and obligations.

Residual Effects

2.50 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

2.51 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'). These include:

- Existing completed projects;
- Approved but uncompleted projects;
- Ongoing activities;
- 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.

2.52 A search of Manchester City Council's planning applications database and knowledge of the area has identified a number of schemes for which significant cumulative effects are considered likely. A plan of the cumulative schemes is contained at Appendix 2.2 and a full list is summarised in Table 2.6 below.

Table 2-6: Cumulative Schemes

Scheme	On Site?
St Johns	
1. Bonded Warehouse	No
2. Manchester Grande (now OGS)	No
3. Village Phase 1 (now South Village)	No
4. St Johns Place	No
5. Village Phase 2 (now Central Village and T1)	No
6. Riverside	No
7. Energy Centre	No
8. Trinity Islands	No
Outside Framework Area	
9. 1 Water Street	Yes
10. Astley Byrom House	No
11. XYZ Building	Yes
12. 1 Spinningfields	Yes
13. Demolition of Iron Girder Bridge	Yes
14. Construction of the Ordsall Chord	Yes
15a. Stanley Street (Phase 1)	Yes
15b. Stanley Street (Phase 2)	Yes
15c. Stanley Street (Phase 3)	No
16. Middlewood Locks	Yes (Reserved Matters approved element only)
17. Salford Central (part of which is formed by Stanley Street	Yes

Scheme	On Site?
developments)	
18. Wilburn Basin	Yes
19. Potato Wharf (Phase 2)	No
20. Trinity Way, Gore Street	No

2.53 The Proposed Development forms part of a wider masterplan for the area. This is known as the St. John's Masterplan. The potential for cumulative effects in conjunction with other phases of the wider masterplan has been considered throughout this assessment where appropriate.

2.54 Each technical chapter (Chapters 6-13) has assessed the potential for likely significant effects on the environment as a result of the above committed developments.

Assumptions and Limitations

2.55 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, except where redevelopment proposals have been granted planning permission or form part of an adopted Masterplan. In those cases, it is assumed that permission will be implemented;
- Baseline conditions have been established between 2015 and 2016 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 and Development Description);
- Construction and demolition methods will follow the timetable and methods set out in Chapter 5 (Construction Methodology and Programme);
- 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.

3 Site Development and Description

Site Context

3.1 The Proposed Development forms part of the St. John's Masterplan area in Manchester City Centre. St. John's comprises the former ITV Quay Street estate in Manchester City Centre. The Masterplan site was acquired in March 2014 by Manchester Quays Limited (MQL), a joint venture between Allied London and Manchester City Council, and is the subject of long term regeneration proposals that involve both conversion of existing buildings and redevelopment of other plots to create a new neighbourhood of the City.

3.2 The redevelopment of the Masterplan site is supported by the St. John's Masterplan and Strategic Regeneration Framework (SRF), which were formally adopted by Manchester City Council's Executive Committee in February 2015 and updated in July 2016.

Site Description

3.3 The proposals relate to an area located within the south western part of the St. John's Masterplan, on a site broadly bounded by the River Irwell and surface car parking (currently in use for construction of the Ordsall Chord) to the west, Grape Street and the Bonded Warehouse to the east, the MSI complex, including the 1830 Warehouse (Grade I Listed) to the south and Water Street and surface car parking to the north.

3.4 The Site is approximately 1.80 ha and is currently occupied by surface car parking, the Starlight theatre (formerly in use by ITV for filming and events), Water Street and the Grade II Listed Colonnaded Railway Viaduct (in part), which was also in use by ITV for filming and storage.

3.5 A Site location plan is provided at Figure 1.1.

3.6 The area around the Site is defined by a mix of leisure, commercial and residential uses including Spinningfields to the north, the Great Northern Warehouse and Deansgate to the east and MSI to the south. It is also situated 750m from the Deansgate / Castlefield Metrolink stop and a range of bus and Metroshuttle services.

3.7 Nearby and on site listed buildings include the Colonnaded Railway Viaduct (Grade II Listed) and the 1830 Warehouse (Grade I Listed) as mentioned, as well as the former Liverpool Road Station Master's House (Grade I Listed) and the Railway Bridge over the River Irwell (Grade I Listed) to the south, the Museum of Science and Industry Warehouse to the east (Grade II Listed). A full list of nearby heritage assets is outlined within the Historic Environment Chapter (Chapter 7) and supporting appendices. In addition to nearby listed buildings, the site is located with the Castlefield Conservation Area and approximately 500m to the west of the St John Street Conservation Area.

Planning Context

3.8 Several individual planning applications are being brought forward in order to deliver St. John's. The individual schemes are illustrated on the latest iteration of the St. John's Masterplan at Figure 1.2.

3.9 The earliest phases of the St. John's Masterplan comprises three applications that were granted Planning Permission on 21 October 2015 (Village Phase One, Manchester Grande and Bonded Warehouse), which were each subject to an EIA screening process. It was determined that EIA was not required on the basis that the schemes do not individually exceed the screening thresholds stated within Schedule 2 of the EIA Regulations and that the applications were scheduled to come forward on an earlier timetable. However; the potential for cumulative effects will be considered within this EIA.

3.10 Applications for Planning Permission for further phases of development within the St. John's, including the conversion of the existing Stage 2 Building on site for an Energy Centre and St John's Place (a residential-led scheme incorporating a 52 storey tower and two hotels) were submitted on 13 June 2016. These applications were accompanied by an Environmental Impact Assessment (the St. John's EIA). As noted in Chapter 1, the Energy Centre application was withdrawn during September 2016. The application for St. John's Place is scheduled for determination in October 2016.

3.11 It is anticipated that in Q4 2016 and Q1 2017, further applications will be submitted for the next phases of St. John's and will be supported by EIA documentation. These schemes include Trinity Islands, designed by Child Graddon Lewis (and the subject of a separate EIA) and Central Village and Riverside Towers, designed by Denton Corker Marshall and Cartwright Pickard (subject of an updated re-submission version of the St. John's EIA).

3.12 A separate EIA has been undertaken in respect of the Proposed Development due to its size, location and the nature of its potential effects.

Proposals

3.13 The Proposed Development is fully in accordance with the adopted St. John's Masterplan and Strategic Regeneration Framework and comprises demolition of existing buildings and delivery of a circa 13,500 sq. m. (GIA) ultra-flexible arts' space and associated public realm, access and highways' works. The breakdown of floorspace is as follows:

General Use	Division	Amount (GIA)
Circulation	N/A	2,554 sq. m.
Public Areas	Lobby	1,414 sq. m.
	Toilets	881 sq. m.

General Use	Division	Amount (GIA)
Warehouse	N/A	2,634 sq. m.
Theatre	Main Theatre	1,467 sq. m.
	Orchestra Pit	266 sq. m.
	Theatre foyer	732 sq. m.
	Control Rooms	124 sq. m.
Performer Support	Green Rooms	287 sq. m.
	Dressing Rooms	485 sq. m.
Workspaces	Offices	720 sq. m.
	Workshop	172 sq. m.
Technical Support	Loading	408 sq. m.
	Services / Waste Storage	369 sq. m.
	MEP Internal	519 sq. m.
	BOH Technical Spaces	368 sq. m.
Ancillary Bar	N/A	Within Foyer, Theatre and Warehouse.
Total		13,400 sq. m.

3.14 The formal description of development as per the planning application form is as follows:

Demolition of the Starlight theatre, existing workshop and other structures and perimeter wall, removal of four existing trees, and alterations to the Grade II Listed Colonnaded Railway Viaduct in order to facilitate the development of a new flexible arts space to be used for a range of activities including theatre, music, dance, art, other performance-related events and conferences (Sui Generis) with ancillary facilities, including retail and bar uses, offices, administrative and back of house functions, training and educational facilities, servicing and access arrangements, highways works, creation of new public realm, cycle parking, provision of new plant and associated works.

3.15 The Proposed Development also requires works to the Grade II Listed Colonnaded Railway Viaduct, which will be facilitated by a Listed Building Consent. The formal description of development as per the Listed Building Consent application form is as follows:

Alterations to the Grade II Listed Colonnaded Railway Viaduct to accommodate the structural solution, entrance foyer and support facilities required in relation to a new flexible arts space, Factory Manchester.

3.16 The Proposed Development comprises of four primary elements: the warehouse, theatre, back of house towers and foyer. In addition, new public realm will be provided. The warehouse has a maximum capacity of 5,000 standing; the theatre has a maximum capacity of around 1,600 (seated) or 2,300 (standing or seated).

3.17 The most unique aspect of the Proposed Development is the extent of flexibility that will be provided between the performing and making spaces, allowing for multiple variations in configuration and therefore performance possibilities.

The Warehouse

3.18 The warehouse is the primary space for the Proposed Development, and will have a clear floor space of circa 34 metres by 67 meters and 21 metres high. The clear span is provided by a bridging structure, maintaining a full clear span over the extent of the floor. The entirety of the ceiling is a technical grid. Lighting, equipment, rigging, and full access for technical crew, for any nature of performance, can be placed at any point over the floor area.

3.19 The warehouse can be subdivided into two separate performance spaces, allowing for more intimate theatre configurations, simultaneous performances in two separate areas or performances on a grander scale utilising the full length of the internal space.

3.20 The north and south façade is made up of vertical linear bands of glazing and precast concrete to provide the required acoustic mass to the façade while still allow daylight into the depth of the warehouse adding to the potential for flexibility of use by allowing a variation in internal environment.

3.21 The east and west walls are two layers of pre-cast concrete to ensure noise breakout protection from the internal amplified sound. The outer skin precast panels of 6m wide x 3m high are mounted on acoustic isolation bearings to prevent noise transfer from the inner skin to the outer skin.

The Theatre

3.22 The theatre is the more traditional performance space at the Proposed Development; however, the theatre can also be configured in multiple ways. The sweeping balcony will have fixed seating, with dedicated theatre foyers to the west side of the building. The stalls for the theatre can be removed, used within the warehouse, and the stalls floor left flat for a standing audience. The proscenium can fully open into the warehouse, allowing for the stage to be configured within the contained theatre, or set deeper into the warehouse space.

3.23 The warehouse and theatre can be opened to one another, providing one contiguous floor plan, or subdivided into three separate spaces, with multiple configurations possible in between.

3.24 The organic form of the theatre is conceptually a shrink wrapped form that envelopes the internal arrangement of spaces and primary structure. The theatre geometry requires materials of such a nature that they can easily be constructed to follow the sweeping form of the building.

3.25 The outer skin is formed by triangular precast concrete panels that are resiliently mounted onto the primary steel structure. Laid over the precast panels is rigid insulation formed to take the final shape of the theatre, with a final coating of white reflective material, either fabric typically used in tensile structures or an applied polyester resin monolithic membrane.

3.26 The warehouse and theatre will span Water Street, with a clearance height of 5.03 metres, which has been agreed with Manchester City Council Highways. The approach to the design and treatment of the space along the length of Water Street has been carefully considered to ensure that it is a welcoming and inviting environment. It will include use of lighting and will be enlivened by the occupancy of the foyer to the east.

Back of House Towers

3.27 The support functions for staff and performers are located within the back of house towers located to the east of the Proposed Development, including offices, dressing rooms, rehearsal spaces, workshops and other back of house areas, such as green rooms and food preparation areas.

3.28 The tower facades are an opportunity to introduce a reference to the historical industrial context of the site and create a "Factory" aesthetic. The main façade element is made up of corrugated metal rain-screen panels of varying colours to provide a rich collage of colour and texture using simple industrial materials.

Foyer

3.29 The foyer, which will be created within the Grade II Listed Colonnaded Railway Viaduct and the space underneath the warehouse to the north will provide support spaces for the public, including entrance and reception area, washrooms, coat check, information point and bar. Elements of the viaduct space will also provide some plant and refuse storage for the Proposed Development.

Access and Highways

Pedestrian and Cycle

3.30 The main pedestrian access will be from the city centre to the northeast, along Water Street (via Quay Street) and Grape Street. These two access routes will coincide at Factory Square and the main entrance point to the foyer. There will be additional access from the south, below the Water Street Bridge (via Liverpool Road), and from the future replacement pedestrian/cycle bridge link to Salford (delivered via the Ordsall Chord scheme), which will connect directly across from the Water Street entrance to the foyer.

3.31 It is proposed to offer cycle parking for 40 cycles within the public realm and a further 20 cycles for staff within the service yard.

Servicing Vehicles

3.32 The primary service entrance to the performance spaces will be via two truck lifts adjacent to the theatre. Trucks will access the lifts from Water Street, and will then be lifted to the upper ground level, where they can drive into the warehouse if necessary. This entrance will offer access to both the warehouse and the theatre.

3.33 Occasionally, items which are too large for the truck lifts, will be brought to the upper level from Lower Byrom Street and offers direct access into the warehouse.

3.34 Two on street loading lay-bys will be located on Water Street offering space for 3 HGVs in total. Small goods and catering supplies for the foyer will be offloaded at a lay-by and brought directly into the foyer through the Water Street entrance.

3.35 General goods and refuse will be delivered and offloaded at a gated service yard off Grape Street.

Vehicular

3.36 There is no dedicated parking for the Factory; visitors will be able to park in the Spinningfields, New Bailey, Great Northern NCP car parks. Further information regarding capacity in nearby car parks is provided within the Transport Assessment prepared by Vectos (Appendix 11.1).

3.37 Five disabled parking bays will be located within the public realm adjacent to Water Street.

3.38 Coach drop-off and pick-up will take place from existing bays located on Liverpool Road, Water Street and Lower Byrom Street.

3.39 The two loading bays located on Water Street will double as taxi ranks in the evening. An additional taxi rank is provided to the south of the Proposed Development on Water Street, offering space for 6 vehicles.

3.40 Tourbus parking is proposed to be accommodated along Water Street in close proximity to the Proposed Development.

Public Realm and Landscaping

3.41 The Proposed Development will have two main areas of public realm: Festival Square to the north and Factory Square to the west, which will be separated by Water Street. These two areas will be linked with the foyer into one contiguous area of public realm through the use of a unifying surface of robust and durable materials potentially marked in parallel to the River Irwell and Water Street.

3.42 The foyer is located below the warehouse and will activate, utilise and restore the existing brick arches of the Grade II Listed Colonnaded Railway Viaduct. It is intended for the foyer space to serve as “indoor” public realm during day-to-day operation.

3.43 Subject to future development plans and agreement with MSI, there is potential for creation of a connection at the ground level of the

Grade II Listed Colonnaded Railway Viaduct direct into the MSI estate and lower level courtyard. The proposals have been future-proofed to enable this connection.

4 Construction Programme and Methodology

4.1 This chapter of the Environmental Statement (ES) has been prepared with input from Laing O'Rourke and describes the anticipated demolition and construction methodology and timing of the Proposed Development. It should be read with reference to the Construction Management Plan.

4.2 Consideration of the likely significant effects on the environment that may arise during these phases of the Proposed Development and any necessary mitigation measures are provided within Chapters 6 to 13 of this ES.

4.3 Planning for demolition and construction is necessarily broad at this stage and may be subject to modification during detailed construction planning. However, it is not anticipated that there will be any different or new significant environmental effects if the phasing differs from that assessed. If there are, then a supplemental ES will be submitted to address those new or different impacts.

Indicative Programme and Methodology

4.4 The construction programme will span a period of approximately three years, which is anticipated to commence from February 2017.

4.5 The Factory can be considered as three separate connected buildings:

- The theatre
- The warehouse
- The towers

4.6 It is currently anticipated that all buildings will be constructed almost concurrently, with the theatre following slightly behind the warehouse and the towers, due to the structural reliance on the west wall of the warehouse to support the theatre technical grid trusses.

4.7 The construction programme is divided into the following seven overlapping stages:

Table 4.1 - Programme of Works

Stage	Proposed Works
Stage 1 – Enabling Works (22 weeks)	Site establishment, demolition of existing buildings and underground services relocations.
Stage 2 – Substructure works and initial concrete structures (52 weeks)	Sub structure works (piling and foundations externally and internally within the arches), drainage works, erection of tower cranes and install concrete structures from ground up to the level 1 slab.
Stage 3 – Structural Steel and Precast (76 weeks)	Insert structural steel to the warehouse walls and structural steel to the towers structures. Precast concrete inner lining to warehouse walls and precast Concrete external lining to the Warehouse installation. Primary structural steel to the theatre and secondary structural steel to the theatre installation. Triangular precast slabs to the theatre.
Stage 4 – Roof Structure Warehouse (36 weeks)	Installation of structural steel roof trusses, technical ceiling, acoustic slabs and Strand Jacking.
Stage 5 - Roof and Envelope works (39 weeks)	Insulation and single ply membrane to the warehouse and towers, insulation and single ply membrane or GRP to the theatre and installation of structure and glazing to the warehouse gables before installing envelope / cladding to the towers.
Stage 6 - Fit out internally (53 weeks)	Fit Large Acoustic Doors and Specialist Equipment. Install lifts and escalators, internal partitions, floor wall and ceiling finishes, doors and glazed screens before Mechanical Electrical and Plumbing and toilet fit out. Testing and Commissioning.
Stage 7 – Public Realm	Paving and roads to all external areas including associated services.

4.8 Best practice methods will be utilised at all times to minimise the impact on local residents and adjacent buildings. Laing O'Rourke's construction strategy will involve prefabrication off site where possible, this will reduce the programme period, minimise deliveries and reduce on site activities, with associated health, safety and quality benefits.

4.9 This will include the use of precast concrete in lieu of in-situ concrete where feasible and off site assembly of Mechanical Electrical and Plumbing (MEP) modules and plant rooms where possible.

4.10 The methodology will be developed in detail when the specialist subcontractors are appointed.

4.11 Construction hours will generally be based upon conventional Manchester City Council prescribed guidance of 0730-1800 hours (Monday to Friday) and 0830-1400 hours (Saturday) with no work scheduled to occur on Sundays or Bank Holidays.

4.12 If essential work is required outside of these typical working hours, which can occur during large and complex construction projects, notification will be given to the Council in order to seek their approval. Regular communication from Laing O'Rourke with adjacent landowners and residents will also seek to manage impact on residential amenity.

Demolition and Construction Impacts

4.13 During the demolition phase, standard working practices will be implemented to minimise likely significant effects on sensitive receptors. Contractors for the demolition and construction works would adhere to the Considerate Constructors Code.

4.14 Detailed assessments of the likely significant effects on the environment that could result from the demolition and construction works are considered within Chapters 6 to 13 inclusive. However, a brief summary of potential impacts (without mitigation in place) is presented in Table 4.1 below.

Table 4-1 - Potential demolition and other enabling work impacts to be managed

Topic	Potential Impact
Noise	Increased road noise levels from vehicles; and Increased noise levels from plant during general demolition and construction works.
Vibration	Increased vibration levels from vehicles; and Increased vibration levels from plant during demolition and construction works.
Dust / Local Air Quality	Generation of windblown dust nuisance from ground surfaces, stockpiles, vehicles, workforces and cutting and grinding of materials; and Generation of exhaust emissions from lorries and plant delivering and removing materials including dust and particulates which have the potential to impact upon local air quality.

Topic	Potential Impact
Waste / Sustainability	Waste generation and its appropriate disposal; and Waste will be managed in accordance with a Site Waste Management Plan (SWMP) produced and submitted to MCC prior to work starting on Site. The SWMP will ensure that the requirements of relevant legislation are met.
Traffic	Traffic congestion caused by Site traffic and an increase in heavy goods vehicle (HGV) movements; Traffic disruptions from abnormal or hazardous loads; and Transfer of mud and material from vehicles onto the public highway creating pollution hazards.
Storage of fuels and construction materials	Accidental spills and discharges to drains which may create pollution hazards.
Pedestrian access to Site and surroundings	Disruptions to pedestrian access and routes within the locality of the Site.
Hazardous materials and contaminated land	Exposure of the workforce to hazardous materials and ground contamination.
Water Quality	Water demand for construction activities and domestic use by the contractor (however, this is anticipated to be low); Generation of domestic foul effluent by contractors.

Controls to Protect the Environment

4.15 The environmental controls (or mitigation measures) to eliminate, reduce or offset likely significant adverse environmental effects during the demolition and construction phase (as identified above) are identified below. It is anticipated that these controls would be secured by appropriate planning condition or obligation:

- **Traffic Management Plan**: this document will include traffic management procedures, integration of traffic management with other St John's projects and the Ordsall Chord ongoing in the area. The document provides details of access, egress and turning points, temporary alterations to local traffic routes, additions or alterations to signage and road markings, segregation of vehicles and pedestrians, car parking / travel plan, tower crane unloading locations and any other measures to ensure the safe movement of pedestrians and vehicles, both on and off site.
- **Environmental Management Plan (EMP):** this document will set out the methods of managing environmental issues for all involved with the demolition and construction works such as:
    - o Pollution control (prevention of water course and ground pollution, storage and disposal of fuels, oils and other chemicals. Provision of spill kits).

  - Noise and vibration control (mitigation measures, such as best practice techniques, attenuation, and timing of activities).
  - Dust (suppression measures during demolition and other dust generating activities).
  - Mud (wheel wash measures to prevent contamination of the roads).

- Requirement to comply with the EMP will be included as part of the contract conditions for each element of the work. All contractors tendering for work will be required to demonstrate that their proposals can comply with the content of the EMP and any conditions or obligations secured through the Planning Permission.
- Laing O'Rourke would also seek to establish a dedicated point of contact and assigning responsibility to deal with demolition and construction related issues if they arise - this would be a named representative from the construction team.
- **Waste Management Plan:** in line with "Site Waste Management Plan Regulation 2008" (SWMP), the waste management plan will demonstrate selection of materials to minimise waste, types and quantities of waste that will be produced and targets established. It will identify how waste can be re-used, recycled, or recovered.

4.16 Laing O'Rourke will establish procedures, to ensure the prevention of water and ground pollution, relating to the following risk activities:

- Demolition.
- Earthworks (including stockpiling of spoil, and movement/storage of contaminated soils).
- Dewatering of excavations.
- Concrete works (including washing out concrete delivery vehicles).
- Storage and movement of fuels, oils and chemicals.
- Cleaning (including plant/machinery and wheel washing).

4.17 Increased levels of dust are most likely to occur during site activities related to demolition, piling, moving construction traffic and ground works. In order to minimise dust and fumes, LOR will consider the following:

- Providing hardstanding where vehicle movements mostly occur.
- Control measures and dust suppression techniques.
- Planning and controlling the orientation, shape and locations of stockpiles, to minimise the risk of dust rising through wind action.
- Measures such as screening and covering.
- Installing appropriate wheel washing facilities at the site exit, to minimise and reduce the risk of dust emissions and deposition of material on the public highway.
- Keeping adjacent roads and hardstanding clean.

- Ensuring appropriate selection and maintenance of construction vehicles, plant and equipment (i.e. vehicle and plant which produce less emissions and are regularly serviced).
- Ensuring plant and equipment is not left running for long periods when not directly in use.
- Selecting where possible electrically powered plant, instead of petrol or diesel.
- Ensuring no wastes or unwanted material is burned on site.

4.18 Waste will be generated during all stages of the construction programme. However, this will be carefully managed and cleared to prevent nuisances such as litter, dust, odour and pests, and to maintain a "clean" working and site environment, for the benefit of all parties. Major sources of waste within the construction process are anticipated to include:

- Surplus soils from the construction.
- Packaging – plastics, pallets, expanded foams etc.
- Waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling, spillage etc.
- Liquid wastes, other than surface water run-off and foul drainage, such as waste oils and chemicals.

4.19 During the demolition and construction phase, requirements for the management of waste will be communicated to all sub-contractors to ensure that waste is managed in accordance with the waste hierarchy and relevant statutory controls. These measures will be controlled through the EMP and Site Waste Management Plan (SWMP) in consultation with the relevant authorities.

4.20 The Government removed the statutory requirement for SWMPs in England in October 2013. However, because SWMPs are considered good practice, a SWMP will be produced to ensure that demolition and construction wastes are dealt with in an appropriate manner and in accordance with the waste hierarchy.

4.21 Procedures for the segregation and storage of waste will be detailed in the SWMP. This will include the use of colour-coded skips to facilitate segregation for re-use and recycling; inspection of containers to ensure they are fit for purpose. There will not be any mixing of hazardous and non-hazardous wastes.

4.22 For waste removed from the Site, notification by the Contractor/Construction Manager for approval (via consultation with the authorities) will take place. Loads will only be deposited at authorised waste treatment and disposal sites. Deposition will be in accordance with the requirements of the Environment Agency and all relevant legislation.

4.23 Any person removing waste from the Site will hold a current waste carrier licence and all waste shall be received at an authorised waste treatment or disposal facility. The nominated person(s) with responsibility for waste will ensure that all relevant authorisations are in place prior to off-site removal. No burning of construction waste will be undertaken on the Site.

4.24 In addition, removal of any inert or non-hazardous waste from the Site will be accompanied by a Waste Transfer Note (WTN), signed by both the producer and the carrier of the waste, and correctly completed in accordance with the Environmental Protection (Duty of Care) Regulations 1991 (as amended). This will apply to the removal of both solid and liquid wastes (other than surface water run-off and foul drainage).

4.25 To prove the correct depositing of waste material and to prevent the occurrence of fly-tipping, removal of any hazardous waste from the Site will be accompanied by a Hazardous Waste Consignment Note (HWCN), signed by both the producer and the carrier of the waste, and correctly completed in accordance with the Hazardous Waste Regulations (England and Wales) Regulations 2005. This will apply to the removal of both solid and liquid wastes (other than surface water run-off and foul drainage).

Sustainability

4.26 A Sustainability Strategy is being developed for the construction phase of the project and will include:-

- Considerate Constructor Scheme (Target Score minimum 37/50).
- Ecology/Biodiversity (maintaining and enhancing the existing).
- Diversity (encourage a diverse workforce).
- Energy (reduced CO_2 targets and consumption monitoring).
- Water management (usage controlled and rainwater recycling implemented).
- Welfare (of all stakeholders including operatives and staff).
- Local employment initiatives and targets.
- Apprentice numbers.
- Community Liaison and Education (arrange information sessions in the community and assist in ready for work initiatives).

Communication

4.27 A Communications Plan will be developed for the project and will include:-

- A complaints procedure to ensure complaints are logged and dealt with promptly.
- Regular liaisons with local residents and occupiers to mitigate the adverse effects of construction in the immediate area, by advising them of forthcoming construction activities and updating on progress. This may be in the form of newsletters, pre-arranged general meetings, or other visits. A Construction Liaison Officer

will be appointed to manage communication and any complaints that may arise.

4.28 The importance of the neighbourhood liaison role has been recognised in ensuring the smooth running of site activities and their relation to the local residents and general public's welfare.

4.29 This represents a key function through which the co-ordination of site activities, the needs of the neighbours and requirements of the statutory authorities are effectively communicated and dealt with. In this way all stakeholders are consulted and informed.

4.30 During the execution of the works, Laing O`Rourke will ensure all works are carried out safely and in such a way it will not inconvenience pedestrians or other road users and with a positive consideration to the needs of the local residents, site personnel and visitors as well as the general public.

4.31 Laing O`Rourke will make regular progress updates either as a leaflet drop to adjacent properties or via the Management Company and on line facilities. Under the Considerate Contractor's scheme, and in accordance with the target Environmental standards, Laing O`Rourke will maintain regular dialogue with neighbours and provide regular updates on site progress and logistics.

4.32 Risks of noise, dust and air pollution will be considered for each proposed activity and associated mitigation measures will be implemented.

5 Alternatives and Design Evolution

Introduction

5.1 Paragraph 2, Part I of Schedule 4 of the EIA Regulations requires the Applicant to provide details of the main alternatives considered.

5.2 This chapter briefly outlines the evolution of the scheme's design, and 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.

5.3 This chapter explains the evolution of the development and its layout, and discusses the following alternative options:

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

The "do nothing" alternative

5.4 The "do nothing" scenario refers to the option of leaving the Site in its current state, therefore as semi-vacant buildings, together with extensive areas of surface car parking.

5.5 The Site is subject to an adopted Masterplan and Strategic Regeneration Framework (Manchester City Council Executive Committee, February 2015 and updated in July 2016), which identifies it as a key strategic area for regeneration. The Site's redevelopment is expected to bring socio-economic and regeneration benefits to Greater Manchester.

5.6 In the Autumn Statement of December 2014, the Government announced funding of £78 million for the Proposed Development: a unique, large-scale, technologically advanced and ultra-flexible arts space designed to enhance the UK's cultural reputation and output. It represents a major investment in the arts sector outside the capital.

5.7 Manchester is one of the fastest growing cities in Europe and the fastest in the UK. In recent years it has been undergoing transformative regeneration, with the cultural and creative sectors playing a central role.

5.8 The strategy for successful, sustainable growth has seen the city's overall social and economic offer significantly improved, its international profile increased and its reputation as a cultural destination enhanced.

5.9 As one of the ten largest publicly funded arts organisations in the country, the Proposed Development will act as a major driver of the next stage of Manchester's regeneration – with clear cultural, economic, educational and social benefits for the city and the wider region.

5.10 The "do nothing" scenario has been discounted due to the established need for regeneration of the Site, and the potential socio-economic benefits it is anticipated to bring. The Site is considered suitable for the Proposed Development as it is brownfield land, strategically allocated, and suitable for significant development in terms of its urban location and good transport links.

Site Selection Context

5.11 The Proposed Development will be located at the heart of a new creative neighbourhood, St John's, in the city centre. The Site was selected for the Proposed Development after an independent appraisal of possible locations elsewhere in the city centre, which was required to underpin the robustness of the original proposition. This appraisal discounted other potential locations for the Proposed Development on the basis of scale, availability, wider mix of uses and adopted policy position.

5.12 Subsequently, locations within the St. John's Masterplan area were assessed against the contribution to practicability and regeneration benefits.

5.13 The Site forms a natural extension to the existing Manchester City Centre settlement, and has the potential to provide economic, regeneration, and employment benefits which will contribute to wider strategic aims of the region. It is brownfield land, previously in use for commercial purposes, and its selection for regeneration is supported by a range of policy documents, as discussed in the Planning Statement submitted in support of the planning application.

5.14 The Site's urban location, transport links, brownfield nature, and ability to sustainably contribute to wider strategic aims are key elements in its selection as a suitable site for mixed-use development.

5.15 As a new creative enterprise and production district, St. John's is the ideal location for the Proposed Development, which will act as a cultural anchor for the neighbourhood.

5.16 Factors in the decision to locate the Proposed Development at St. John's include:

- Large-scale regeneration site within the control of a single entity and available for redevelopment.
- Location within Manchester city centre with its comprehensive public transport network.
- Capable of accommodating large numbers of visitors.
- Close to a number of the city's most successful and distinctive urban neighbourhoods.

- Proximity to high-quality retail and leisure uses, including major visitor attractions such as the Museum of Science and Industry.
- The role of St. John's in providing space and opportunities for a range of supporting uses and functions, creating a larger and richer creative cluster that enables more talented people to stay and make their careers in Manchester.

5.17 There is a clear ability to support and drive forward a strategic regeneration project in line with a comprehensive masterplan at St. John's that will deliver a range of complementary and supporting uses, including retail, hotels, leisure, culture, workspace and residential.

5.18 A core development principle of the St. John's Masterplan is to retain, refurbish and re-use key heritage assets. The Site provides the volume of space required to deliver this unique new large-scale venue, while ensuring that these assets can be retained and re-purposed in a way that creates an exceptional and distinctive sense of place.

5.19 This chapter does not therefore consider alternative sites within the context of the planning application, as the Site's selection occurred beforehand through the policy-making and Strategic Regeneration Framework processes.

Design Evolution

5.20 The form of the Proposed Development has been influenced by a range of factors including: location; existing and proposed surrounding uses; landscape character; and, technical constraints at the Site.

5.21 The Proposed Development has been developed in consultation with the Local Planning Authority, Senior Officers at Manchester City Council, Statutory Consultees, other key stakeholders, adjoining owners and occupiers and local residents. As part of the consultation process, a range of stakeholders have been engaged including the following:

- Manchester Quays Limited.
- Salford City Council.
- Historic England.
- Greater Manchester Police.
- Manchester City Council Highways.
- Manchester City Council Conservation.
- Manchester City Council Access.
- Manchester City Council Environmental Health.
- Manchester City Council Flood Risk.
- Transport for Greater Manchester.
- Greater Manchester Archaeological Advisory Service.
- Local Ward Councillors.

- Castlefield Forum.
- Museum of Science and Industry.
- Network Rail.
- Local Residents and Businesses.
- Places Matter!
- Artistic curators, directors and artists.

5.22 The functional requirements of the Proposed Development, the Site's context and constraints, the need to maximise the presence of the Proposed Development and carefully consider its relationship to the wider masterplan phases of development, has been fully assessed.

5.23 The strategic principles and design drivers identified for the Proposed Development were:

- Maximising the benefits of its City Centre location.
- Promoting cultural innovation, growth, skills development and talent retention.
- Opening up connections within and through the Site.
- Creating sustainable neighbourhoods with a distinctive sense of place.
- Maintaining linkages to the area's historic past.
- Historically-sensitive regeneration to provide multiple strategic benefits.
- Providing a landmark, high-quality development to showcase Manchester on the world stage.
- Creating a unique large scale, ultra-flexible arts space.
- Capacity for elements to be used together, or separately, with full acoustic separation.
- A space where the newest type of cultural and creative products can be created.

5.24 Sustainability principles have also been incorporated throughout the design process. Key considerations included:

- Sustainable high quality design.
- Creating mixed communities, contributing to social sustainability.
- Reducing carbon emissions through developing energy efficient buildings.
- Promoting biodiversity.
- Complementing sustainable transport measures and increasing accessibility.
- Managing of water and energy resources.
- Encouraging waste minimisation.

Site Layout

5.25 The layout of the Site has been influenced through consideration of its historic context and local constraints such as townscape, the surrounding built form and visual amenity, flood risk and ecology. Therefore, there has been limited scope for considering alternative layouts.

5.26 The position of the Proposed Development was originally located adjacent to Network Rail owned land to provide sufficient space for buildings located nearby within the adopted Masterplan. Due to the need by both Network Rail and Salford City Council to retain access to land in the vicinity of the Site for maintenance of the railway and new pedestrian foot-bridge, the position of the building was moved north and east of its original position.

5.27 In addition, this design development also enabled the Proposed Development to shift further away from the highly graded Listed Buildings within the Museum of Science and Industry complex and allowed the potential physical impact on the Grade II Listed Colonnaded Railway Viaduct to be minimised.

5.28 The building has also been positioned to maximise the benefits of the public realm. The public space to be located between the River Irwell and Water Street will receive sunlight during most hours of the day and combines with redeveloped public spaces on Grape Street to create a cohesive and comprehensive public realm strategy.

5.29 Existing and historic street patterns have been a key influence on the wider St. John’s Masterplan, which is based on a grid system to reflect the historic layout of the area. Grape Street will be opened up to the public, and forms a key thoroughfare through the Masterplan site; the Proposed Development incorporates a new public space that addresses Grape Street.

5.30 Consideration of Listed Structures and non-designated heritage assets has also informed the layout, height and massing of the building, which has been positioned and designed to complement these nearby historic assets.

Consideration of Alternative Uses

5.31 The St. John’s Masterplan adopted in February 2015 identified the Site as being suitable for a residential tower with active uses at ground floor, as part of the wider mixed-use residential led scheme. The supporting Strategic Regeneration Framework identified that St. John’s would be a cultural and creative district, which could accommodate 2-3 new arts’ buildings although at that stage the precise location of these facilities was not identified.

5.32 Following the funding commitment from Central Government and The Arts Council England and after completion of an options appraisal undertaken by Manchester City Council, it was confirmed that St John’s would be the most suitable location for this new cultural venue.

5.33 The delivery of a cultural facility within this location would complement the mix of uses across the wider Site, which include workspace and retail and leisure uses, which would support the Proposed Development as well as gain from the cultural anchor it would provide for St. John's.

5.34 The Proposed Development would provide an active use that would encourage vibrancy during the day and evening and as such it has been located in part of the St. John's Masterplan that is more focused to commercial uses.

5.35 The Proposed Development will support growth, creating new jobs and opportunities to develop careers in creative and new technologies, within a key growth sector for the City Region.

5.36 For the reasons above, alternative uses were discounted as the proposed employment uses and public realm provision will provide an important asset to the local and regional community, as well as a world-class ultra-flexible arts' space that can become a major contributor to strategic growth in the North.

Consideration of Alternative Designs

5.37 Following a design competition, OMA Architects were selected to be the lead designers of the scheme. The brief was to design a new kind of large-scale venue aligned with the vision of Manchester International Festival, with partnerships, production capacity and technical sophistication to provide a cultural counter-weight to London.

5.38 Flexibility was key to the design brief and therefore the Proposed Development has been designed with multi-purpose spaces that can support both the creation and presentation of large scale artistic projects, with the ability to transform from a tradition sit down theatre to a venue at full standing capacity in a matter of hours.

5.39 The design of the Proposed Development has been subject to a detailed design process, developed in conjunction with a range of stakeholders. Public engagement and consultation has formed an important tenet of the process, as detailed in Chapter 2 of this ES and within the Statement of Consultation prepared in support of the planning application.

5.40 Review of the design with Historic England confirmed that the revised building position, which resulted in moving the building north by 7 meters, was beneficial from a heritage standpoint. The repositioning of the building meant that the impact to the cast iron arches (MSI) was eliminated and minimised at the brick arches. Additionally, the proximity to the Grade I listed 1830s warehouse on the MSI estate was reduced and considered to constitute an improvement by reducing the impact on this designated heritage asset.

5.41 The most significant revision due to review by theatre directors was the reduction in the seating capacity of the theatre from 1800 in the original brief to 1600. 1800 seats created distance from the audience to the stage that was considered too great for a desired perception of intimacy for performances, as well as a large number of seats to fill. Examples were cited of successful theatres around the country, and 1500-1600 seats was therefore recommended. The brief was therefore agreed to be revised to 1600 seats to ensure that Factory would provide the typically successful layout of an intimate theatre space.

5.42 The Design and Access Statement prepared by OMA describes the consideration of alternative designs and the final design of the scheme in full.

Summary

5.43 Where possible, alternative options have been considered throughout the design process, however this has been constrained by:

- Designation of the Site within a Strategic Regeneration Framework precluding consideration of alternative sites;
- Individual historical and environmental constraints at the Site limiting consideration of alternative layouts;
- Use types being determined by the need to ensure viability and deliverability of the Site and infrastructure;
- Unfeasibility of design alternatives given the nature of the application within a wider masterplan.

5.44 The combination of the constraints outlined above have limited the scope for considering alternative options; refinement of the proposals will be considered further at the detailed design stage.

5.45 The Proposed Development has been influenced by pre-application consultation with the public and the local authority. Comments received during the formal consideration of the applications will continue to be considered.

5.46 A summary of the consultation process undertaken can be found in Chapter 2, EIA Methodology and in the Statements of Community Consultation prepared in support of the planning applications.

Objectivity

5.47 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.

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

6 Townscape and Visual Impact Assessment

Introduction

6.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to Townscape and Visual Issues. 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; cumulative effects and the likely residual effects. Technical appendices also support this assessment and consist of the following:

Appendix 6.1: Maps

Appendix 6.2: Baseline viewpoint and townscape photographs.

Legislative and Policy Context

Legislation

6.2 The European Landscape Convention (ELC, 2000) (Ref. 11.1) provides a foundation for closer co-operation on landscape issues across Europe and was ratified in the UK on the 21 November 2006, and became binding on 1 March 2007. The convention identifies the need to recognise landscape in law, to develop and promote landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the evolution and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies.

6.3 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

National Planning Policy Framework

6.4 Key aspects of the NPPF which apply to the Townscape and Heritage Assessment are the paragraphs below:

Para.56 The Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.

Para. 61 Although visual appearance and the architecture of individual buildings are very important factors, securing high quality and inclusive design goes beyond aesthetic considerations. Therefore, planning policies and decisions should address the connections between people and places and the integration of new development into the natural, built and historic environment.

Para. 128 In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.'

Local planning policy

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

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 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.'

6.6 The most significant Strategic Character Area affected by the Proposed Development is the City Centre Character Area. 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.

6.7 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.'

6.8 Heritage impacts are discussed and evaluated in more detail in Chapter 7 - Historic Built Environment.

Assessment Methodology

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

- **Effects on Townscape character**. For the purposes of this study the area immediately around the Proposed Development is examined on a character area basis based on the template used by Manchester City Council. Character areas are shown on Fig 6.2, which is located at Appendix 6.1.
- **Effects on visual amenity.** This is examined through the Representative Viewpoint Approach in which the impact of the Proposed Development is assessed in short, medium and long distance views at key locations.
- **Effects on people.** This will examine the effects on people who are most sensitive and least sensitive to changes in the view.

6.10 The assessment has been based on accepted methodologies for visual impact assessment contained in:

- Guidelines for Landscape and Visual Impact Assessment, third edition, compiled by the Landscape Institute and the Institute for

Environmental Management and Assessment, Spons Press, 2013
Landscape Character Assessment- Guidance for England Scotland 2002.

6.11 In addition the following guidance documents have been also been consulted:

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

6.12 The guidance contained in Historic England's advice note on Tall Buildings is particular germane:

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

Potential Impacts

6.13 The following potential effects were considered to be relevant:

- Potential change in townscape character.
- Visual intrusion.
- Effect on visual amenity.

Townscape Character effects

6.14 The assessment of the Proposed Development on Townscape Character has been based on Manchester City Centre Strategic Character Areas and City Centre Zones. 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 areas which could be potentially affected by the Proposed Development are.

Strategic Character Areas:

- Manchester City Centre

Manchester City Centre Character Zones

A) : St John's

B) : Castlefield

C) : Chapel street

D): Salford

E): Spinningfields

6.15 Their extent is defined on **Fig 6.2**: **Inner City Zones and Viewpoints** (Appendix 6.1) and they are described in more detail in the corresponding baseline condition section.

6.16 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 the follow:

- 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 (these effects will only be noted in summary form as a more detailed assessment is supplied in the historic environment section.)

6.17 The category and degree of townscape effects from major to negligible is measured by assessing the intrinsic sensitivity of the Townscape Character Area (TCA), or Inner City Zone in this case, concerned against the magnitude of the effect as a result of changes brought about by the Proposed Development.

Visual Effects

6.18 The zone of theoretical visibility (ZVT), 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 ZVT or Viewshed map, **Fig 6.1** in **Appendix 6.1**, and then more detailed confirmation as part of the field work exercise. It covers the area immediately surrounding the Proposed Development with a focus on the city centre. The Proposed Development will be far from universally visible as the building is 35.6m above ground level. Tight urban grain, trees combined with variations in topography, also unite to exclude views from many streets and public areas. The ZVT does however, provide a quick guide as to the Proposed Development's visibility. As with other Townscape and Visual Impact Assessments, and in accordance with guidance issued by IEMA, 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. These viewpoint locations are marked in **Appendix 6.1** on **Fig 6.1 ZVT and viewpoints** and **Fig 6.2 Inner City Zones and viewpoints** and illustrated by way of photographs taken from these viewpoints in **Appendix 6.2.**

6.19 Viewpoints were selected to cover a number of different locations to represent 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 and gardens; footpaths; and, main approach roads.

6.20 During the main field assessment process which occurred in June 2016, baseline viewpoint photographs were taken using a Canon E500 DSLR camera in accordance with the Landscape Institutes Advice note L1/11. The advice note also offers the following guidance on field of view*:*

'While a standard lens giving a horizontal field of view of about 40 degrees may be suitable for some purposes, a single-frame photograph based on this field of view is unlikely to convey the breadth of visual information required to represent a proposed development and relevant context. If the required field of view is only slightly greater than 40 degrees, a wide-angle lens or wide-angle setting on a zoom lens may be appropriate.'

6.21 This guidance has been taken into account in and in order to illustrate as much of the surrounding context as possible photographs were taken at 1.6m height, with a lens set to 24mm which provided a field of view of around 73.6 degrees. The details of each photograph are also recorded and include location coordinates, focal length of lens and corresponding field of view. The viewing distance for all photographs when printed at A4 is 300mm.

6.22 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 OMA and the accurate interpretation of this information by Our Studio in the form of a series of accurate, verified wireline outlines of the Proposed Development superimposed onto them.

6.23 Each viewpoint is evaluated for visual sensitivity and magnitude of change brought about by the Proposed Development in order to determine the category and significance of effect. In the case of sensitivity, judgements are made concerning the susceptibility of the receptor to the type of change involved coupled with the value attached to the receptor. The receptors most susceptible or sensitive to change (as defined by GLVIA 3) are likely to be:

- Residents at home.

- People whose focus is directed towards townscape or landscape appreciation or on particular views.
- Visitors to heritage assets, or to other attractions where views of the surroundings are an important contributor to the experience.
- Communities where views contribute to the landscape setting enjoyed by residents in the area.
- Travellers on road, rail or other transport routes tend to fall into an intermediate category of moderate susceptibility to change. Where travel involves recognized scenic routes awareness of views, and sensitivity is commensurately higher but this does apply in this instance.

6.24 Visual receptors likely to be less sensitive to change include:

- People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views in the landscape, people at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where setting is not important to the quality of working life.[1]

6.25 Assessing sensitivity for visual receptors must also include a judgement on how a particular view is valued in relation perhaps to its status as a heritage asset, notable landmark or through a planning designation. In the case of visitors this might also include designated panoramic viewing points in guidebooks or tourist maps as the site is in close proximity to one of the most historic parts of Manchester.

6.26 The magnitude of the effect is made up of judgements about:

- The size and scale of effect – is there a complete loss of a view or are the changes only minor in nature.
- The geographical extent of the area that will be affected, the duration of the effect , whether it is long, medium or short term and its reversibility i.e. whether the Proposed Development is reversible or irreversible.

6.27 The visual impact of the Proposed Development will demonstrably change as it is constructed. As this is likely to be a very short period in relative terms in the context of its lifecycle, the impact of the building upon completion is the focus of this study. Similarly the impact pathway is direct. The building is either visible or it is not.

Generic Significance Criteria

6.28 The following tables have been compiled to enable the evaluation of receptor sensitivity and impact magnitude for each of the topic areas under consideration. These are represented by **Table 6.1** and **6.2** below. The significance of environmental effect can then be determined using the Effect Significance Matrix with a professional judgement made as to whether the impact is beneficial, negligible or adverse. It is important to note that the table below is offered in support of professional judgement and guides the narrative explanation of the nature and significance of both townscape and

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[1] Guidelines for Landscape and Visual Impact Assessment 2013 3rd Edn by the Landscape Institute and IEMA

visual effects brought about by the Proposed Development. This matrix is represented by **Table 6.3** below.

Table 6.1 Impact magnitude

Magnitude of impact	Townscape	Visual
Major Beneficial	The Development would fit very well with the scale, landform and pattern of the townscape and bring substantial enhancements to the townscape.	The Development would cause a substantial improvement in the existing view.
Moderate Beneficial	The Development would fit well with the scale, landform and pattern of the townscape and maintain and/or enhance the existing townscape character.	The Development would cause a noticeable improvement in the existing view.
Minor Beneficial	The Development would complement the scale, landform and pattern of the townscape, whilst maintaining the existing character.	The Development would cause a barely perceptible improvement in the existing view.
Negligible	The Development would cause very limited change in the townscape but creates no significant effects	No discernible deterioration or improvement in the existing view.
Minor Adverse	The Development would cause minor permanent and/or temporary loss or alteration to one or more key elements or features of the townscape, including the introduction of elements that may be uncharacteristic of the surrounding townscape.	The Development would cause a barely perceptible deterioration in the existing view.
Moderate Adverse	The Development would cause moderate permanent loss or alteration to one or more key elements of the townscape, including the introduction of elements that are prominent, but may be uncharacteristic with the surrounding townscape.	The Development would cause a noticeable deterioration in the existing view.
Major Adverse	The Development would cause total permanent loss or major alteration to key elements and features of the townscape, to	The Development would cause a substantial deterioration in the existing view.

Magnitude of impact	Townscape	Visual
	include the introduction of elements totally uncharacteristic of the surrounding townscape.	

Table 6.2 Receptor sensitivity

Sensitivity	Townscape	Visual
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.	Predominantly receptors who have a high susceptibility to change i.e. Residential receptors or receptors whose focus is directed towards townscape appreciation. Also includes views which are valued or designated.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.	Receptors who have a moderate susceptibility to change. This includes users of a public park, people engaged in recreation informal or formal. Local views or views with no particular focus but which nonetheless have an appeal.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.	People in their place of work or driving. People engaged in retail activity. Ordinary views with no particular value or appeal.

Table 6.3 Effect 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
Minor	Moderate - Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

Limitations and Assumptions

6.29 The principal limitation as far as the field survey work was concerned has been that photography was undertaken in the summer time when the extent of foliage on trees is at its maximum. In some views this has the effect of softening or obscuring the Proposed Development from view. However, the population of mature trees in inner city Manchester, especially in regard the area surrounding the Proposed Development is low and this effect is noticeable in only a small number of views.

Baseline conditions

Townscape baseline assessment

6.30 A summary set out below describes the main attributes and characteristics of each of the Inner City Zones and Outer Zone area that may be potentially affected by the Proposed Development. Each character area is referenced on **Fig 6.2: Inner City Zones and listed buildings (Appendix 6.1).** Only those areas which have the potential to be affected by the Proposed Development are included.

Zone A – St John's

6.31 The Site lies within this zone. 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 contains a number of non-designated heritage assets, many of which are proposed to be retained and re-used as part of the St. John's Masterplan. It also lies adjacent to a number of Listed structures, including the Grade I Liverpool Road Station and 1830s Warehouse. The area contains a number of natural assets, including riverside frontages and a mature garden that faces the existing St. John Street public gardens.

6.32 The central part of the area comprises the former Granada Studios headquarters and associated car park, which is in use as a surface car park by staff and visitors to the former ITV Quay Street estate.

6.33 The southern part of the area accommodates the studio's former Stage One, a large red-brick building backing onto Lower Byrom Street, and the former Coronation Street set, which is now disused. A Victorian Accumulator Tower overlooks Grape Street to the north. By virtue of its location within the former Coronation Street studio complex, a high boundary wall largely screens the area from the surrounding streets. To the south of the zone a range of high quality heritage buildings which line Liverpool Road, including the original Liverpool Road Station Buildings; the first passenger transport terminal that received Stephenson's Rocket (Grade I Listed), and various industrial buildings, which have now been utilised for the Museum of Science and Industry. These buildings have extremely fine architectural quality and Liverpool Road forms an important perspective vista. The area at the junction of Water Street and Liverpool Road is dominated by several viaducts and bridges over different periods (Grade I to Grade II Listed).

6.34 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.

6.35 A new committed scheme, the Ordsall Chord, is under construction which will transform the townscape of the river crossings that currently exist in the southwestern corner of this character area. A new bridge and viaduct will carry a new railway line north towards Salford Central station and a new pedestrian bridge will replace the former Princes Bridge (now removed).

6.36 Immediately to the north of Liverpool Rd, and to the west of Deansgate, are the low rise Georgian streets of the wider St John's area, home to the chambers and practices of Manchester's legal and medical professions. The quiet oasis of St John's gardens occupies a small tranquil green space in the centre of this district; a contrast to busy Deansgate which is a short distance away.

Representative Viewpoints: Nos. 1, 2, 3, 4, 5 and 8

Zone B - Castlefield

6.37 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. Historic interest is linked with the historic transport networks formed by the railways and canals and 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.

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

6.39 The enclosed canal basins are a particular characteristic feature of the zone and the public spaces and towpaths provide a very human scale and intimacy to the area. Throughout the canal system the views are constantly changing, even slight distances creating very different juxtapositions and views.

6.40 The Mancunian Way passes through this area and links with the inner ring road affording occasional interrupted views of the city centre.

Representative Viewpoints: Nos.11,12 and 13

Zone C Chapel Street.

Chapel Street is the historic core of Salford and a key part of the city centre. Recently it has seen many new developments for residential, educational, civic and business uses. The area includes the city centre's first five star rated hotel, the Lowry, on the banks of the River Irwell, which forms the southern boundary of the zone. Development along the river has created a 'canyon' effect with views opening up at various crossing points. A small plaza combines with a pedestrian bridge next to the Lowry Hotel and forms one such nodal point. The raised section of the railway corridor linking Salford Central Station, in the centre of this zone, with Manchester Victoria also bisects the area. In general the area has a dense urban fabric with few open spaces or opportunities for panoramic views out.

Representative Viewpoint: Nos. 9

Zone D Salford

6.41 This zone can be separated further into two areas of distinctly different character separated by the A6. To the north of the A6 the townscape consists of quiet, leafy, residential, low rise housing sandwiched between Trinity Way, Blackfriars Road and the river. Major civic buildings also occur in this zone such as Salford Town Hall and Salford Cathedral. To the south of the A6 the townscape character is very different dominated as it is by low rise industrial premises with commercial and office development and the occasional residential tower block. The land is generally higher than the railway from Salford Central in this zone, so views of Manchester City Centre when they occur are extensive. Major new redevelopment is now progressing adjacent to the River Irwell including the site at Middlewood Locks and also at Wilburn Basin; both of which will occupy salient positions in the townscape of the most southerly limits of this zone.

Representative Viewpoints: Nos 10 and 14

Zone E Spinningfields.

6.42 Situated between Deansgate and the River Irwell Spinningfields has transformed to become a principal focus for both the expansion of the office market and Manchester's judicial functions following the construction of Manchester's Civil Justice Centre at a height of 80 metres. The area also includes the Crown and County Courts (Grade II Listed) and the cultural assets of the People's History Museum (Grade II Listed) and the refurbished John Rylands Library (Grade I listed). The area contains, Sunlight House (Grade II*), Masonic Lodge (Grade II). In addition, new apartment blocks have been constructed on the River Irwell frontage.

Most of the building forms are large in scale and mass and heavily glazed including No 1 Spinningfields – a new ground plus 20 storey tower currently under construction. The recent development has created several new and re-vamped public open spaces including Irwell Square, Hardman Square and Spinningfields Square, linked by a network of legible and pedestrian friendly routes. Views are varied depending on the orientation of the road junctions and the axial emphasis of the public open spaces. In general, the area slopes gently down to the River Irwell.

Representative Viewpoints: No 6, and 7

Identification and Evaluation of Key Impacts

Demolition and construction

6.43 The construction of this building on a site well within the bounds of Manchester City Centre and in a sensitive historical location 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 building concerned. The demolition 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, concrete mixing plant 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.

Effects of demolition, clearance and construction on Townscape Character

6.44 The townscape character area most affected by the demolition and construction operations is the Townscape Character Zone in which the Proposed Development is situated (Zone A, St. John’s). The effects of such large scale construction on the character of this zone is predicted to be **major adverse** for the duration of the construction period due to increased traffic levels, noise, stockpiling of demolition and construction materials and temporary fencing. The effects however, should be relatively localised and temporary and will not affect other Townscape character zones other than the adjacent margins of Zone B Castlefield.

Effects of demolition, clearance and construction on Views

6.45 The effects of demolition and clearance on the Representative Viewpoints will also be relatively localised as the Proposed Development has restricted visibility, as the ZVT demonstrates. This is described in detail in the respective assessment of each Representative Viewpoint below. 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 will be of short duration in relation to the lifespan of the Proposed Development itself. The impact magnitude, and significance of effect is therefore judged to be **major adverse** in Zone A but minor elsewhere.

Operation

Effects of completed Development on Townscape Character and Views

6.46 The visual and townscape effects of the completed Proposed Development are now summarised with respect to the effects of the Proposed Development on the Townscape Character Areas (TCA) and then amplified in more detail through a narrative description of the nature of effect each of the Representative Viewpoints which lie within each character area.

6.47 Selected key viewpoints have been subjected to the insertion of an accurate verified wireline into a baseline photograph so that the extent of the effects can be judged more accurately. The results of this exercise can be found in **Appendix 6.2**. In each case the impact of the Proposed Development is compared with the baseline condition or view and an assessment made in terms of impact magnitude and receptor sensitivity. A judgement is then made as to whether the impact is of major to negligible significance using the Effect Significance Matrix in **Table 6.3**. A professional judgement is made as to whether the effect of the Proposed Development is of an adverse or beneficial nature.

6.48 Receptor sensitivity is judged by assessing the receptor’s susceptibility to change and the value of the view using criteria set out in the Assessment Methodology section. The magnitude of change is assessed in terms of material changes in the view. Three factors in assessing magnitude are: geographic extent, reversibility and duration. These three factors are common to all of the assessments made below and are an intrinsic part of each judgement. For the sake of this TVIA, it has been assumed that the Proposed Development is of limited geographic extent as defined by the Site boundary, will stand for a long time (50 years +) and is irreversible to the extent that it is probable that a building will always occupy the space in such a pivotal location in the city centre but that like all buildings, the capacity for modification, alteration and extension are ever present.

The effects below are primarily concerned with the effects on Townscape Character and people or visual receptors. The effects on heritage assets, including listed buildings and Conservation Areas is dealt with in more detail in Chapter 7 of this ES (Historic Environment). Reference will be made however, to heritage assets that appear in any of the Representative Views as they often play an important part in determining townscape character but no judgement will be made as to the effect of the Proposed Development on them to avoid unnecessary duplication.

6.44 In this case because the height of the Proposed Development is relatively limited, the Zone of Theoretical Visibility is equally confined as Fig 6.1 (Appendix 6.1) demonstrates. Nevertheless, to confirm the validity of the ZVT more precisely, a series Representative Viewpoints were located in areas of marginal visibility, surveyed and subject to the accurate, view verification process in the usual way by Our Studio. It became clear during this procedure that in a number of these viewpoints the Proposed Development was simply not visible. In these cases there is no Proposed View recorded in Appendix 6.2. A baseline view is displayed in these circumstances, and a value of **no impact** is recorded in the relevant narrative section below. This situation applies to views 1, 2, 3, 4, 5, 11 and 12.

Zone A St John's

6.49 This zone contains an eclectic mix of townscape character with some of the most sensitive areas in Manchester, part of which has one of the lowest capacities for change due to an intrinsically strong sense of historic character. The Museum of Science and Industry (MSI) and Little John Street contain a dense collection of listed buildings of which most are low rise buildings of 4 or 5 storeys maximum. Both receptor sensitivity and townscape sensitivity are **high** in this part of the zone but lower elsewhere in the zone as people are focussed on the built environment with a strong sense of historic identity a large number of which are listed.

6.50 The other half of this zone has its own separate identity and was previously occupied by Granada TV, which is now coming forward as the St John's neighbourhood. The River Irwell forms the eastern boundary of this zone. Views of the Proposed Development will be limited as the building is not especially high and the urban grain is often tight with little opportunity for open views. The heritage significance of MSI a sequence of Heritage Views (rendered AVRs) have been taken, exploring the impact of the Proposed Development on the core of this zone in more detail. These are discussed in terms of their impact on townscape character and visual receptors below but are also discussed in the context of the way in which the Proposed Development affects the setting of listed buildings in Chapter 7 Historic Built Environment.

Heritage Views

Heritage Views 1, 2, 3, 4 and 8

6.51 MSI is a popular destination attracting visitors and residents alike to one of the most iconic museums in the country. Townscape character stems from a high concentration of low rise buildings and structures to which occasional glass stairwells or entrance gates are attached.

Receptor sensitivity therefore is high as most receptors will be focussed on the townscape and its surroundings and the townscape character is of a universally high quality.

6.52 The Proposed Development introduces a building which is clearly modern in origin which, importantly, differentiates it from the historic buildings that surround it. It is also of appropriate scale and mass and is clad in materials which are clearly contemporary. As such the Proposed Development can be seen to fit very well with the scale, landform and pattern of the townscape and bring substantial enhancements to it in the process. The impact magnitude is therefore judged to be major beneficial and should contribute positively to the visitor experience. At no point in any of the five views does the building feel overwhelming or overpowering. As a result the significance of effect for all four views is judged to be **major beneficial.**

Heritage View 5

6.53 The focus of this view explores the relationship of the Proposed Development to the Liverpool Road Station Buildings and associated viaducts over Water Street. The Proposed Development rises up behind the Station buildings but not in a dominant or overpowering way. The cladding is neutral and does not conflict with the red brick and stone façade of the Station Buildings and is seen as very much a background feature. Although visual receptor sensitivity is low townscape sensitivity is high as it is on the Liverpool Road Station building, nearbystructures and their setting. Impact magnitude is judged to be minor beneficial for townscape character as it is seen as a background feature clearly of modern origin. The significance of effect varies therefore from **minor negligible** for visual receptors to **moderate beneficial** for townscape.

Heritage View 6

6.54 Located on Water Street, the Proposed Development will transform this view townscape character. The character of the view is mixed, with only the top of the Bonded Warehouse in view over the old entrance to Granada studios. This will be replaced by a new structure which eclipses all behind and introduces a bold new feature into the townscape mirroring the function of the more historic bridges further down Water Street. Receptor sensitivity in both townscape and visual receptor terms is low here but impact magnitude is judged to be major beneficial in view of the proximity of the Proposed Development to the viewpoint. Significance of effect is therefore recorded as **moderate beneficial**.

Heritage View 7

6.55 An axial view down Liverpool Road focussed once again on the Liverpool Road Station Buildings. Sensitivity for both visual and townscape receptors is high. The new Wilburn Basin building is now a major, solid, new focus in the view. The Proposed Development fits into the scale of the townscape and view and sits behind the historic façade of MSI. Its curved roof and contemporary cladding distinguish it clearly from its historic neighbours in a subtle way. Impact magnitude is judged to be negligible offering no improvement or deterioration in the view. As a consequence significance of effect is judged to be **negligible** also.

Townscape Views

6.56 Demonstration of the limited visibility of the Proposed Development on the periphery of Zone A is confirmed by the following Townscape Viewpoints:

Viewpoint 1: Camp Street

6.57 No impact

Viewpoint 2: Tonman Street

6.58 No impact

Viewpoint 3: Liverpool Road

6.59 No impact

Viewpoint 4: Museum of Science and Industry

6.60 No impact

Viewpoint 5: St John’s Gardens

6.61 No impact

Viewpoint 8: Water Street

6.62 The Proposed Development will have a dramatic effect on this view as it will, in effect straddle Water Street which will pass beneath it. The prevailing townscape character of this view is ordinary and not particularly well defined with the warehouses of Albert Shed to the north west (right) of the street and trees which line the wider St John’s site to the east channel the view towards the Proposed Development site. The Proposed Development is in scale with the building mass and urban grain and will provide a vibrant new feature and focus for the view. The curved roofline provides a welcome contrast to the more traditional ridgeline of the Albert Shed and Marriott Hotel. Receptor sensitivity is judged to be low here in both townscape and visual receptor terms, in an area largely devoid of residential dwellings and some way off the main city centre thoroughfares. Impact magnitude by contrast is judged to be major beneficial as it will bring substantial enhancements and improvements to both townscape and view. As a consequence a significance value of **moderate beneficial** is recorded for this viewpoint.

Zone B Castlefield

6.63 This also contains one of the most sensitive areas of Manchester, Castlefield basin which from a townscape perspective is highly susceptible to change. This applies equally to receptor sensitivity owing to a high density of apartments in this area. The least sensitive area of this zone is north of the railway and southwest of the Inner Ring Road characterised as it is, for the most part, by commercial, storage and industrial units and intersected by the busy Inner Ring Road. The most sensitive part of the zone, however, from a townscape perspective, the Castlefield Basin is sunken and views of the Proposed Development are largely obscured as a result by surrounding buildings.

6.64 The following Representative Viewpoints have been selected to evaluate the effects of the Proposed Development on this Zone: 11, 12 and 13.

Viewpoint 11: Castlefield basin

No impact

Viewpoint 12: Castlefield basin

No impact

Viewpoint 13: Water Street

6.65 The Proposed Development will form a prominent feature in the view from this location. The various viaducts that cross Water Street at this point provide a strong horizontal form and a horizon in much of the view, soon to be reinforced by the Ordsall Chord, with vertical relief offered by background buildings such as the Civil Justice Centre.

6.66 The Proposed Development will be clearly seen in this view rising above the viaducts and adding a diverse roofline and structure in a way that is both in proportion to the scale of the surrounding townscape and clearly distinguishes itself from the surrounding historic structures, most of which are listed. Receptor sensitivity is low here in an area dominated, at present, by vacant sites. Townscape character the sensitivity can be considered to be moderate given the close proximity to the historic brick and cast iron bridges and viaducts which offer views of Liverpool Road Station. As the Proposed Development is partially screened at street level but affects the skyline and introduces the modern built form into a sensitive historic townscape the impact magnitude is judged to be moderate but beneficial. The significance of effect is therefore judged to be **moderate to minor beneficial** significance.

Zone C Chapel Street

6.67 This zone is located in Salford and is a heterogeneous mix of housing, commercial and office development and contains the Lowry Hotel and also the Inner Ring Road. It extends south to the area of land directly opposite the Proposed Development. Views can be obtained at various points especially at the various crossings over the river but the raised railway viaduct acts as a low level block to views from the north over much of the zone. Receptor sensitivity is mixed and the impact magnitude will vary across the zone becoming generally higher in the south. One viewpoint is now examined in more detail.

Viewpoint 9 Irwell Street Bridge

6.68 The emerging form of the Water Street tower is the new dominant focus of this view. The banks of the River Irwell looking south are less enclosed than north of the Irwell Bridge but the Albert Shed and Marriott hotel provide a low level barrier and impediment to views beyond nonetheless. The Proposed Development is largely concealed behind this façade but is visible where it extends towards the river at a height consistent with its neighbours. A glimpse of the top of the development is visible above the ridgeline of the Marriott Hotel. Receptor sensitivity is high here, with riverside apartment blocks and hotels such as the Premier Inn and the Lowry Hotel but low in terms of townscape character. Impact magnitude is considered to be minor beneficial as most of the Proposed Development is obscured and it is of consistent townscape height and scale. As a consequence the significance of effect is judged to be **moderate to minor beneficial.**

Zone D Salford

6.69 The effect on the townscape character of this zone is also related to the character of the each of the two halves of the zone. To the north of the A6 the intimate leafy residential townscape character of residential housing will largely remain unaffected as the urban grain is tight and largely inhibits views. To the south of the A6 the Proposed Development will be more visible although the receptor sensitivity is generally lower in this half of the zone. It should be noted that the visual effects in this part of Salford will quickly become restricted as intervening developments under construction such as Middlewood Locks and Wilburn Basin combine to limit views of Manchester City Centre. The effect on views is now explored below with reference to two representative viewpoints.

Viewpoint 14 Oldfield Road

6.70 This viewpoint offers a panoramic view of the city centre and demonstrates the effect that recent development has and is continuing to have on the skyline. Notable buildings include the Civil Justice Centre, No. 1 Deansgate, Beetham Tower and, most latterly, Wilburn Basin. The Proposed Development fits well into this spectrum providing a low level focus sandwiched between No. 1 Deansgate and the Beetham Tower. Receptor sensitivity in this part of Salford is generally low as vacant sites and commercial property abounds. This applies also to visual receptors. The impact of magnitude is judged to be minor beneficial as the development would complement the scale, landform and pattern of the townscape, whilst maintaining the existing character. Therefore the significance of effect is judged to be **minor beneficial** also.

Viewpoint 10 Trinity Way

6.71 The top of the Proposed Development will be glimpsed above the railway from this busy intersection between Trinity Way and Chapel Street. Receptor sensitivity is low in both townscape and visual receptor terms and impact magnitude is negligible resulting in a significance of effects value of **negligible** also.

Zone E Spinningfields

6.72 This vibrant part of Manchester which has undergone such a transformation in recent years and is now the focus of many professional and banking services in the city. It has a townscape character contemporary in feel and style with multitude of modern office buildings which line streets and enclose small squares. The urban grain is tight with little opportunity for views out. Activity is not only constrained to the day time as a range of bars and restaurants fuel a host of night-time activities. The impact of the Proposed Development on the townscape character of this zone will be limited to a series of niche views which are now explored in more detail.

Viewpoint 6 Quay Street

6.73 The Proposed Development is only glimpsed here above the two storey Artzu Gallery. Receptor sensitivity in townscape terms is not particularly high as buildings of different origins, mostly recent, combine in a heterogeneous mixture of different types and styles. Visual receptors are not in the residential category but occupied in commercial or office premises. Impact magnitude is minor and as a consequence the significance of effect is **minor beneficial – negligible** as a result.

Viewpoint 7 Gartside Street

6.74 Gartside Street is in direct alignment with the proposed development and offers a glimpsed view rising above New Quay Street. Townscape character at this point is wholly modern located as it is at the edge of the recent Spinningfields development complex. Impact magnitude therefore, is judged to be minor beneficial as the Proposed Development would complement the existing scale and character and represent an improvement to the view. Receptor sensitivity in this area occupied by offices and restaurants is mixed with a moderate value recorded. As a result overall significance of effect is judged to be **minor beneficial**.

Mitigation Measures

6.75 Mitigation has been incorporated into the Proposed Development as part of the design process and has evolved through consultation with the Local Planning Authority, Historic England and Places Matter Design Review amongst others. This matter has therefore been addressed in the overall design, surface finish and layout of the Proposed Development and no additional mitigation measures are proposed.

6.76 In terms of mitigating the effects of the demolition and construction phase however, it is worth noting that high quality hoardings will be used to secure and protect the Site at street level with information panels and secure viewing holes at appropriate locations.

Cumulative Effects

6.77 The cumulative effect of the Proposed Development is now examined in relation to additional effects arising from similar developments that are either consented or are coming forward in the planning process in close proximity to the Site. In terms of the Proposed Development the following schemes therefore need to be considered:

- St John’s, including St. John’s Place and Central Village (formerly Village Phase 2) and Tower 1 and 2.
- Trinity Islands.
- Astley & Byrom House.
- Owen Street.
- South Village (formerly Village Phase 1).
- OGS (formerly Manchester Grande).
- Middlewood Locks.
- Salford Central.
- Ordsall Chord.

6.78 Clearly these developments will not have a universal effect on the small number of city centre zones of Manchester, or the Representative Viewpoints therein, that have been selected to assess the effects of the Proposed Development. In order to assess the cumulative effect in a systematic way, the following Table, (**Table 6.4**) 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 then the effect values are reassessed and adjusted accordingly to take the scheme into account if it is judged that there is a cumulative effect.

6.79 Of course as the cumulative schemes come forward then, in certain cases, receptor sensitivity is likely to increase as many of the developments contain apartments. However, by the same token, impact magnitude is likely to decline as the Proposed Development will now be seen in the context of a greater number of similar developments of equivalent or, as in this case, a much greater scale. As a result the net effect is generally a lowering of the significance of effect value in cumulative terms. This is exacerbated to a value of no impact if the cumulative building now obscures the view of the Proposed Development completely which occurs in quite a few cases.

Table 6.4 Cumulative impact assessment

Development only (Residual Effect)		Relevant cumulative scheme	Cumulative impact
Location			
Heritage Views			
1,2,3,4,8			
Sensitivity	High	St John's	
Magnitude	Major beneficial	Trinity Islands	
Significance	Major beneficial		Moderate beneficial
H5			
Sensitivity	Low / high	St John's	
Magnitude	Minor beneficial		
Significance	Minor negligible / Moderate beneficial		Negligible
H6			
Sensitivity	Low		
Magnitude	Major beneficial		
Significance	Moderate beneficial		Moderate beneficial
H7			
Sensitivity	High		
Magnitude	Negligible		
Significance	Negligible		Negligible
1			
Sensitivity			
Magnitude			
Significance	No impact		No impact
2			
Sensitivity			
Magnitude			
Significance	No impact		No impact
3			
Sensitivity			
Magnitude			
Significance	No impact		No impact
4			
Sensitivity			
Magnitude			
Significance	No impact		No impact

	Development only (Residual Effect)	Relevant cumulative scheme	Cumulative impact
5			
Sensitivity			
Magnitude			
Significance	No impact		No impact
6			
Sensitivity	Moderate /low	St John's	
Magnitude	Minor	OGS (formerly Manchester Grande)	
Significance	Minor beneficial /negligible		No impact
7			
Sensitivity	Moderate	St John's	
Magnitude	Minor	OGS (formerly Manchester Grande)	
Significance	Minor beneficial		No impact
8			
Sensitivity	Low	St John's	
Magnitude	Major beneficial		
Significance	Moderate beneficial		Negligible
9			
Sensitivity	High / low	St John's	
Magnitude	Minor beneficial	Trinity Islands	
Significance	Moderate to minor beneficial		No impact
10			
Sensitivity	Low	St John's	
Magnitude	Negligible	Salford Central	
Significance	Negligible		Negligible
11			
Sensitivity			
Magnitude			
Significance	No impact		No impact
12			
Sensitivity			
Magnitude			
Significance	No impact		No impact
13			
Sensitivity	Low / moderate	St John's	
Magnitude	Moderate / beneficial	Trinity Islands	
Significance	Moderate / minor beneficial	OGS (formerly Manchester Grande)	Minor beneficial
14			
Sensitivity	Low	St John's	
Magnitude	Minor beneficial	Trinity Islands	

Development only (Residual Effect)		Relevant cumulative scheme	Cumulative impact
Significance	Minor beneficial	Astley & Byrom House Middlewood Locks	Negligible

Residual Effects

6.80 The visual impact assessment has been carried out based on the assumption that all the necessary mitigation measures have been accounted for in the design process. The images for selected viewpoints illustrated in **Appendix 6.2** represent the accurate definition of the location and mass of the component parts of the Proposed Development. The predicted significance of effect values are therefore the same for each representative viewpoint and Townscape Character Area as the residual effect values and are illustrated in **Table 6.4** above.

7 Historic Built Environment

Introduction

7.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to the Historic Built Environment. 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.

7.2 This Chapter is accompanied by one technical appendix; the accompanying Heritage Statement for the Site (Appendix 7.1). All work has been produced by Stephen Levrant Heritage Architecture Ltd. (SL:HA).

7.3 This Chapter should be read alongside Chapter 6 Townscape Visual Impact Assessment, which assesses the impact of the Proposed Development over a wider area and assesses it against townscape and visual amenity.

Legislative and Policy Context

Planning (Listed Buildings and Conservation Areas) Act 1990

7.4 As the Proposed Development will require intervention into the Grade II listed viaduct structure, Listed Building Consent will be required. 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.

7.5 As the Site is within the Castlefield Conservation Area, Section 72 of the Act is of relevance as it requires the Local Planning Authority to pay special attention to the *'desirability of preserving or enhancing the character and appearance'* of the designated area. Consequently, it is important to consider the Site as a contributor to the townscape character of the conservation area and the impact of the Proposed Development on this aspect of the wider historic environment.

National Planning Policy

7.6 Section 12 of the National Planning Policy Framework (NPPF) sets out the Government's planning policies on the conservation of the historic environment.

7.7 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 (NPPF paragraph 7).

7.8 The focus of the Government's planning policy guidance is to ensure that account is always taken of the desirability of sustaining and enhancing the significance of heritage assets and for new development to make a positive contribution to local character and distinctiveness (NPPF paragraph 126).

7.9 The NPPF stresses that "*great weight*" should be given to the conservation of designated heritage assets (NPPF paragraph 132), 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.

Local Planning Policy: *Manchester City Council Unitary Development Plan (1995) and Core Strategy (2012)*

7.10 Extant policies DC18.1 and DC19.1 of the UDP and Policies EN3 and CC9 of the Core Strategy are relevant to this assessment. These policies seek to preserve and enhance the setting of buildings and areas of architectural or historic interest.

Assessment Methodology and Significance Criteria

Scope

7.11 This chapter assesses the effect of the Proposed Development on designated and non-designated built heritage assets, both within the Site and within a 500m study area (250m radius).

Baseline Assessment

7.12 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.

7.13 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 the Local Planning Authority and Historic England.

7.14 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.

Methodology

7.15 The assessment methodology for the Historic Built Environment and Visual Impact Assessment 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. Receptors that may 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 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 *Seeing the History in the View* (May 2011);
- Historic England's *Good Practice Advice Note 2: Managing Significance in Decision-Taking in the Historic Environment* (2015);
- Historic England's *Good Practice Advice Note 3: The Setting of Heritage Assets (*2015);
- Historic England's *Understanding Place: Conservation Area Designation, Appraisal and Management* (2011); and
- Historic England Advice Note 4: *Tall Buildings* (December 2015)

7.16 The aims of this assessment have been:

- To establish the baseline environment regarding designated heritage assets related to the historic built environment, i.e. Listed Buildings and Conservation Areas.
- Assessment of the significance of the 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.

7.17 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 non-intrusive surveys.

7.18 A survey of the surrounding areas was conducted in June 2016 by visual inspection, in order to map out and identify the settings of the designated heritage assets that could be affected by the Proposed

Development. 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.

7.19 For the purposes of this assessment, consideration has been given to the relevant part of Manchester City centre that surrounds the Site within a 250m 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.

7.20 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.

7.21 Information was collated from a number of sources including:

- Manchester Local Images Library.
- Manchester Archive Plus.
- The National Heritage List.
- Manchester City Council Planning website.
- John Rylands University Library website.

Significance Criteria

7.22 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, provides a list of principles of assessing significance based on architectural and historic interest, age and rarity, aesthetic merits, selectivity and national interest. Historic England's criteria outlined in 'Conservation Principles, Policies and Guidance,' are also considered in this assessment.

7.23 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 7.1:

Table 7.1 Significance Criteria for determining 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

Significance	Definition
	listing grade Conservation Areas containing very important buildings
Moderate	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

7.24 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.

7.25 Table 7.2 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 7.2: Criteria for determining magnitude of impact

Rating	Factors in the assessment of magnitude of 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	The development does not affect the heritage values of the heritage assets in the view, or

Rating	Factors in the assessment of magnitude of impact
	the ability to appreciate those values.
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

7.26 Derived by combining the significance rating of the resource with the magnitude of impact for each asset, Table 7.3 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.

Table 7.3: Significance of effect matrix

		Significance		
Magnitude of impact		**High**	**Moderate**	**Low**
	Major	Major	Major – Moderate	**Moderate - Minor**
	Moderate	Moderate	Moderate - Minor	**Minor**
	Minor	Moderate – Minor	Minor	**Minor - Negligible**
	Negligible	**Negligible**	**Negligible**	**Negligible**

Assumptions and Limitations

7.27 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.

7.28 Assessment of below ground archaeology does not form part of this assessment and is considered within the Archaeological Assessment, Archaeological Watching Brief and Archaeological Trench Report.

Baseline Conditions

Site description

7.29 The proposals relate to an area as described in Section 3 of this ES (Site Description and Development Proposals).

7.30 The Proposed Development will result in physical interventions to the Grade II listed Colonnaded Viaduct and the demolition of the Starlight Theatre. The area of the listed Viaduct subject to the proposed interventions is the to the north side of the viaduct and is a typical later 19th century brick arch structure; the southern side of the structure (within the MSI site and not subject to the Proposed Development) that is a colonnaded cast-iron structure. The Starlight Theatre was built on top of the Viaduct in the late 1980s/ early 1990s as a TV studio; it is of no heritage interest and its demolition is fully justifiable.

7.31 The assessment has identified 21 no. heritage assets within the study area (Table 7.4 and Figure 7.1).

Table 7.4: Heritage Assets within the study area

Description (number refers to location on Figure 7.1)	Heritage Designation
1) Stephenson's Bridge	**Grade I**
2) Liverpool Road Station Building	**Grade I**
3) 1830 Warehouse	**Grade I**
4) 1830 Viaduct	**Grade II**
5) Colonnaded Railway Viaduct	**Grade II**
6) Manchester South Junction and Altrincham Railway Viaduct	**Grade II**
7) Giants Basin	**Grade II**
8) Pair of culvert arches over River Medlock and associated overflow channel	**Grade II**
9) Commercial Hotel, Liverpool Road	**Graded II**
10) 123 Liverpool Road	**Grade II**
11) MSI Power Hall	**Grade II**
12) MSI Warehouse	**Grade II**

Description (number refers to location on Figure 7.1)	Heritage Designation
13) Great John Street Hotel	**Grade II**
14) Victoria and Albert Warehouse	**Grade II**
15) Zig-Zag viaduct	**Grade II**
16) Girder Bridge (Salford side)	**Grade II**
17) Stephenson's Bridge (Salford side)	**Grade I**
18) Manchester and Salford Junction Canal Tunnel	**Grade II**
19) Bonded Warehouse	**Non-designated heritage asset**
20) Castlefield	**Conservation Area**
21) St Johns	**Conservation Area**

Historical Context

7.32 The following historical context should be read alongside the map regression in Section 4 of Appendix 7.1.

7.33 The immediate environs surrounding the former ITV Quay Street estate, as it is today, began developing following the establishment of the first of Manchester's Quay's in the late 18th century. This first quay was located at approximately the junction of Water Street and Quay Street, thus giving Quay Street its name. By the beginning of the 19th century other warehouses and wharves had been constructed and a handful of small residential roads and courts, which were interspersed with warehousing and industrial buildings, leading off Quay Street southwards into what is today the car park of the former ITV Studio.

7.34 A cluster of grander Georgian townhouses faced Water Street at the point where the canal crossed underneath Water Street, via the Irwell Bridge. These small pockets of housing were intersected by timber yards, warehousing facing the Irwell and quays with associated industrial buildings.

7.35 Land for a new canal was purchased in 1824 and in July 1836 the Salford & Manchester Junction Canal Act was passed allowing work to commence on the new Salford Junction Canal. The Act permitted the construction of a basin to be positioned parallel to Atherton Street and terminating just before Quay Street. This basin was named

Brunswick Basin and served as a potato market on its sidings. By the early 1840's the canal was regarded surplus to requirements largely due to the timing of its construction coinciding with the beginnings of the railway boom. A section of the canal to the east was in-filled and was later to become the site of the Manchester Central Railway Station (now Manchester Central Conference centre) and the Great Northern Warehouse. The canal remained open, but to limited trade and closed in 1922.

7.36 By 1850, there were over 80 houses on the site, which were densely concentrated mainly on the site now occupied by the 'Stage One' building and the neighbouring garden/studio. The majority of these houses were back-to-backs, three-storey terraces and courtyard housing, intersected by occasional public houses.

7.37 The Brunswick Potato Market structure was open on all sides in 1851 and by 1891 the market was filled-in. Granada purchased the section of the canal that passed beneath their new studio site in 1955 with the end of the market building nearest Quay Street being shortened to accommodate the construction of Granada's first phase in 1956. This building was subsequently kept as part of the studio's reception, with the remainder of the market buildings being demolished.

7.38 Once Sidney Bernstein had purchased the Granada site, clearance of any remaining housing and streets began. It was at this time that the Junction Canal was in-filled and modern studio buildings constructed upon the site. The industrial nature of the area continued into the mid-20th century, by which time some areas of housing had been cleared and other more modern engineering works had been constructed.

7.39 In regards to the Liverpool Road Station/ MSI complex, the cutting of the Bridgewater Canal in 1765, to the south of this area, reinforced this location as a hub of transportation and industry. By 1808, the line of Liverpool Road had been laid out, and in 1810, a redbrick double-fronted town house had been erected on the corner of Water Street. In 1830, the construction of the Liverpool Road Station (Grade I Listed) saw the construction of the group of station buildings to the western end of Liverpool Road and incorporating the existing town house of 1810 into the new station as the stationmasters' residence. The station development included the stone bridge over the Irwell (Grade I listed), a brick viaduct and a cast iron bridge over Water Street (replaced 1905 & Grade II Listed).

7.40 Rapid development of the railways followed including the MSJ&AR Viaduct in 1850 and the partial redevelopment of the station following a warehouse fire in 1866, by which time the station was used exclusively for transporting goods. The fire resulted in two early warehouses being replaced by a Bonded Warehouse on Grape Street in c1867, which was originally named the Charles Street Warehouse before 1888 (now part of the ITV Quay Street estate). The eastern end of Liverpool Road was characterised by blocks of three-storeyed weaver's terraces and back courtyard dwellings behind. The northern side of the street was the St Matthews Church (designed by Sir Charles Barry, demolished 1951) with its Sunday school to the southern side of the street (Grade II Listed). Two iron and glass market buildings were constructed either side of the church in the 1870's.

7.41 During the 1880's, developments on the station site saw the Lower Byrom Street Warehouse, which is now occupied by the Museum of Science and Industry (MSI), being constructed along with an accumulator tower to generate the good's yard machinery with hydraulic power.

7.42 Except for the areas of late-20th century residential blocks to the western end of the street, today the area largely remains unchanged as it did in the mid-19th Century. The railway buildings have been redeveloped for use as MSI and the former railway and industrial buildings form a significant grouping, which can be understood and appreciated as a multi-phased railway station development.

Character Analysis of the Site

7.43 The area surrounding the Site of the Proposed Development building represents the boundary of two distinct character areas; the former ITV estate to the north and the Liverpool Road/ MSI complex to the south (see Figure 3 in Section 5 of the Heritage Statement in Appendix 7.1)

7.44 **The former ITV estate/ St Johns masterplan area**: Following the decline of local industry and the railways, during the mid-1950's and into the mid-1960's, the site was totally redeveloped with the construction of Granada Studios. Over several years, this venture redefined this area of Manchester into the first commercial television station in Great Britain. This modern edifice became an important creative and technical hub. In the process, and in the following decades, many early warehouses along Water Street were demolished to make way for car parking associated with the studios. Following the acquisition of Grape Street, to the south of the television centre, the Bonded Warehouse and associated structures, including the former stables, train viaduct and accumulator tower were all utilised within the expansion and development of the site.

7.45 The prevailing character within the Granada Site largely focuses on the mid-20th century modern studio buildings, which make up a large and sprawling proportion of the site. Spaces in and around the enclosed site are interrupted and severed by later additions and ad-hoc extensions and adaptions for the exterior Coronation Street set.

7.46 This character area does not contain any public areas of green space, and historically has never had any such areas within it. Following the demolition of a block of early 19th century townhouses facing on

Great John Street, Atherton Street, Grape Street and Lower Byrom Street, the space was used as a car park for Granada employees and in recent years, the area was extensively planted. Today this established mature garden contains a small, modern garden studio. This green space is only visible from within the studio site as its high perimeter security walls and intruder-proof fencing closes off this open space from surrounding streets creating non-active street frontages.

7.47 A negative factor of the Granada Site focusses on the lack of active street frontages resulting from the high and impenetrable security walls erected around the entire site. These large areas of blank walling are somewhat softened by planting but do still dominate the surrounding streetscapes and views creating a non-active and closed-in appearance when viewed from surrounding streets.

7.48 Along with the early buildings upon the Granada site, other more utilitarian buildings and structures were constructed in more recent years to accommodate the workings of the studio and its tours. These structures did not follow nor match Ralph Tubbs original design concept or vision for the site and were substandard in their execution They do not enhance the setting of any of the identified heritage assets within the site.

7.49 The loss of historic built form towards the southern end of Water Street has drastically altered the nature and historic streetscape of Grape Street and Water Street. The remaining unbuilt plots backing onto the River Irwell on Water Street were previously used for Granada Tour's car parking and today form a large open expanse, which is underutilised and would benefit from redevelopment.

7.50 **Liverpool Road area**: The area was laid out in the 18th Century due to its proximity to the River Irwell. The cutting of the Bridgewater Canal in 1765, to the south of this area, reinforced this location as a hub of transportation and industry. By 1808, the line of Liverpool Road had been laid out, and in 1810, a redbrick double-fronted town house had been erected on the corner of Water Street. In 1830, the construction of the Liverpool Road Station (Grade I Listed) saw the construction of the group of station buildings to the western end of Liverpool Road and incorporating the existing town house of 1810 into the new station as the stationmasters' residence. The station development included the stone bridge over the Irwell (Grade I listed), a brick viaduct and a cast iron bridge over Water Street (replaced 1905 & Grade II Listed).

7.51 Rapid development of the railways followed including the MSJ&AR Viaduct in 1850 and the partial redevelopment of the station following a warehouse fire in 1866, by which time the station was used exclusively for transporting goods. The fire resulted in two early warehouses being replaced by the Bonded Warehouse on Grape Street, which was originally named the Charles Street Warehouse, before 1888 (now part of the former ITV Quay Street estate). The eastern end of Liverpool Road was characterised by blocks of three-storeyed weaver's terraces and back courtyard dwellings behind. Two Grade II listed iron and glass market buildings were constructed to the north side of the street in the 1870's. During the 1880's, developments on the station site saw the Grade II Lower Byrom Street Warehouse, which is now occupied by the Museum of Science and Industry (MSI), being constructed.

7.52 Except for the areas of late-20th century residential blocks to the western end of the street, today the area largely remains unchanged as it did in the mid-19th Century. The railway buildings have been redeveloped for use as MSI and the former railway and industrial buildings form a significant grouping, which can be understood and appreciated as a multi-phased railway station development.

7.53 The main historic qualities of the area relate to the unique survival and relationship of the Liverpool Road Station site, its associated warehouses and infrastructure including bridges and viaducts, which all represent the changing demands and requirements of the world's first passenger railway. This specific element of the character area contributes greatly to the area's historic and innovative past.

7.54 The streetscape of Liverpool Road is a varied one, with low range classical station buildings to the west and highly decorative mid-Victorian glazed market buildings with high-pitched roofs and gables. In-between are simple early 19th Century terraced houses and public houses which make up a diverse mix of different building types, ages and former uses.

7.55 Historically, the building stock in the area was predominantly built of redbrick with some stone sill, quoin and keystone detailing. During the 1830's Liverpool Road Station's redbrick buildings were applied with coursed painted render to their ground floor level. Other building materials appeared later in the 19th Century in the form of decorative Gothic cast iron market buildings with large areas of glazing. Modern residential buildings constructed approximately 15 years have also used redbrick with stone dressings, with later restaurants and apartment buildings to the east constructed using red-brick but with larger areas of plain glazing.

7.56 Views of this Character Area are largely limited to the enclosed urban form of Liverpool Road, but kinetic views moving south open into the lower areas of Potato Wharf and the Castlefield Basin to the south-west, reveal the association with this adjacent canal transport infrastructure and industrial character.

7.57 The long wide view looking eastwards along Liverpool Road towards Deansgate terminates with the massive and dominant Beetham Tower terminating the view. The dominant characteristic of the western end of Liverpool Road is the relatively continuous tight urban grain and back of pavement construction. The slight incline towards Deansgate allows views west towards the River Irwell and above the high perimeter wall of the Liverpool Road Station, allowing interesting glimpses of the Grade I Listed Goods Warehouse within the station yard.

7.58 Historically the character area has not had any form of green space nor any natural elements within it. Although the River Irwell is situated at the western end of Liverpool Road, it has been largely obstructed by various bridge and viaduct structures leading to Liverpool Road Station providing only a distant fleeting view when viewed from the Water Street/Liverpool Road junction.

7.59 Parts of the area have been demolished during the latter half of the 20th Century and modern buildings built in their place. Architecturally these recent buildings, to a large extent, adhere to the historic building materials and massing of former and existing historic buildings of the area. Areas of buildings towards the eastern end of Liverpool Road show obvious signs of no maintenance and neglect, these include both Campfield Market halls and the row of 7 weaver’s cottages, with several being uninhabited for some time and falling into disrepair

7.60 Section 5 of the Heritage Statement in Appendix 7.1 provides further description of the character of the Site and the surrounding area.

Description of the development of the Site

7.61 The Bonded Warehouse (originally known as the Charles Street Warehouse pre 1891) was constructed in 1869, with a railway line passing over Water Street directly into the building for securely storing goods such as alcohol and tobacco; the brick arched side of the viaduct corresponds to this original railway line (area highlighted in green in Figure 4 – Appendix 7.1).

7.62 Two warehouses for storing cotton and a transit shed were constructed to the south of Grape Street as part of the Liverpool Road Station complex in 1831. However in 1866 a serious fire gutted one warehouse and severely damaged the other, and these in turn were subsequently demolished and replaced by the Bonded Warehouse.

7.63 The Warehouse had three internal track turntables and an internal railway line which ran through its southern side; this had a further parallel line outside the building which was also fitted with turntables in order to direct trains at right angles into the warehouse’s three large goods entrances.

7.64 The Lower Byrom Street Warehouse, and tracks into this building, were then constructed alongside the tracks into the Bonded Warehouse shortly afterwards and form the southern, colonnaded part of the viaduct (area highlighted in yellow in Figure 4 within Appendix 7.1).

7.65 The former track beds to the south of the warehouse have been removed. Low quality structures, associated with the development of the former ITV Quay Street estate, have been constructed on top of the viaduct adjacent to the Warehouse which have no architectural or historic interest and adversely affect the setting of the surrounding heritage assets; these are the Stage 2 building and the Starlight Theatre building.

7.66 The last active use the brick arches of the viaduct had were as film sets for the filming of Coronation Street. Internally, the arches of the viaduct retain their original openings, which link all the arches together; in some locations these openings have been altered either by being enlarged or enclosed.

7.67 Section 5.3 in Appendix 7.1 provides further information on the Grade II listed viaduct.

Significance of settings of the identified heritage assets

7.68 Table 7.5 provides a summary of the significance of each of the identified listed buildings that could be impacted by the Proposed Development. Due to the potential for impacts on the setting of the identified listed buildings, particular reference is made to the significance of the setting of these buildings.

Table 7.5: Significance of setting of the identified heritage assets

Listed Building	Grade	Summary of significance	Significance of setting
1) Stephenson's Bridge (Manchester)	I	Railway bridge carrying former Liverpool to Manchester railway over the River Irwell. Designed in 1830 by George Stephenson, 2 segmental arches with central pier in stone.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent girder bridge and MSJ&AR viaduct which all converge to the west, Salford side of the River. The bridge has high historic value due to its association with the development of the railways in Manchester.
2) Liverpool Road Station	I	Former passenger railway station at terminus of Liverpool and Manchester railway, now part of museum complex. 1830 by George Stephenson with attached house of 1808, formerly occupied by the station agent. Oldest surviving passenger railway station in the world. Ceased to handle passenger traffic in 1844 but continued in use as a goods station until 1975.	The significance of the setting to the former station building is in its group value with the Old Warehouse and the adjacent bridge and viaduct structures. The building is experienced along the entire length of Liverpool Road where it forms a continuous frontage up to Lower Byrom Street. Short-range views of the building are also experienced from Water Street. Due to the modest height of the buildings and the urban form in this area it is not experienced from outside of the immediate streetscape.
3) 1830 Warehouse	I	Railway warehouse, 1830, by George Stephenson. Red brick with sandstone dressing and slate roofs. Long slightly	The warehouse building is experienced from within the former Liverpool Road Station complex and its setting is

Listed Building	Grade	Summary of significance	Significance of setting
		curved plan, convex to the railway line and concave to the rear. 3 storeys, 10 individually gabled bays arranged in pairs with slotted pilasters between each pair at both ends.	understood as part of this grouping of buildings.
4) Railway viaduct to Liverpool Road Station	II	Railway viaduct with attached animal ramp at east end of south side, including bridge carrying railway line over Water Street to former Liverpool Road Station. 1830 with bridge rebuilt 1905. Brick viaduct, iron bridge.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent former Liverpool Road Station, its warehouse and the 2 bridges and viaducts immediately to the south. The viaduct has high historic value due to its association with the development of the railways in Manchester.
5) Colonnaded railway viaduct	II	Railway viaduct. Probably c.1870. Cast-iron. A series of cast-iron columns on stone bases supports the viaduct which has cast-iron beams showing at the sides.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent former Liverpool Road Station, its warehouse and the 2 bridges and viaducts immediately to the south. The viaduct has high historic value due to its association with the development of the railways in Manchester.
6) MSJ&AR Viaduct	II	1846-9 by David Bellhouse Jnr in red brick with sandstone dressings and cast iron bridges. Early example of a 1 ¾ mile long urban viaduct incorporating a series of well detailed bridges. The MSJ&AR line is one of the earliest suburban railways and was the first in Manchester.	The viaduct has group value with the associated railway structures and buildings from Piccadilly Station to the Liverpool Road Station and the bridges that cross the River Irwell. Due to the length of the structure it has several different settings; these are understood as being different depending on the urban form and or context of the viaduct in the particular location. In the context of the subject site, the significance of the setting is best represented within the Castlefield area where the viaduct forms part of the multi-level environment, adjacent to associated railway viaducts and bridges.
7) Giants Basin	II	Circular weir. Probably 1765, by James Brindley, for Duke of Bridgewater, altered in C19. Coursed squared sandstone. Circular structure approx.10m in diameter, with 2-course sloped lip. Part of hydraulic system by which the Bridgewater Canal terminus basin exploited the course of the River Medlock, which was diverted through a culvert running from east of Deansgate at Knott Mill to Potato Wharf, and the canal overflow was returned to the river via this weir.	Forms group with canal basin at Potato Wharf, and with Castlefield Railway Viaduct, and Culvert arches, New Elm Road; associated with Floodgate, Deansgate.
8) Pair of culvert arches of River Medlock and associated overflow channel	II	Pair of culvert arches. Probably 1765, by James Brindley, for Duke of Bridgewater. Coursed squared sandstone. Two low segmental spans at an angle, over the outflows from the River Medlock culvert and the overflow culvert from the Giant's Basin, that on the right lower and with a plain arch-band.	Forms group with canal basin at Potato Wharf, and with Castlefield Railway Viaduct, and Giants Weir, New Elm Road; associated with Floodgate, Deansgate.

Listed Building	Grade	Summary of significance	Significance of setting
9) Commercial Hotel, Liverpool Road	II	Hotel. Early to mid C19, altered. Red brick in Flemish bond, with some sandstone dressings, slate roof. Double-depth double-fronted plan, with rear wing	The significance of the streetscape setting of the listed building is intrinsic to its architectural and historic interest. Forming part of the historic streetscape of Liverpool Road, alongside Nos. 123 and opposite the Liverpool Road complex, means the setting of the building is limited to the ability to understand and appreciate it from the street.
10) 123 Liverpool Road	II	Pair of town houses, now office. Early to mid C19, altered. Red brick in Flemish bond with some sandstone dressings and slate roof. Double-depth plan with back extension.	123 Liverpool Road is listed due to its group value; as such the significance of the streetscape setting of the listed building is intrinsic to its architectural and historic interest. Forming part of the historic streetscape of Liverpool Road, alongside the Commercial Hotel and opposite the Liverpool Road complex, means the setting of the building is limited to the ability to understand and appreciate it from the street.
11) Power Hall of MSI	II	Railway goods transfer shed, now museum exhibition hall. 1855, for London and North Western Railway. Red brick with some sandstone dressings, hipped slate roof. High group value with other railway buildings.	The setting of the Power Hall is enhanced with the survival of a number of similar dates and uses of former railway architecture that are located within the MSI site.
12) MSI Warehouse	II	Large three storey and basement Railway goods warehouse, now part of museum complex. 1880. Red brick with dressings of red brick and some sandstone, slate and glass roof. Large rectangular plan. Forms a group with other railway buildings.	The warehouse setting is enhanced with the survival of a number of similar dates and uses of former railway architecture that are located within the MSI site.
13) Great John Street Hotel	II	School, now college of further education. Late C19, altered. Stock brick with dressings of red brick and sandstone. Notable for its flat roof which formerly served as school playground.	The former school building largely lost its original setting over the past 50 years with the demolition of all historic buildings and former courts around the building.
14) Victoria and Albert Warehouse	II	Warehouses. Early to mid C19, altered. Red brick with sandstone dressings and slate roof; quay of very large dressed stone blocks. Victoria Warehouse L-plan with one range at right-angles to street and the other parallel to the quay, and Albert Warehouse continued from north end of this. Five storeys.	The significance of the setting of the Warehouse has been affected by the erosion of development along the riverside over the last c.50 years. The warehouse is largely horn of its historic context and its setting is therefore understood against its relationship with the river and the warehouses in the wider area. Having been converted into a hotel, with associated landscaping exclusively for the hotel users, there is the capacity to extend and enhance the setting of the warehouse.
15) Zig-Zag viaduct	II	Railway viaduct carrying railway line over River Irwell and Water Street to former Lower Byrom Street Warehouse of former Liverpool Road Goods Station. Late 19th Century, red brick.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent former Liverpool Road Station, its warehouse and the 2 bridges and

Listed Building	Grade	Summary of significance	Significance of setting
		Forms part of group of railway structures at this site.	viaducts immediately to the south. The viaduct has high historic value due to its association with the development of the railways in Manchester.
16) Girder Bridge	II	1860s bridge leading to railway viaduct over River Irwell. Built at an angle over the river to abut the 1830 stone bridge on its south side, enabling the railway lines the two bridges carried to converge on the west, Salford side of the river. Brick viaduct with zig-zag north wall. Integral component to the Liverpool Road Station.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent stone bridge and MSJ&AR viaduct which all converge to the west, Salford side of the River. The bridge has high historic value due to its association with the development of the railways in Manchester.
17) Railway Bridge (Salford)	I	Railway bridge carrying former Liverpool to Manchester railway over the River Irwell. Designed in 1830 by George Stephenson, 2 segmental arches with central pier in stone.	The significance of the setting of the bridge is in relation to its relationship and group value with the adjacent girder bridge and MSJ&AR viaduct which all converge to the west, Salford side of the River. The bridge has high historic value due to its association with the development of the railways in Manchester.
18) Manchester and Salford Junction Canal Tunnel	II	Extensive canal tunnel constructed in the 1830's from the River Irwell in the west, to approximately Whitworth Street West to the east. Canal structure is only now visible from within tunnel itself, retains large-scale air raid shelters dating to the Second World War.	The canal tunnel is only viewable from within the tunnel itself where its setting can only be recognised, no remnants of its original external portal entrances or basins survive. The tunnels are notable for their extensive air raid shelters which survive within.
19) Bonded Warehouse	Non-designated	c.1869, the building is constructed of red-brick with blue engineering brick banding and quoins. Large battened timber doors are located to the base of each loading bay with half glazed doors to each loophole and the remains of hoists and their associated brackets to the top of most. All windows are metal framed and louvre opening and are largely original.	The Warehouse is an integral part of the multi-phased development of the former Liverpool Road Goods Station, reflecting the former rail network in the area. The Warehouse is also understood as being part of the former ITV Granada site and thus group value is afforded to the relationship of the building to the mid-20th Century buildings to the north. Consequently, the setting of the building is the significance of its group value and the ability to visually appreciate the building in conjunction with the surrounding buildings.

Conservation Areas

7.69 Conservation areas are designated areas that are deemed to have special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance.

7.70 The Castlefield Conservation Area has been designated as a Conservation Area due to the high significance and grouping of a number of structures, which reflect the industrial development of this part of Manchester. Alongside this, the site is of special historic interest due to the connections with the Roman occupation of the area. The Conservation Area is one of the largest in Manchester and was designated in 1979.

7.71 Adjoining the boundary to the Castlefield Conservation Area is the St John Street Conservation Area, which has been designated due to the high architectural interest of the buildings on St John Street which is the only surviving Georgian terraced street in central Manchester.

7.72 It is considered that the Proposed Development has the potential to impact the character and appearance of both conservation areas.

Statement of Significance

7.73 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.

7.74 Regarding the subject Site, the Grade II colonnaded viaduct was clearly built in two phases, demonstrated by the different structural forms on each side; the colonnaded viaduct is, as the name suggests, an open structure constructed with brick jack arches on large brick piers. The viaduct structure to the north, and the part of the viaduct structure that will be physically impacted by the proposals, is of brick arch construction with a series of closed round arches expressed on the north face. As has been explained, the two sides of the viaduct structure have been, and still are, in separate uses and this has resulted in a number of alterations to the structure. Notwithstanding the removal of the track beds and the subsequent numerous resurfacing materials, which are not on top of the structure, the colonnaded side of the viaduct (south, within MSI) has been infilled to the back (north) side with glazed partitions. The brick arches to the north side have all been infilled and contain numerous penetrations and openings, in association with its former use as a studio space. The viaduct is of considerable significance (medium value) due to the extent and survival of its structure (evidential) and its historic interest. Architectural interest is also yielded through the group value of the structure in association with the adjacent listed industrial buildings/ structures.

7.75 Table 7.6 provides the significance values of the identified heritage assets.

Table 7.6: Significance value of the identified heritage assets

Name	Heritage Designation	Value
1) Stephenson's Bridge	Grade I	**High**
2) Liverpool Road Station Building	Grade I	**High**
3) 1830 Warehouse	Grade I	**High**
4) 1830 Viaduct	Grade II	**Medium**

Name	Heritage Designation	Value
5) Colonnaded Railway Viaduct	Grade II	**Medium**
6) Manchester South Junction and Altrincham Railway Viaduct	Grade II	**Medium**
7) Giants Basin	Grade II	**Medium**
8) Pair of culvert arches over River Medlock and associated overflow channel	Grade II	**Medium**
9) Commercial Hotel, Liverpool Road	Graded II	**Medium**
10) 123 Liverpool Road	Grade II	**Medium**
11) MSI Power Hall	Grade II	**Medium**
12) MSI Warehouse	Grade II	**Medium**
13) Great John Street Hotel	Grade II	**Medium**
14) Victoria and Albert Warehouse	Grade II	**Medium**
15) Zig-Zag viaduct	Grade II	**Medium**
16) Girder Bridge (Salford side)	Grade II	**Medium**
17) Stephenson's Bridge (Salford side)	Grade I	**High**
18(Manchester and Salford Junction Canal Tunnel	Grade II	**Medium**
19) Bonded Warehouse	Non-designated heritage asset	**Low**
20) Castlefield	Conservation Area	**High**
21) St Johns	**Conservation Area**	**High**

Identification & the Evaluation of Likely Significant Effects

7.76 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 Development. The potential effects in relation to the current Proposed Development have been deemed to relate to physical impacts on the fabric of the Grade II listed colonnaded viaduct and the setting of the identified heritage assets.

7.77 Detailed evaluation of the impacts on the settings of the identified heritage assets are provided within the Visual Impact Assessment set out in Section 6 of the Heritage Statement within Appendix 7.1.

Demolition and Construction Phase

7.78 During the construction phase the setting and fabric of the Grade II listed Colonnaded viaduct will be impacted, as will the setting of the non-designated Bonded Warehouse, Grade II Zig-zag bridge, Grade II 1830 viaduct and Grade I Stephenson's Bridge.

7.79 Impacts will be related to construction traffic, noise, dust, site hoarding/ scaffolding etc. 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 setting of the heritage assets as a group and **permanent minor adverse impacts** on the fabric of the Grade II Colonnaded Viaduct, due to loss of historic fabric.

7.80 The proposed physical interventions to the historic fabric of the Grade II listed Colonnaded Viaduct are in regards to integrating the structure into the Proposed Development and the need to support the Proposed Development from stilts that penetrate the arches and transfer the load to new foundations installed between the existing piers of the arches. It is proposed to install eight (8no.) new columns through the arches; in one location, an existing opening will be utilised. This will result in instances of minor adverse impact on the significance of the listed structure.

Operation

7.81 The Proposed Development will result in the brick arches to the north side of the Grade II colonnaded viaduct being repaired, maintained and put into active use. This is considered to outweigh the minor adverse impact of the localised removal of historic fabric, to allow for the structural interventions for the Proposed Development. Consequently, the Proposed Development will have a **beneficial impact on the Grade II listed colonnaded viaduct.**

7.82 The potential effects of the Proposed Development are considered in full within the Visual Impact Assessment in Section 6 of the Heritage Statement (Appendix 7.1) and summarised in Table 7.8. The Proposed Development will result in one instance of no impact, five instances of negligible impact and two instances of minor beneficial impact.

Cumulative Effects

7.83 In assessing the likely significant effects of the Proposed Development, due consideration has been paid to the other committed developments (i.e. those that have already commenced construction or those that have not commenced but have a valid planning permission or those that are reasonably foreseeable, i.e. as part of an approved Masterplan), where there are likely to be significant effects. Committed Developments are set out in Appendix 2.2.

Demolition and Construction Phase

7.84 All of the St Johns developments, alongside the Ordsall Chord, Middlewood Locks and Salford Central developments are likely to be viewed in conjunction with the Site construction as largely one entity. This results in a slightly extended area of visual intrusion on the setting of the non-designated Bonded Warehouse, Grade II Zig-Zag bridge, Grade II 1830 viaduct and Grade I Stephenson's Bridge.

7.85 The overall cumulative effects of the above developments and the Proposed Development traffic will have a localised, temporary, minor adverse impact to the settings of the heritage assets. The overall significance of effect will be **minor adverse** in all cases.

Operation Phase

7.86 It is considered that the cumulative impact of the committed developments will have a **minor positive** effect, alongside the Proposed Development, by establishing a cohesive townscape in this location and a clustering of contemporary development which would form new landmarks to this underutilised area of the city.

7.87 The Proposed Developments at Middlewood Locks and Wilburn Basin, Salford, are of a large scale and will transform the area to the west of the Site. The potential visual impact of these schemes, on the historic built environment, has been tested separately and accepted. The overall cumulative effects of these two schemes alongside the Proposed Development is expected to result in limited instances of **minor adverse** harm to the heritage values of the Grade I and Grade II listed buildings within the former Liverpool Road Station/ MSI complex, from viewing places along Liverpool Road looking west. However, mitigation for any adverse impacts are considered to be offered by the substantial public benefits of these schemes.

7.88 Due to the proximity of the proposed tower elements of Trinity Islands, St John's Place, Central Village and Riverside, which form part of the St John's Masterplan, the overall cumulative effects of these schemes alongside the Proposed Development is expected to result in limited instances of moderate adverse harm to the heritage values of the Grade I and Grade II listed buildings within the former Liverpool Road Station/ MSI complex, from viewing places along Liverpool Road and Water Street looking west. However, mitigation for any adverse impacts are considered to be offered by the substantial public benefits of these schemes.

Mitigation Measures

Demolition and Construction Phase

7.89 The Construction Methodology and Programme, Air Quality Chapter and Noise and Vibration assessment details the protective measures that will be put in place to ensure any potential adverse impacts of the demolition and construction phase will be minimised. Recommended measures include:

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

Operation Phase

7.90 Heritage considerations have been integral to the design of the Proposed Development. Enlisting appropriate specialists and consulting with the Local Planning Authority and Historic England has informed the design development and assessment process to ensure potential adverse visual impacts on the identified heritage assets are minimised. The proposals seek to maintain a sustainable, viable use for the listed Viaduct structure by better revealing its heritage values and allowing for continual maintenance and repair.

7.91 The Proposed Development responds to the context of the Site's surroundings in regards to the variety in massing, scale, alignment and materiality of the buildings surrounding the Site. The Proposed Development has also responded to the local character and history and reflects the diversity of the local identity, building styles and materials. Importantly, the design of the Proposed Development is appropriately innovative continuing the history of independence and variety and place shaping, addressing connections between people and places**.**

7.92 As will be evident, the proposals for the Site herald further investment in this part of Manchester. The proposals will clearly make a positive contribution to the vitality of this part of the city and therefore enhance the character and distinctiveness of the setting of the identified heritage assets surrounding the Site.

7.93 The substantial public benefits of the scheme will also offer mitigation against instances of adverse impacts (see section 7 of the Heritage Statement in Appendix 7.1).

Residual Effects

Operation Phase

7.94 Consideration to mitigating the impacts on the identified heritage assets has been made throughout the development of the Proposed Development. Consequently, the residual effects will be the same as the potential effects discussed.

7.95 A summary of the potential and residual effects is set out below in Table 7.8

Table 7.8: Summary of potential and residual effects

Receptor	Likely Significant Effect	Mitigation	Residual Effect
Demolition and Construction Phase			
Bonded Warehouse (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Colonnaded Viaduct (physical)	Minor Adverse	Construction methodology and programme	**Minor Adverse**
Colonnaded Viaduct (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Stephenson's bridge (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
1830s viaduct (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Zig-Zag bridge (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Operational Phase			
1) Stephenson's Bridge (setting)	Negligible	n/a	**Negligible**
2) Liverpool Road Station Building (setting)	Negligible	n/a	**Negligible**
3) 1830 Warehouse	Negligible	n/a	**Negligible**

Receptor	Likely Significant Effect	Mitigation	Residual Effect
(setting)			
4) 1830 Viaduct (setting)	Negligible	n/s	**Negligible**
5) Colonnaded Railway Viaduct (physical)	Minor adverse	Public benefits	**Negligible**
5) Colonnaded Railway Viaduct (setting)	Minor adverse	Public benefits	**Negligible**
6) Manchester South Junction and Altrincham Railway Viaduct (setting)	Negligible	n/a	**Negligible**
7) Giants Basin (setting)	Negligible	n/a	**Negligible**
8) Pair of culvert arches over River Medlock and associated overflow channel (setting)	Negligible	n/a	**Negligible**
9) Commercial Hotel, Liverpool Road (setting)	Negligible	N/a	**Negligible**
10) 123 Liverpool Road (setting)	Negligible	n/a	**Negligible**
11) MSI Power Hall (setting)	Negligible	n/a	**Negligible**
12) MSI Warehouse (setting)	Negligible	n/a	**Negligible**
13) Great John Street Hotel (setting)	Negligible	n/a	**Negligible**
14) Victoria and Albert Warehouse (setting)	Negligible	n/a	**Negligible**
15) Zig-Zag viaduct	Negligible	n/a	**Negligible**
16) Girder Bridge (Salford side) (setting)	Negligible	n/a	**Negligible**
17) Stephenson's Bridge (Salford side) (setting)	Negligible	n/a	**Negligible**
18) Manchester and Salford	Negligible	n/a	**Negligible**

Receptor	Likely Significant Effect	Mitigation	Residual Effect
Junction Canal Tunnel (setting)			
19) Bonded Warehouse (setting)	Minor beneficial	n/a	**Minor beneficial**
20) Castlefield (character and appearance)	Minor beneficial	n/a	**Minor beneficial**
21) St Johns (character and appearance	**Negligible**	**n/a**	**Negligible**

References

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- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. (English Heritage, April 2008).
- Understanding Place: Historic Area Assessments: Principles and Practice. (English Heritage, 2010).
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- Seeing the History in View: A Method for Assessing Heritage Significance within Views. (English Heritage, May 2011).
- Department for Culture, Media and Sport (DCMS). 2010. Principles of Selection for Listed Buildings.

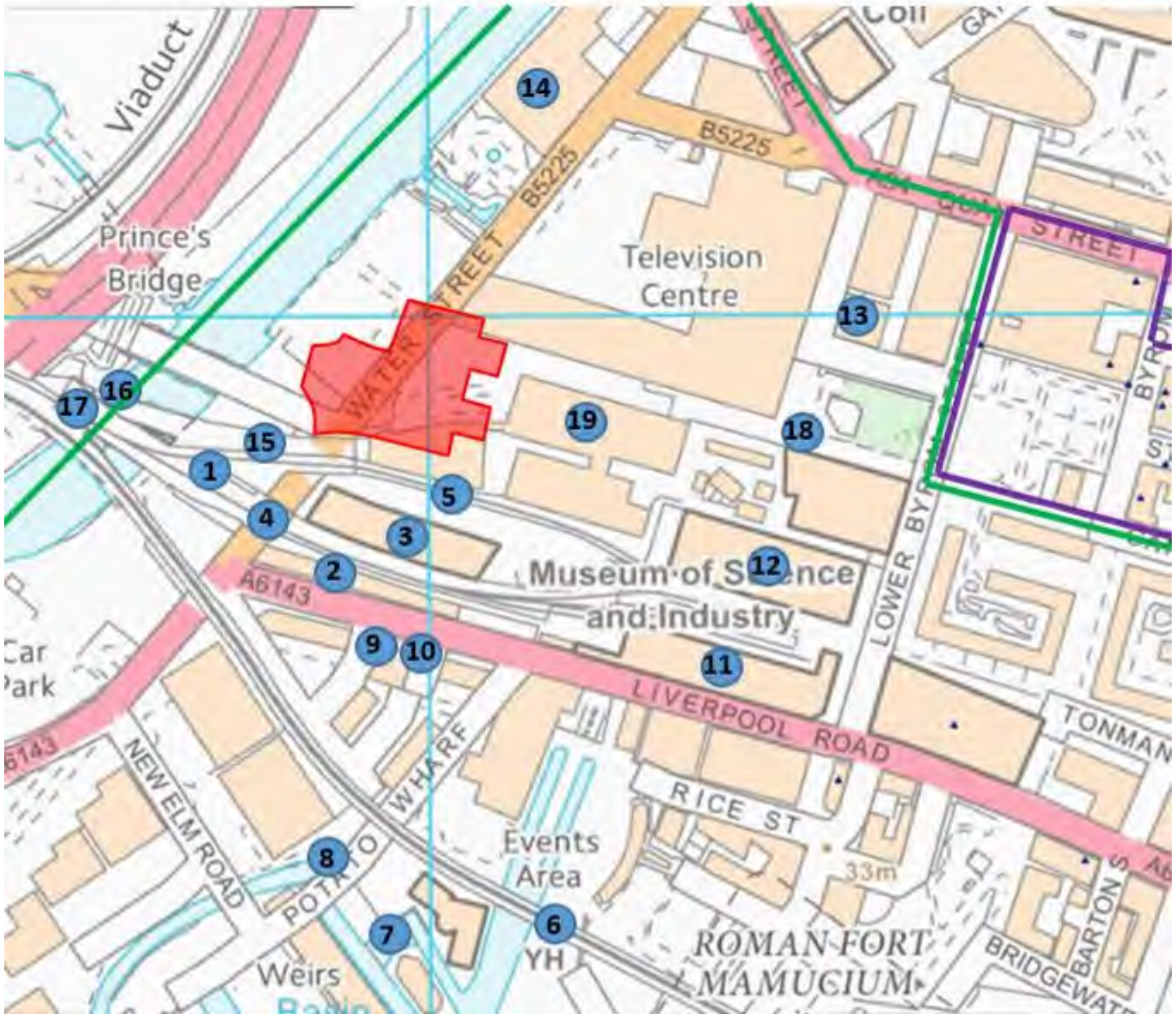

Figure:	**7.1**		
Title:	**Built Heritage Assets within 250m radius of Site**		
Project:	**Factory, Manchester**		
Date:	**September 2016**	**Scale:**	**NTS**

8 Air Quality

Introduction

8.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to Air Quality. 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.

Legislation and Policy Context

Legislation

Air Quality Strategy for England, Scotland, Wales and Northern Ireland

8.2 National planning policy on air quality is provided through the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[1]. The Strategy sets out air quality objectives and policy options to further improve air quality in the UK from today and into the long-term, in line with the requirements of Part IV of the Environment Act 1995. As well as direct benefits to public health, these options are intended to provide important benefits to quality of life and help to protect our environment. The Strategy:

- sets out a way forward for work and planning on air quality issues;
- sets out the air quality standards and objectives to be achieved in the UK by 2020, based on the health effects of the pollutants concerned and costs of emission reduction methods;
- introduces a new policy framework for tackling fine particles; and,
- identifies potential new national planning policy measures which modelling indicates could give further health benefits and move closer towards meeting the Strategy's objectives.

8.3 The Strategy sets out standards and objectives for ten main health threatening air pollutants in the UK: carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulate matter (of less than 10 micrometers (μm) aerodynamic diameter: PM_{10}, and less than 2.5 μm aerodynamic diameter: $PM_{2.5}$), ozone (O_3), lead (Pb), benzene (C_6H_6), polycyclic aromatic hydrocarbons (PAHs) and 1,3-butadiene (C_4H_6).

8.4 The air quality standards identified are long-term benchmarks for ambient pollutant concentrations, with minimum or zero risk levels set with regard to scientific and medical evidence on the effects of each particular pollutant on health or, in the appropriate context, on

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

the wider environment. Air quality objectives are policy based targets identified by the government which should be considered as maximum ambient concentrations that should not normally be exceeded. The objectives are established based on health sensitivity to the pollutant and in consideration of economic and social implications.

8.5 The standards identify not only the appropriate concentration value for each pollutant but the period over which the impact should be considered. The periods are pollutant specific with some including an annual mean, capturing the risk of long-term exposure to the pollutant, and a short-term value, capturing critical exposures to peaks in concentration. The short-term periods vary between pollutants, reflecting their different health related impacts. For example, NO_2 is calculated on a 1-hour averaging period whereas PM_{10} is based on a 24-hour averaging period.

8.6 With regards to particulates (PM_{10} and $PM_{2.5}$), the Strategy has adopted an 'exposure reduction' approach to seek a more efficient way of achieving further reductions in the health effects of air pollution by providing a driver to improve air quality everywhere in the UK rather than just in a small number of localised hotspot areas. This approach is based on the principle that, for all pollutants with a low or zero threshold for adverse effects, it will generally be more beneficial to public health, and potentially more cost-effective, across the whole population of an urban area or region than in smaller hotspot areas.

8.7 The objectives in the Strategy are a statement of policy intention/target, and as a result there is no legal requirement to meet these objectives. However, this is not the case where the levels adopted are equivalent to limit values in EU legislation, in which case the levels are legally binding through the appropriate European Directive and national legislation transposing such Directive. Responsibility for implementation and enforcement, where applicable, of the Strategy and that objectives are met in areas where people are likely to be exposed to relevant pollutants over the relevant averaging period lies with the Local Authority.

Air Quality Standards Regulations 2010

8.8 The Air Quality Standards Regulations 2010 implement European Council Directives 2008/50/EC on ambient air quality and cleaner air for Europe and 2004/107/EC relating to arsenic (As), cadmium (Cd), mercury (Hg), nickel (Ni) and PAHs in ambient air. The Regulations also revoke and replace the Air Quality Standards Regulations 2007.

8.9 The Regulations establish limit values for SO_2, NO_2, C_6H_6, CO, Pb and PM_{10} in ambient air and target values for $PM_{2.5}$, O_3, As, Cd, Ni and benzo(a)pyrene ($C_{20}H_{12}$). The limit values for NO_2, PM_{10} and $PM_{2.5}$, the main pollutants of concern in the Greater Manchester Area, are presented in Table 8.1.

Table 8.1 Air Quality Limit Values for Relevant Pollutants to the Greater Manchester Area

Pollutant	Concentration	Measured as
NO_2	200 µg/m^3	**1-hour mean, not to be exceeded more than 18 times a year (99.79 %ile)**
	40 µg/m^3	**Annual mean**
PM_{10}	50 µg/m^3	**24-hour mean, not to be exceeded more than 35 times a year (90.41 %ile)**
	40 µg/m^3	**Annual mean**
$PM_{2.5}$	**25 µg/m^3**	**Annual mean, 0% margin of tolerance from 1st January 2015 and reducing to 20 µg/m^3 by January 2020.**

Environmental Protection Act 1990

8.10 Part III of the Environmental Protection Act 1990 (as amended) makes provision for the identification and control of statutory nuisances. The Act identifies statutory nuisance, in relation to air quality, as '*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance; or, any accumulation or deposit which is prejudicial to health or a nuisance*'. However, the Act does not provide any further clarification as to thresholds of what constitutes a nuisance and no statutory guideline values have been set that indicate what constitutes a 'nuisance'. As a result, the level at which a nuisance occurs is highly variable and dependent on perception, with effects influenced by existing conditions and the degree of change that has occurred.

8.11 Where a statutory nuisance has been demonstrated the Local Authority must serve an abatement notice, non-compliance with which would constitute a legal offence. The abatement notice may prevent or restrict occurrence or reoccurrence of the nuisance or may, itself, undertake action to abate the nuisance and recover any associated expenses.

National Planning Policy

8.12 National planning policy guidance in relation to air quality is provided through the National Planning Policy Framework (NPPF)[2], with planning practice guidance provided by the Department for Communities and Local Government[3] to support this.

8.13 Chapter 11 of the NPPF sets out the Government's planning policies on the conservation and enhancement of the natural environment. This states, in paragraph 109, that: '*The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*'.

8.14 The NPPF states in paragraph 120 that '*to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects *(including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*'.

8.15 Paragraph 124 of the NPPF also provides further guidance in relation to air quality, and states that: '*planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan*'.

8.16 The Planning Practice Guidance provides direction on the application of the NPPF, for example paragraph 005 (Reference ID: 32-005-20140306) identifies the process through which the relevance of air quality to a planning decision is established and paragraph 007 (Reference ID: 32-007-20140306) provides information on the level of detail that may be required in an assessment. The guidance places an emphasis on consultation with the planning authority to ensure the scope of an air quality assessment focuses on local issues.

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[2] Department for Communities and Local Government (2012) National Planning Policy Framework

[3] Department for Communities and Local Government (2014) Planning Practice Guidance – Air Quality. Accessed through http://planningguidance.planningportal.gov.uk.

Local Planning Policy

Manchester Local Plan

8.17 Local planning policy is provided in Manchester City Council's Local Plan, with the Core Strategy Development Plan Document[4] comprising the key document in the Local Plan outlining the Council's vision for Manchester in 2027 and identifying the planning policies which will be used to deliver that vision.

8.18 The main planning policy relating to air quality is provided by Policy EN16 of the Core Strategy, which states that: '*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*'.

8.19 Further to this, Policy EN7 on energy infrastructure opportunities identifies that '*there will be a presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations… the cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16*'.

Local Air Quality Management Plan

8.20 Local authorities are required, under Part IV of the Environment Act 1995, to assess and review local air quality within their area periodically. The assessment and review processes should consider the air quality both at the time of review and likely future conditions within a relevant period and identify whether air quality standards and objectives are being achieved at the time of review and likely to be achieved for the appropriate period into the future.

8.21 The local authority has an obligation under the Act to identify any areas in which the objectives are not or are not likely to be achieved and must designate them as an Air Quality Management Area (AQMA). For each area, an Action Plan identifying how the authority will address the air quality issues with the aim of achieving the prescribed air quality standards and objectives.

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[4] Manchester City Council (2012) Manchester's Local Development Framework Core Strategy Development Plan Document.

8.22 The Greater Manchester Air Quality Action Plan[5] has been prepared by the 10 Greater Manchester Authorities, including Manchester City Council, complying with the statutory requirement to produce such a plan once an AQMA has been declared. The Plan details the measures that will be taken across the area and process by which the Plan will be evaluated, and is accompanied by detailed annexes for each of the 10 district authorities providing a more detailed and local focus to the wider actions and strategies. The latest monitoring report[6] identifies that long-term trends indicate an improvement in air quality, although areas remain above the air quality objective for annual mean NO_2, although the hourly NO_2 objective was not exceeded.

Assessment Methodology and Significance Criteria

Overview

8.23 The Air Quality Assessment considers the impact of the Proposed Development, both during demolition, construction and operation, on local air quality and its subsequent effect on sensitive receptors. The scope of the assessment includes consideration of the effects arising as a result of dust related impacts during demolition and construction and local air quality effects as a result of increased traffic volumes and flows associated with the Proposed Development.

8.24 The assessment has not considered effects associated with construction traffic or odour, which were scoped out of the assessment for the following reasons:

- Construction traffic - full details of the number and distribution of vehicles resulting from the construction phase are not fully known at this stage. However, adverse effects as a result of construction traffic are considered unlikely, with changes in traffic flows/volumes anticipated to be negligible and temporary across the construction phase. However, for the purpose of the construction dust assessment, it is assumed that it is likely that HDV movements will exceed 50 HDV movements in any one day;
- Odour - assessment of odour impacts could not be completed at this stage due to insufficient detail on emissions being available (*e.g.* ventilation location/height, kitchen size, *etc*.).However adverse effects are considered unlikely due to the nature of the development and approprioate use of abtement measures if required.

8.25 The Air Quality Assessment has been completed following appropriate best practice guidelines produced by the Institute of Air Quality Management (IAQM)[7] for dust during construction and jointly produced by the IAQM and Environmental Protection UK (EPUK)[8] for

[5] Greater Manchester Combined Authority (2004) Greater Manchester Air Quality Management Plan.
[6] Greater Manchester Combined Authority (2014) 2013/2014 Air Quality Progress Report for Greater Manchester. Report Reference GMPR2014\112172. December 29014.
[7] Holman *et al*. (2014) IAQM Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management, London.
[8] Moorcroft and Barrowcliffe et al. (2015) Land-use Planning and Development Control: Planning for Air Quality. Institute of Air Quality Management, London.

operational air quality effects. The area over which impacts are considered varies between the two assessments: construction related impacts are considered over a 350 m radius surrounding the Proposed Development plus 50 m from the highway boundary of main roads surrounding the site for up to 500m from the Site; operational effects are considered across the road network, as advised by the Transport Assessment, and included the road network surrounding the development site (including Water Street, Liverpool Road and Quay Street/New Quay Street plus associated roads) and some of the major routes to/from the development area (including Mancunian Way, Regent Road, Trinity Way, Chester Road and Deansgate).

8.26 Consultation on air quality issues with Manchester City Council was completed regarding the approach and the assessment. The Council requested that $PM_{2.5}$ should be included in the assessment, with the assessment and verification of results using air quality monitoring data from within the study area that was provided by Manchester City Council.

Demolition and Construction

Dust

8.27 Assessment of the risk of impact associated with the generation of dust and PM_{10} during the demolition and construction phases of the Proposed Development and determination of subsequent mitigation measures necessary has been undertaken following IAQM guidelines[9].

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

8.29 The guidelines identify appropriate screening criteria for the identification of potential receptors, based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of deposition with distance. A detailed assessment of the impact of dust from construction sites will be required where:

[9] Holman *et al*. (2014) IAQM Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management, London.

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

8.30 The magnitude of dust emissions for each activity is classified as small, medium or large depending upon the scale of the works proposed, materials involved and level of activity required. The IAQM guidelines provide examples of how the magnitude of emission can be defined, which are identified in Table 8.2. The Proposed Development is unlikely to satisfy all criteria within the examples, therefore professional judgement and site specific information are used to identify appropriate emission magnitude.

Table 8.2 Dust Emission Magnitude Definition (source: IAQM Guidance 2014)

Activity	Small	Medium	Large
Demolition	▪ Total building volume <20,000m^3 ▪ Construction material with low potential for dust release (*e.g.* metal cladding or timber) ▪ Demolition activities <10m above ground level ▪ Demolition during wetter months	▪ Total building volume 20,000 – 50,000m^3 ▪ Potentially dusty construction material ▪ Demolition activities 10 - 20m above ground level	**▪ Total building volume >50,000m^3** **▪ Potentially dusty construction material (*e.g.* concrete)** **▪ Demolition activities >20m above ground level**
Earthworks	▪ Total site area <2,500m^2 ▪ Soil type with large grain size (*e.g.* sand) ▪ <5 heavy earth moving vehicles active at any one time ▪ Formation of bunds <4m in height ▪ Total material moved <20,000 tonnes ▪ Earthworks during wetter months	▪ Total site area 2,500 - 10,000m^2 ▪ Moderately dusty soil type (*e.g.* silt) ▪ 5 - 10 heavy earth moving vehicles active at any one time ▪ Formation of bunds 4 - 8m in height ▪ Total material moved 20,000 – 100,000 tonnes	**▪ Total site area >10,000m^2** **▪ Potentially dusty soil type (*e.g.* clay)** **▪ >10 heavy earth moving vehicles active at any one time** **▪ Formation of bunds >8m in height** **▪ Total material moved >100,000 tonnes**
Construction	▪ Total building volume <25,000m^3 ▪ Construction material with low potential for dust (*e.g.* metal cladding or timber)	▪ Total building volume 25,000 – 100,000m^3 ▪ Potentially dusty construction material (*e.g.* concrete) ▪ On-site concrete batching	**▪ Total building volume >100,000m^3** **▪ On-site concrete batching, sandblasting**
Trackout	▪ <10 HDV (>3.5t) outward movements* in any one day# ▪ Surface material with low potential for dust release ▪ Unpaved road length <50m	▪ 10 - 50 HDV (>3.5t) outward movements* in any one day# ▪ Moderately dusty surface material (*e.g.* with high clay content) ▪ Unpaved road length 50 - 100m	**▪ >50 HDV (>3.5t) outward movements* in any one day#** **▪ Potentially dusty surface material (*e.g.* high clay content)** **▪ Unpaved road length >100m**

*** A vehicle movement is a one way journey, *i.e.* from A to B, and excludes the return journey**
 # HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

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

8.32 The first step in identifying the sensitivity of the area is to establish the sensitivity of the receptor, based on the presence or level of activity associated with the area influenced by the Proposed Development. Professional judgement and site specific information are used to assign an appropriate level of receptor sensitivity using the principles outlined in Table 8.3. Following this, the sensitivity of the area can be established from Tables 8.4 to 8.6 based on the sensitivity of the receptor, number of receptors (in the case of human health and dust soiling) and the distance from source.

Table 8.3 Receptor Sensitivity Definitions (source: IAQM Guidance 2014)

Receptor	Small	Medium	Large
Dust Soiling	• Enjoyment of amenity would not reasonably be expected; • There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; • Transient exposure, where people or property is only expected to be present for limited periods of time as part of the normal pattern of use • Indicative examples include playing fields, farmland, footpaths, short-term car parks and roads.	• Users would expect to enjoy a reasonable level of amenity, but not reasonably at same level as in their home; • The appearance, aesthetics or value of property could be diminished by soiling; • Indicative examples include parks and places of work.	• Users can reasonably expect enjoyment of a high level of amenity; • The appearance, aesthetics or value of property would be diminished by soiling, and continuous or regularly extended periods of presence expected during normal pattern of land use; • Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
Human Health	• Locations where human exposure is transient; • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations where the people exposed are workers#, and exposure is over a time period relevant to the air quality objective for PM_{10}*; • Indicative examples	• Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}*; • Indicative examples include residential

Receptor	Small	Medium	Large
		include office and shop workers, but not those occupationally exposed to dust.	properties, hospitals, schools and residential care homes.
Ecological	• Locations with a local designation where the features may be affected by dust deposition, *e.g.* Local Nature Reserve	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; • Locations with a national designation where the features may be affected by dust deposition, *e.g.* Site of Special Scientific Interest.	• Locations with an international or national designation and the designated features may be affected by dust soiling, *e.g.* Special Area of Conservation with acid heathland; • Location where there is a community of a particularly dust sensitive species, such as vascular species included in the Red Data List for Great Britain.

* **Workers are considered to be less sensitive than the general public as a whole because the most sensitive to the effects of air pollution, such as young children, are not normally workers.**

\# **In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for 8 hours or more in a day, following Defra Guidance[10].**

[10] Defra (2016) Local Air Quality Management. Technical Guidance LAQM.TG(16). Defra, London.

Table 8.4 Sensitivity of the Area to Dust Soiling Effects on People and Property (source: IAQM Guidance 2014)

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

Table 8.5 Sensitivity of the Area to Human Health Impacts (source: IAQM Guidance 2014)

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

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source				
			<20m	*<50m*	*<100m*	*<200m*	*<350m*
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32 µg/m³	>10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28 µg/m³	>10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	**-**	**>1**	**Low**	**Low**	**Low**	**Low**	**Low**

Table 8.6 Sensitivity of the Area to Ecological Impacts (source: IAQM Guidance 2014)

Receptor Sensitivity	Distance from Source	
	<20m	*<50m*
High	High	**Medium**
Medium	Medium	**Low**
Low	**Low**	**Low**

8.33 The risk of dust related impacts from the Proposed Development is established from the sensitivity of the area and the likely dust emission magnitude. The risk should be established, on the worst-case area sensitivity and in the absence of mitigation, for each of the construction related activities (demolition, earthworks, construction and trackout) following the matrix in Table 8.7.

Table 8.7 Risk of Dust Impacts from Each Activity (source: IAQM Guidance 2014)

Sensitivity of Area	Activity	Dust Emission Magnitude		
		Large	*Medium*	*Small*
High	Demolition	High Risk	Medium Risk	**Medium Risk**
	Earthworks	High Risk	Medium Risk	**Low Risk**
	Construction	High Risk	Medium Risk	**Low Risk**
	Trackout	High Risk	Medium Risk	**Low Risk**
Medium	Demolition	High Risk	Medium Risk	**Low Risk**
	Earthworks	Medium Risk	Medium Risk	**Low Risk**
	Construction	Medium Risk	Medium Risk	**Low Risk**
	Trackout	Medium Risk	Low Risk	**Negligible**
Low	Demolition	Medium Risk	Low Risk	**Negligible**
	Earthworks	Low Risk	Low Risk	**Negligible**
	Construction	Low Risk	Low Risk	**Negligible**
	Trackout	**Low Risk**	**Low Risk**	**Negligible**

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

Operational Traffic and Infrastructure

8.35 A detailed assessment of the effects of operational traffic on the local area has been completed using the new generation air dispersal model: ADMS-Roads, version 4.0.1.0 (release date November 2015). ADMS-Roads, a version of the Atmospheric Dispersion Modelling System (ADMS), is a computer based model of the atmospheric dispersion of pollutants in urban areas released from road traffic and industrial sources. The model simulates the sources of pollutants using point, line, area and volume source models and is designed to permit consideration of dispersion problems ranging from simple (*e.g.* a single isolated point source or from a single road) to more complex problems (*e.g*. multiple industrial and road traffic emissions over a large area).

8.36 Pollutant concentrations and deposition throughout a specified area, as well as specific locations identified by the user, are calculated by the model from the following input types:

- Source parameters such as height of release, efflux velocity, buoyancy, momentum, mass release rate and terminal settling velocities;
- Road geometry, along with traffic count and composition. The effect of street canyons can also be accounted for;
- Meteorological parameters such as wind speed, direction, precipitation, temperature and atmospheric stability; and,
- Topographical factors such as proximity of buildings, ground levels and surface roughness.

8.37 A significant difference of the ADMS-Roads model and other models used for air dispersion modelling in urban areas is that it applies up-to-date physics using parameterisations of the boundary layer structure based on the Monin-Obukhov length, and the boundary layer height. Definition of the boundary layer in terms of measurable physical parameters, allowing for realistic representation of the changing characteristic of dispersion with height, allows for a more accurate and soundly based prediction of the concentrations of pollutants.

8.38 Concentrations of oxides of nitrogen (NO_X) and particulate matter (PM_{10} and $PM_{2.5}$) have been predicted from the model using emission factors from Version 6.0.1 of the Emission Factor Toolkit, which is built into ADMS. Although NO_X concentrations are not of primary concern, it provides a more accurate method of estimating NO_2 concentrations from the model. The NO_2 concentrations have been established using the latest version of Defra's conversion calculator (v4.1)[11].

8.39 The IAQM guidelines[12] recommend the use of $PM_{2.5}$ concentrations for the assessment of air quality impacts from combustion sources, such as traffic, as the Air Quality Assessment Level (AQAL) for this is much lower than that of PM_{10}. However, local factors suggest that concentrations of PM_{10} are of greater concern, and as a result both have been considered. Defra guidance[13] identifies that local authorities are required to work towards reducing levels of $PM_{2.5}$ in England.

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[11] Defra (2014) NO_X to NO_2 calculator version 4.1. Accessed through http://laqm.gov.uk.

[12] Moorcroft and Barrowcliffe et al. (2015) Land-use Planning and Development Control: Planning for Air Quality. Institute of Air Quality Management, London

[13] Defra (2016) Local Air Quality Management. Technical Guidance LAQM.TG(16). Defra, London.

Traffic Data

8.40 Traffic flow data in the form of Annual Average Daily Traffic (AADT) flows and traffic composition have been obtained from the Transport Consultants, Vectos. The model area and committed development included in the model were agreed by Vectos with Transport for Greater Manchester.

8.41 AADT data was provided for three scenarios: baseline (2014); worst-case scenario including the Proposed Development (2017); and a future year of Proposed Development (2032) operation. This allows for the quantum of impact to be identified against estimated future traffic levels and not present day levels. The AADT data is presented in Table 8.8. A number of the roads have been sub-divided into sections, for example Deansgate central which runs between Quay Street and Great Bridgewater Street, to allow for accurate modelling of the pollutant dispersion.

Table 8.8 Traffic Data Included in the Assessment

Road	Section	AADT Flows														
		2014			2017 without Proposed Development			2017 with Proposed Development			2032 without Proposed Development			2032 with Proposed Development		
		LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)
Regent Road	East	44878	3468	39.5	53823	3513	39.5	54054	3497	39.5	56229	3409	38.5	56581	3402	**38.5**
	West	36015	3236	33	44153	3256	33	44107	3238	33	43742	3146	34	43954	3137	**33**
Mancunian Way	West	57848	4043	54	69500	3981	54	70526	3986	53.5	74622	3917	53.5	75481	3932	**53.5**
	East	60284	3887	65.5	71467	4228	65.5	72624	4226	65.5	75096	4191	66	75969	4195	**66**
Chester Road	South	26790	1676	37	34135	1543	37	34355	1540	37	35035	1589	36	35265	1590	**35**
	Central	27545	1702	27	34872	1628	27	35047	1624	27	35299	1660	26	35523	1660	**26**
	North	18749	665	30	18303	1030	30	18620	1040	30	18815	825	30.5	19331	818	**30**
Mancunian Way/Chester Road Roundabout	-	13108	760	25	14689	654	25	14727	655	25.6	14941	585	25.6	14935	587	**25.6**
Deansgate	South	15210	648	18	17375	922	18	18197	909	18	17527	750	18	18494	743	**17**
	Central	10043	507	20	10879	738	20	11104	728	20	9994	618	21	10540	609	**21**
	North	7898	524	32.5	10392	859	32.5	10503	862	31.5	9786	680	32	10219	677	**25**

Road	**Section**	**AADT Flows**														
		2014			2017 without Proposed Development			2017 with Proposed Development			2032 without Proposed Development			2032 with Proposed Development		
		LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)
Chorlton Road	-	13366	472	34	14236	511	34	14610	511	34	13810	445	34	14101	445	**34**
Whitworth Street	-	2612	502	16	4309	604	16	4994	589	16	5004	548	17	5712	541	**16**
Great Bridgewater Street	-	5428	537	16	5943	455	16	6622	446	15	5490	472	17	6101	464	**17**
Peter Street	-	6054	561	24	10500	445	24	10519	455	24	10844	385	25	10849	386	**25**
Lower Byrom Street	North	4388	219	36	6142	256	36	6720	263	36	6218	280	37	6892	277	**36**
	Central	4388	219	36	6142	256	36	6794	263	36	6218	280	37	6892	277	**36**
	South	4388	219	34	6142	256	34	6794	263	33	6218	280	35	6963	277	**35**
Gartside Street	-	5522	289	27.5	7753	216	27.5	7479	212	27	8523	226	25	8153	216	**24**
Trinity Way	North	18915	989	30	21928	584	30	22341	588	29	22484	632	30	22857	650	**29**
	Central	18385	1208	17	22282	1095	17	23621	1079	16	24830	1132	16	25882	1134	**16**
	South	21025	1184	25	24370	1071	25	25712	1042	25	26541	1077	25	27721	1084	**25**
Hampson Street	-	6601	530	12	6512	565	12	7919	556	12	8223	567	11	9148	550	**11**

Road	Section	AADT Flows														
		2014			2017 without Proposed Development			2017 with Proposed Development			2032 without Proposed Development			2032 with Proposed Development		
		LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)
Water Street	North 1	2347	68	33	2682	30	33	3171	51	36	3124	38	33	3480	58	**37**
	North 2	3031	106	41	3407	83	41	3171	51	41	3661	92	41	4264	58	**40**
	Central North	3082	97	28	4097	78	28	4043	51	32	4093	85	24	4264	58	**30**
	Central South	3082	97	26	4097	78	26	4341	51	25	4093	85	29	4549	58	**27**
	South 2	6716	634	43	8159	633	43	9823	593	37	7241	636	44	9479	615	**29**
	South 1	6716	634	25	8159	633	25	9823	593	26	7241	636	26	8770	614	**25**
Liverpool Road	West	6362	629	42	8174	589	42	10687	575	43	7776	597	43	10095	600	**43**
	Central West	5155	566	42	6143	544	42	8744	529	42	5909	554	43	8253	557	**43**
	Central East	7521	716	38	9693	654	38	11411	638	38	10033	678	38	11728	667	**36**
	East	9205	675	22	11210	605	22	12411	590	23	10932	582	23	12304	572	**24**

Road	Section	AADT Flows														
		2014			2017 without Proposed Development			2017 with Proposed Development			2032 without Proposed Development			2032 with Proposed Development		
		LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)
B5225	-	683	38	30	889	53	30	0	0	0	644	55	23	0	0	**0**
New Quay Street	West	28935	1399	25	33191	1022	25	34034	1004	25	34043	1073	25	34875	1027	**25**
	Central West	9661	530	30	6531	310	30	7588	309	31	7232	335	28	7993	319	**28**
	Central East	9661	530	23	6531	310	23	7588	309	23	7232	335	25	7993	319	**25**
	East	7315	463	16	3849	280	16	4845	328	22	4108	297	15	5001	333	**18**
Quay Street	West	9954	652	25	9529	436	25	10372	441	25	10849	451	25	11514	443	**25**
	Central West	9954	652	25	9529	436	25	10372	441	25	10849	451	25	11514	443	**25**
	Central East	6950	640	29	5844	481	29	6717	479	29	6680	478	29	7019	484	**29**
	East	3665	338	19	4503	224	19	5026	221	18	5115	219	16	5270	216	**16**
Bridge Street	East	3302	1097	19	5407	1057	19	5663	1056	19	5501	1041	19	5830	1047	**19**
	Central	2697	1076	14	3492	1037	14	3713	1034	14	3994	1028	14	4128	1018	**14**
	West	6473	1242	23	7699	1119	23	7503	1118	23	8229	1120	23	7813	1118	**23**

Road	**Section**	**AADT Flows**														
		2014			2017 without Proposed Development			2017 with Proposed Development			2032 without Proposed Development			2032 with Proposed Development		
		LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)	LDV	HDV	Avr Speed (km/h)
New Bailey Street	-	6473	1242	27	7698	1119	27	7503	1117	27	8230	1119	24	7811	1118	**24**
Chapel Street	East	7841	522	35	8604	395	35	8569	394	35	8814	398	35	8612	398	**35**
	Central	9235	1600	13	10394	1471	13	10684	1472	13	11497	1470	12	11688	1469	**12**
	West	13677	2065	27	17031	2019	27	17334	2032	27	18726	2019	27	19067	2050	**27**
A6042	-	24297	1254	27	32174	897	27	32131	881	27	32913	967	28	33062	955	**28**
Middlewood Street	-	8768	616	34	9162	707	34	9989	694	33	9721	651	30	10304	612	**30**
Oldfield Road	**-**	**4110**	**307**	**12**	**5854**	**369**	**12**	**5853**	**377**	**12**	**8966**	**342**	**13**	**8951**	**346**	**13**

Train Emissions

8.42 Diesel trains operate along a train line that lies in close proximity to the southern boundary of the Site, with the frequency of trains significant enough to warrant inclusion in the ADMS-Roads model as a line source. The emission figures, identified in Table 8.9, have been taken from the Air Quality Assessment produced for the Network Rail Manchester Piccadilly and Oxford Road Capacity Scheme (December 2014)[14]. Although this link excludes the section to the west of Castlefield Junction, data for this reach was not available. Nonetheless, as fewer trains utilise the reach to the west of Castlefield Junction than to the east (as the railway line splits) this represents a worst-case scenario.

8.43 Consideration has been given to the Ordsall Chord development and potential for contribution to these emissions. However, the proposals for this development include electrification of this component, and therefore will not contribute to the emissions in this area. Although there are proposals for the lines to be electrified, and therefore reduce emissions in the future, the continuation of diesel trains on the existing line has been included as a worst-case scenario.

Table 8.9 Emissions from Diesel Trains Included in the Assessment

Rail Section	Assumed Link Length	DMU/EMU Passenger Kilometres	Freight Kilometres	DMU NO_X Emissions (g/day)	Freight NO_X Emissions (g/day)	Total NO_X Emissions (g/s)	Total NO_X Emissions (mg/m/s)
Oxford Road to Castlefield Junction (two-way)	**0.9**	**343.7**	**46.1**	**12876.0**	**7838.7**	**0.240**	**0.266**

Meteorological Information

8.44 Manchester Airport records meteorological conditions on an hourly basis, with the location considered to be representative of conditions across Manchester and therefore appropriate for inclusion within the ADMS-Roads Model. An initial test was carried out over 5 recent years (2010 to 2014), in accordance with Defra guidance[15] .The study identified 2010 as resulting in the highest concentrations at the

[14] Network Rail (2014) Manchester Piccadilly and Oxford Road Capacity Scheme. Environment Statement. Air Quality – Assumptions and Model Results for the Assessment of Operational Effects. December 2014.

[15] Defra (2016) Local Air Quality Management. Technical Guidance LAQM.TG(16). Defra, London.

modelled sensitive receptors, and therefore this year was used for all further models.

8.45 Figure 8.1 shows the wind rose for the meteorological data collected in 2010. It can be seen that the predominant wind direction is southerly, with lesser westerly and north-westerly influences.

Model Verification

8.46 Model verification was carried out in order to calibrate the ADMS-Roads model against the nearby air quality monitoring site. The most recent available NO_2 diffusion tube data was for 2014, which was used as the verification year for the model. Meteorological data for 2014 from Manchester Airport was used along with appropriate traffic data for the surrounding area. Background data for NO_2 and NO_X was taken from the Defra background mapping data archive.

8.47 The results of the model verification are provided in Table 8.10, with the ratio of monitored to modelled concentration identified in the final column which was applied to the results of the modelled data.

Table 8.10 Model Verification Results

Monitored NO_2	Background NO_2	Background NO_X	Road NO_X		Ratio
			Modelled	*Monitored*	*Monitored to Modelled*
39.85 µg/m³	**30.02 µg/m³**	**51.00 µg/m³**	**11.46 µg/m³**	**15.66µg/m³**	**1.37**

Significance of Impact

8.48 The IAQM and EPUK guidelines[16] provide guidance for establishing the significance of air quality impacts arising as a result of development proposals. The magnitude of impact on individual receptors is dependent upon the long-term average pollutant concentration at the receptor in the assessment year and the percentage change relative to the AQAL, as identified in Table 8.11 below.

[16] Moorcroft and Barrowcliffe et al. (2015) Land-use Planning and Development Control: Planning for Air Quality. Institute of Air Quality Management, London.

Table 8.11 Impact Magnitude Definition

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

8.49 The guidelines do not, however, provide a set method for establishing the significance of the impact. Whilst the establishment of the impact magnitude on individual receptors can be identified as negligible, slight, moderate or substantial, the significance of the overall effect is dependent on a number of factors. Therefore, professional judgement will be applied to determine the likely significance of effects, with the following factors considered:

- the existing and future air quality in the absence of the development, notably whether the Air Quality Objectives are likely to be met or the scale of exceedences in the long-term and short-term mean concentrations;
- the extent of current and future population exposure to the impacts, notably the number of properties and/or people present and the scale of impact (*e.g.* whether the majority of the local population is subject to substantial or slight magnitude impacts);
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts, such as establishing a worst-case scenario for sensitive receptors.

Limitations and Assumptions

8.50 The assessment methodology followed has been devised to provide a representative and accurate assessment of air quality effects associated with the Proposed Development, however inherently there will remain some level of uncertainty. This has, however, been minimised as far as possible through compliance with best practice guidelines. Sensitive receptors selected represent a worst-case scenario based on the baseline information received, and will provide a good indication of the likely impacts. Furthermore, by considering the worst-case meteorological data over the last 5 years the likely worst-case is again identified.

8.51 Vehicle emission factors built into the modelling software only go up to the year 2030. The air quality impacts of the development are considered beyond this. It is assumed that cars will continue to improve with regards to emissions (*i.e*. get cleaner) as a result of improved technologies, and therefore by using the 2030 vehicle emission factors for assessment of impact in 2032 would represent a conservative approach without limitation to the assessment.

8.52 Similarly, Defra background maps only forecast pollutant concentrations up to 2030. The emissions for the study area follow a downward trend indicating that air quality in the area is gradually improving as a result of improved technology. Therefore, use of the 2030 background figure for the assessment of the Proposed Development in 2032 would represent a conservative/worst-case approach that would not represent a limitation to the assessment.

8.53 The data supplied by the traffic consultants, on which the air quality modelling was based, utilised 2014 as the baseline year with assessment years for the development of 2017 and 2032. The years of assessment were partly constrained by the transport model, however assessment of the development being fully operational in 2017 provides a worst case scenario whilst 2032 provides a useful future year scenario for the change in impact magnitude to be considered. Further to this, the traffic data incorporates all of the identified developments within the St. John's Masterplan area. A qualitative analysis identified that changes to the AADT traffic levels were relatively small, and the AADT data provided represents a worst-case scenario to that of the Proposed Development.

8.54 Furthermore, verification of the modelled results will ensure the effect of any assumptions or limitations in the background data or traffic data are minimised as far as possible.

Baseline Conditions

Current Baseline

8.55 The Proposed Development falls within a designated Air Quality Management Area (AQMA), which extends along the main arterial traffic routes in the city and around Manchester Airport. The pollutant declared for the AQMA is NO_2 (annual mean), with the source identified as a mixture of road types. Figure 8.2 identifies the extent of the AQMA within Manchester City Council's authority boundary.

8.56 The most recent air quality progress report for Greater Manchester, reporting on the years 2013 to 2014 and covering all 10 districts of Greater Manchester, concluded that:

- long-term trends have shown that there has been an improvement in air quality, but areas still remain above the air quality objective for the annual mean NO_2;

- the assessment of monitoring data shows that real time monitoring data for the NO_2 annual mean objective broadly confirms the existing AQMA boundaries;
- exceedences were noted at several roadside monitoring sites, with measurements from Greater Manchester's diffusion tube network confirming locations that continue to be above the annual mean NO_2;
- there were no exceedences of the hourly NO_2 objective;
- real time monitoring data for PM_{10} shows that annual average objectives are not exceeded and are following a downward trend;
- no sites had more than 35 exceedences of the daily mean particulate objective, and therefore this objective is met;
- reporting of SO_2, CO and C_6H_6 has been discontinued as previous assessments indicated no exceedences.

8.57 Importantly, the Greater Manchester Air Quality Action Plan identifies that the major source of both NO_2 and PM_{10} is the road network, with a large percentage of that originating from roads with an AADT flow in excess of 10,000 vehicles.

8.58 As part of the Greater Manchester Air Quality Action Plan, a number of automated and non-automated air quality monitoring stations have been set up. Two continuous automated monitoring stations are located in the vicinity of Manchester City Centre, as identified in Table 8.12, with five non-automated monitoring locations in the vicinity of the Proposed Development. One site, Liverpool Road (Urban Centre), is located in close proximity to the Proposed Development with four further sites, Oxford Street (kerbside), Hewitt Street (Urban Centre), Town Hall (Urban Background) and Princess Street (Kerbside), close to the likely area of influence.

Table 8.12 Continuous Air Quality Monitoring Locations within Manchester City Centre

Monitoring Site	Location	Distance from Site	Type	Pollutants Monitored
Oxford Road	384233 397287	1.1 km	Kerb side – sites with sample inlets within 1m of the edge of a busy road. Sampling heights are within 2-3m.	NO_2, PM_{10}
Piccadilly	384310 398337	1.1 km	Urban centre – non-kerbside sites located in an area representative of typical population exposure in town or city centre areas, *e.g.* pedestrian precincts and shopping areas. Sampling heights are typically within 2-3m.	NO_2, O_3, PM_{10}, $PM_{2.5}$, SO_2

Nitrogen Dioxide

8.59 NO_2 concentrations are monitored by both automated and non-automated monitoring sites in Manchester. A summary of the annual mean NO_2 concentrations and the number of 1-hour mean exceedences recorded (automated surveys only) are provided in Table 8.13. In general, the results from the nearby monitors largely mirror that reported for the Greater Manchester area overall, with a long-term downward trend in annual mean concentrations yet concentrations remain above the Air Quality Objective for NO_2.

8.60 The results from the closest monitoring site (Liverpool Road, non-automated survey) identifies that annual mean concentrations in the specific area have generally been falling but still exceed the Air Quality Objective. Similar patterns were seen in all of the sites, however those sites in close proximity to the study area were notably lower than Oxford Road to the east of the study area where concentrations (60 µg/m3 in 2015) were significantly higher than Liverpool Road (40.52 µg/m3 in 2015).

8.61 Automated survey results from the Manchester Piccadilly and Oxford Road survey locations demonstrate that the number of 1-hour mean exceedences are likely to be quite high, based on predictions using the 99.8th percentile of hourly means. However, compared to previous actual exceedences, with a maximum of 19 at Oxford Road in 2015, it is considered unlikely that this will have significantly increased to over 100, with errors in the calibration of the equipment potentially influencing this.

Table 8.13 Monitoring Results for NO_2 against Standards and Objectives

Year	Monitoring Objective	Automated Surveys		Non-Automated Surveys				
		Oxford Road 384233 397287	*Piccadilly 384310 398837*	*Liverpool Road*	*Oxford Street*	*Hewitt Street*	*Princess Street*	*Town Hall*
2007	Annual Mean Concentration	-	44 µg/m^3	-	81.00 µg/m^3	-	73.80 µg/m^3	**46.80 µg/m^3**
	Number of 1-hour Mean Exceedences	-	0	-	-	-	-	**-**
2008	Annual Mean Concentration	-	43 µg/m^3	51.46 µg/m^3	78.85 µg/m^3	-	62.25 µg/m^3	**39.84 µg/m^3**
	Number of 1-hour Mean Exceedences	-	12	-	-	-	-	**-**
2009	Annual Mean Concentration	-	42 µg/m^3	48.19 µg/m^3	71.10 µg/m^3	42.66 µg/m^3	55.30 µg/m^3	**37.92 µg/m^3**
	Number of 1-hour Mean Exceedences	-	0	-	-	-	-	**-**
2010	Annual Mean Concentration	64 µg/m^3	45 µg/m^3	52.08 µg/m^3	71.61 µg/m^3	49.29 µg/m^3	59.52 µg/m^3	**41.85 µg/m^3**
	Number of 1-hour Mean Exceedences	2	0	-	-	-	-	**-**
2011	Annual Mean Concentration	66 µg/m^3	44 µg/m^3	44.88 µg/m^3	66.00 µg/m^3	41.36 µg/m^3	53.68 µg/m^3	**36.96 µg/m^3**
	Number of 1-hour Mean Exceedences	5 (166)*	0 (109)*	-	-	-	-	**-**
2012	Annual Mean Concentration	62 µg/m^3	41 µg/m^3	45.99 µg/m^3	65.42 µg/m^3	40.55 µg/m^3	50.78 µg/m^3	**36.30 µg/m^3**
	Number of 1-hour Mean Exceedences	13 (181)*	0 (101)*	-	-	-	-	**-**
2013	Annual Mean Concentration	55 µg/m^3	39 µg/m^3	41.18 µg/m^3	51.90 µg/m^3	39.44 µg/m^3	47.05 µg/m^3	**32.26 µg/m^3**
	Number of 1-hour Mean Exceedences	0 (138)*	0 (97)*	-	-	-	-	**-**
2014	Annual Mean Concentration	68 µg/m^3	40 µg/m^3	39.85 µg/m^3	52.67 µg/m^3	38.68 µg/m^3	50.30 µg/m^3	**33.62 µg/m^3**
	Number of 1-hour Mean Exceedences	14	2	-	-	-	-	**-**
2015	Annual Mean Concentration	-	-	40.52 µg/m^3	57.14 µg/m^3	37.53 µg/m^3	55.24 µg/m^3	**31.22 µg/m^3**
	Number of 1-hour Mean Exceedences	-	-	-	-	-	-	**-**

*** If the data capture for the full year is less than 90%, the 99.8th percentile of hourly means (in brackets) is a useful predictor of**

Year	Monitoring Objective	Automated Surveys		Non-Automated Surveys				
		Oxford Road 384233 397287	***Piccadilly 384310 398837***	***Liverpool Road***	***Oxford Street***	***Hewitt Street***	***Princess Street***	***Town Hall***
possible exceedence of the Air Quality Objective.								

8.62 Air pollution background concentrations for NO_2 obtained from the Defra background mapping for 2011, see Table 8.14, identified that the background levels for the grid squares covering the scheme, and the average of these, as well as for Manchester City Council's authority area fall below the Air Quality Objective and confirm the continued downward trend of NO_2 concentration. However, the background concentrations are notably lower than those recorded in the vicinity of the study area.

Table 8.14 Defra Background NO_2 Concentrations for the Site and Manchester City Council Area

Year	Annual Mean NO_2 Concentration					
	Manchester City Council	*Grid Squares Covering the Scheme*				
		382500 397500	*38500 398500*	*383500 397500*	*383500 398500*	*Average*
2011	25.97 µg/m^3	31.59 µg/m^3	30.05 µg/m^3	34.10 µg/m^3	35.57 µg/m^3	**32.83 µg/m^3**
2012	25.50 µg/m^3	31.07 µg/m^3	29.53 µg/m^3	33.66 µg/m^3	35.01 µg/m^3	**32.32 µg/m^3**
2013	25.02 µg/m^3	30.54 µg/m^3	29.00 µg/m^3	33.23 µg/m^3	34.46 µg/m^3	**31.81 µg/m^3**
2014	24.55 µg/m^3	30.02 µg/m^3	28.48 µg/m^3	32.79 µg/m^3	33.91 µg/m^3	**31.30 µg/m^3**
2015	**24.07 µg/m^3**	**29.49 µg/m^3**	**27.95 µg/m^3**	**32.35 µg/m^3**	**33.35 µg/m^3**	**30.79 µg/m^3**

Particulate Matter

8.63 Particulate concentrations are only monitored by automated monitoring sites in Manchester. A summary of the annual mean PM_{10} and $PM_{2.5}$ concentrations and the number of 24-hour mean exceedences for PM_{10} recorded are provided in Table 8.15. In general, the results are fairly consistent at each site, although concentrations at Oxford Road are consistently higher than that recorded at Piccadilly, with all records falling beneath the Air Quality Objective. Similarly, the number of 24-hour mean exceedences is consistently higher at Oxford Road, however the number of exceedences falls within the Air Quality Objective.

Table 8.15 Automated Monitoring Results for Particulate Matter against Standards and Objectives

Year	Monitoring Objective	PM_{10}		$PM_{2.5}$
		Oxford Road 384233 397287	*Piccadilly 384310 398337*	*Piccadilly 384310 398337*
2009	Annual Mean Concentration	-	22 µg/m^3	
	Number of 1-hour Mean Exceedences	-	6	-
2010	Annual Mean Concentration	31 µg/m^3	21 µg/m^3	**18 µg/m^3**
	Number of 1-hour Mean Exceedences	17	1	-
2011	Annual Mean Concentration	32 µg/m^3	22 µg/m^3	**14 µg/m^3**
	Number of 1-hour Mean Exceedences	33	8	-
2012	Annual Mean Concentration	30 µg/m^3	21 µg/m^3	**14 µg/m^3**
	Number of 1-hour Mean Exceedences	28	11	-
2013	Annual Mean Concentration	31 µg/m^3	22 µg/m^3	**12 µg/m^3**
	Number of 1-hour Mean Exceedences	21	7	-
2014	Annual Mean Concentration	28 µg/m^3	20 µg/m^3	**12 µg/m^3**
	Number of 1-hour Mean Exceedences	**18**	**5**	-

8.64 Air pollution background concentration for PM_{10} obtained from the Defra background mapping for 2011, see Table 8.16, identified that the background levels for the individual grid squares covering the scheme, and the average of these, fall below the Air Quality Objective and confirm the continued downward trend of concentration. However, the background concentrations are slightly lower than those recorded in the vicinity of the study area. Table 8.16 also provides the average of the annual mean $PM_{2.5}$ concentration for the study area, which also demonstrates a gradual decline in background concentration.

Table 8.16 Defra Background Particulate Matter Concentrations for the Site

Year	Annual Mean PM_{10} Concentration					Annual Mean $PM_{2.5}$ Concentration
	Grid Squares Covering the Scheme					
	382500 397500	*38500 398500*	*383500 397500*	*383500 398500*	*Average*	*Average*
2011	19.24 μg/m³	18.51 μg/m³	19.77 μg/m³	19.82 μg/m³	19.33 μg/m³	**13.52 μg/m³**
2012	18.92 μg/m³	18.20 μg/m³	19.41 μg/m³	19.38 μg/m³	18.98 μg/m³	**13.18 μg/m³**
2013	18.61 μg/m³	17.89 μg/m³	19.05 μg/m³	18.94 μg/m³	18.62 μg/m³	**12.84 μg/m³**
2014	18.29 μg/m³	17.58 μg/m³	18.69 μg/m³	18.51 μg/m³	18.27 μg/m³	**12.50 μg/m³**
2015	**17.97 μg/m³**	**17.27 μg/m³**	**18.33 μg/m³**	**18.07 μg/m³**	**17.91 μg/m³**	**12.16 μg/m³**

Other Pollutants

8.65 Automated monitoring results for other pollutants have shown that concentrations in Greater Manchester are consistently below the relevant air quality objective, and therefore monitoring of these pollutants has been discontinued as part of the Greater Manchester Air Quality Action Plan. This includes SO_2, C_6H_6, C_4H_6, Pb and CO.

Future Baseline

8.66 The most recent air quality progress report and latest Updating and Screening Assessment for Greater Manchester[17] both identify that annual mean pollutant concentrations for NO_2 is following a downward trend towards the Air Quality Objective (as demonstrated by Figure 8.3), although a significant increase is noted at the Oxford Road site between 2013 and 2014. The PM_{10} concentrations are relatively consistent.

8.67 Furthermore, air pollution background concentrations for both NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) obtained from the Defra background mapping for 2011, see Table 8.17 and 8.18, confirm these trends. The data for the individual grid squares covering the

[17] Greater Manchester Combined Authority (2016) 2015 Air Quality Updating and Screening Assessment for Greater Manchester. February 2016.

scheme, and the average of these, identify that the downward trend in NO_2 will continue whilst PM_{10} and $PM_{2.5}$ concentrations fluctuate slightly with no obvious trend within the grid squares containing the Proposed Development.

8.68 Consequently, it has been assumed that the baseline provides an indicative pollutant concentration that is representative, or at least a worst-case scenario, of future years.

Table 8.17 Defra Background Pollution Concentration Predictions for the Site

Year	Annual Mean NO_2 Concentration				
	Grid Squares Covering the Scheme				
	382500 397500	*382500 398500*	*383500 397500*	*383500 398500*	*Average*
2016	28.49 µg/m^3	27.06 µg/m^3	31.40 µg/m^3	32.68 µg/m^3	**29.91 µg/m^3**
2017	27.48 µg/m^3	26.16 µg/m^3	30.45 µg/m^3	32.01 µg/m^3	**29.02 µg/m^3**
2018	26.47 µg/m^3	25.26 µg/m^3	29.51 µg/m^3	31.34 µg/m^3	**28.14 µg/m^3**
2019	25.46 µg/m^3	24.36 µg/m^3	28.56 µg/m^3	30.67 µg/m^3	**27.26 µg/m^3**
2020	24.45 µg/m^3	23.45 µg/m^3	27.61 µg/m^3	30.00 µg/m^3	**26.38 µg/m^3**
2021	24.09 µg/m^3	23.15 µg/m^3	27.28 µg/m^3	29.84 µg/m^3	**26.09 µg/m^3**
2022	23.73 µg/m^3	22.85 µg/m^3	26.95 µg/m^3	29.67 µg/m^3	**25.80 µg/m^3**
2023	23.37 µg/m^3	22.55 µg/m^3	26.61 µg/m^3	29.51 µg/m^3	**25.51 µg/m^3**
2024	23.00 µg/m^3	22.25 µg/m^3	26.28 µg/m^3	29.35 µg/m^3	**25.22 µg/m^3**
2025	22.64 µg/m^3	21.95 µg/m^3	25.95 µg/m^3	29.19 µg/m^3	**24.93 µg/m^3**
2026	22.56 µg/m^3	21.90 µg/m^3	25.87 µg/m^3	29.18 µg/m^3	**24.88 µg/m^3**
2027	22.48 µg/m^3	21.85 µg/m^3	25.80 µg/m^3	29.17 µg/m^3	**24.82 µg/m^3**
2028	22.40 µg/m^3	21.80 µg/m^3	25.72 µg/m^3	29.16 µg/m^3	**24.77 µg/m^3**
2029	22.32 µg/m^3	21.74 µg/m^3	25.65 µg/m^3	29.15 µg/m^3	**24.72 µg/m^3**
2030	**22.24 µg/m^3**	**21.69 µg/m^3**	**25.57 µg/m^3**	**29.14 µg/m^3**	24.66 µg/m^3

Table 8.18 Defra Background Pollution Concentration Predictions for the Site

Year	Annual Mean PM_{10} Concentration					Annual Mean $PM_{2.5}$
	Grid Squares Covering the Scheme					
	382500 397500	*382500 398500*	*383500 397500*	*383500 398500*	*Average*	*Average*
2016	17.82 µg/m³	17.13 µg/m³	18.16 µg/m³	17.88 µg/m³	17.75 µg/m³	**12.01 µg/m³**
2017	17.68 µg/m³	16.98 µg/m³	18.00 µg/m³	17.69 µg/m³	17.58 µg/m³	**11.85 µg/m³**
2018	17.53 µg/m³	16.83 µg/m³	17.83 µg/m³	17.50 µg/m³	17.42 µg/m³	**11.70 µg/m³**
2019	17.38 µg/m³	16.69 µg/m³	17.66 µg/m³	17.31 µg/m³	17.26 µg/m³	**11.55 µg/m³**
2020	17.23 µg/m³	16.54 µg/m³	17.49 µg/m³	17.12 µg/m³	17.10 µg/m³	**11.39 µg/m³**
2021	17.20 µg/m³	16.51 µg/m³	17.46 µg/m³	17.07 µg/m³	17.06 µg/m³	**11.35 µg/m³**
2022	17.17 µg/m³	16.48 µg/m³	17.42 µg/m³	17.03 µg/m³	17.03 µg/m³	**11.30 µg/m³**
2023	17.14 µg/m³	16.45 µg/m³	17.39 µg/m³	16.99 µg/m³	16.99 µg/m³	**11.26 µg/m³**
2024	17.11 µg/m³	16.42 µg/m³	17.35 µg/m³	16.94 µg/m³	16.96 µg/m³	**11.21 µg/m³**
2025	17.09 µg/m³	16.38 µg/m³	17.32 µg/m³	16.90 µg/m³	16.92 µg/m³	**11.17 µg/m³**
2026	17.12 µg/m³	16.42 µg/m³	17.35 µg/m³	16.93 µg/m³	16.96 µg/m³	**11.19 µg/m³**
2027	17.16 µg/m³	16.45 µg/m³	17.39 µg/m³	16.97 µg/m³	16.99 µg/m³	**11.21 µg/m³**
2028	17.19 µg/m³	16.48 µg/m³	17.42 µg/m³	17.00 µg/m³	17.02 µg/m³	**11.23 µg/m³**
2029	17.23 µg/m³	16.51 µg/m³	17.46 µg/m³	17.03 µg/m³	17.06 µg/m³	**11.25 µg/m³**
2030	**17.26 µg/m³**	**16.55 µg/m³**	**17.49 µg/m³**	**17.07 µg/m³**	**17.09 µg/m³**	**11.27 µg/m³**

Sensitive Receptors

Demolition and Construction

8.69 The area of influence from demolition and construction dust contains a variety of different land-uses and varying scales of use intensity. Immediately surrounding the Proposed Development is the Museum of Science and Industry, which includes various Grade I and II Listed buildings, to the south and the wider Manchester St John's redevelopment immediately to the north, east and south.

8.70 In the wider area, to the north and east of the Proposed Development, on the eastern side of the River Irwell, the land-use is largely characterised by commercial and high-rise residential properties, although with some more traditional apartments to the east. The area includes a number of amenity areas, hotels and significant buildings.

8.71 To the south of the Proposed Development the land-use is predominantly residential, with a mixture of high-rise and traditional apartments and industrial properties. Of particular note is the Grade I Listed Liverpool Road Station, 1830s Warehouse and Viaducts, Potato Wharf and Castlefield Bowl, the latter of which is used for outdoor music events.

8.72 To the west of the Proposed Development the main land-use is what appears to be brownfield land supporting a range of semi-natural habitats, with a hotel located at the northern end. A recreational footpath heads along the far bank of the River Irwell, linking Blackfriars Street to the north with Salford Quays to the south-east.

8.73 There are no statutory designated sites of ecological importance present within the area of influence (within 500m to 1km in respect of air quality assessments), and therefore no further consideration of impacts in this assessment is required.

Operation

8.74 Sensitive receptors against which the impacts of the Proposed Development will be assessed have been identified in line with appropriate guidelines[18,19]. These identify that receptors could comprise residential and other properties where members of the public are regularly present, which are close to or within the Proposed Development or are located alongside roads significantly affected by the development. Furthermore, the Defra guidance states that, for dispersion modelling, the user should ensure that areas representing the locations of maximum public exposure are indicated.

8.75 Consequently, the identification of sensitive receptors for assessment has focused on potentially sensitive locations, such as residential properties, schools, hotels and museums, in relation to the roads identified as likely to see large increases in traffic flow volumes, informed by the output of the Traffic Assessment. Where a number of receptors are present in one area, the receptor representing the worst-case scenario (*e.g.* where the façade is closest to the road or the building is closest to the junction) has been selected for the assessment. The list of sensitive receptors is provided in Table 8.19,

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[18] Defra (2009) Local Air Quality Management. Technical Guidance LAQM.TG(09). Defra, London.

[19] Moorcroft and Barrowcliffe et al. (2015) Land-use Planning and Development Control: Planning for Air Quality. Institute of Air Quality Management, London.

with those associated with the Proposed Development provided in Table 8.20. All sensitive receptors are identified in Figure 8.4.

Table 8.19 Location of Existing Sensitive Receptors for Operational Traffic Impact Assessment

Receptor ID	Description	Grid Reference
E-1a	Irwell Street Residential Flats – 1st Residential Floor (5m)	**383154 398196**
E-1b	Irwell Street Residential Flats – Mid-level Residential Floor (15m)	
E-2	Manchester College – St. John's Centre – Ground Floor	**383209 398114**
E-3a	Bauhaus, Quay St/Atherton St – 1st Residential Floor (4m)	**383230 398061**
E-3b	Bauhaus, Quay St/Atherton St – Mid-level Residential Floor (15m)	
E-4	Rozel Square Residential Flats – Ground Floor	**383249 397859**
E-5a	Potato Wharf Residential Flats, Liverpool Road – Ground Floor	**382916 397850**
E-5b	Potato Wharf Residential Flats, Liverpool Road – 1st Floor (4m)	
E-6	Liverpool Road Residential Flats – 1st Residential Floor (3m)	**383402 397693**
E-7	Hilton Hotel, Deansgate – 1st Bedroom Floor (3m)	**383431 397662**
E-8	Deansgate Residential Flats – Ground Floor	**383311 397456**
E-9	Castlegate Residential Flats – Ground Floor	**383214 397424**
E-10a	Blantyre Street Residential Flats – 1st Residential Floor (3m)	**382970 397348**
E-10b	Blantyre Street Residential Flats – Mid-level Residential Floor (15m)	
E-11	Thomas Court Residential Flats – Ground Floor	**382946 397216**
E-12	Castlefield School – Ground Floor	**383067 397196**

Receptor ID	Description	Grid Reference
E-13	Frederick Street Residential Flats – Ground Floor	**383072 398731**
E-14a	Chapel Street Residential (East) – 1st Residential Floor (4m)	**383045 398558**
E-14b	Chapel Street Residential (East) – Mid-level Residential Floor (15m)	
E-15a	Chapel Street Residential (West) – 1st Residential Floor (3m)	**382967 398532**
E-15b	Chapel Street Residential (West) – Mid-level Residential Floor (16.5m)	
E-16a	Fresh Manchester Residential, Chapel St – 1st Residential Floor (4m)	**383242 398592**
E-16b	Fresh Manchester Residential, Chapel St – Mid-level Residential Floor (15m)	
E-17	Premier Inn Hotel, New Bailey St – 1st Bedroom Level (3m)	**383234 398475**
E-18a	Jacksonville Crescent Residential Flats – Ground Floor	**383249 397139**
E-18b	Jacksonville Crescent Residential Flats – 1st Floor (4m)	
E-19	Angela Street Residential House – Ground Floor	**382952 397105**
E-20	Chester Road Residential Flats – Ground Floor	**382653 397101**
E-21	Ordsall Road Residential Flats – Ground Floor	**382452 397717**
E-22	Bridge Street Residential Flats – 1st Residential Floor (4m)	**383593 398282**
E-23	**Middlewood Street Residential Flats – 1st Residential Floor (4.65m)**	**382484 398052**

Table 8.20 Location of Proposed Development Sensitive Receptors for Operational Traffic Impact Assessment

Receptor ID	Description	Grid Reference
P-10a	Water Street 1 (South-West) – Ground Floor	**382954 397950**
P-10b	Water Street 2 (North-West) – Ground Floor	**382997 398002**
P-10c	Water Street 3 (North-East) – Ground Floor	**383017 398006**
P-10d	**Water Street 4 (South-East) – Ground Floor**	**382960 397940**

Identification & the Evaluation of Key Impacts

Construction

Dust Emission Magnitude

8.76 The likely magnitude of dust emissions from the Proposed Development for the four main activities has been assessed, as identified in Table 8.21.

Table 8.21 Predicted Magnitude of Dust Emissions from Proposed Development

Activity	Magnitude	Justification
Demolition	Medium	Relatively minor demolition will be required for the development, with the majority of the site comprising hard standing, and some buildings comprising of metal sheet materials with low dust generation. However, some buildings are above 10m from ground level.
Earthworks	Small	The site area is relatively small and, given the size of the site, is unlikely to support more than 5 heavy earth moving vehicles at any one time. There is unlikely to be significant earth material moved or bunds required.
Construction	Medium	The building volume has potential to exceed 25,000m^3, although is proposed to be constructed from material with relatively low dust generating potential.
Trackout	Medium	Considering the size of the Site, and the development requirements, the HDV outward movements is considered likely to exceed 10 HDV movements and has potential to exceed 50 HDV movements during certain aspects of the development. However, given the size of the sites, unpaved road lengths will be minimal and unlikely to support potentially dusty material. Therefore, a medium magnitude of impact is considered to be appropriate.

Sensitivity of the Area

8.77 The area surrounding the Proposed Development that would fall within the area of influence of dust emissions is described in Paragraphs 8.69 to 8.73. Although the Proposed Development is located in a highly urbanised location, those land-uses immediately surrounding the site are associated with the St. John's masterplan development. However, further afield, the area of influence is comprised of high varied land-uses with residential, commercial and recreational uses identified in the area of influence. As a result, exposure to impacts will vary from transient exposure as a result of infrequent and short-duration presence, such as the use of the riverside path on the far bank of the River Irwell, to long-term and regular exposure, such as residential properties to the east and south. As a result of the varied land-uses, the sensitivity of property in the area of influence to impacts will vary, with commercial areas typically less sensitive than residential properties and the Museum of Science and Industry to the south-east.

8.78 The sensitivity of the area to each of the previously identified impact types associated with the Proposed Development are identified in Table 8.22.

Table 8.22 Sensitivity of Receptors to Dust Emission Effects

Impact Type	Sensitivity	Justification
Dust Soiling	High	Residential properties and significant buildings, including the Museum of Science and Industry and associated Grade I listed buildings including Liverpool Road Station, are considered to be particularly sensitive to dust soiling impacts, with users expecting high levels of amenity and the appearance, aesthetics and value of the properties would be diminished by regular soiling over extended periods of time.
	Medium	Commercial, industrial and office properties are likely to be relatively sensitive to dust soiling impacts, although the level of amenity expected by users is typically lower and the buildings are of lower sensitivity with regards to impacts associated with dust on their appearance, aesthetics or value.
	Low	The local roads and footpaths present in the area of influence are of low sensitivity to dust effects, with their appearance or aesthetics unlikely to be influences and the presence of people or property are largely transient.
Human Health	High	The area of influence includes both residential properties and an educational establishment where human exposure will be over a prolonged period and, in some cases, up to 8 hours or more in a day.
	Medium	The area of influence includes a number of commercial, industrial and office properties where relatively long-term exposure is present, although the sensitivity of those is generally lower.

Impact Type	Sensitivity	Justification
	Low	The presence of public footpaths, parks and busy shopping areas in the field survey area are considered to be of low sensitivity as exposure to impacts are largely short-term and transient.
Ecological	Negligible	Due to an absence of statutory designated sites within the area of influence, a negligible sensitivity is considered to be appropriate.

8.79 As a result, the sensitivity of the area overall to these is summarised in Table 8.23.

Table 8.23 Sensitivity of the Area to Dust Emission Impacts

Impact Type	Receptor Sensitivity	Distance from Source	No. Receptors	Background Concentration	Sensitivity of Area
Dust Soiling	High	<20	1-10	-	**Medium**
		<50	1-10	-	**Low**
		<100	10-100	-	**Low**
		<350	>100	-	**Low**
	Medium	<20	>1	-	**Medium**
	Low	<20	>1	-	**Low**
Human Health	High	<20	1-10	<24 μg/m^3	**Low**
		<50	1-10	<24 μg/m^3	**Low**
		<100	10-100	<24 μg/m^3	**Low**
		<350	>100	<24 μg/m^3	**Low**
	Medium	<20	1-10	<24 μg/m^3	**Low**
		<50	1-10	<24 μg/m^3	**Low**
		<100	1-10	<24 μg/m^3	**Low**

		<350	>10	<24 µg/m^3	**Low**
	Low	**<20**	**>1**	**-**	**Low**

8.80 Consequently, the risk of dust impacts and the significance of effect as a result of dust emissions are presented in Table 8.24, which considers the magnitude of dust emission from the Proposed Development (Table 8.21) and the sensitivity of the surrounding area (Table 8.23). Following the IAQM guidance, the risk of impact is based on the worst-case sensitivity identified.

Table 8.24 Risk of Dust Related Impacts from the Proposed Development

Activity	Dust Soiling	Human Health	Ecological
Demolition	Medium Risk Moderate Adverse Effect	Low Risk Minor Adverse Effect	**Negligible**
Earthworks	Low Risk Minor Adverse Effect	Low Risk Minor Adverse Effect	**Negligible**
Construction	Medium Risk Moderate Adverse Effect	Low Risk Minor Adverse Effect	**Negligible**
Trackout	**Low Risk** **Minor Adverse Effect**	**Low Risk** **Minor Adverse Effect**	**Negligible**

Operation

8.81 The results of the air quality modelling have been split into three assessment periods: 2014 (Baseline); 2017 (worst-case scenario with Proposed Development) and 2032 (future year of Proposed Development operation). The baseline conditions for each of the existing sensitive receptors have been identified in the 2014 results to provide a baseline understanding of the air quality conditions across the site at each of the identified sensitive receptors under 'without development' and 'with development' scenarios. For each of the assessment years, the annual mean NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations are identified for each of the existing sensitive receptors under 'without development' and 'with development' scenarios. Further to this, the site suitability of the development location, in terms of predicted air quality at key sensitive receptor locations, has been assessed.

2014 Baseline Results

8.82 The air quality modelling results presented in Table 8.25 identifies the NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations at each of the existing sensitive receptors for 2014. To allow for comparison of changes across the site, the average of the background concentrations across the site has been utilised to provide a total NO_2, PM_{10} and $PM_{2.5}$ concentration for each of the sensitive receptors.

8.83 From these results it can be seen that the annual mean NO_2 concentrations at more than two-thirds of the existing sensitive receptors exceeded the relevant AQAL (40 µg/m^3), although two of these were only marginally over the limit. The highest concentration was significantly above the limit value, recorded at sensitive receptor E-10a with a concentration of 53.13 µg/m^3. Only one other sensitive receptor modelled (E-14a) resulted in a concentration above 50 µg/m^3, with just two further sites (E-15a and E-21) with concentrations above 45 µg/m^3. The lowest modelled concentration was below the AQAL with a concentration of just 34.13 µg/m^3 at sensitive receptor E-16b. Modelled concentrations fell below 35 µg/m^3 at a further two sensitive receptors (E-1b and E-3b) with a further 8 sensitive receptors falling below the AQAL.

8.84 The modelled annual mean PM_{10} and $PM_{2.5}$ concentrations identified that all of the existing sensitive receptors within the assessment area fall within the relevant AQAL (40 µg/m^3 and 25 µg/m^3 respectively). The highest modelled concentrations were significantly below the AQAL for both PM_{10} and $PM_{2.5}$, with 22.06 µg/m^3 and 14.84 µg/m^3 recorded at sensitive receptor E-10a.

Table 8.25 ADMS-Roads 2014 Baseline Results for Nitrogen Dioxide and Particulate Matter

Receptor	NO_2 Annual Mean (µg/m^3)	PM_{10} Annual Mean (µg/m^3)	$PM_{2.5}$ Annual Mean (µg/m^3)
E-1a - Irwell Street Residential (1st Residential Floor)	38.98	19.17	**13.08**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	34.40	18.62	**12.72**
E-2 - Manchester College – St. John's Centre	**41.75**	19.50	**13.29**
E-3a - Bauhaus Residential (1st Residential Floor)	37.57	19.00	**12.96**

Receptor	NO_2 Annual Mean (µg/m³)	PM_{10} Annual Mean (µg/m³)	$PM_{2.5}$ Annual Mean (µg/m³)
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	34.25	18.59	**12.70**
E-4 - Rozel Square Residential	37.08	18.95	**12.92**
E-5a - Potato Wharf Residential (Ground Floor)	**42.36**	19.16	**13.05**
E-5b - Potato Wharf Residential (1st Floor)	**42.36**	19.06	**12.99**
E-6 Liverpool Road Residential	**41.92**	19.44	**13.25**
E-7 - Hilton Hotel, Deansgate	**42.50**	19.52	**13.30**
E-8 - Deansgate Residential	**41.22**	19.60	**13.32**
E-9 - Castlegate Residential	**41.32**	19.70	**13.39**
E-10a - Blantyre Street Residential (1st Residential Floor)	**53.13**	22.06	**14.84**
E-10b - Blantyre Street Residential (Mid-level Residential Floor)	37.94	19.27	**13.11**
E-11 - Thomas Court Residential	**42.34**	19.90	**13.51**
E-12 - Castlefield School	**43.00**	20.29	**13.74**
E-13 - Frederick Street Residential	**41.16**	19.54	**13.30**
E-14a - Chapel Street Residential (East) (1st Residential Floor)	**50.46**	20.31	**13.83**
E-14b - Chapel Street Residential (East) (Mid-level Residential Floor)	35.66	18.76	**12.81**
E-15a - Chapel Street Residential (West) (1st Residential Floor)	**47.87**	20.27	**13.78**
E-15b - Chapel Street Residential (West) (Mid-level Residential	35.21	18.71	**12.78**

Receptor	NO_2 Annual Mean ($\mu g/m^3$)	PM_{10} Annual Mean ($\mu g/m^3$)	$PM_{2.5}$ Annual Mean ($\mu g/m^3$)
Floor)			
E-16a - Fresh Manchester Residential (1st Residential Floor)	38.64	19.19	**13.08**
E-16b - Fresh Manchester Residential (Mid-level Residential Floor)	34.13	18.58	**12.70**
E-17 - Premier Inn Hotel, New Bailey St	**42.08**	19.42	**13.24**
E-18a - Jacksonville Crescent Residential (Ground Floor)	**42.89**	20.46	**13.83**
E-18b - Jacksonville Crescent Residential (1st Floor)	**41.40**	20.14	**13.64**
E-19 - Angela Street Residential	**40.02**	19.62	**13.33**
E-20 - Chester Road Residential	**42.89**	20.04	**13.60**
E-21 - Ordsall Road Residential	**45.41**	20.23	**13.73**
E-22 - Bridge Street Residential	**40.43**	19.09	**13.04**
E-23 – Middlewood Street Residential	**35.93**	**18.86**	**12.87**

2017 Assessment Results

8.85 The air quality results presented in Tables 8.26 and 8.27 identify the predicted annual mean NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations at each of the sensitive receptors in 2017 under both with and without the Proposed Development scenarios. To allow for comparison of changes across the site, the average of the background concentrations across the site has been utilised to provide a total NO_2 and particulate matter concentration for each of the sensitive receptors.

8.86 NO_2 concentrations have been identified as increasing at almost all existing sensitive receptors as a result of the Proposed Development, although the scale of increase varies between them. The greatest increase in NO_2 concentration at an existing sensitive receptor was identified as 0.50 μg/m^3 at sensitive receptor E5a (Potato Wharf Residential), which is the closest receptor and lies on the corner of Water Street and Liverpool Road. Many of the sensitive receptors see only minor increases in NO_2 concentration in the magnitude of less 0.05 μg/m^3 with one site modelled to have no change in concentration and two with very minor improvements in concentration at sensitive receptors E-16b (Fresh Manchester Residential) and E-17 (Premier Inn Hotel, New Bailey St.).

8.87 Although NO_2 concentrations at four of the sensitive receptors exceed the AQAL with the Proposed Development, the highest being 47.63 μg/m^3 at sensitive receptor E-10a (Blantyre Street Residential), the concentrations without the development in all cases would remain above 40 μg/m^3. Therefore, in each of these cases, the AQAL threshold was not exceeded as a direct result of the Proposed Development. The receptor which is closest to an exceedance as a result of the development is E-5b (Potato Wharf Residential) where an increase of 0.41 μg/m^3 results in an annual mean concentration of 39.94 μg/m^3.

8.88 An analysis of the relationship between 1-hour and annual mean NO_2 concentrations at roadside sites concluded[20] that there are unlikely to be exceedances of the 1-hour NO_2 limit of 200 μg/m^3 alongside busy streets when the annual mean is less than 60 μg/m^3. Therefore, as all of the modelled concentrations fall significantly below this level there are unlikely to be any exceedances of the 1-hour mean limit at any modelled sensitive receptors as a result of the Proposed Development.

8.89 The changes in PM_{10} and $PM_{2.5}$ concentrations are similar, with relatively minor increases in concentration at 26 and 22 sensitive receptors respectively. However, the resultant concentrations for all sensitive receptors remain significantly below the 40 μg/m^3 AQAL for PM_{10} and 25 μg/m^3 AQAL for $PM_{2.5}$. Although no change was recorded in a small number of receptors as a result of the Proposed Development, it is likely that an increase has occurred but that the scale is very small and lost through rounding of the results to two decimal places and are therefore insignificant.

8.90 The greatest increase as a result of the Proposed Development for PM_{10} was modelled at sensitive receptor E-5a (Potato Wharf Residential), where the increase as a result of the Proposed Development was 0.08 μg/m^3 with a resultant concentration of 18.33 μg/m^3. The highest resultant concentration was identified at sensitive receptor E-10a (Blantyre Road Residential), where a 0.03 μg/m^3 increase as a result of the Proposed Development led to a modelled concentration of 20.47 μg/m^3. The $PM_{2.5}$ modelled concentrations

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[20] Laxen and Marner (2003) Analysis of the Relationship between 1-hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites.

showed a similar pattern, with the greatest increases in modelled concentration of 0.04 µg/m^3 as a result of the Proposed Development seen at sensitive receptors E-5a and E-5b (Potato Wharf Residential) and the highest modelled concentration of 13.53 µg/m^3 identified at sensitive receptor E-10a (Blantyre Road Residential).

Table 8.26 ADMS-Roads 2017 Results for Nitrogen Dioxide

Receptor	Without Development	With Development	Difference in Total NO_2
E-1a - Irwell Street Residential (1st Residential Floor)	34.25	34.50	**+0.25**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	31.80	31.86	**+0.06**
E-2 - Manchester College – St. John's Centre	36.55	36.73	**+0.18**
E-3a - Bauhaus Residential (1st Residential Floor)	34.08	34.24	**+0.16**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	31.84	31.91	**+0.07**
E-4 - Rozel Square Residential	34.68	35.00	**+0.32**
E-5a – Potato Wharf Residential (Ground Floor)	39.42	39.92	**+0.50**
E-5b – Potato Wharf Residential (1st Floor)	39.53	39.94	**+0.41**
E-6 – Liverpool Road Residential	38.59	38.89	**+0.30**
E-7 – Hilton Hotel, Deansgate	39.43	39.74	**+0.31**
E-8 – Deansgate Residential	37.80	37.91	**+0.11**
E-9 – Castlegate Residential	37.78	37.88	**+0.10**
E-10a – Blantyre Street Residential (1st Residential Floor)	**47.47**	**47.63**	**+0.16**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	34.63	34.68	**+0.05**
E-11 – Thomas Court Residential	38.39	38.43	**+0.04**

Receptor	Without Development	With Development	Difference in Total NO_2
E-12 – Castlefield School	38.97	39.05	**+0.08**
E-13 – Frederick Street Residential	37.52	37.54	**+0.02**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	**44.06**	**44.18**	**+0.12**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	32.61	32.66	**+0.05**
E-15a – Chapel Street Residential (West) (1st Residential Floor)	**42.37**	**42.54**	**+0.17**
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	32.26	32.31	**+0.05**
E-16a – Fresh Manchester Residential (1st Residential Floor)	34.69	34.70	**+0.01**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	31.39	31.38	**-0.01**
E-17 – Premier Inn Hotel, New Bailey Street	37.14	37.12	**-0.02**
E-18a – Jacksonville Crescent Residential (Ground Floor)	38.96	39.07	**+0.11**
E-18b – Jacksonville Crescent Residential (1st Floor)	37.66	37.76	**+0.10**
E-19 – Angela Street Residential	36.35	36.47	**+0.12**
E-20 – Chester Road Residential	39.12	39.17	**+0.05**
E-21 – Ordsall Road Residential	**40.97**	**40.97**	**0.00**
E-22 – Bridge Street Residential	36.48	36.61	**+0.13**
E-23 – Middlewood Street Residential	**32.90**	**33.07**	**+0.17**

Table 8.27 ADMS-Roads 2017 Results for Particulate Matter

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-1a - Irwell Street Residential (1st Residential Floor)	18.07	18.11	+0.04	12.14	12.16	**+0.02**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	17.81	17.82	+0.01	11.99	11.99	**0.00**
E-2 - Manchester College – St. John's Centre	18.32	18.36	+0.03	12.29	12.31	**+0.02**
E-3a - Bauhaus Residential (1st Residential Floor)	18.06	18.09	+0.02	12.14	12.15	**+0.01**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	17.81	17.82	+0.01	11.99	11.99	**+0.01**
E-4 - Rozel Square Residential	18.13	18.18	+0.04	12.17	12.20	**+0.03**
E-5a – Potato Wharf Residential (Ground Floor)	18.26	18.33	+0.08	12.25	12.29	**+0.04**
E-5b – Potato Wharf Residential (1st Floor)	18.18	18.25	+0.06	12.25	12.24	**+0.04**
E-6 – Liverpool Road Residential	18.45	18.50	+0.05	12.37	12.40	**+0.03**
E-7 – Hilton Hotel, Deansgate	18.52	18.56	+0.05	12.41	12.44	**+0.02**

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-8 – Deansgate Residential	18.53	18.55	+0.02	12.41	12.42	**+0.01**
E-9 – Castlegate Residential	18.61	18.63	+0.02	12.46	12.47	**+0.01**
E-10a – Blantyre Street Residential (1st Residential Floor)	20.44	20.47	+0.03	13.51	13.53	**+0.02**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	18.33	18.34	+0.01	12.29	12.29	**+0.01**
E-11 – Thomas Court Residential	18.81	18.82	+0.01	12.57	12.58	**+0.01**
E-12 – Castlefield School	19.13	19.15	+0.02	12.75	12.76	**+0.01**
E-13 – Frederick Street Residential	18.56	18.56	0.00	12.43	12.43	**0.00**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	18.99	19.01	+0.02	12.70	12.71	**+0.01**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	17.93	17.93	+0.01	12.06	12.06	**0.00**
E-15a – Chapel Street Residential (West) (1st	19.01	19.04	+0.02	12.70	12.72	**+0.01**

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
Residential Floor)						
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	17.90	17.90	+0.01	12.04	12.04	**0.00**
E-16a – Fresh Manchester Residential (1st Residential Floor)	18.21	18.21	0.00	12.22	12.22	**0.00**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	17.80	17.80	0.00	11.98	11.98	**0.00**
E-17 – Premier Inn Hotel, New Bailey Street	18.36	18.36	0.00	12.32	12.32	**0.00**
E-18a – Jacksonville Crescent Residential (Ground Floor)	19.28	19.30	+0.02	12.83	12.84	**+0.01**
E-18b – Jacksonville Crescent Residential (1st Floor)	19.03	19.05	+0.02	12.69	12.70	**+0.01**
E-19 – Angela Street Residential	18.56	18.58	+0.02	12.42	12.43	**+0.01**
E-20 – Chester Road Residential	18.97	18.98	+0.01	12.66	12.67	**+0.01**
E-21 – Ordsall Road Residential	19.07	19.07	0.00	12.73	12.73	**0.00**

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-22 – Bridge Street Residential	18.21	18.22	+0.01	12.23	12.24	**+0.01**
E-23 – Middlewood Street Residential	**18.01**	**18.03**	**+0.02**	**12.10**	**12.11**	**+0.01**

Site Suitability

8.91 As the Proposed Development is a cultural facility and performance venue, its future users will be present for short periods of time and as such the relevant air quality standards are hourly or daily depending on the pollutant.

8.92 All modelled receptors for NO_2 are well below 60 µg/m^3 therefore the hourly mean objective is unlikely to be exceeded in the vicinity of the Proposed Development.

8.93 Proposed sensitive receptors modelled show PM_{10} exceedences are well below the 35 day threshold, and as such the site is suitable for short term exposure.

Table 8.28 Annual Mean Pollutant Concentrations at Proposed Sensitive Receptors for 2017

Receptor	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Number of Daily exceedances of PM_{10} (days)	Annual Mean $PM_{2.5}$ (µg/m^3)
P-10a – Water Street 1 (South-West)	36.39	18.26	2	**12.25**
P-10b – Water Street 2 (North-West)	34.93	18.18	2	**12.20**
P-10c – Water Street 3 (North-East)	34.10	18.08	1	**12.14**
P-10d – Water Street 4 (South-East)	**35.89**	**18.18**	**2**	**12.20**

8.94 Although no residential, and thus long term exposure, is included in the Proposed Development, all modelled receptors meet their relevant long term annual mean standards.

2032 Assessment Results

8.95 The air quality results presented in Tables 8.29 and 8.30 identify the predicted annual mean NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations at each of the sensitive receptors in 2032 under both with and without the Proposed Development scenarios. To allow for comparison of changes across the site, the average of the background concentrations across the site has been utilised to provide a total NO_2 and particulate matter concentration for each of the sensitive receptors.

8.96 NO_2 concentrations have been identified as increasing for each of the sensitive receptors as a result of the Proposed Development, however the scale of change differs between them. The greatest increase in NO_2 concentration was an increase of 0.39 μg/m^3 at sensitive receptor E-5a (Potato Wharf Residential), although 8 further sensitive receptors are modelled to have increases of greater than 0.30 μg/m^3.

8.97 The NO_2 concentration at all sensitive receptors are significantly below the AQAL, with the greatest resultant concentration being 33.11 μg/m^3 at sensitive receptor E-10a (Blantyre Road Residential). Over two-thirds of the modelled concentrations at sensitive receptors fell more than 10 μg/m^3 below the AQAL, with the lowest modelled concentration being 26.43 μg/m^3 identified at sensitive receptor E-15b (Chapel Street Residential (West)).

8.98 An analysis of the relationship between 1-hour and annual mean NO_2 concentrations at roadside sites concluded[21] that there are unlikely to be exceedances of the 1-hour NO_2 limit of 200 μg/m^3 alongside busy streets when the annual mean is less than 60 μg/m^3. Therefore, as all of the modelled concentrations fall significantly below this level there are unlikely to be any exceedances of the 1-hour mean limit at any modelled sensitive receptors as a result of the Proposed Development.

8.99 The changes in PM_{10} and $PM_{2.5}$ concentrations are similar, with relative minor increases in concentration at each of the identified sensitive receptors. However, the resultant concentrations for all sensitive receptors remain significantly below the 40 μg/m^3 AQAL for PM_{10} and 25 μg/m^3 AQAL for $PM_{2.5}$.

8.100 The greatest increase as a result of the Proposed Development for PM_{10} was modelled at sensitive receptor E-10a (Blantyre Road Residential), where the increase as a result of the Proposed Development was 0.13 μg/m^3 with a resultant concentration of 19.92 μg/m^3. The $PM_{2.5}$ modelled concentrations showed a similar pattern, with the greatest increase of 0.07 μg/m^3 and the highest resultant concentration of 12.77 μg/m^3 also occurring at sensitive receptor E-10a.

Table 8.29 ADMS-Roads 2032 Results for Nitrogen Dioxide

Receptor	Without Development	With Development	Difference in Total NO_2
E-1a - Irwell Street Residential (1st Residential Floor)	27.81	27.96	**+0.15**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	26.75	26.81	**+0.06**

21 Laxen and Marner (2003) Analysis of the Relationship between 1-hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites.

Receptor	Without Development	With Development	Difference in Total NO_2
E-2 - Manchester College – St. John's Centre	28.92	28.99	**+0.07**
E-3a - Bauhaus Residential (1st Residential Floor)	27.79	27.91	**+0.12**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	26.84	26.90	**+0.06**
E-4 - Rozel Square Residential	28.09	28.31	**+0.22**
E-5a – Potato Wharf Residential (Ground Floor)	32.18	32.57	**+0.39**
E-5b – Potato Wharf Residential (1st Floor)	32.58	32.91	**+0.33**
E-6 – Liverpool Road Residential	29.26	29.60	**+0.34**
E-7 – Hilton Hotel, Deansgate	29.56	29.94	**+0.38**
E-8 – Deansgate Residential	28.90	29.09	**+0.19**
E-9 – Castlegate Residential	28.61	28.80	**+0.19**
E-10a – Blantyre Street Residential (1st Residential Floor)	32.74	33.11	**+0.37**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	27.13	27.24	**+0.11**
E-11 – Thomas Court Residential	28.64	28.82	**+0.18**
E-12 – Castlefield School	28.87	29.09	**+0.22**
E-13 – Frederick Street Residential	28.55	28.68	**+0.13**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	31.53	31.87	**+0.34**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	26.51	26.59	**+0.08**

Receptor	Without Development	With Development	Difference in Total NO_2
E-15a – Chapel Street Residential (West) (1st Residential Floor)	30.43	30.78	**+0.35**
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	26.36	26.43	**+0.07**
E-16a – Fresh Manchester Residential (1st Residential Floor)	27.29	27.38	**+0.09**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	25.91	25.96	**+0.05**
E-17 – Premier Inn Hotel, New Bailey Street	28.24	28.41	**+0.17**
E-18a – Jacksonville Crescent Residential (Ground Floor)	28.86	29.10	**+0.24**
E-18b – Jacksonville Crescent Residential (1st Floor)	28.31	28.52	**+0.21**
E-19 – Angela Street Residential	27.71	27.85	**+0.14**
E-20 – Chester Road Residential	29.02	29.28	**+0.26**
E-21 – Ordsall Road Residential	29.41	29.74	**+0.33**
E-22 – Bridge Street Residential	27.48	27.82	**+0.34**
E-23 – Middlewood Street Residential	**26.52**	**26.64**	**+0.12**

Table 8.30 ADMS-Roads 2032 Results for Particulate Matter

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-1a - Irwell Street Residential (1st Residential Floor)	17.55	17.60	+0.05	11.52	11.54	**+0.02**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	17.31	17.32	+0.02	11.39	11.39	**+0.01**
E-2 - Manchester College – St. John's Centre	17.79	17.84	+0.05	11.64	11.67	**+0.03**
E-3a - Bauhaus Residential (1st Residential Floor)	17.55	17.58	+0.03	11.51	11.53	**+0.02**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	17.30	17.32	+0.02	11.38	11.39	**+0.01**
E-4 - Rozel Square Residential	17.60	17.66	+0.06	11.54	11.57	**+0.03**
E-5a – Potato Wharf Residential (Ground Floor)	17.70	17.80	+0.10	11.59	11.65	**+0.06**
E-5b – Potato Wharf Residential (1st Floor)	17.63	17.72	+0.09	11.56	11.60	**+0.05**
E-6 – Liverpool Road Residential	17.84	17.92	+0.08	11.67	11.71	**+0.04**
E-7 – Hilton Hotel, Deansgate	17.90	17.97	+0.07	11.70	11.74	**+0.04**

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-8 – Deansgate Residential	17.94	17.99	+0.05	11.72	11.75	**+0.03**
E-9 – Castlegate Residential	18.02	18.08	+0.06	11.76	11.80	**+0.03**
E-10a – Blantyre Street Residential (1st Residential Floor)	19.78	19.92	+0.13	12.70	12.77	**+0.07**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	17.79	17.83	+0.04	11.64	11.66	**+0.02**
E-11 – Thomas Court Residential	18.21	18.27	+0.06	11.87	11.90	**+0.03**
E-12 – Castlefield School	18.55	18.63	+0.08	12.04	12.08	**+0.04**
E-13 – Frederick Street Residential	17.99	18.02	+0.03	11.75	11.77	**+0.02**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	18.36	18.44	+0.08	11.95	11.99	**+0.04**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	17.41	17.43	+0.02	11.44	11.45	**+0.01**

Receptor	**PM_{10}**			**$PM_{2.5}$**		
	Without Development	**With Development**	**Difference in Total PM_{10}**	**Without Development**	**With Development**	**Difference in Total $PM_{2.5}$**
E-15a – Chapel Street Residential (West) (1st Residential Floor)	18.41	18.50	+0.10	11.97	12.02	**+0.05**
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	17.38	17.40	+0.02	11.42	11.43	**+0.01**
E-16a – Fresh Manchester Residential (1st Residential Floor)	17.67	17.69	+0.02	11.58	11.59	**+0.01**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	17.29	17.30	+0.01	11.38	11.38	**+0.01**
E-17 – Premier Inn Hotel, New Bailey Street	17.80	17.84	+0.04	11.65	11.67	**+0.02**
E-18a – Jacksonville Crescent Residential (Ground Floor)	18.70	18.79	+0.09	12.12	12.17	**+0.05**
E-18b – Jacksonville Crescent Residential (1st Floor)	18.47	17.60	+0.08	12.00	12.04	**+0.04**
E-19 – Angela Street Residential	17.97	17.32	+0.04	11.74	11.76	**+0.02**

Receptor	PM_{10}			$PM_{2.5}$		
	Without Development	With Development	Difference in Total PM_{10}	Without Development	With Development	Difference in Total $PM_{2.5}$
E-20 – Chester Road Residential	18.38	17.84	+0.06	11.96	11.99	**+0.03**
E-21 – Ordsall Road Residential	18.42	17.58	+0.08	11.98	12.02	**+0.04**
E-22 – Bridge Street Residential	17.62	17.32	+0.07	11.55	11.59	**+0.04**
E-23 – Middlewood Street Residential	**17.49**	**17.66**	**+0.03**	**11.48**	**11.50**	**+0.02**

Site Suitability

8.101 As the Proposed Development is a cultural facility and performance venue, its future users will be present for short periods of time and as such the relevant air quality standards are hourly or daily depending on the pollutant.

8.102 All modelled receptors for NO_2 are well below 60 µg/m^3 therefore the hourly mean objective is unlikely to be exceeded in the vicinity of the Proposed Development.

8.103 Proposed sensitive receptors modelled show PM_{10} exceedences are all 1 day, well below the 35 day threshold, and as such the site is suitable for short term exposure.

Table 8.31 Annual Mean Pollutant Concentrations at Proposed Sensitive Receptors for 2017

Receptor	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Number of Daily exceedances of PM_{10} (days)	Annual Mean $PM_{2.5}$ (µg/m^3)
P-10a – Water Street 1 (South-West)	29.31	17.74	1	**11.62**
P-10b – Water Street 2 (North-West)	28.21	17.67	1	**11.58**
P-10c – Water Street 3 (North-East)	27.75	17.57	1	**11.53**
P-10d – Water Street 4 (South-East)	**29.06**	**17.67**	**1**	**11.58**

8.104 Although no residential, and thus long term exposure, is included in the Proposed Development, all modelled receptors meet their relevant long term annual mean standards.

Assessment of Significance

8.105 The difference in pollutant concentrations between the 'without development' and 'with development' scenarios, presented in Tables 8.26, 8.27, 8.29 and 8.30 above, identifies the scale of change at existing sensitive receptors that is attributed to the Proposed Development. This allows for quantification of the magnitude of impact on air quality associated with the existing sensitive receptors, following IAQM/EPUK guidelines.

8.106 The magnitude of changes in the annual mean NO_2 concentration at sensitive receptors is identified in Table 8.32. From this it can be seen that the majority of the changes are of negligible impact, however the Proposed Development will give rise to some impacts of slight magnitude at some sensitive receptors in 2017 with all impacts considered to be negligible by 2032.

8.107 In 2017, the modelling identified six existing sensitive receptors would be subject to an adverse impact of slight magnitude (E-5a, E-5b, E-6, E-7, E-10a and E-15a), although some of these have been considered slight based on the high existing NO_2 concentration with a minor increase in the region of 0.3 to 0.4 µg/m^3 representing a precautionary approach. The impacts are, however, only temporary with the 2032 modelling identifying that all existing sensitive receptors are subject to impacts of negligible magnitude.

8.108 The predictive modelling has shown that there will be no significant effects from the Proposed Development in operation on NO_2 concentrations in 2017 or 2032. The 2017 scenario is a worst-case representation with all of the proposed development operational in this year, with slight impact magnitudes of temporary duration not considered to be significant.

8.109 The predictive modelling has determined that there will be no significant effects from the Proposed Development in operation on both PM_{10} and $PM_{2.5}$, as identified in Tables 8.33 and 8.34. Negligible effects as a result of PM_{10} and $PM_{2.5}$ concentrations are predicted at all receptor locations in both 2017 and 2032 as a result of the Proposed Development in operation.

Table 8.32 Significance of Changes in Annual Mean Nitrogen Dioxide Concentration at Existing Sensitive Receptors

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-1a - Irwell Street Residential (1st Residential Floor)	+0.25	0.63%	34.50	86.26%	Negligible	+0.15	0.37	27.96	69.91	**Negligible**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	+0.06	0.15%	31.86	79.66%	Negligible	+0.06	0.15	26.81	67.02	**Negligible**
E-2 - Manchester College – St. John's Centre	+0.18	0.45%	36.73	91.83%	Negligible	+0.07	0.18	28.99	72.47	**Negligible**
E-3a - Bauhaus Residential (1st Residential Floor)	+0.16	0.40%	34.24	85.60%	Negligible	+0.12	0.30	27.91	69.77	**Negligible**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	+0.07	0.18%	31.91	79.77%	Negligible	+0.06	0.15	26.90	67.24	**Negligible**
E-4 - Rozel Square Residential	+0.32	0.80%	35.00	87.51%	Negligible	+0.22	0.55	28.31	70.78	**Negligible**
E-5a – Potato Wharf Residential (Ground Floor)	+0.50	1.25%	39.92	99.81%	Slight	+0.39	0.98	32.57	81.42	**Negligible**
E-5b – Potato Wharf Residential (1st	+0.41	1.03%	39.94	99.86%	Slight	+0.33	0.82	32.91	82.28	**Negligible**

Receptor	**2017**					**2032**				
	Difference	***% of AQAL***	***Concentration with Devt***	***% of AQAL***	***Significance***	***Difference***	***% of AQAL***	***Concentration with Devt***	***% of AQAL***	***Significance***
Floor)										
E-6 – Liverpool Road Residential	+0.30	0.75%	38.89	97.22%	Slight	+0.34	0.85	29.60	74.00	**Negligible**
E-7 – Hilton Hotel, Deansgate	+0.31	0.77%	39.74	99.35%	Slight	+0.38	0.95	29.94	74.85	**Negligible**
E-8 – Deansgate Residential	+0.11	0.27%	37.91	94.77%	Negligible	+0.19	0.47	29.09	72.72	**Negligible**
E-9 – Castlegate Residential	+0.10	0.25%	37.88	94.71%	Negligible	+0.19	0.47	28.80	72.01	**Negligible**
E-10a – Blantyre Street Residential (1st Residential Floor)	+0.16	0.40%	**47.63**	119.07%	Slight	+0.37	0.92	33.11	82.76	**Negligible**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	+0.05	0.12%	34.68	86.70%	Negligible	+0.11	0.27	27.24	68.11	**Negligible**
E-11 – Thomas Court Residential	+0.04	0.10%	38.43	96.08%	Negligible	+0.18	0.45	28.82	72.05	**Negligible**
E-12 – Castlefield School	+0.08	0.20%	39.05	97.63%	Negligible	+0.22	0.55	29.09	72.73	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-13 – Frederick Street Residential	+0.02	0.05%	37.54	93.84%	Negligible	+0.13	0.33	28.68	71.70	**Negligible**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	+0.12	0.30%	**44.18**	110.45%	Negligible	+0.34	0.85	31.87	79.68	**Negligible**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	+0.05	0.13%	32.66	81.65%	Negligible	+0.08	0.20	26.59	66.48	**Negligible**
E-15a – Chapel Street Residential (West) (1st Residential Floor)	+0.17	0.42%	**42.54**	106.34%	Slight	+0.35	0.88	30.78	76.95	**Negligible**
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	+0.05	0.12%	32.31	80.77%	Negligible	+0.07	0.18	26.43	66.06	**Negligible**
E-16a – Fresh Manchester Residential (1st Residential Floor)	+0.01	0.02%	34.70	86.76%	Negligible	+0.09	0.23	27.38	68.46	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	-0.01	0.02%	31.38	78.46%	Negligible	+0.05	0.13	25.96	64.90	**Negligible**
E-17 – Premier Inn Hotel, New Bailey Street	-0.02	0.05%	37.12	92.79%	Negligible	+0.17	0.43	28.41	71.02	**Negligible**
E-18a – Jacksonville Crescent Residential (Ground Floor)	+0.11	0.27%	39.07	97.66%	Negligible	+0.24	0.60	29.10	72.74	**Negligible**
E-18b – Jacksonville Crescent Residential (1st Floor)	+0.10	0.25%	37.76	94.39%	Negligible	+0.21	0.53	28.52	71.29	**Negligible**
E-19 – Angela Street Residential	+0.12	0.30%	36.47	91.18%	Negligible	+0.14	0.35	27.85	69.64	**Negligible**
E-20 – Chester Road Residential	+0.05	0.13%	39.17	97.93%	Negligible	+0.26	0.65	29.28	73.20	**Negligible**
E-21 – Ordsall Road Residential	0.00	0.00%	**40.97**	102.43%	Negligible	+0.33	0.83	29.74	74.35	**Negligible**
E-22 – Bridge Street Residential	+0.13	0.33%	36.61	91.52%	Negligible	+0.34	0.85	27.82	69.54	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-23 – Middlewood Street Residential	**+0.17**	**0.43%**	**33.07**	**82.68%**	**Negligible**	**+0.12**	**0.30**	**26.64**	**66.60**	**Negligible**

Table 8.33 Significance of Changes in Annual Mean Particulate Matter (PM_{10}) Concentration at Existing Sensitive Receptors

Receptor	2017						2032					
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*
E-1a - Irwell Street Residential (1st Residential Floor)	+0.04	0.10 %	18.11	45.27 %	Negligible	1	+0.05	0.11 %	17.60	43.99%	Negligible	**1**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	+0.01	0.02 %	17.82	44.56 %	Negligible	1	+0.02	0.04 %	17.32	43.31%	Negligible	**1**
E-2 - Manchester College – St. John's Centre	+0.03	0.08 %	18.36	45.89 %	Negligible	2	+0.05	0.12 %	17.84	44.60%	Negligible	**1**
E-3a - Bauhaus Residential (1st Residential Floor)	+0.02	0.06 %	18.09	45.21 %	Negligible	1	+0.03	0.09 %	17.58	43.96%	Negligible	**1**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	+0.01	0.02 %	17.82	44.55 %	Negligible	1	+0.02	0.04 %	17.32	43.30%	Negligible	**1**
E-4 - Rozel Square Residential	+0.04	0.11 %	18.18	45.44 %	Negligible	2	+0.06	0.16 %	17.66	44.15%	Negligible	**1**

Receptor	2017						2032					
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*
E-5a – Potato Wharf Residential (Ground Floor)	+0.08	0.19 %	18.33	45.83 %	Negligible	2	+0.10	0.26 %	17.80	44.50%	Negligible	**1**
E-5b – Potato Wharf Residential (1st Floor)	+0.06	0.15 %	18.25	45.61 %	Negligible	2	+0.09	0.21 %	17.72	44.30%	Negligible	**1**
E-6 – Liverpool Road Residential	+0.05	0.12 %	18.50	46.25 %	Negligible	2	+0.08	0.20 %	17.92	44.80%	Negligible	**1**
E-7 – Hilton Hotel, Deansgate	+0.05	0.10 %	18.56	46.40 %	Negligible	2	+0.07	0.19 %	17.97	44.93%	Negligible	**1**
E-8 – Deansgate Residential	+0.02	0.04 %	18.55	46.37 %	Negligible	2	+0.05	0.13 %	17.99	44.99%	Negligible	**1**
E-9 – Castlegate Residential	+0.02	0.04 %	18.63	46.57 %	Negligible	2	+0.06	0.14 %	18.08	45.19%	Negligible	**1**
E-10a – Blantyre Street Residential (1st Residential Floor)	+0.03	0.07 %	20.47	51.18 %	Negligible	4	+0.13	0.34 %	19.92	49.79%	Negligible	**3**

Receptor	2017						2032					
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	+0.01	0.02 %	18.34	45.85 %	Negligible	2	+0.044	0.09 %	17.83	44.57%	Negligible	**1**
E-11 – Thomas Court Residential	+0.01	0.03 %	18.82	47.05 %	Negligible	2	+0.06	0.14 %	18.27	45.67%	Negligible	**2**
E-12 – Castlefield School	+0.02	0.05 %	19.15	47.88 %	Negligible	2	+0.08	0.20 %	18.63	46.57%	Negligible	**2**
E-13 – Frederick Street Residential	0.00	0.01 %	18.56	46.41 %	Negligible	2	+0.03	0.08 %	18.02	45.06%	Negligible	**1**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	+0.02	0.04 %	19.01	47.52 %	Negligible	2	+0.08	0.21 %	18.44	46.10%	Negligible	**2**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	+0.01	0.01 %	17.93	44.83 %	Negligible	1	+0.02	0.05 %	17.43	43.56%	Negligible	**1**
E-15a – Chapel Street Residential (West) (1st	+0.02	0.06	19.04	47.59	Negligible	2	+0.10	0.24	18.50	46.26%	Negligible	**2**

Receptor	**2017**						**2032**					
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*
Residential Floor)		%		%				%				
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	+0.01	0.01 %	17.90	44.75 %	Negligible	1	+0.02	0.04 %	17.40	43.49%	Negligible	**1**
E-16a – Fresh Manchester Residential (1st Residential Floor)	0.00	0.00 %	18.21	45.53 %	Negligible	2	+0.02	0.05 %	17.69	44.23%	Negligible	**1**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	0.00	0.01 %	17.80	44.50 %	Negligible	1	+0.01	0.03 %	17.30	43.25%	Negligible	**1**
E-17 – Premier Inn Hotel, New Bailey Street	0.00	-0.01 %	18.36	45.90 %	Negligible	2	+0.04	0.10 %	17.84	44.60%	Negligible	**1**
E-18a – Jacksonville Crescent Residential (Ground Floor)	+0.02	0.06 %	19.30	48.25 %	Negligible	3	+0.09	0.22 %	18.79	46.98%	Negligible	**2**

Receptor	2017						2032					
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*24-hour Exceedances*
E-18b – Jacksonville Crescent Residential (1st Floor)	+0.02	0.05 %	19.05	47.63 %	Negligible	2	+0.08	0.19 %	18.54	46.36%	Negligible	**2**
E-19 – Angela Street Residential	+0.02	0.05 %	18.58	46.45 %	Negligible	2	+0.04	0.11 %	18.01	45.03%	Negligible	**1**
E-20 – Chester Road Residential	+0.01	0.02 %	18.98	47.45 %	Negligible	2	+0.06	0.15 %	18.44	46.10%	Negligible	**2**
E-21 – Ordsall Road Residential	0.00	0.00 %	19.07	47.68 %	Negligible	2	+0.08	0.20 %	18.50	46.24%	Negligible	**2**
E-22 – Bridge Street Residential	+0.01	0.03 %	18.22	45.56 %	Negligible	2	+0.07	0.16 %	17.68	44.20%	Negligible	**1**
E-23 – Middlewood Street Residential	**+0.02**	**0.05 %**	**18.03**	**45.07 %**	**Negligible**	**1**	**+0.03**	**0.08 %**	**17.52**	**43.79 %**	**Negligible**	**1**

Table 8.34 Significance of Changes in Annual Mean Particulate Matter ($PM_{2.5}$) Concentration at Existing Sensitive Receptors

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-1a - Irwell Street Residential (1st Residential Floor)	+0.02	0.09%	12.16	48.66 %	Negligible	+0.02	0.10%	11.54	46.16 %	**Negligible**
E-1b - Irwell Street Residential (Mid-level Residential Floor)	0.00	0.02%	11.99	47.97 %	Negligible	+0.01	0.03%	11.69	45.58 %	**Negligible**
E-2 - Manchester College – St. John's Centre	+0.02	0.08%	12.31	49.24 %	Negligible	+0.03	0.10%	11.67	46.68 %	**Negligible**
E-3a - Bauhaus Residential (1st Residential Floor)	+0.01	0.05%	12.15	48.59 %	Negligible	+0.02	0.07%	11.53	46.13 %	**Negligible**
E-3b - Bauhaus Residential – (Mid-level Residential Floor)	+0.01	0.02%	11.99	47.97 %	Negligible	+0.01	0.04%	11.39	15.57 %	**Negligible**
E-4 - Rozel Square Residential	+0.03	0.10%	12.20	48.80 %	Negligible	+0.03	0.14%	11.57	46.29 %	**Negligible**
E-5a – Potato Wharf Residential (Ground Floor)	+0.04	0.18%	12.29	49.16 %	Negligible	+0.06	0.22%	11.65	46.59 %	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-5b – Potato Wharf Residential (1st Floor)	+0.04	0.14%	12.24	48.96 %	Negligible	+0.05	0.18%	11.60	46.42 %	**Negligible**
E-6 – Liverpool Road Residential	+0.03	0.11%	12.40	49.60 %	Negligible	+0.04	0.17%	11.71	46.86 %	**Negligible**
E-7 – Hilton Hotel, Deansgate	+0.02	0.09%	12.44	49.75 %	Negligible	+0.04	0.16%	11.74	46.97 %	**Negligible**
E-8 – Deansgate Residential	+0.01	0.04%	12.42	49.67 %	Negligible	+0.03	0.11%	11.75	47.01 %	**Negligible**
E-9 – Castlegate Residential	+0.01	0.04%	12.47	49.86 %	Negligible	+0.03	0.12%	11.80	47.18 %	**Negligible**
E-10a – Blantyre Street Residential (1st Residential Floor)	+0.02	0.07%	13.53	54.12 %	Negligible	+0.07	0.29%	12.70	51.08 %	**Negligible**
E-10b – Blantyre Street Residential (Mid-level Residential Floor)	+0.01	0.02%	12.29	47.17 %	Negligible	+0.02	0.08%	11.66	46.64 %	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-11 – Thomas Court Residential	+0.01	0.03%	12.58	50.30 %	Negligible	+0.03	0.12%	11.90	47.59 %	**Negligible**
E-12 – Castlefield School	+0.01	0.04%	12.76	51.04 %	Negligible	+0.04	0.17%	12.08	48.34 %	**Negligible**
E-13 – Frederick Street Residential	0.00	0.01%	12.43	49.72 %	Negligible	+0.02	0.07%	11.77	47.07 %	**Negligible**
E-14a – Chapel Street Residential (East) (1st Residential Floor)	+0.01	0.04%	12.71	50.85 %	Negligible	+0.04	0.18%	11.99	47.97 %	**Negligible**
E-14b – Chapel Street Residential (East) (Mid-level Residential Floor)	0.00	0.01%	12.06	48.24 %	Negligible	+0.01	0.04%	11.45	45.80 %	**Negligible**
E-15a – Chapel Street Residential (West) (1st Residential Floor)	+0.01	0.05%	12.72	50.87 %	Negligible	+0.05	0.20%	12.02	48.10 %	**Negligible**
E-15b – Chapel Street Residential (West) (Mid-level Residential Floor)	0.00	0.01%	12.04	48.16 %	Negligible	+0.01	0.04%	11.43	45.74 %	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-16a – Fresh Manchester Residential (1st Residential Floor)	0.00	0.00%	12.22	48.90 %	Negligible	+0.01	0.05%	11.59	46.36 %	**Negligible**
E-16b – Fresh Manchester Residential (Mid-level Residential Floor)	0.00	0.01%	11.98	47.92 %	Negligible	+0.01	0.02%	11.38	45.53 %	**Negligible**
E-17 – Premier Inn Hotel, New Bailey Street	0.00	-0.01%	12.32	49.26 %	Negligible	+0.02	0.09%	11.67	46.68 %	**Negligible**
E-18a – Jacksonville Crescent Residential (Ground Floor)	+0.01	0.05%	12.84	51.37 %	Negligible	+0.05	0.19%	12.17	48.69 %	**Negligible**
E-18b – Jacksonville Crescent Residential (1st Floor)	+0.01	0.04%	12.70	50.79 %	Negligible	+0.04	0.16%	12.04	48.16 %	**Negligible**
E-19 – Angela Street Residential	+0.01	0.04%	12.43	49.74 %	Negligible	+0.02	0.09%	11.76	47.04 %	**Negligible**
E-20 – Chester Road Residential	+0.01	0.02%	12.67	50.67 %	Negligible	+0.03	0.13%	11.99	47.96 %	**Negligible**

Receptor	2017					2032				
	Difference	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*	*Difference*	*% of AQAL*	*Concentration with Devt*	*% of AQAL*	*Significance*
E-21 – Ordsall Road Residential	0.00	0.00%	12.73	50.91 %	Negligible	+0.04	0.17%	12.02	48.07 %	**Negligible**
E-22 – Bridge Street Residential	+0.01	0.03%	12.24	48.96 %	Negligible	+0.04	0.14%	11.59	46.35 %	**Negligible**
E-23 – Middlewood Street Residential	**+0.02**	**0.09 %**	**12.16**	**48.66 %**	**Negligible**	**+0.02**	**0.06 %**	**11.50**	**45.99 %**	**Negligible**

Mitigation Measures

Construction

8.110 The IAQM guidelines[22] provide an indication of the mitigation measures that would be appropriate for inclusion within the Proposed Development, based on the level of risk of dust related impacts identified for each of the activities. Consequently, the following mitigation measures should be incorporated into the Proposed Development and delivered through the implementation of a Construction Environment Management Plan (CEMP).

8.111 Mitigation measures that are generic to each of the activities, and therefore should be implemented for the duration of the construction related works where applicable are identified in Table 8.35, whilst activity specific mitigation measures are identified in Table 8.36.

Table 8.35 Generic Mitigation to be incorporated into the Proposed Development

Development Element	Mitigation Measure
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. Display the head or regional office contact information.
Planning	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in the IAQM Guidance document. The desirable measures should be included as recommended. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. Make the complaints log available to the Local Authority upon request. Record any exceptional incidents that cause dust and/or air

22 Holman *et al*. (2014) IAQM Guidance on the assessment of dust from demolition and construction. Institute of Air Quality Management, London.

Development Element	Mitigation Measure
	emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority upon request. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions. Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. Avoid site run-off of water or mud. Keep site fencing, barriers and scaffolding clean using wet methods. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover. Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle/ vehicle movements	Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Development Element	Mitigation Measure
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (*e.g.* suitable local exhaust ventilation systems). Ensure an adequate water supply on site for effective dust/ particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Use enclosed chutes and conveyors and covered skips. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use find water sprays on such equipment wherever appropriate. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	Avoid bonfires and burning of waste materials.

Table 8.36 Activity Specific Mitigation to be Incorporated into the Proposed Development

Development Activity	Mitigation Measure
Demolition	Soft strip inside buildings before demolitions (retaining walls and windows in the rest of the building where possible, to provide a screen against dust. Ensure effective water suppression is used during demolition operations. Hand-held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or damp down such material

	before demolition.
Earthworks	Only remove materials cover in small areas during work and not all at once.
Construction	Avoid scabbling (roughening of concrete surfaces) if possible. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. Implement a wheel washing system.

Operation

8.112 The Transport Assessment (see Appendix 11.1 of Chapter 11 of the ES) for the Proposed Development has identified a number of mitigation measures for the improvement of the associated traffic flows, which will have implications to the local air quality. Reductions in vehicular emissions and associated localised pollutant concentrations should be achieved through the adoption of strategic and sustainable transport practices and the adoption of a Travel Plan. Such measures would encourage the use of more sustainable transport modes, such as public transport or pedestrian links to the city centre.

Cumulative Effects

8.113 A number of development projects in the Manchester and Salford area have been granted planning permission or are in the process of being assessed, which have potential to give rise to cumulative effects with the Proposed Development.

Demolition and Construction

8.114 The Proposed Development is likely to have an overlapping area of influence with each of the identified schemes for inclusion within the cumulative assessment, and as a result if the developments run concurrently have the potential to give rise to cumulative effects with respect to demolition and construction dust emissions and may affect the predicted magnitude and/or significance of dust effects upon sensitive receptors.

8.115 Due to the close proximity of the various phases of the St. John's Masterplan (Bonded Warehouse, Manchester Grande, Village Phase 1, St. John's Place, Central Village, Riverside, Energy Centre, Trinity

Islands and St. John's Factory), overlap in the construction phases between these and the Proposed Development have potential for cumulative effects on sensitive receptors in all locations. It is highly likely that the Proposed Development will have an overlap with some of these projects, with a worst case scenario considered.

8.116 Further to this, the combination of developments identified below will potentially influence sensitive receptors in the respective areas:

- Sensitive receptors to the north: Astley House & Byrom House (9), Quay House (11), Stanley Street (14), Middlewood Locks (15), Salford Central (16), Land at Gore Street (19) and the Land at Middlewood Basin (20) developments have potential to give rise to cumulative effects with the Proposed Development;
- Sensitive receptors to the east: Astley House & Byrom House (9), Quay House (11), Girder Bridge (12), Ordsall Chord (13) and the Land at Potato Wharf (18) developments have potential to give rise to cumulative effects with the Proposed Development;
- Sensitive receptors to the south: 1 Water Street (8), Girder Bridge (12), Ordsall Chord (13), Middlewood Locks (15), Land at Wilburn Street (17), Land at Potato Wharf (18) and the Land at Middlewood Basin (20) developments have potential to give rise to cumulative effects with the Proposed Development; and,
- Sensitive receptors to the west: 1 Water Street (8), Girder Bridge (12), Ordsall Chord (13), Stanley Street (14), Middlewood Locks (15), Land at Wilburn Street (17), Land at Potato Wharf (18), Land at Gore Street (19) and the Land at Middlewood Basin (20) developments have potential to give rise to cumulative effects with the Proposed Development.

8.117 As the Proposed Development is predicted to give a low to medium risk of dust impacts, fewer mitigation measures are identified as recommended in the IAQM guidelines. However, the dust generation in combination with other developments are likely to give rise to a greater magnitude of dust emission, and has been assumed to be major in all cases as a precautionary approach. Consequently, additional mitigation measures identified in Tables 8.37 and 8.38 should be incorporated into the Proposed Development to further minimise dust emission from the Site and its contribution to cumulative effects with other identified developments. The mitigation measures proposed to mitigate the impacts of the Proposed Development alone (see Tables 8.35 and 8.36) have been included for ease of reference and are identified in italics.

Table 8.37 Additional Generic Mitigation to be incorporated into the Proposed Development

Development Element	Mitigation Measure
Communication	*Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.*

Development Element	Mitigation Measure
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. *Display the head or regional office contact information.*
Planning	*Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in the IAQM Guidance document. The desirable measures should be included as recommended. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.*
Site Management	*Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.* *Make the complaints log available to the Local Authority upon request.* *Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.*
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority upon request. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary. *Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority upon request.* *Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions.* *Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before*

Development Element	Mitigation Measure
	work commences on site.
Preparing and Maintaining the Site	*Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.* *Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.* *Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.* *Avoid site run-off of water or mud.* *Keep site fencing, barriers and scaffolding clean using wet methods.* *Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover.* *Cover, seed or fence stockpiles to prevent wind whipping.*
Operating vehicle/ vehicle movements	*Ensure all vehicles switch off engines when stationary – no idling vehicles.* *Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.* Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas. *Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.* *Implement a Travel Plan that supports and encourages sustainable travel.*
Operations	*Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (e.g. suitable local exhaust ventilation systems).* *Ensure an adequate water supply on site for effective dust/ particulate matter suppression/mitigation, using non-potable*

Development Element	Mitigation Measure
	water where possible and appropriate. *Use enclosed chutes and conveyors and covered skips.* *Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use find water sprays on such equipment wherever appropriate.* *Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.*
Waste Management	*Avoid bonfires and burning of waste materials.*

Table 8.38 Additional Activity Specific Mitigation to be incorporated into the Proposed Development

Development Activity	Mitigation Measure
Demolition	*Soft strip inside buildings before demolitions (retaining walls and windows in the rest of the building where possible, to provide a screen against dust.* *Ensure effective water suppression is used during demolition operations. Hand-held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.* *Avoid explosive blasting, using appropriate manual or mechanical alternatives.* *Bag and remove any biological debris or damp down such material before demolition.*
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Only remove materials cover in small areas during work and not all at once.

Development Activity	Mitigation Measure
Construction	*Avoid scabbling (roughening of concrete surfaces) if possible.* *Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.* Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emissions control systems to prevent escape of material and overfilling during delivery. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. Avoid dry sweeping of large areas. *Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.* Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Record all inspections of haul routes and any subsequent action in a site log book. *Implement a wheel washing system.*

8.118 Further to these, the following mitigation measures should also be incorporated to reduce the potential for cumulative effects:

- Regular liaison meetings should be held with other high risk construction sites within 500m of the Site boundary, to ensure DMPs, or similar, are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes;
- Where there is potential for significant effects upon a sensitive receptor, consideration should be given to the timing of activities, and where possible activities with potential to generate significand dust emissions should not be undertaken at the same time;
- Additional monitoring requirements as a result of concurrent activities should be identified in the liaison meetings, and

reviewed in subsequent meetings to understand if further mitigation measures are necessary.

8.119 The Proposed Development is considered to have a negligible and temporary effect as a result of construction traffic, and is therefore considered to be unlikely to give rise to cumulative air quality impacts in-combination with the other identified developments running concurrently.

Operation

8.120 The cumulative effect of changes in traffic and subsequent impacts on local air quality have been considered through the impact assessment, with the development trips associated with the other elements of the St John's masterplan (Bonded Warehouse, Manchester Grande, Village Phase 1, St. John's Place, Central Village, Riverside, Energy Centre and Trinity Islands) including in the traffic data for the 'with development' scenario as these are committed developments. Further to this, although not part of the St. John's Masterplan, the potential future construction of a car park as part of the Water Street Masterplan site located to the south has been included within the 'with development' scenario.

8.121 The changes in traffic levels associated with the remaining developments identified have been incorporated into the base traffic data, and therefore the resultant pollutant concentrations identified 'with development' provide an indication of the total pollutant concentration expected with all of the developments in place. The schemes that were included within the traffic data for the do minimum scenarios include:

- S1 – Wooden Street Residential (327 dwellings);
- S4 – Middlewood Locks Residential (1,201 dwellings, 68,000 m^2 office space, 27,000 m^2 leisure);
- S5 – Middlewood Locks (Granada Site) Residential (250 dwellings, 370 m^2 office);
- S11 – Wilburn Basin Residential (491 dwellings);
- M1 – Water Street Residential (301 dwellings); and,
- M2 – Great Jackson Street Residential (1,300 dwellings).

8.122 Consequently, the significance of effect is not considered to alter from that previously identified.

Residual Effects

Demolition and Construction

8.123 The application of mitigation measures during the construction phase through a CEMP, as identified in Tables 8.37 and 8.38, is designed to ensure that the emission of dust during the construction phase is minimised. It is possible that some particulate deposition in the surroundings will still occur, however the periods over which this may occur and the extent of the area affected will be reduced significantly as a result of the mitigation measures. The potential cumulative effects associated with this has the potential to give rise to significant adverse effects, and as a result additional mitigation measures have been identified to further reduce the migration of dust from the Site.

8.124 Consequently, with the application of the mitigation measures, the risk of dust soiling or human health impacts and resultant significance of effects from the Proposed Development are considered to be **negligible** for all activities and receptors. When considering the cumulative effects with other developments, implementation of the additional mitigation measures will ensure the impact attributable to the Proposed Development will remain negligible and the overall effect should be no greater than a **minor adverse effect**.

Operation

8.125 Implementation of mitigation measures, including those identified by the Transport Assessment, will have beneficial effects in reducing the adverse impact on local air quality. As the traffic counts included in the assessment model do not include the full extent of anticipated vehicular reduction is expected from the proposed mitigation measures, which will provide a greater availability of sustainable transport options than a standard apartment development, the measures will have an influence on local air quality. Considering the extent and magnitude of the likely impacts of the mitigation measures, the significance of residual effect is considered to be **negligible**. This includes consideration of cumulative effects with other committed developments.

8.126 Further to this, should transport infrastructure improvements be considered by Manchester City Council be taken forward, such as the Regent Road Improvement Scheme, the adverse effects of the scheme would be further reduced.

Summary

8.127 A summary of the findings of the assessment are provided in Table 8.39 below.

Table 8.39 Summary of Receptors, Effects, Mitigation Measures and Residual Effects

Impact	Receptor(s)	Mitigation Measure	Residual Effect
Construction			
Major adverse cumulative effect of dust soiling	Residential properties, museums and significant buildings	Generic and activity specific measures to control dust generation and emission from site, liaison with local stakeholders, liaison with other developments and, where possible, avoidance of significant dust-generating activities simultaneously (see Tables 8.37 and	Negligible effects on dust soiling from Proposed Development and minor adverse effect overall

		8.38).	
Major adverse cumulative effect on human health from dust	Residential, education, commercial, industrial and office buildings	Generic and activity specific measures to control dust generation and emission from site, liaison with local stakeholders, liaison with other developments and, where possible, avoidance of significant dust-generating activities simultaneously (see Tables 8.37 and 8.38).	Negligible effects on human health from Proposed Development and minor adverse effect overall
Operational			
Negligible and slight adverse effects on NO_2 concentrations	Varies by receptor, see Table 8.32	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions	Negligible effects on NO_2 concentrations
Negligible effects on PM_{10} concentrations	All	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions	Negligible effects on PM_{10} concentrations
Negligible effects on $PM_{2.5}$ concentrations	All	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions	Negligible effects on $PM_{2.5}$ concentrations

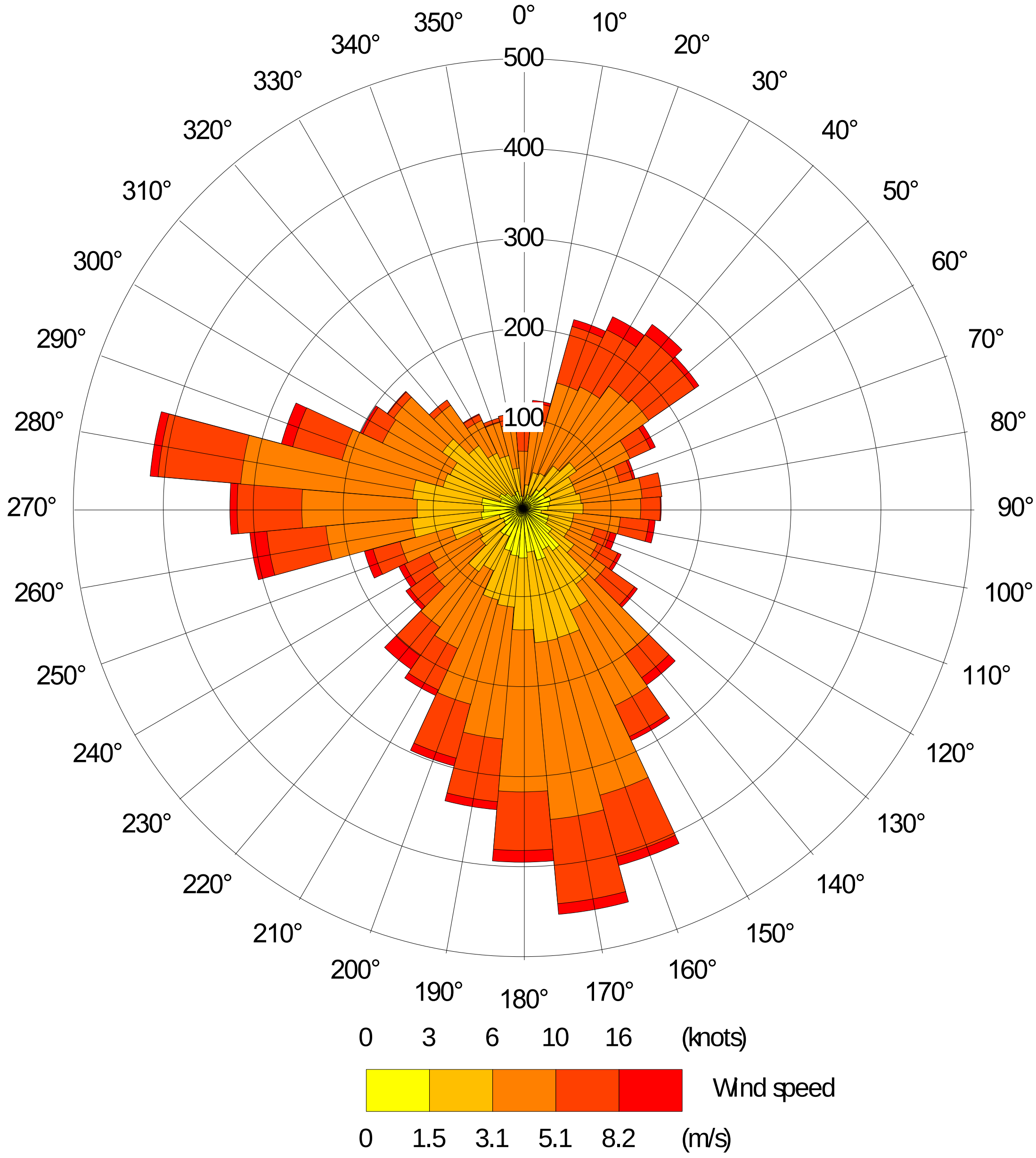

Figure:	**8.1**		
Title:	**Wind Rose for Manchester Airport Meteorological Data in 2010**		
Project:	**Factory, St. Johns. Manchester**		
Date:	**August 2016**	**Scale:**	**NTS**

Figure:	**8.2**		
Title:	**Manchester AQMA within Manchester City Council Authority Boundary** (Source: UK-AIR, Defra)		
Project:	**Factory, St. Johns. Manchester**		
Date:	**August 2016**	**Scale:**	**NTS**

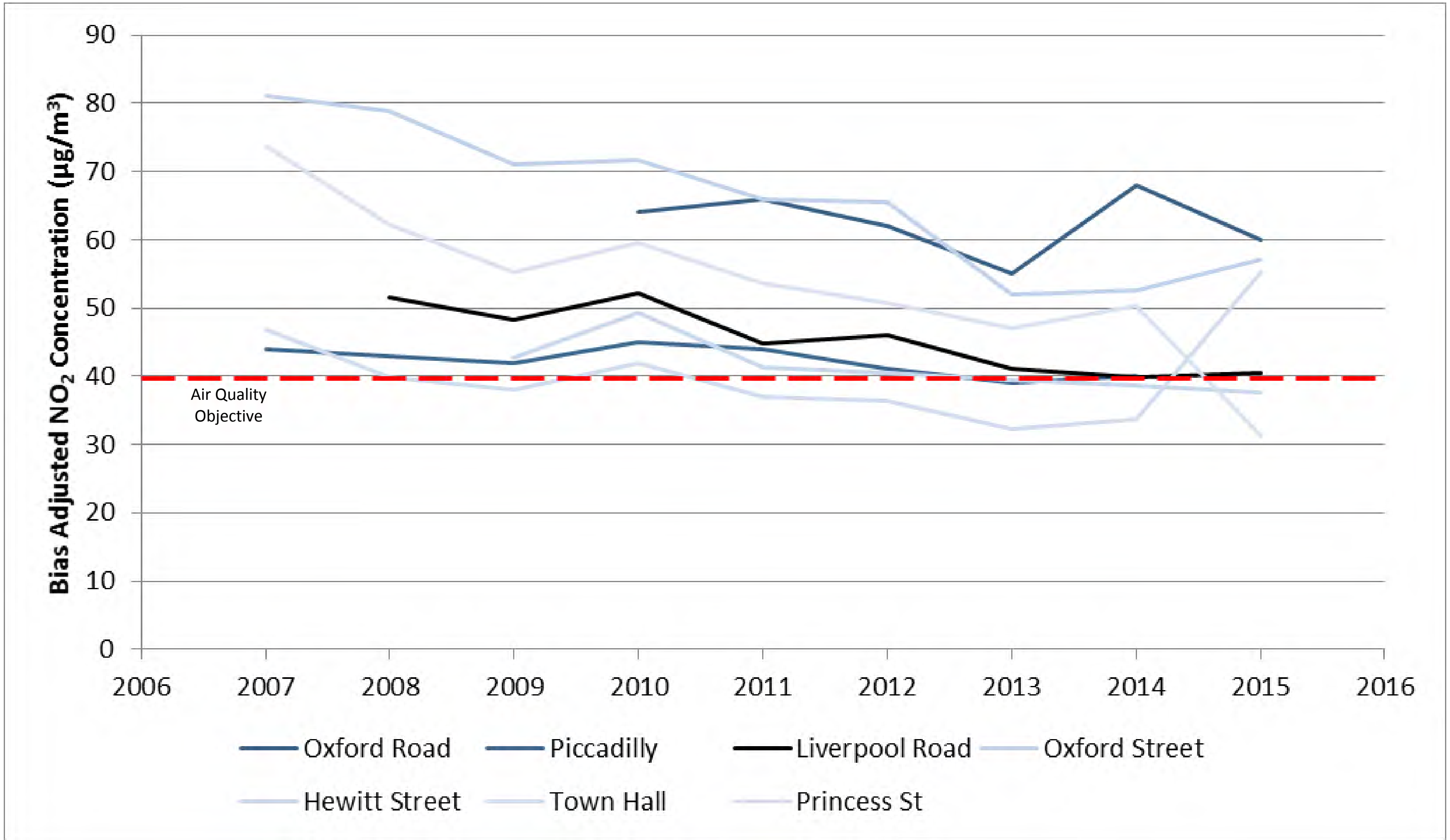

Figure:	**8.3**		
Title:	**Trend in Nitrogen Dioxide Concentration within Proposed Development Study Area**		
Project:	**Factory, St. Johns. Manchester**		
Date:	**August 2016**	**Scale:**	**-**

	Figure:	**8.4**		
	Title:	**Visualisation of Location of Sensitive Receptors for Operational Traffic Impact Assessment** (© Crown Copyright and database rights 2016 Ordnance Survey 0100031673)		
	Project:	**Factory, St. Johns. Manchester**		
	Date:	**August 2016**	**Scale:**	**NTS**

9 Noise and vibration

Introduction

9.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to noise and vibration. It specifically 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.

9.2 The assessment is undertaken in the context of national noise policy and to comply with Manchester City Council's (MCC) local planning policies.

9.3 The assessment of temporary effects considers:

- Noise and vibration from demolition and construction activities on the Site.
- Noise from off-site construction traffic on neighbouring roads.

9.4 Assessment of the effects of operational noise considers:

- Noise from events within the Proposed Development.
- Building services plant noise.
- Deliveries and loading.
- Changes in road traffic noise due to operation the development.
- Noise from pedestrians going to and from events.

9.5 The following appendices support this chapter:

- Appendix 9.1 Acoustic terminology
- Appendix 9.2 Derivation of significance criteria
- Appendix 9.3 Construction noise and vibration calculation assumptions
- Appendix 9.4 Event noise emission calculation
- Appendix 9.5 Baseline noise survey
- Appendix 9.6 Road traffic noise calculation.

Policy Context

9.6 The assessment approach reflects the requirements of Government's noise policy and the EIA Regulations and considers Manchester City Council's (MCC) environmental noise policy.

National Planning Policy

9.7 The following summarises relevant legislation and planning policy. A more detailed description is given in Appendix 9.2.

Primary Legislation

9.8 Relevant legislation includes the Control of Pollution Act 1974. The construction noise and vibration assessment and envisaged mitigation are informed by this legislation. Specific references are made to sections of legislation as necessary. For example 'Best Practicable Means' is defined in section 72 of the Control of Pollution Act; and prior consent for the construction method and steps to minimise noise can be sought from local authorities under section 61 of the Control of Pollution Act.

National Policy and Guidance

9.9 The National Planning Policy Framework (NPPF)[1] took effect in 2012 to define the Government's planning policies for England. Key to this assessment are paragraphs 109 and 123 of NPPF.

9.10 Paragraph 109 requires the planning system to *"contribute to and enhance the natural and local environment by … Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of … noise pollution".*

9.11 Paragraph 123 of NPPF states that

"planning policies and decisions should aim to:

- **avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;**
- **mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;**
- **recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and**
- **identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."**

9.12 The NPPF planning objectives reflect and are linked to the policies and objectives set out in the Noise Policy Statement for England (NPSE)2.

9.13 The NPSE uses the key phrases 'significant adverse' and 'adverse'. In clarifying what these mean the NPSE notes that:

"There are two established concepts from toxicology that are currently being applied to noise effects, for example, by the World Health Organization. They are:

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[1] Department for Communities and Local Government (2012); *National Planning Policy Framework*; http://www.communities.gov.uk/publications/planningandbuilding/nppf

[2] Department for Environment Food and Rural Affairs (2010), *Noise Policy Statement for England*

NOEL – No Observed Effect Level
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected."

9.14 The Policy extends these concepts to include:

"SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse health effects on health and quality of life occur."

9.15 These terms are adopted in the Government's Planning Practice Guidance on noise (PPG-N)[3], which presents example outcomes to help characterise these effects (see Table 9.1).

Table 9.1: Noise exposure hierarchy based on likely average response (based on PPG-N)

	Perception	Examples of outcomes	Increasing effect level	Action
↓ Increasing noise level ↓	Not noticeable	No effect	No observed effect	No specific measures required
	No Observed Effect Level (NOEL)			
	Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
	Lowest Observed Adverse Effect Level (LOAEL)			
	Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level (SOAEL)			
	Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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

[3] Department for Communities And Local Government (2012) *National Planning Practice Guidance – Noise*, http://planningguidance.planningportal.gov.uk/blog/guidance/noise-guidance/ (Revision date: 06 03 2014)

↓	Perception	Examples of outcomes	Increasing effect level	Action
	Unacceptable Adverse Effect Level (UAEL)			
	Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

9.16 The NPSE notes that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is for a project to identify relevant SOAELs taking account of the different sources of exposure and different receptors (see Appendix 9.2 for proposed thresholds).

9.17 Any receptor forecast to experience an overall exposure from the Proposed Development that exceeds the relevant SOAELs is identified as being subject to significant adverse impact on health and quality of life (under Government noise policy) and hence identified as a likely significant adverse effect.

9.18 Where the noise level from the Proposed Development is between LOAEL and SOAEL, the NPSE states:

> **"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."**

9.19 Other factors, such as the number of dwellings affected and the magnitude of noise change, can result in impacts between LOAEL and SOAEL being reported as likely significant effects in EIA terms. The EIA process requires that likely significant effects are identified along with the envisaged mitigation to avoid or reduce these significant effects.

Local Planning Policy

9.20 Manchester City Council Core Strategy[4] Policy C10 refers to leisure and the evening economy, which requires that in relation to residential amenity, "*the proposed use should not create an unacceptable impact on neighbouring uses in terms of noise, traffic and disturbance.*" Similarly, Policy DM1 requires that regard is given to noise and vibration. The objectives of the NPPF have been integrated into the EIA. Accordingly, this noise chapter

[4] http://www.manchester.gov.uk/download/downloads/id/18981/final_core_strategy.pdf

demonstrates how MCC's policy objectives will be met as well as identifying the likely significant effects.

9.21 MCC sets out guidance specifically on noise in relation to planning in the document *Planning & Noise Technical Guidance*[5].

Standards and Guidelines

9.22 Reference is also made to the following:

- British Standard BS4142: 2014. Methods for Rating and Assessing Industrial and Commercial Sound.
- British Standard BS5228:2009+A1:2014. Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 1 Noise and Part 2 Vibration.
- British Standard BS6472:2008 Part 1. Guide to Evaluation of Human Exposure to Vibration in Buildings – Vibration Sources other than Blasting.
- British Standard BS7385:1993 Part 2 Evaluation and Measurement for Vibration in Buildings – Guide to Damage Levels for Groundborne Vibration.
- British Standard BS8233: 2014. Guidance on Sound Insulation and Noise Reduction for Buildings.
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, HD213/11 Revision 1, Noise and Vibration. Highways Agency and Welsh Office, 2011.
- Guidelines for Community Noise, World Health Organization, 1999.
- Night Noise Guidelines for Europe, World Health Organization, 2009.
- Calculation of Road Traffic Noise, Department of Transport, Welsh Office, 1988.

Assessment Methodology and Significance Criteria

9.23 The following describes the assessment methods applied, including the means by which noise levels have been predicted. Significance of the predicted noise impacts has then been assessed by reference to criteria developed for each type of impact summarised in Sections 9.3 and 9.4.

9.24 The assessment considers impacts and effects at dwellings, hotels and the Museum of Science and Industry (MSI). For this case, hotels have been assessed as dwellings, since the existing hotels are in the near vicinity of either existing or proposed residential buildings. The need to protect dwellings will therefore ensure that the impacts at hotels are identified and reported.

9.25 For MSI, assessment is made against criteria for commercial and other uses appropriate for the uses of the museum spaces. These include the exhibitions in the adjacent 1830 Warehouse and the

[5] http://www.manchester.gov.uk/download/downloads/id/23747/noise_and_planning_guidance.pdf

stores and Technical Services' offices and workshops below the Pineapple Line arches.

Limitations and Assumptions

9.26 For some of the sources of noise that will arise from construction and operation of the Proposed Development it is not possible, at this stage of the project design, to quantify levels of noise that will arise. Where possible, calculations have been carried out based on the assumptions set out below. For some sources, the approach taken has been to define noise limits or other requirements, with which the Proposed Development will be designed to comply, thereby avoiding significant effects.

9.27 In some cases, quantifying noise levels and/or defining acceptable and justifiable criteria is not possible. It is anticipated that these types of noise, such as that from patrons going to and from venues, will be mitigated and minimised through the development and implementation of management plans, preparation of which can be secured by planning conditions.

Demolition and construction traffic noise

Methodology

9.28 The Department of Transport Memorandum Calculation of Road Traffic Noise (CRTN)[6] presents a procedure for the prediction of road traffic noise. The relevant parts of this procedure have been used to predict, for a given road at a reference distance, the change in noise level resulting from the change in road traffic between the baseline and the assessment case with construction traffic.

Assessment criteria

9.29 A potentially significant effect of construction road traffic noise is identified where the development causes a 3dB increase where the baseline traffic noise level is between LOAEL and SOAEL. Where the baseline is above SOAEL, an increase greater than 1dB is assessed as a potentially significant effect.

9.30 In terms of government policy, the following effect levels (LOAELs and SOAELs) have been applied for residential buildings. These are set consistent with construction noise criteria and higher than the effect levels for operational road traffic since they relate to the temporary situation and will only occur for part of the construction programme.

[6] Department of Transport Welsh Office(1988);*Calculation of Road Traffic Noise*; HMSO

Table 9.2 Assessment criteria for daytime construction traffic noise for dwellings (including hotels)

Effect level	Noise level (facade)
LOAEL	65dB$L_{Aeq,12hr}$ 70dB$L_{Aeq,12hr}$ at Marriott Hotel[1]
SOAEL	75dB$L_{Aeq,12hr}$
1. A higher LOAEL is appropriate because baseline noise levels are higher than at other locations	

Demolition and construction noise

Methodology

9.31 Noise from construction activities has been calculated using the approach presented in BS5228-1. This uses the schedule of construction plant and processes that are likely to be required for the proposed development and the construction programme contained in Appendix 9.3.

9.32 The predicted noise levels at surrounding dwellings have been calculated by considering the individual source noise levels of key noise-generating plant taken from BS5228-1, the proportion of time for which each will be operating, the numbers of pieces of plant operating, the distance to the receptors and any intervening screening.

9.33 The assessment is based on the assumption that works will be undertaken using best practicable means (BPM) as required by section 72 of the Control of Pollution Act and described in BS5228-1.

Assessment criteria

9.34 The thresholds for determining potentially significant construction noise effects have been determined using the ABC method described in Annex E of BS5228-1 and the measured noise levels (see Table 9.3). For evening and night time, the criteria are derived from logged noise levels measured on site. Measured freefield ambient noise levels have been converted to façade levels by adding 3dB, as specified in BS5228-1.

Table 9.3 Summary of ambient noise levels (façade levels)

Location	Day dB$L_{Aeq,T}$	Evening dB$L_{Aeq,T}$	Night dB$L_{Aeq,T}$
Marriott Hotel	71	-	**-**

Location	Day $dBL_{Aeq,T}$	Evening $dBL_{Aeq,T}$	Night $dBL_{Aeq,T}$
Liverpool Road (residential)	67	-	**-**
Lower Byrom Street (residential)	64	-	**-**
On site*	(64)	62	**61**
***On site logger data used for evening and night; on-site daytime level is included in the table for comparison with the off-site levels**			

9.35 For residential receptors (including hotels), a potentially significant effect is identified where construction noise during the day is predicted to exceed the criteria given in Table 9.4.

Table 9.4 Summary of daytime construction noise criteria (façade levels)

Location	Day $dBL_{Aeq,12hr}$	Evening $dBL_{Aeq,12hr}$	Night $dBL_{Aeq,12hr}$
Marriott Hotel	75	60	**50**
Liverpool Road (residential)	70	60	**50**
Lower Byrom Street (residential)	**70**	**60**	**50**

9.36 The assessment of EIA significance is determined by evaluating the construction noise thresholds along with other factors, such as the number of receptors and their sensitivity.

9.37 In terms of government policy, the effect levels in Table 9.5 have been applied for residential buildings.

Table 9.5 Adverse effect levels for demolition and construction noise at dwellings (including hotels)

Effect level	Period	Noise level
LOAEL	Day	65(70[1])$dBL_{Aeq,daytime}$

Effect level	Period	Noise level
	Evening	55dB$L_{Aeq,1hr}$
	Night	45dB$L_{Aeq,1hr}$
SOAEL	Day	75dB$L_{Aeq,daytime}$
	Evening	65dB$L_{Aeq,1hr}$
	Night	55dB$L_{Aeq,1hr}$
1, The higher LOAEL applies to the Marriott Hotel only and is because the baseline noise levels are higher than at other locations		

9.38 A noise impact criterion of 55dB$L_{Aeq,T}$ and a change of more than 3dB$L_{Aeq,T}$ is set for MSI based on British Standards guidance given in BS8233:2014[7].

Demolition and construction vibration

Methodology

9.39 Vibration from construction sources has been predicted using the procedures described in BS 5228: Part 2[8]. For plant and processes not included in BS5228, reference has been made to other[9] sources of data and information.

9.40 As for noise, the vibration assessment assumes the use of BPM.

Assessment criteria

9.41 The risk of vibration causing damage to buildings is assessed in terms of the peak particle velocity (PPV) at the base of the building[10]. The building damage risk criteria given in Table 9.6 have been applied to all buildings, below which there is no risk of building damage.

9.42 Although the MSI buildings are not considered to be any more vulnerable to vibration than those elsewhere, separate consideration has been given to the collections stored in MSI. Given the extent and diversity of the collections stored beneath the Pineapple Line, particularly in Store 4, it is not possible to define a single vibration limit appropriate to all items. Assessment of vulnerability has therefore been gauged by MSI staff in relation to individual items and their perceived vulnerability to vibration.

[7] British Standard BS8233:2014. Guidance on Sound Insulation and Noise Reduction for Buildings.
[8] British Standards Institution (2009); BS 5228-1:2009+A1:2014 and BS 5228 Part 2 *Code of Practice for Noise and Vibration Control on Open Construction Sites*
[9] Hiller D (2003), *A comparison of noise and vibration from percussive and bored piling*. Proc Underground Construction 2003, pp 213-224. Hemming Group Limited
[10] British Standards Institution (1993); BS7385 1993 –Part 2 *Evaluation and Measurement for vibration in buildings – Guide to damage levels for groundborne vibration*

Table 9.6 Assessment criteria for risk of building damage from vibration

Category of building	Peak particle velocity (PPV) at building foundation	
	Transient[1] vibration	Continuous[2] vibration
Potentially vulnerable buildings[3]	≥6 mm/s	**≥3 mm/s**
Structurally sound buildings	≥12 mm/s	**≥6 mm/s**

1. **Transient vibration relative to building response such as impulsive vibration from percussive piling**
2. **Continuous vibration relative to building response such as vibrating rollers**
3. **BS7385-2 highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Where information about these structures is not currently known, the significance criteria for these receptors has been set at a lower level on a precautionary basis**

9.43 BS 5228: Part 2 provides guidance on human perception in terms of PPV and states that at 0.3mm/s and above, vibration may be "*just perceptible in residential environments*". Where a PPV above 0.3mm/s is predicted, assessment of significance is evaluated according to criteria given in British Standard 6472. Part 1 of BS6472 assesses the impact of vibration using the vibration dose value (VDV). This indicator takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number and duration of vibration events during an assessment period. Assessment criteria for exposure to vibration are given in Table 9.7. Requirements for offices and workshops apply to MSI Technical Services spaces.

Table 9.7 Criteria for human exposure to vibration in buildings

Threshold (residential)	Impact classification	Vibration exposure[1]	
		VDV daytime (07:00-23:00) ($m/s^{1.75}$)	VDV night time (23:00-07:00) ($m/s^{1.75}$)
LOAEL	Minor	0.2	0.1
-	Moderate	0.4	0.2
SOAEL	Major	0.8	0.4

1. Determined at the worst location on a normally loaded floor (usually the centre of the floor)

NOTE: For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16hr day.

Noise from events

Methodology

9.44 Noise emission from the Proposed Development is being addressed in the building envelope design to ensure that noise emission criteria are achieved. Appendix 9.4 outlines the calculation process. In summary, the assessment is based on an internal sound level of 110dB at 63Hz for the Warehouse and 100dB at 63Hz for the Theatre, which is the maximum internal design noise levels. Many events will operate at a lower internal sound level, so the assessment is for the worst case.

9.45 Transmission of sound through the building envelope has been calculated and the resulting noise at surrounding building calculated using SoundPlan modelling software. This is industry standard software package that implements BS9613-2:1996[11] for sound propagation to model noise levels in three dimensions.

9.46 Since the wider St John's Masterplan development includes new residential buildings in the vicinity of the Proposed Development, the Factory building is being designed such that this criterion would be achieved at the new dwellings. The new dwellings would be closer to the venue than are the existing residential areas and therefore significant effects of noise at the existing dwellings will be avoided.

9.47 In addition to the proposed building two new public spaces will generally be open for public use and are designed to accommodate performances and activities. Noise emission would need to be controlled to protect amenity at the closer new dwellings. A quantitative assessment has not been undertaken as use will be controlled through the Event Management Strategy and it is anticipated that such use would be subject to a planning condition to protect residents in the proposed new dwellings, which would ensure the existing dwellings are also protected from noise.

Assessment criteria

9.48 Through consultation with MCC, it has been established that the Proposed Development should be designed so that low frequency sound emission within any dwelling does not exceed 47dBL_{eq} in the 63Hz octave frequency band and 41dBL_{eq} in the 125Hz band.

Building services plant noise

Methodology

9.49 The design is not yet progressed to the level where detailed information regarding the design of the buildings services plant is available. Accordingly, noise from building services plant will be

[11] ISO 9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation

controlled through the specification of noise limits and acoustic design requirements.

Assessment criteria

9.50 Noise limits will apply to residential buildings (including hotels) only. Designing to these limits will ensure that occupants of other premises on the surrounding roads are adequately protected from noise.

9.51 Based on the results of the noise survey, the typical minimum background sound levels at the nearest noise sensitive receptors to the site are:

- 55dBL_{A90} daytime (07:00 - 23:00hrs)
- 48dBL_{A90} night-time (23:00 - 07:00hrs)

9.52 BS4142:2014 states that the impacts will be low if the rating level of the combined plant noise associated with the Proposed Development when measured at 1m from the façade of the nearest noise sensitive building does not exceed the background sound levels.

9.53 The rating level includes any character to the sound (such as tonality and impulsivity), which should be assessed according to BS4142:2014.

9.54 BS4142:2014 also requires the context to be considered. An important aspect of the context, in relation to this assessment, is the absolute level of sound. The LOAELs and SOAELs used for road traffic noise in Table 9.8 will be used to consider this aspect of the context of the impact from building services noise. It can be seen that the residual sound levels fall between the LOAEL and SOAEL values. On this basis, it is not considered necessary to adjust the BS4142:2014 ratings.

9.55 Noise limits required by MCC are likely to be 5dB below typical background L_{A90} levels. Achieving these noise limits and acoustic design requirements will ensure that there are no significant effects at nearby residential or other sensitive receptors.

Deliveries and loading

Methodology

9.56 There are two issues to consider: deliveries of heavy equipment associated with events and deliveries of smaller and lighter goods associated with the running of the venue, such as office supplies and food and beverages.

9.57 Deliveries of heavy equipment associated with events will be taken through a fully enclosed service area, so are not assessed further.

9.58 Deliveries of smaller and lighter goods would be to other delivery areas during normal delivery hours and would therefore not add significantly to the overall daytime ambient noise. A quantitative assessment has therefore not been undertaken.

Road traffic noise

Methodology

9.59 Operational road traffic has been calculated using CRTN to calculate noise changes from changes in traffic flows. Changes in traffic flows have been derived from the transport assessment (Chapter 11). Noise change has been quantified by calculating the basic noise level (BNL), defined in CRTN, for the do minimum (without the Proposed Development) and do something (with the Proposed Development) for the assessment year.

9.60 In addition, since the changes in traffic due to the Proposed Development would not typically be spread throughout the day but would be restricted to the periods immediately before and after each event, the short term impacts have been assessed.

Assessment criteria

9.61 A hierarchy of impacts of traffic noise is given in DMRB 213/11[12] (see Appendix 9.2) potentially significant effect for road traffic noise is identified where the Proposed Development would cause a 3dB or greater increase in road traffic noise level where the do minimum noise level is below SOAEL. Where the do minimum traffic noise level is above SOAEL, any increase in level greater than 1dB is assessed as a potentially significant effect. LOAEL and SOAEL for road traffic noise for this assessment are given in Table 9.8 and the rationale for the values applied is set out in Appendix 9.2.

Table 9.8 Adverse effect levels for road traffic noise

Effect level	Period	Noise level*
LOAEL	Day	50dB$L_{Aeq,16hr}$
	Night	40dB$L_{Aeq,8hr}$
SOAEL	Day	63dB$L_{Aeq,16hr}$
	Night	55dB$L_{Aeq,8hr}$

Noise from patrons

Methodology

9.62 There is no recognised method for calculating the outdoor noise levels from patrons and no recognised method of assessing the

[12] Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, HD213/11 Revision 1, Noise and Vibration. Highways Agency and Welsh Office, 2011

noise impact of patron noise. Patron noise is therefore assessed qualitatively by considering the following.

9.63 Patron noise will be variable depending on the scale of the event and the patron demographic. Patron noise is likely to be concentrated in the main area of public realm to the front (north) of the Proposed Development, which is remote from and screened from most of the surrounding residential buildings. Outdoor smoking areas can result in noise disturbance and would be screened or remote from existing dwellings.

9.64 Noise from patrons moving away from the Proposed Development will be mainly on routes to and from the nearby car parking and public transport facilities. Peaks in noise from patrons on foot will generally coincide with peaks in patron road traffic noise, which would partially mask the patron noise.

Assessment criteria

9.65 No criteria are available against which to assess patron noise. Professional judgment has therefore been applied qualitatively, considering the location, others sources of noise and location and density of residential properties.

Baseline Conditions

9.66 The site is located in a busy urban environment where the baseline noise climate is dominated by traffic on minor roads adjacent to the Site, more distant major roads and the railway to the west and south west of the Site.

9.67 The nearby noise sensitive receptors are residential buildings in Liverpool Road and Lower Byrom Street and the Castlefield Hotel, also in Liverpool Road. The Marriott Hotel is towards the northern end of Water Street. Facilities within the Museum of Science and Industry (MSI) are also considered.

9.68 The assessment has focused on the residential areas closest to the site where any potential impacts would be greatest. Baseline noise survey data have been gathered to characterise the noise climate. Full details of the survey, including measurement locations and noise sensitive receptors are in Appendix 9.5.

9.69 Noise surveys were carried out in two stages, as follows.

9.70 To advise the design of the building envelope, measurements were made at three locations over a two week period from Tuesday 26 January 2016 to Tuesday 9 February 2016. Noise levels were measured over consecutive 5 minute periods. The main noise source was distant road traffic, particularly from Trinity Way.

9.71 To supplement the logger data for the EIA, particularly in relation to demolition and construction noise assessment, short term attended daytime measurements were also made on Wednesday 7 August 2016. The measurement locations were representative of dwellings on Lower Byrom Street and Liverpool Road, and at the Castlefield Hotel and Marriott Hotel. Construction works at the Network Rail Ordsall Chord site prevented representative measurements being made at the western end of Liverpool Road. The data measured at the Castlefield Hotel are considered to be representative of the baseline level at these dwellings.

9.72 The short term measurements were made at times selected from the logger data to be between the morning and evening peak hours, so provide a reasonable basis for assessment of the daytime construction noise impacts. The full results are provided in Appendix 9.5 and Table 9.9 provides a summary.

Table 9.9 Summary of daytime measurement data (freefield levels)

Location	Ambient noise level $dBL_{Aeq,T}$	Background noise level* dBL_{A90}
Marriott Hotel	68	**56**
Liverpool Road	64	**53**
Lower Byrom Street	61	**49**

***Background noise levels are those considered to be typical and representative of the night time levels derived from the noise loggers as described in Appendix 9.5.**

9.73 The on-site logger data have been used to define evening and night time limits for construction noise. The logarithmic averages of all the data within the relevant time periods have been calculated to establish the assessment criteria. Only data from two of the three on-site loggers has been used, since one data set was a few dB higher than the other two. Excluding the highest data provides a more cautious approach to the assessment.

9.74 Noise limits for building services plant will be derived from the background sound levels (L_{A90}). Graphs plotting the background noise level time histories for each week of logging are included in Appendix 9.5.

Identification and the Evaluation of Key Impacts

Demolition and Construction Phase

Demolition and construction traffic noise

9.75 Although individual site vehicles would be heard along their routes to and from site, their contribution to the overall road traffic noise levels quantified through the working day will be small. The scheduling and number of required vehicles for each stage of works have yet to be quantified but it is expected that they will lead to a no more than minor impact and therefore **no significant effect** is identified.

Demolition and construction noise

9.76 At this stage, the highest noise levels expected to occur as a result of the works would be from:

- Breaking out and removal of foundations and hardstanding
- Foundation excavation
- Piling.

9.77 Estimated noise levels for each of these activities are set out in Table 9.10. Calculations assume that there would be a 2.4m solid hoarding around the site perimeter and BPM would be used, but no further mitigation is included. Piling is assumed to use bored piles, rather than driven, as BPM method to minimise noise and vibration.

Table 9.10 Summary of construction noise (dB$L_{Aeq,T}$ freefield)

Receptor location[1]	Activity (position[1])			
	Breaking out concrete (1)	Foundation excavation (3)	Bored piling (2)	Bored piling (4)
R1 – 1830 Warehouse	68	59	64	**59**
R2 – Liverpool Rd	49	45	47	**44**
R3 – Liverpool Rd	51	44	48	**44**
R4 – Lower Byrom St	43	38	41	**40**
R5 – Marriott Hotel	51	50	51	**54**

1 See Appendix 9.3 for construction activity locations and receptor positions

9.79 The predicted noise levels are below the assessment criteria at all existing residential buildings including hotels and is therefore **no significant effect** is identified.

9.80 At the MSI 1830 Warehouse and Technical Services buildings, due to their proximity to the works, particularly piling operations when closest to the 1830 Warehouse, construction noise from some activities is predicted to exceed the assessment criterion. It is likely to be impracticable to mitigate sufficiently all noise from these works and some short term and occasional disruption to performances in the 1830 Warehouse could arise. Due to the duration of the works and the nature of the 1830 Warehouse construction and use, which would prevent any intervention to improve the façade sound insulation, noise is identified as a temporary **significant effect**.

Demolition and construction vibration

9.81 Vibration will be well below levels at which there is a risk of causing damage and is therefore no significant effect on the fabric of any building is identified.

9.82 The distances to all the existing residential receptors from the proposed works are around 100m or more. Therefore, **no significant effect** is identified at dwellings.

9.83 Deconstruction of the Starlight Theatre will not have a direct vibration transmission path to the occupied MSI buildings, since it is located on top of the Pineapple Line arches. Vibration is therefore not expected to be perceptible in either the Technical Services building or the 1830 Warehouse from this activity. Structureborne noise may be audible for periods during sawing, drilling or coring of concrete or masonry with a direct connection to the occupied MSI spaces.

9.84 Vibration from bored piling will be well below damage criteria but may be occasionally perceptible in Technical Services and to a lesser degree in the 1830 Warehouse. No piling by vibratory or percussive methods will be required. Given the nature of the use of the Technical Services building as office and workshop space, although potentially perceptible at times, vibration would be intermittent and only for the days when piling is close to the building. Therefore **no significant effect** from vibration on the building occupants is identified.

9.85 Vibration in Store 4 would be similar to that in Technical Services. Due to the variable and uncertain nature of the items in storage, and uncertainty in how they may respond to the vibration, the impact of vibration on Store 4 is cautiously identified as a **significant effect**.

Operational Phase

Noise from events

9.86 Appendix 9.4 describes how the building envelope will be designed to control noise emissions during music events with the highest levels of internal noise. Many events will operate with lower internal noise levels.

9.87 The impact of event noise will be controlled such that no adverse impacts will occur at the closest dwellings with a direct line of sight to the Proposed Development. Noise levels at more distant or more screened buildings will be lower than at these dwellings.

9.88 Therefore **no significant effect** is identified due to noise from events.

9.89 For activities in outdoor event space, the type and scheduling of events would dictate the noise levels at surrounding premises. Without appropriate controls in place noise levels from large gatherings of people could lead to a potential **significant effect** at the closest dwellings and other noise sensitive receptors.

Building services plant noise

9.90 Noise from building services plant will be controlled through design to achieve acceptable noise criteria based on the existing baseline noise levels at the closest noise sensitive receptors.

9.91 MCC’s requirement is more stringent than the assessment criteria, requiring a rating level 5dB below the background (LA90) level so compliance with local requirements will protect against noise:

9.92 Therefore **no significant effect** is identified from building services plant noise.

Deliveries and loading

9.93 Heavy deliveries associated with events, such as stage sets, sound systems and lighting will be delivered via a fully enclosed truck lift on the western side of the Proposed Development, which will fully enclose lorries during loading and unloading and therefore control noise emissions.

9.94 For smaller deliveries, such as food and beverages, access will be via other entrances. These are expected only to take place during standard delivery hours, which could be secured by a planning condition.

9.95 Through implementation of the measures described above, **no significant effect** is identified from the noise impacts from deliveries and loading.

Road traffic noise

9.96 Appendix 9.6 presents the basic noise levels (BNLs) for all road links assessed and the changes that would arise as a result of the development. The greatest increase is 1.2dB$L_{A10, 18hr}$, which is well below the assessment criterion, and increases on all residential routes are calculated to be less than 1dB$L_{A10, 18hr}$. **No significant effect** is therefore identified from traffic noise.

9.97 The greatest change in hourly noise level is predicted to be 3.6dB$L_{Aeq,1hr}$ and would be on Water Street in the period immediately following a 5000 capacity event. Since this is only slightly greater than the assessment criterion, would only occur on occasions when large events are held and would be only for a short duration, the noise is assessed as leading to **no significant effect**.

Noise from patrons

9.98 The assessment assumes the implementation of a management plan to direct patrons and to encourage responsible behaviour. The impact of noise along pedestrian routes will therefore be minimised as far as practicable. This will be particularly important for events that finish late in the evening. Access and egress by large numbers of patrons will generally be for short periods of time only, before and after events. Furthermore, dispersal routes will be carefully planned so that patrons avoid residential areas, particularly during the evening. **No significant effect** is therefore identified at sensitive receptors due to patrons.

Mitigation Measures

Demolition and construction phase

Demolition and construction traffic noise

9.99 Demolition and construction works will take place during daytime only, with vehicles mainly accessing the site during these hours. For logistical reasons it may be necessary to have some deliveries outside these hours, such as if any abnormal loads are required to transport large items.

9.100 Although no significant effect from construction traffic noise is predicted, any risk of disturbance to residents will be mitigated and minimised by considerate behaviour, such as not leaving engines idling and minimising the need to wait on the public highway.

Demolition and construction noise

9.101 Demolition and construction works will be undertaken using the principles of best practicable means (BPM) as set out in paragraph 9.33. This will include, as necessary, selection of quiet plant, ensuring plant is maintained, plant is operated with all covers in place and closed and shutting down plant when not in use.

9.102 No significant effect of construction noise is predicted and therefore no further mitigation is required to protect residential buildings from noise. Breaking out of the Starlight Theatre foundation slab will require local, moveable screening or enclosure to minimise as far as practicable the impacts at the 1830 Warehouse and Technical Services building.

Demolition and construction vibration

9.103 As for noise, the impacts and effects of vibration will be mitigated through BPM. No significant effects are identified at residential buildings and therefore no further mitigation is required to protect residents. Although the vibration will be minimised by use of bored piling, due to uncertainties in their vibration sensitivity, it may be necessary to protect some items in MSI Store 4-to ensure that they cannot be dislodged from shelves or caused to come into contact with one another through exposure to vibration.

Operational Phase

Noise from events

9.104 The proposed building envelope design incorporates provision to control noise break out such that acceptable noise criteria are achieved and hence no significant effect is identified. Therefore, no further mitigation is required to control event noise emission.

9.105 For outdoor events, mitigation will be required through a management process to control the number and timing of events, the types of event and the acceptable noise levels. These measures will be established through the licensing provisions.

Building services plant noise

9.106 Design of building services plant, including any enclosures or screening will ensure that acceptable noise criteria are achieved. Mitigation of noise to ensure no significant effect arises will therefore be an inherent element of the design and so no further mitigation is required.

Deliveries and loading

9.107 Deliveries of heavy equipment within an enclosed loading bay will mitigate noise. Good practice will be ensured through a management plan to employ considerate working, particularly if it is necessary to work outside normal delivery hours. The plan will include issues such as considerate driver behaviour and not allowing vehicles, if required to wait on the public highway for access to the service yard, to do so with engines running.

9.108 No significant effect of noise from deliveries or from loading are predicted, provided that smaller operational deliveries are restricted to the standard delivery hours.

Road traffic noise

9.109 No significant effect of road traffic noise is predicted and therefore no mitigation is required.

Noise from patrons

9.110 The operator will put in place an Event Management Strategy, which is being submitted with the planning application, which includes measures to minimise disturbance.

Cumulative Effects

Demolition and Construction Phase

9.111 Cumulative effects of noise could arise temporarily during concurrent construction works or permanently through noise from simultaneous operation of the Proposed Development and other consented schemes.

9.112 The Proposed Development and the other developments being considered would each have controls on construction noise applied at the closest noise sensitive receptors to each. For cumulative significant effects of construction noise to occur at these receptors as a result of the simultaneous construction of the Proposed Development and another development, it would be necessary for the works to occur concurrently, and generate sufficient levels of noise at the receptor that they would increase the total site noise level significantly. In view of the distances of the other committed developments from the Proposed Development, it is unlikely that noise levels would combine in a way that would to lead to a cumulative significant effect at any receptor.

Operational Phase

9.113 Similarly, during operation, noise from each development would be controlled so as to achieve acceptable noise criteria at its closest noise sensitive receptor. Noise levels at more distant noise sensitive receptors would therefore be lower. The cumulative impact of the Proposed Development and operation of other committed developments would therefore not lead a cumulative significant effect of noise.

9.114 The traffic noise assessment is based on traffic flows with the St John's masterplan in place and a comparison made of the traffic noise changes with and without the Proposed Development. The cumulative effects of traffic noise for the St John's Masterplan area and committed development within the wider surrounding area have therefore been accounted for in the assessment.

Residual Effects

9.115 Table 9.11 summarises the pre-mitigation significance of effects and the residual effects following implementation of mitigation.

Table 9.11 Summary of noise and vibration effects

Impact	Description	Pre-mitigation Significance	Post-mitigation Significance
Demolition and construction phase			
Demolition and construction traffic noise	Effects of vehicle movements off site	Not significant	**Not significant**
Site noise	Effects on dwellings incl. hotels	Not significant	**Not significant**
	Effects on MSI	Significant at 1830 Warehouse and Technical Services office	**Significant at 1830 Warehouse**
Site vibration	Effects on dwellings (incl. hotels)	Not significant	**Not significant**
	Effects on MSI	Significant effect at Store 4 No significant elsewhere	**Not significant**
Operational phase			
Event noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Building services plant noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Deliveries and loading noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Traffic noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Patrons noise	**Effects on all existing noise sensitive receptors**	**Not significant**	**Not significant**

9.116 With the identified mitigation, it is predicted that there would be no significant effect of noise or vibration, other than temporary effects at the MSI 1830 Warehouse. The Proposed Development would therefore be compatible with national policy and MCC's Core Strategy policies C10 and DM1 in relation to noise and vibration.

10 Wind Microclimate

Introduction

10.1 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 likely 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. This chapter has been prepared by Urban Microclimate Ltd.

Policy Context

National Planning Policy

10.2 Although there are no national planning policies directly relating to wind microclimate issues, the NPPF emphasises the benefits of a high quality built environment. An example of this is presented in paragraph 58:

> **"...using streetscapes and buildings to create attractive and comfortable places to live, work and visit..."**

10.3 The NPPG identifies the potential for a building's size and shape to affect the wind microclimate. Under the section addressing 'Design: How should buildings and the spaces between them be considered?', the NPPG states in Paragraph 025 ('Consider form') that:

> **"Some forms pose specific design challenges, for example how taller buildings meet the ground and how they affect local wind [...] patterns should be carefully considered."**

10.4 The NPPG goes on to state in Paragraph 026 ('Consider scale') that:

> **"Account should be taken of local climatic condition, including [...] wind".**

Local Planning Policy

10.5 Manchester City Council's Local Development Framework Core Strategy Development Plan Document (adopted July 2012) includes Policy EN2 Tall Buildings, for which tall buildings are defined as buildings which are substantially taller than their neighbourhoods and/or which significantly change the skyline. Policy EN2 states:

> **"...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."**

10.6 The Guide to Development in Manchester, Supplementary Planning Document and Planning Guidance (adopted April 2007), Section 2.

Design, Paragraph 2.40 (Hard landscaped areas within the public realm should be attractive) states:

"Where the public realm includes hard landscaped areas, its design should reflect the level and nature of their use, and should consider issues such as overshadowing, prevailing winds…"

10.7 Within the same guide, Section 12. The City Centre, Paragraph 12.8 (Development Quality) states:

"…Key questions will be … the microclimate, including overshadowing and air turbulence effects, created by the relationship of the building to those adjacent; and the quality and usability of the spaces surrounding the building."

10.8 With regards to the above, it should be noted that the Proposed Development is not considered a "Tall Building".

Additional Standards and Guidance

10.9 The assessment of environmental wind flows lies outside the scope of BS EN 1991-1-4:2005[1], the current European Standard for wind actions on structures, which focuses on wind loading issues.

10.10 The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by and compared against the industry standard Lawson criteria[2], which are recognised by Local Authorities as a suitable benchmark for wind assessments.

Assessment Methodology and Significance Criteria

10.11 With reference to the policies and guidelines outlined above, the Proposed Development is not considered a tall building. Nevertheless, the Development represents a relatively large structure, with potential to create accelerated pedestrian level winds. An experience-based desk study has therefore been carried out to provide a qualitative assessment of the likely effects of the Development on the pedestrian level wind environment. The study considers the Proposed Development's massing and exposure in conjunction with long-term wind climate statistics applicable to the Site, and draws on extensive experience in the assessment of wind flows, gained from wind tunnel testing of generally similarly massed schemes within similar urban settings. These detailed studies were based on the aforementioned Lawson criteria for pedestrian comfort and safety.

10.12 The assessment considers the following configurations:

- Existing Site conditions (Baseline);
- Proposed Development with existing surrounds; and

[1] BS EN 1991-1-4:2005 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

[2] Lawson, T.V. (1990), "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol, Report Number TVL 9025

- Proposed Development with future surrounds.

10.13 Surrounding developments currently under construction include 1 Water Street, 2-3 Hardman Boulevard (XYZ Building), Quay House (1 Spinningfields), the Orsdall Chord, Salford Central Plots A5 and A6, and the Renaker development at Wilburn Basin. These developments are considered as part of the baseline, in their completed state.

10.14 The future surrounding developments considered include parts of the wider St John's development forming the basis of separate planning applications and consented developments in the surrounding area with potential for cumulative effects. These schemes comprise the following:

- Bonded Warehouse, St John's;
- Manchester Grande, St John's;
- Village Phase 1, St John's;
- St John's Place, St John's;
- Central Village, St John's;
- Riverside, St John's;
- Energy Centre, St John's;
- Astley House and Byrom House;
- Middlewood Locks;
- Salford Central;
- Potato Wharf Blocks 3 & 4;
- Middlewood Basin; and
- Trinity Islands.

10.15 Further consented future developments in the area lie beyond the extent of potential significant cumulative effects.

10.16 Long-term wind frequency statistics from Manchester Airport, approximately 13.5 km to the south of the Site, were sourced for the period 2001 to 2012. The data was corrected to apply directly at the Site, taking account of differences in upwind terrain and altitude between the weather centre and the Site, based on the widely accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-1-4:2005.

10.17 Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table 10.1 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

Table 10.1: Lawson Criteria for Pedestrian Safety or Distress

Threshold mean-hourly wind speed exceeded once a year	Safety Ratings		Qualifying Comments
15 m/s	S2	Unsuitable for general public	**Less able and cyclists find conditions physically difficult.**
20 m/s	**S1**	**Unsuitable for able-bodied**	**Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts.**

10.18 Details of the Lawson criteria for pedestrian comfort are presented in Table 10.2 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% has been established as giving a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

Table 10.2: Lawson Criteria for Pedestrian Comfort

Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time	Comfort Rating / Activity		Qualifying Comments
4 m/s	C4	Long term Sitting	**Reading a newspaper and eating and drinking.**
6 m/s	C3	Standing or short term Sitting	**Appropriate for bus stops, window shopping and building entrances.**
8 m/s	C2	Walking and Strolling	**General areas of walking and sightseeing.**
10 m/s	**C1**	**Business walking**	**Local areas around tall buildings where people are not likely to linger.**

10.19 The pedestrian level wind environment assessment is summarised in terms of suitability for various activities, based on expected seasonal comfort and safety ratings in accordance with the Lawson criteria, detailed above. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus conditions for recreational activities focus on summer, but also consider spring and autumn. Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter, but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.

10.20 For the suitability assessment the activities considered, and their relation to the Lawson criteria, are shown in Table 10.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

Table 10.3: Suitability Assessment

Suitability		Target Lawson comfort and safety criteria for specified seasons
Outdoor seating	For long periods of sitting, such as for an outdoor café or picnic area.	**'Long term sitting' (C4) in at least summer.**
Entrances, waiting areas	For pedestrian ingress/egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc.	**'Standing or short term sitting' (C3) in all seasons.**
General leisure (excluding seating areas)	For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.	**'Standing or short term sitting' (C3) from spring to autumn.**
Thoroughfare	For pedestrian access to, and passage through, the Site and surrounding area.	**'Business walking' / 'Walking or strolling' (C1/C2) in all seasons.**
Unsuitable	Unsuitable for all activities.	**Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2).**

Significance Criteria

10.21 The significance of any effects is assessed based on the likely suitability of wind conditions in each area against the current or planned pedestrian activities, with the sensitivity of receptors considered high.

- Effects on pedestrian safety are generally considered major. Where the effect is of small spatial extent and is marginal relative to the safety criteria, it is considered moderate.
- Effects on pedestrian comfort where conditions change from suitable to unsuitable (for adverse impact) or from unsuitable to suitable (for beneficial impact) for current or planned activities are deemed moderate.
- Where conditions change from marginal (or tolerable) to suitable or unsuitable for current or planned activities the effect is deemed minor. Similarly a change from suitable or unsuitable to marginal/tolerable is also deemed minor.
- Any effect that does not alter the suitability of wind conditions with respect to current or planned activities is considered negligible.

10.22 As an example, where conditions at a building frontage with no current entrances are suitable only for strolling and a proposed development introduced an entrance in this area, wind conditions would need to improve to be suitable for pedestrian ingress/egress for the effect to be negligible. If wind conditions became marginally windy for an entrance, the effect would be minor adverse even if wind speeds were lower, due to the introduction of a more sensitive activity.

10.23 Where existing conditions are calmer than required, an increase in wind speeds could be accommodated without the effect being significant, provided conditions remain suitable for pedestrian activities.

Assumptions and Limitations

10.24 The assessment provides an expert qualitative review of expected pedestrian level wind conditions, based on consideration of the massing and exposure of the Proposed Development in conjunction with long-term wind statistics applicable to the Site.

10.25 The design of parts of the surrounding St John’s development is ongoing. The cumulative assessment is based on the massing and layout as considered in the December 2015 ES and the Central Village and T1 September 2016 ES addendum.

10.26 Historical wind statistics are used as standard practice due, in part, to lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.

Baseline Conditions

10.27 The wind climate expected at the Site is summarised in Figure 10.1 in terms of the annual amd seasonal wind speed and direction probability distributions at a reference height of 35 m above local ground level (approximately +61 m AOD).

10.28 Based on the wind climate statistics, winds from the southerly quadrant are prevalent. Light to moderate winds from the south and south-south-east are most common, whilst stronger winds more frequently blow from the south-south-west. Winds from the west-south-west and west also occur frequently, and extreme wind speeds (relevant to pedestrian safety) are most likely to blow from this direction. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.

10.29 The existing Site is sheltered at low level from prevailing southerly winds and, in the absence of any dominant structures with respect to wind, conditions are expected to be suitable for recreational activities including at least short periods of standing or sitting. These conditions would be suitable for pedestrian ingress/egress at entrances, waiting or meeting points and general recreational uses. Most of the Site is further expected to be suitable for long periods of outdoor sitting, such as for a picnic, during at least summer.

10.30 Similar conditions are expected within the immediate surrounding area. Conditions are therefore expected to be suitable for existing activities, comprising mainly pedestrian thoroughfare and ingress/egress to buildings.

Identification & the Evaluation of Key Impacts

Demolition and Construction

10.31 The existing buildings to be demolished within the Site are lower than the neighbouring buildings and offer only limited shelter to these buildings from approaching winds. Potential, short-term, increases in the exposure of surrounding buildings is not therefore expected to be significant with regards to the suitability of pedestrian level wind conditions.

10.32 In addition, the massing, orientation and spacing relative to surrounding buildings is such that potential short terms effects where partially completed buildings may exacerbate downdraughts from existing downwind buildings are not expected to be significant. Potential wind effects from the partially completed Proposed Development are therefore expected to be less than from the completed Proposed Development considered below.

10.33 Finally, pedestrian activities within the Site and immediate surrounds will also be different during construction and will include restrictions on pedestrian movements in some areas for safety reasons. Pedestrian perception of conditions both within the Site and in the surrounding area is also likely to be affected by expectations of conditions around a building site, with pedestrians more likely to tolerate adverse conditions as they can appreciate it as a temporary situation.

10.34 Overall, conditions in and around the Site are expected to be suitable for interim pedestrian activities and the effect of the Proposed Development during construction is expected to be of **negligible** significance.

Operation

10.35 Upon completion, the Proposed Development will be exposed to stronger west-south-westerly winds and, at mid-to-upper levels, to prevailing southerly winds. However, the modest height of the Proposed Development is expected to limit the severity of resulting downdraughts and the railway viaduct on the south side is expected to largely prevent downdraughts from the south elevation from reaching pedestrian level directly. In addition, whilst the underpasses have potential to channel pedestrian level winds through the covered areas, the potential for accelerated winds around the external corners is reduced.

10.36 The pedestrian level wind environment in and around the site, resulting from the above effects, is presented in terms of suitability for pedestrian activities in Figure 10.2.

Pedestrian Safety

10.37 As discussed above, the Proposed Development is sheltered at low levels from prevailing southerly winds and presents a modest obstruction to the stronger west-south-westerly winds. As a result, pedestrian level wind conditions in and around the site are expected to remain rated as safe for all users.

10.38 The Proposed Development is thus expected to have **negligible** effect with respect to pedestrian safety.

Pedestrian Comfort

10.39 In terms of pedestrian comfort, with respect to wind force, wind conditions are expected to be suitable for at least leisurely strolling and are thus expected to be suitable for pedestrian access to and passage through the Proposed Development.

10.40 The main entrances to the Proposed Development are expected to generally enjoy suitable conditions for pedestrian ingress/egress. There is some potential for winds accelerating around the northwest corner of the main ground floor structure to affect the area around the west end of the north entrance. However, resulting conditions are expected to be at least tolerable for pedestrian ingress/egress, and these winds are not expected to extend across the length of the entrance area.

10.41 Away from building corners, conditions are expected to be suitable for recreational activities including at least short periods of standing or sitting, such as for a meeting point. These conditions are expected to be considered suitable for the predominantly hard landscaped public spaces.

10.42 The Proposed Development is not expected to have any significant effect on the suitability of wind conditions within the surrounding area, with conditions expected to remain suitable for existing activities, comprising mainly pedestrian thoroughfare and ingress/egress to buildings. The lower level yard of the Museum of Science and Industry, to the south of the Site, is further expected to remain suitable for recreational activities.

10.43 The Proposed Development is thus expected to have a generally **negligible**, to no worse than localised **minor adverse,** effect with respect to pedestrian comfort.

Mitigation Measures

10.44 Conditions are expected to be generally suitable, and at least tolerable, for planned pedestrian activities and no mitigation measures are considered to be required.

10.45 The west end of the main north entrance may benefit from localised shelter, such as a porous screen extending out from the building corner, but this would be considered an enhancement rather than a mitigation requirement.

Cumulative Effects

10.46 The introduction of future surrounding developments provides the Site, as a whole, with enhanced shelter from prevailing southerly and stronger westerly winds. However, Central Village and Riverside (forming part of the wider St John's development, in accordance with the December 2015 ES and the Central Village and T1 September 2016 ES addendum) introduces tall buildings to the north of the Site, as well as sensitive pedestrian activities such as café outdoor seating.

10.47 The Proposed Development has potential to partially shelter Riverside from prevailing southerly winds and Central Village from stronger west-south-westerly winds. However, whilst there is also potential to exacerbate channelling of westerly winds in particular, the future towers are expected to largely dominate wind conditions in the northern part of the Site.

10.48 Conditions within the neighbouring parts of the wider St John's development, and thus mitigation requirements, are therefore expected to be dictated by developments themselves and additional cumulative effects from the Proposed Development are not expected to be significant.

10.49 Similarly, it is expected that ongoing development of the wider landscaping strategy will help alleviate wind effects from the wider St John's development impacting on the Proposed Development. Resulting conditions are expected to be at least tolerable for proposed pedestrian activities and thus the cumulative effects of the Proposed Development and adjacent future developments are expected to be no worse than **minor adverse**.

10.50 No significant cumulative effects of the Proposed Development and future surrounding developments is expected within the wider surrounding area.

Residual Effects

10.51 No mitigation is considered to be required within the Site, though there may be opportunity to enhance conditions at the west end of main north entrance. Residual conditions are expected to be generally suitable, and no worse than tolerable, for proposed pedestrian activities. The residual effect of the Proposed Development is thus expected to be generally **negligible**, to no worse than localised **minor adverse**.

10.52 Ongoing development of wider St John's landscaping strategy is expected to alleviate potential accelerated winds emanating from the future towers such that residual conditions are at least tolerable for proposed pedestrian activities, including recreational uses of amenity spaces, and cumulative effects are also expected to be no worse than **minor adverse**.

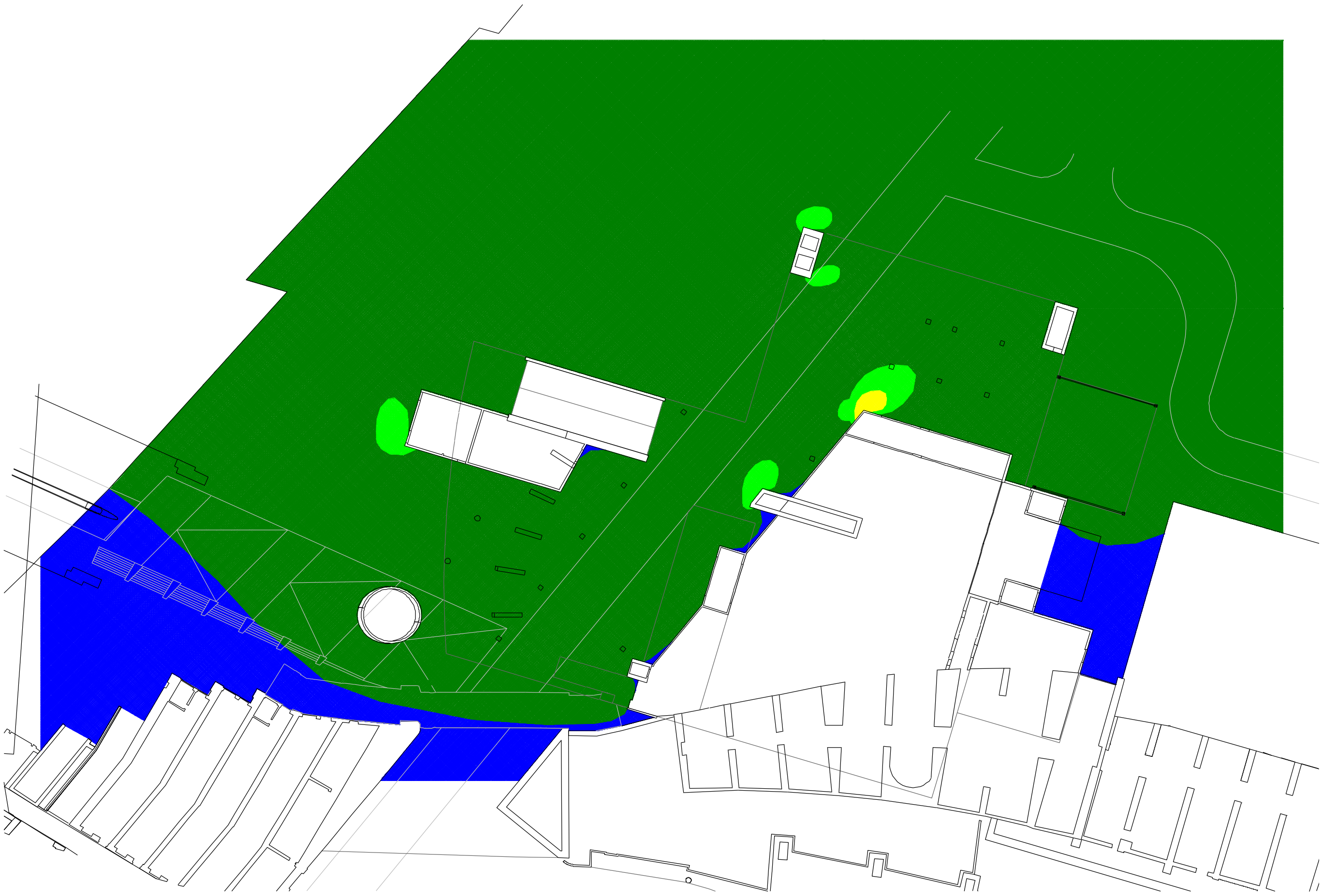
Table 10.4 - Summary of Wind Microclimate Effects

Impact	Description	Pre-mitigation Significance	Post-Mitigation Significance
Demolition and Construction			
Increased Wind Speed	Effect on nearby pedestrian activity	Negligible	Negligible
Operation			
Increased Wind Speed	Pedestrian Safety	Negligible	Negligible
Increased Wind Speed	Pedestrian Comfort	Negligible / Minor Adverse	Negligible / Minor Adverse

Wind Climate at Site at Reference Height of 35m (above local ground)

Figure:	10.1		
Title:	Wind Climate at Site		
Project:	Factory, St. Johns. Manchester		
Date:	August 2016	Scale:	Scale /NTS

Indicative Suitability Assessment, Proposed Development with Existing Surrounds



Outdoor Seating	North ↑
Entrances, Waiting areas	
General Leisure (excluding seating areas)	
Thoroughfare	
Unsuitable	

Figure:	**10.2**			
Title:	**Wind Microclimate Suitability Assessment**			
Project:	**Factory, St. Johns. Manchester**			
Date:	**August 2016**	**Scale:**	**Scale /NTS**	

11 Traffic & Transport

Introduction

11.1 In this Chapter Vectos Transport Consultants consider the environmental implications of development trips to the Proposed Development and the wider St John's Masterplan area. The site forms part of the central core of the St Johns Masterplan area. This analysis assesses the impact of development traffic its significance and the residual effects on the environment with mitigation. The assessment also considers the changes in traffic flow with other committed development trips and the wider growth of the Regional Centre more than 15 years into the future.

11.2 In this analysis, consideration is given to vehicle movements by Car and Other Goods Vehicles (OGVs i.e. +7.5 tonnes). Trips by public transport will have limited impact as the bus, rail and tram systems are already making journeys into the city. Pedestrians and cyclists are not considered to give rise to any measurable environmental implications but they are considered as vulnerable road users.

11.3 The Chapter is supported by a Transport Assessment which is included as Technical Appendix 11.1 in Volume 2 of the ES and will be referred to in this chapter. The assumptions for the traffic forecasting have been agreed with Transport for Greater Manchester (TfGM) who undertook the SATURN modelling and also with Manchester City Council (MCC) highways officers.

Legislative and Policy Context

National Planning Policy Framework

11.4 The main source of national policy regarding the transport planning aspects of development can be found in the Department of Communities and Local Government (DCLG) 'National Planning Policy Framework' (March 2012).

11.5 The document sets out the national Government's planning policies for England and how these are expected to be applied by local authorities. The underlying objectives of the NPPF are to contribute toward achieving sustainable development. The NPPF identifies that development should be sustainable in terms of economic, social and environmental sustainability.

11.6 The NPPF states that twelve core land-use planning principles should underpin the development of local plans and also in making planning decisions. The transport-related principle states that planning should 'actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are, or can be made, sustainable.'

11.7 The NPPF also states that development should only be prevented or refused on transport grounds where the residual impacts of development are severe.

Local Planning Policy

Manchester Core Strategy (2012)

11.8 Manchester's Core Strategy was adopted on 11 July 2012 and is the key document in the Manchester Local Plan. It sets the out the long term strategic policies for Manchester's future development and forms the framework that planning applications will be assessed against. The relevant policies that influence transport are described below.

11.9 Policy T1 **Sustainable Transport** aims to deliver a sustainable high quality and integrated transport system to encourage a modal shift away from the car.

11.10 Policy T2 **Accessible Areas of Opportunity & Need** 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 and is easily accessible by walking, cycling and public transport.

11.11 The policy also states that 'Within the City Centre, developments provide a level of car parking which reflects the highly accessible nature of the location, as well as the realistic requirements of the users of the development.

11.12 Policy DM1 **Development Management** states that all development should be fully accessible to disabled people and access to new development should be accessible to sustainable transport modes.

11.13 These policies may be supported by supplementary planning documents which give more detail to policies in the Core Strategy.

11.14 Manchester adopted its 'Guide to Development in Manchester SPD and Planning Guidance' (April 2007), 'Providing for Housing Choice SPD and Planning Guidance' (September 2008)

11.15 The **Guide to Development in Manchester** is effectively a hybrid document acting as both a Supplementary Planning Document and planning guidance. The document sets out the City Council's stance on a wide range of issues. It provides guidance on Urban Design, Accessibility, Environmental Standards, Street Hierarchy and Parking. The development aims to conform to that guidance.

Greater Manchester Transport Strategy 2040

11.16 The Greater Manchester Local Transport Plan (LTP) is moving on from LTP3 and there are two Draft Consultation Documents that aim to set the future transport strategy. The first document is the Greater Manchester Transport Strategy 2040 which sets out the Vision for transport in Manchester over that period and the second document is the Delivery Plan 1: 2016/17-2021/22.

11.17 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 to:

- Supporting Sustainable Economic growth
- Protecting Our Environment
- Improving Quality of Life for All
- Developing an Innovative City Region

11.18 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. A common theme is the need to tackle congestion on our transport networks and minimise the negative impacts of traffic on our communities

11.19 The Delivery Plan 1: 2016/17-2021/22 sets out schemes and measures that are aimed to be brought forward up to 2021. It also sets out the funding availability and will provide annual updates on progress against key performance indicators.

St John's Strategic Regeneration Framework

11.20 A Strategic Regeneration Framework was prepared for the St John's Masterplan area was prepared in 2014 and adopted by MCC in February 2015, updated in July 2016. The vision for the site is to create a new mixed use, sustainable city centre neighbourhood which is accessible, has a distinctive sense of place, and offers life and activity 24 hours of the day, 7 days a week and 365 days of the year. At the heart of the strategy is the delivery of a mix of uses focused on employment, residential and leisure, together with complementary ground floor retail activity which will provide amenities for visitors to, and occupiers of, this district, as well as to local residents and other city centre users in adjoining districts.

11.21 The National and Local Policy context as well as the Strategic Regeneration Framework will form the basis of the Transport and Access Strategy for the Site.

Assessment Methodology and Significance Criteria

11.22 An environmental impact can arise through the extra vehicle trips that might arrive 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 (IEA)

Guidelines for the Environmental Assessment of Road Traffic (1993) and include;

- *Noise;*
- *Vibration;*
- *Visual Impact;*
- **Severance;**
- **Driver Delay;**
- **Pedestrian Amenity;**
- **Accidents and Safety;**
- **Hazardous Loads;**
- *Air Pollution;*
- **Dust and Dirt;**
- *Ecological Impact;*
- *Heritage and Conservation Areas*.

11.23 The environmental implications arising from Noise/Vibration, Visual Impact, Air Quality and Heritage matters are dealt with in other chapters of this ES. Ecological impact is considered within a standalone technical report submitted with the planning application. This analysis considered the implications of the factors highlighted in bold during the operational and construction phases of development. The issues of Hazardous Loads and Dust & Dirt are only considered to arise during the Construction Phase.

11.24 The development of the St John's Masterplan area will replace the Granada Studios site which provided parking for around 1100 cars. As a Television Studios it previously generated traffic from the employees on the site accessing the various car parks, as well as service vehicles and broadcast vehicles accessing the site. Therefore consideration has been given to the net change in vehicle movements.

11.25 A description of that site and its accesses is provided in Chapter 3 of the ES and the Transport Assessment (Appendix 11.1).

11.26 The Proposed Development will give rise to an increase in traffic movements which will have consequent environmental impacts. It is this impact which the EIA will seek to quantify and assess. The IEA Guidelines states that in Scoping out the extent of the assessment 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.**

11.27 The sensitivity for residential properties largely relates to residents enjoying the outside space. The areas or types of road users that are considered sensitive are described below:

- Nearby Residential Properties:
  - Lower Byrom Street.
  - Great John Street.
  - Atherton Street.
  - Left Bank (Quay Street).
  - Liverpool Road.
- Vulnerable Road Users
  - Pedestrians
  - Cyclists.

Methodology for Determining Sensitivity

11.28 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in **Table 11.1**.

Table 11.1 - Methodology for Determining 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.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

11.29 In considering the sensitivity it is noted that the area is within a city centre environment with traffic and its associated issues evident for much of the day. Also the number of pedestrians and cyclists in this locality is currently relatively low compared to other streets in the city. The sensitivity of those receptors is presented in **Table 11.2.**

Table 11.2 – Sensitivity of Receptors

Receptor	Sensitivity
Residential Properties on Lower Byrom Street, Liverpool Road, Great John Street, Atherton Street and Left Bank Apartments facing New Quay Street	The receptor/resource has **moderate** capacity to absorb change without significantly altering its present character. The receptor is of **local** importance.
Pedestrians	The receptor/resource has **moderate** capacity to absorb change without significantly altering its present character. The receptor is of **local** importance.

Receptor	Sensitivity
Cyclists	The receptor/resource has **moderate** capacity to absorb change without significantly altering its present character. The receptor is of **local** importance.

Methodology for Determining Impact Magnitude

11.30 Having determined the locations where there is a significant change in traffic flow, the assessment will quantify the magnitude of that impact using the criteria described in **Table 11.3.**

Table 11.3 - Methodology for Determining Impact Magnitude

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-demolition) conditions such that the post demolition 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 demolition 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-demolition circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

11.31 The significance of the impact will then be determined according the criteria taking into account the following factors. This will account for the cumulative effect of other committed developments.

- 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.

11.32 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The Impact Significance Matrix is set out in **Table 11.4**.

Table 11.4 - Effect 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
Minor	Moderate - Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

11.33 Following this analysis the assessment will consider the effect of Mitigation Measures that will be applied and the resultant Residual Impact.

Baseline Conditions

Existing Conditions

11.34 The Site previously attracted traffic to the Studio operations. The Site is located adjacent to the Inner Relief Road and has good potential to intercept car traffic before it reaches any sensitive locations. It is also a good location for travel by modes other than the car; it is adjacent to existing bus routes a national cycle route and within walking distance of Manchester City Centre. These factors will help to reduce the traffic volumes and offers residents and visitors the opportunity to access the Site by sustainable transport modes. The accessibility of the Site by sustainable modes is described in further detail in Chapter 5 of the Transport Assessment (Appendix 11.1).

11.35 TfGM has developed a SATURN traffic model for the area. This model included a 2014 baseline scenario for validation purposes and to provide a comparison to test future year scenarios. The traffic flows in the 2014 model include traffic from Granada Studios when this was still operating. That model shown in **Figure 11.1** represents the most appropriate means of testing the highway operation of St John's traffic. The 2014 baseline levels for the weekday AM and PM flows are shown at **Figures 11.2** and **11.3**.

11.36 The existing traffic speed data for the area has been obtained from observations at different times of the day and described in Section 3.5 of the Transport Assessment. These are shown as **Figures 11.4 and 11.5** for the AM and PM peak periods. In summary there are notable peak hour delays observed around the Regent Road/Water Street/Trinity Way junctions in both peaks and also on Quay Street and Deansgate in the PM peak. The extent of queues at critical links on the network in the different time periods have also been derived from the model and are shown in **Figure 11.6** and **11.7**. It is the nature of the model that these queues are represented on specific links with 'vertical stacking' rather than the blocking back effect that occurs in reality. Therefore these queues should be used for comparative purposes for assessment.

11.37 The three year personal injury 'Stats 19' accident data as recorded by police has also been obtained from TfGM for the period 2012-2015. This is described in Section 3.6 of the Transport Assessment (Appendix 11.1) and a summary of accident location and seriousness are presented as **Figure 11.8**. There have been 44 accidents in the wider area in those three years with no fatal accidents and 9 serious injury accidents. There were 2 accidents on Water Street caused by lapses in concentration and one accident on Liverpool Road caused by a vehicle fire. On the Inner Relief Road there have been 4 recorded injury accidents at Trinity Way/Water Street. 3 of these accidents were due to inattention and one for careless driving. 5 accidents were recorded at the Regent Road/Trinity Way junction. This is considered low compared to the volume of traffic using those routes. Deansgate (15) and Quay Street (9) experience more accidents reflecting the nature of these roads as carrying reasonably high traffic flows with a lot of different activities occurring there.

11.38 In summary, the recorded accidents do not indicate a particular highway safety blackspot within the area.

Baseline Conditions

11.39 The Baseline traffic flows for the assessment are based on the TfGM 2014 SATURN model flows. This traffic model was developed to test the operation of the Regent Road /Water Street Capacity Improvement scheme.

11.40 The years of assessment are taken as 2017 and 2032. These are the assessment years taken for the major highway improvement proposed for Regent Road; the assessment years also represent the earliest possible opening for the early phases at St John's together with a 15 year future scenario. This represents a robust means of testing the full development scenario with the future highway scenario and the full development of the Regional Centre up to that point.

11.41 The Transport Assessments of other committed developments that lie close to St John's or result in a major increase in traffic flow have been reviewed. The list of committed developments are described in **Appendix 2.2.** Where committed developments result in a material nett increase in traffic flow on the highway network within the study area compared to their extant or approved land use, they have been included specifically within the model using the traffic flows derived from the supporting Transport Assessments.

11.42 Other committed developments that have only a marginal nett change in traffic flow or other allocations in the Local Plan are assumed to have their traffic flows accounted for in the general growth factors for the Regional Centre. The Transport Assessments of recently approved developments at Potato Wharf, Owen Street, Stanley Street and Gresham Mill have all been reviewed and the Transport Assessments for these developments show that the nett traffic changes are either less than the existing or extant land use or at an insignificant level. These changes can be accounted for in the background traffic growth.

11.43 The baseline condition for both the 2017 and 2032 assessment years include the following committed transport schemes:

- Bus Priority Package, comprising
  - Rochdale Road corridor bus priority measures
  - Oxford and Wilmslow Road bus priority measures
  - Leigh-Salford-Manchester guided busway and associated on-highway bus priority improvements
  - Regional Centre transport strategy highway impacts
  - Metrolink Second City Crossing highway impacts
- Regent Road capacity improvement scheme, which now has Conditional Approval and comprises changes at the following junctions:
  - Regent Road / Water Street
  - Regent Road / Ordsall Lane
  - Regent Road / Oldfield Road
  - Chester Road roundabout
  - Trinity Way / Hampson Street
  - Middlewood Street / Hampson Street
- Removal of traffic signals at Water Street / Liverpool Street, which are to be removed as part of Network Rail's Ordsall Chord scheme.

11.44 The growth factors applied to all traffic to account for future growth of the Regional Centre are:

Growth Factors (Growth from 2014)

	2017	**2032**
AM Peak	5%	12%
Inter-Peak	7%	15%
PM Peak	2%	17%

11.45 TfGM has provided factors to convert the AM PM and Interpeak flows to a 24 hour Annual Average Daily Traffic flow (AADT) and an 18 hour Annual Average Weekday Traffic flow (AAWT) which have been used for the Air Quality and Noise assessments. TfGM has also provided factors for OGV proportions. The details of the TfGM factors to provide the 24 hr AADT and 18 hr AAWT flows are given in Appendix F of the Transport Assessment (Appendix 11.1).

11.46 The Baseline 'Do-Minimum' traffic flow forecasts at 2017 levels are shown in **Figures 11.9** and **11.10** for the AM and PM peaks and the 2032 'Do-Minimum forecasts are shown in **Figures 11.11** and **11.12**

11.47 To complete the Baseline Flows the former Granada Studios traffic needs to be deducted from the model and the traffic from all the St John's development sites added.

With Development Forecast

11.48 To consider the 'With Development' scenario, the 2017 and 2032 future year scenarios included the development trips from the whole of the St John's Masterplan Area including the proposed development and also developments as indicated in the Water Street Regeneration Framework. The Water Street Framework provides for residential development with parking, a Big Yellow Storage unit and the potential for public car parking. While the scale and mix of development is yet to be confirmed, it was considered appropriate to ensure a robust assessment to assume reasonable traffic generations for that site in order to assess the implications of highway operation.

11.49 The forecast of new development trips has been made using the TRICS (v7.2.2) database of trips attracted to the standard land uses. To avoid duplication of trip making activity it has been assumed that the ancillary A1, A2, A3 and A4 units across the wider St. John's Masterplan site trade off the residents, employees and event visitors.

11.50 The TRICS data base was interrogated for city/town centre or edge of centre sites for the following land uses, Apartments, Lower Rise Apartments, Office, and Hotels and also studio activities at the Old Granada Studios (OGS). In addition, St John's will host events attracting large numbers of visitors. The Proposed Development is an ultra-flexible performance space that can host different events at different times. From a review of indicative event programming the coincidence of maximum capacity events occurring at the same time would be rare. However, a robust event scenario has been assessed assuming 6,850 visitors to the Proposed Development.

11.51 The forecast for modal share for people travelling to events has been based on TRICS data for theatres and event spaces, with some adjustment to reflect the particular locational and transport characteristics of St John's.

11.52 The traffic flow forecasts for St John's are presented in **Table 11.5** with the event forecasts in **Table 11.6**. Tables 11.5 and 11.6 are presented at the end of this chapter.

11.53 The distribution of development traffic on the highway network has been based on the TfGM SATURN Traffic Model Devtrips programme.

Changes in Traffic Flow with Development

11.54 The 2017 Do-Something traffic forecast includes the above development trips added to the background Do-Minimum flows. These are shown in **Figures 11.13** and **11.14** for the AM and PM peak hours

11.55 Similarly the 2032 Do –Something flows are presented in **Figures 11.15** and **11.16** for the respective peak periods.

11.56 The percentage change in traffic flow is a useful guide to assess the environmental implications of additional traffic. The percentage change at 2017 levels for the AM and PM peak hours is given in **Figures 11.17** and **11.18. Figures 11.19** and **11.20** give the same calculation for the 2032 levels.

11.57 It can be seen from **Figure 11.17** that the greatest change in vehicle flows occurs at 2017 levels at the southern end of Water Street adjacent to the proposed Trinity Islands scheme the increase in AM Peak hour flows is 42%. Along Liverpool Road the traffic flows increase by 39% also in the AM Peak. It is reasonable to assume that as well as development traffic, the changes in traffic on Liverpool Road reflect the change in priority with Water Street as well as the presence of development in line with the Water Street Strategic Regeneration Framework as well as traffic from St John's. These changes in traffic flow represent a perceptible increase in traffic flow for the local residents that live in Liverpool Road.

11.58 Further to the north Water Street sees a percentage increase of 24% with traffic heading to the proposed St. John's Central Basement Car Park from the Ring Road.

11.59 The closure of a small length of Quay Street results in a modest diversion of traffic onto a section of New Quay Street resulting in an increase of up to 16%. Further to the west on Quay Street the increase in traffic flows is greater at 23%/22% in the respective peak periods at the 2017 assessment year.

11.60 On Lower Byrom Street, there is little change in traffic flow in the AM peak. In the PM at 2017, the percentage increase in traffic flow is 15%.

11.61 The Inner Relief Road and Deansgate see only modest changes in traffic flow. There appears to be a modelling quirk which sends more traffic along Byrom Street/Hardman Street rather than keeping those flows on Deansgate.

Identification and Evaluation of Significant Effects

Construction Phase

11.62 The environmental implications of construction traffic are considered to relate to issues of Dust and Dirt and potentially Hazardous Loads. At this stage of the planning process, a forecast of construction traffic has not been undertaken. However, from experience on sites such as Spinningfields the construction traffic movements are usually a low level of regular movements over the course of the working day and the timing of deliveries can be controlled to avoid peak hours. Finally, construction activity typically begins prior to the morning rush hour and is complete before the evening peak period.

11.63 The environmental implications of Dust and Dirt could arise on the construction site from the movement of construction vehicles. The issue of hazardous loads arises from deliveries to a construction site but this is likely to be a rare occurrence.

11.64 It is considered that with an appropriate construction routeing plan, large construction traffic for the development will be directed to arrive/depart via the Inner Relief Road and Water Street from the south thereby avoiding residential properties. Therefore, the possible implications of construction traffic is considered to only affect vulnerable road users. The nature of the environmental impact during construction and the likely significance of the effects are considered in **Table 11.7** below.

Table 11.7 – Potential Impacts and Effects

Receptor	Impact	Potential Short Term Effects
Residential Properties		
Vulnerable Road Users	Dust & Dirt Hazardous Loads	Reduced Amenity Increased intimidation Increased risk of accidents

11.65 Both of these effects would be short term issues during the construction phase. Without mitigation the effects of Dust & Dirt and Hazardous Loads during construction is described in **Table 11.8.**

Table 11.8 – Effect During Construction

Receptor	Dust & Dirt	Hazardous Loads
Vulnerable Road Users	**Moderate -Minor Adverse**	**Minor Adverse**

Operational Phase

11.66 In reference to the IEA Guidelines the environmental impacts of issues such as severance/pedestrian amenity, safety or driver delay are only perceptible when the change in traffic is greater than 30% or 10% in sensitive locations. As described in **Figures 11.17** and **11.18** the areas of a perceptible impact can be identified. These include parts of Liverpool Road and Lower Byrom Street in the PM peak hour. On other areas of highway, the sensitive residential locations do not see a significant increase that would cause a perceptible impact.

11.67 At 2032, residents on Lower Byrom Street would experience an increase in two way traffic flows of 122 vehicles or two vehicles per minute in the busiest peak hour. On Liverpool Road the greatest change is 223 vehicles or around 4 vehicles per minute in the busiest peak hour. At other times the increase in traffic flow is less.

11.68 The servicing strategy for the Proposed Development directs vehicles to use the Inner Relief Road and Water Street, keeping servicing vehicles away from existing residential areas.

11.69 A further consideration for Liverpool Road is the presence of coach drop-off activity. There are 6 existing coach parking and pick-up bays within the area which will be used for events drop-off and pick-up. With a large event a further 5 coaches are expected. There is a section of Liverpool Road with single yellow lines, which it is proposed that coaches will use for drop-off and pick up. This section has a time limit of 20 minutes. Long stay coach parking is off site and Manchester has a number of facilities available (outlined in further detail in the Transport Assessment at Appendix 11.1).

11.70 The closure of Quay Street results in only modest diversion of traffic at the wester section of that route.

11.71 On Water Street, adjacent to the proposed Trinity Islands scheme, increase in traffic flow is at 24%. The northern section of Water Street sees a 19% increase in traffic. Elsewhere there is a 19% increase in traffic on Hampson Street, an 8% increase in traffic on Whitworth Street and a 10% increase on Great Bridgewater Street.

11.72 On other links including the Inner Relief Road the changes in traffic flow are much lower reflecting the greater Baseline traffic flows there.

11.73 As well as the peak hour flows there is forecast to be peaks of traffic activity associated with events at Factory. The post event traffic activity is the busiest. As there is no parking for visitors, the traffic activity relates to taxi and coach pick-ups and a movement of pedestrians to other transport interchanges or nearby homes. This activity has been quantified and established in the Transport Assessment.

11.74 Up to 11 coaches are forecast after a large event to pick up 582 persons. These would pick-up in the 6 existing coach parking areas near to Factory on Water Street, Liverpool and Lower Byrom Street. A further 6 coaches can park for 20 minutes on Liverpool Road.

11.75 163 taxi pickups are forecast over about a 20 minute period after an event. These are split between private hire and black cabs. Black cabs would be permitted to pick-up close to the Site in a 6 bay rank to the south. Taxis would also use the two loading bays located on Water Street. There are also four taxi ranks within a short 10 minute walk of the Site. Pre-booked private hire pick-ups can collect from any safe location within a 5-10 minute walk. In general there are more private hire taxis in Manchester; however, in this location and with expected the visitor profile it is expected that black cab activity would be equivalent to private hire. Over about a 20 minute period after an event it is forecast around 80 taxis will use the ranks on Water Street. A further 80 private hire pickups will take place on roads within a 10 minute walk of the Site. These will be directed to take place in locations away from existing residential areas, as described in further detail in the Event Management Strategy.

11.76 The nature of the environmental impacts and the likely effects on residents, pedestrian and cyclist road users as a result of the Proposed Development are considered in **Table 11.9**.

Table 11.9 – Potential Impacts and Effects

Receptor	Impact	Potential Effect Long Term Effects
Residents of Liverpool Road **Lower Byrom Street** **& Left Bank Apartments** **Facing onto New Quay Street**	Severance Driver Delay Pedestrian Amenity Highway Safety	Reduced opportunities to cross and increased delay crossing the highway, Increased intimidation Increased risk of accidents
Pedestrians	Pedestrian Amenity Highway Safety Severance	Reduced opportunities to cross and increased delay crossing the highway, Increased intimidation Increased risk of accidents
Cyclists	Highway Safety	Increased risk to cycle users Increased Intimidation

11.77 The magnitude of the effect of additional traffic movement on these receptors has been considered and this is presented next in **Table 11.10**.

Table 11.10 – Magnitude of Impact

Receptor	Magnitude of Impact
Residents of Liverpool Road, Lower Byrom Street and Left Bank Apartments Facing New Quay Street	**Moderate** Loss or alteration to one or more key elements/features of the baseline conditions such that post demolition character/composition/attributes of the baseline will be materially changed.
Pedestrians	**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-demolition circumstances/situation.
Cyclists	**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-demolition circumstances/situation.

11.78 In considering the Impact Significance Matrix in **Table 11.4**, the receptors are forecast to experience the following impact prior to mitigation as given in **Table 11.11**.

Table 11.11 – Effect Significance

Receptor	Impact Significance
Residents of Liverpool Road, Lower Byrom Street and Left Bank Apartments Facing New Quay Street	**Moderate – Minor Adverse**
Pedestrians	**Minor Adverse**
Cyclists	**Minor Adverse**

Mitigation

Construction Phase

11.79 To mitigate the potential effects of construction traffic on sensitive receptors a Construction Management Plan (CMP) would be employed and its key measures would be applied as a planning condition to the permission. This CMP will set out the delivery route for construction vehicles which will be a direct route from the Inner Relief Road to the Site accessed directly off Water Street to avoid the sensitive residential locations.

11.80 In addition, a condition to the planning permission will ensure that wheel washing, road sweeping and dust suppression measures are employed at the Site during construction in order to mitigate the transmission of dust and dirt from vehicle movements.

11.81 Finally, if there is a need to transport hazardous loads then the contractor will employ the appropriate health and safety measures and risk assessments to ensure that harm to the environment and vulnerable road users would be minimised. Such measures could include a strategy to limit traffic speeds for construction vehicles, and banksmen to monitor manoeuvring vehicles.

Operational Phase

11.82 The mitigation that would be employed to reduce the environmental effects of the Proposed Development on the local receptors is summarised below.

11.83 Liverpool Road traffic benefits from the removal of the traffic lights with Water Street, which gives priority to the Liverpool Road traffic and means that the regular queue of stationary vehicles at that junction is removed. Any queueing would tend to occur on Water Street further from the residential properties of Liverpool Road.

11.84 In considering the implications of coach pick-up activity, coach drivers would be instructed to follow Manchester's code of conduct. This will ensure engines are switched off and in addition during pick up passengers would be instructed to wait on the coach.

11.85 No parking is provided for the Proposed Development aside from 5 disabled parking bays located in the public realm adjacent to Water Street. The majority of employees and visitors will be able to park in existing facilities (as described in the Transport Assessment at Appendix 11.1) or travel by non-car modes. Variable Message Signing will direct drivers to the main car parks in the area indicating where capacity is available.

11.86 Pedestrians in and around the Proposed Development will benefit from a quality public realm with Factory Square to the West and Festival Square to the north.

11.87 To ensure that there is no general rat-running or traffic from St John's looking to exit onto Lower Byrom Street two measures are proposed. Grape Street just west of Lower Byrom Street will be one way westbound. There automatic bollards will be located on Grape Street to control traffic access to those vehicles that need to use that route. This access control will generally be managed automatically by number plate recognition. An intercom system will also be installed.

11.88 Lowered kerbs will be provided adjacent to the Proposed Development at Water Street to assist pedestrian crossing. For larger events, marshals will be used to direct pedestrians. To minimise any adverse impact on local residents from events finishing later in the evening there are gates within South Village that will be closed and marshals will be employed to direct visitors north along Studio Way and onto Quay Street and also via Water Street. The dispersal procedures are more fully described in the Event Management Strategy submitted in support of the application.

11.89 As has been described already, the Site benefits from excellent locational characteristics which mean that residents visitors and employees can access the amenities, leisure and employment opportunities of Manchester City Centre and local facilities without using a car, thereby reducing the demand for travel in the first place. St John's will offer a range of facilities and opportunities for work and leisure on site which mean that people do not need to leave the area in order to conduct many of their daily activities.

11.90 An improved pedestrian and cycle route (the National Cycle Route 6) across the River Irwell is being delivered as part of Network Rail's Ordsall Chord scheme. The whole of the St John's area is designed to be cycle friendly with low traffic speeds. Cyclists will benefit from extensive and excellent cycle parking within St Johns. The Proposed

Development will offer 20 cycle spaces for staff and 40 spaces for visitors within the public realm. In addition as part of the neighbouring development at Central Village to the north a Cycle Hub will offer 200 cycle parking spaces and facilities including cycle hire.

11.91 Water Street will be traffic calmed so that traffic speeds are kept low with a design speed of 20mph. This starts at the junction with Liverpool Road so that the priority is changed and Water Street traffic gives way to traffic on Liverpool Road. Water Street is narrowed with raised crossing tables and quality differential road surfacing at the pedestrian desire lines across Water Street. This traffic calmed environment continues throughout St John's so that pedestrians have many alternative routes through the area.

11.92 The Site is located just over 500m from Salford Central Rail Station. It is also within 800m of Deansgate/Castlefield Rail and Metrolink Stations. The three Metroshuttle services pass in close proximity to St John's. To improve the bus service connectivity, Grape Street will be designed to accommodate bus services. If there is potential for new or diverted bus services in the future to serve the site then this is facilitated by the Grape Street link. Services would be made on a commercial basis given the level of additional patronage expected not only for the Proposed Development and St John's but also the wider development of the surrounding area.

11.93 On New Quay Street, the traffic signal junctions at Water Street and Gartside Street will be upgraded to give a quality pedestrian crossing environment while maintaining capacity. This forms part of the St. John's Place proposals. Quality wayfinding will be available throughout the area. It is considered that the new pedestrian infrastructure will result in an improved pedestrian environment that will enhance road safety above existing conditions, reduce severance and improve pedestrian amenity.

11.94 St John's will also benefit from 6 new City Car Club spaces as part of the wider Masterplan development.

11.95 The Proposed Development will benefit from a Travel Plan that will utilise these physical measures to influence and encourage sustainable travel behaviour. An Event Management Strategy has also been produced, which will help to manage and direct the movement of visitors in the most efficient manner and to the most appropriate transport mode.

Residual Effects Construction Phase

11.96 Considering the mitigation measures that would be employed during construction such as the implementation of a CMP dictating the route of vehicles, the application of wheel washing, street cleaning and dust suppression measures and the application of a Risk Assessment for the movement of hazardous loads then it is considered that the environmental implications of construction traffic on vulnerable road users would be reduced.

11.97 Following mitigation, the remaining impact on receptors has been estimated and this is tabulated as indicated in **Table 11.12**.

Table 11.12 – Residual Impact – Construction Phase

Receptor	Pre-Mitigation Significance	Post-Mitigation Significance
Vulnerable Road Users (Pedestrians and Cyclists)	**Minor Adverse**	**Minor – Negligible**

Residual Effects Operational Phase

11.98 Considering the large package of sustainable transport measures, the enhancement of pedestrian and cycling facilities and the existing good public transport provision, it is considered that the implications of additional traffic on residents of Liverpool Road and Lower Byrom Street would be reduced.

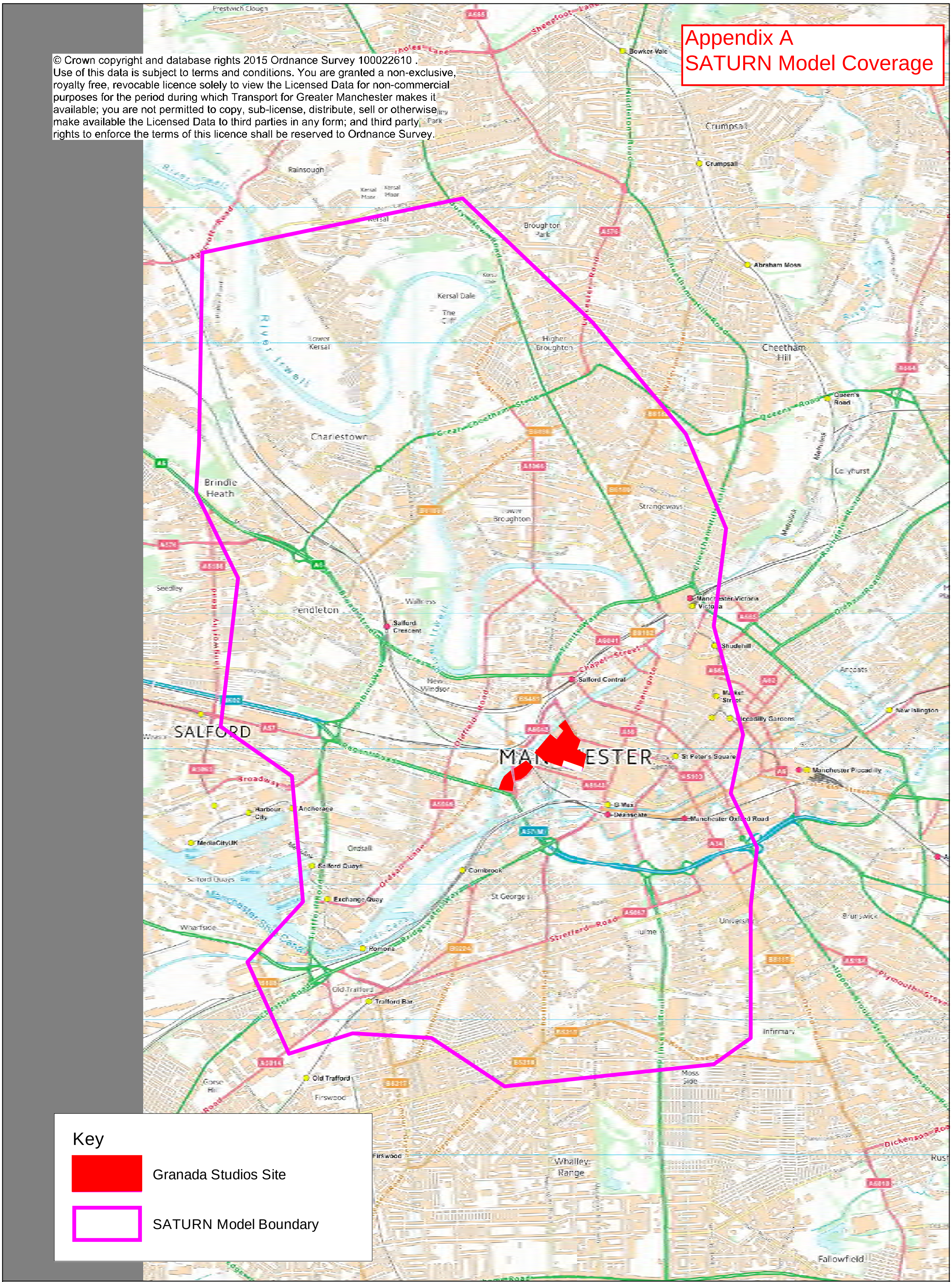
11.99 Pedestrians and cyclists should see a marked improvement in facilities for both these sets of road users with better connectivity and much improved cycle parking facilities.

11.100 Following mitigation, the remaining impact on receptors has been estimated and this is tabulated as indicated in **Table 11.13**.

Table 11.13 – Residual Impact – Operational Phase

Receptor	Pre-Mitigation Significance	Post-Mitigation Significance
Residents of Liverpool Road, Lower Byrom Street and Left Bank Apartments Facing New Quay Street	**Moderate – Minor Adverse**	**Minor Adverse**
Pedestrians	**Minor Adverse**	**Minor – Negligible**
Cyclists	**Minor Adverse**	**Minor – Negligible**

Appendix A
SATURN Model Coverage



St John's Masterplan - SATURN Model Coverage

Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	Drawn By : SN	Date : May 2015
	Scale : NTS	Report : 123 Figure : 1

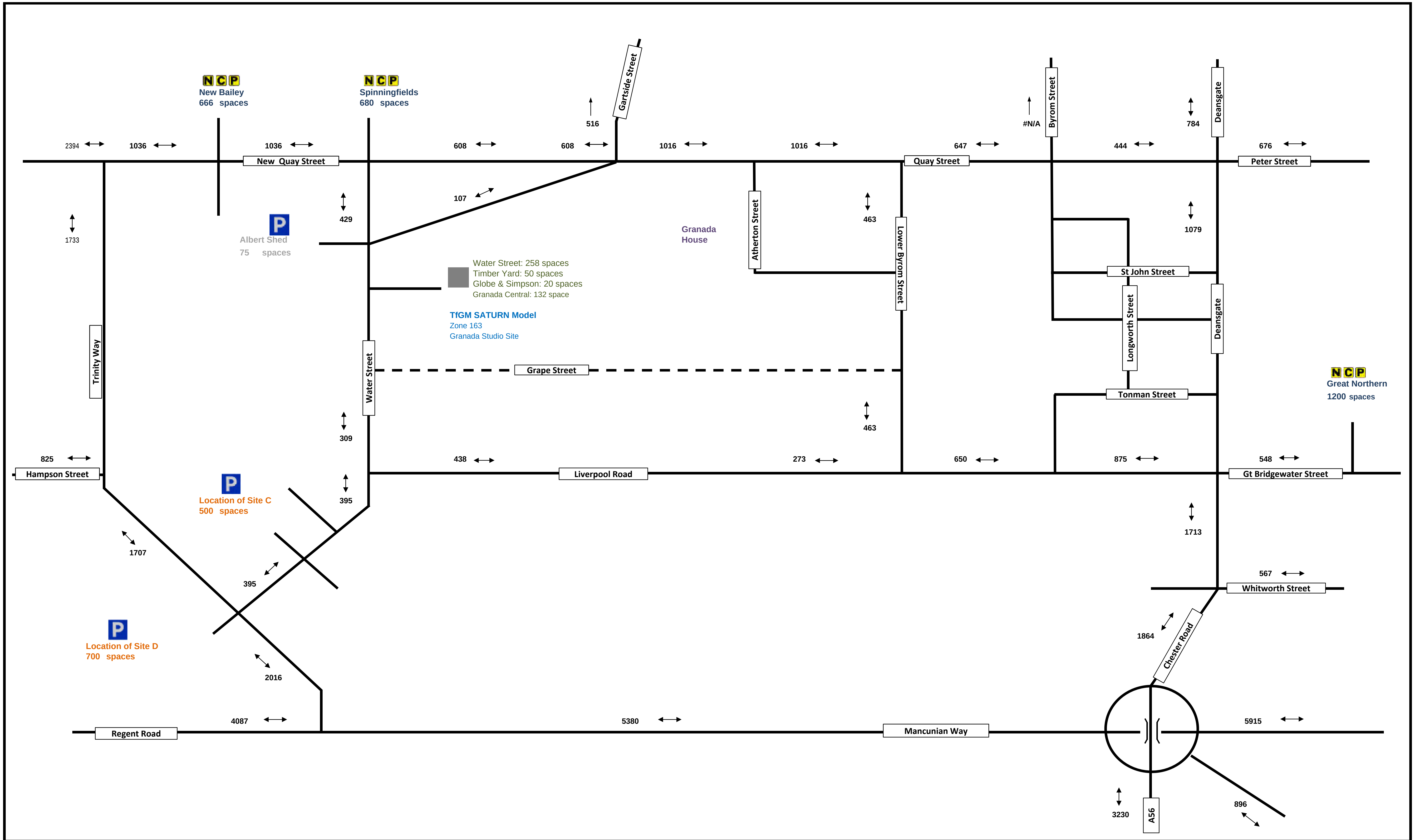


Figure 11.2

St Johns Masterplan
2014 Base Case
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

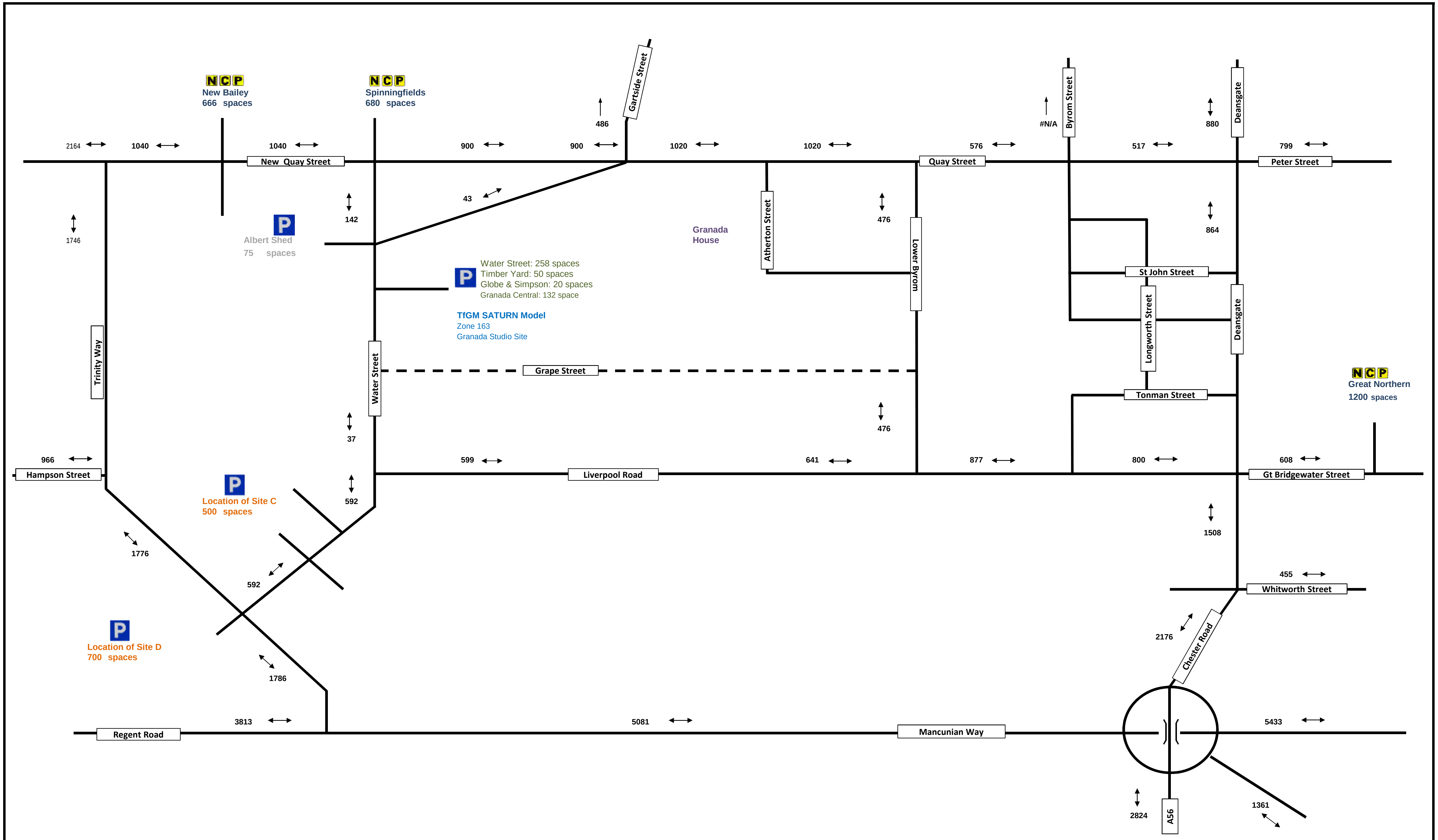


Figure 11.3

St Johns Masterplan
2014 Base Case
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

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transport planning specialists

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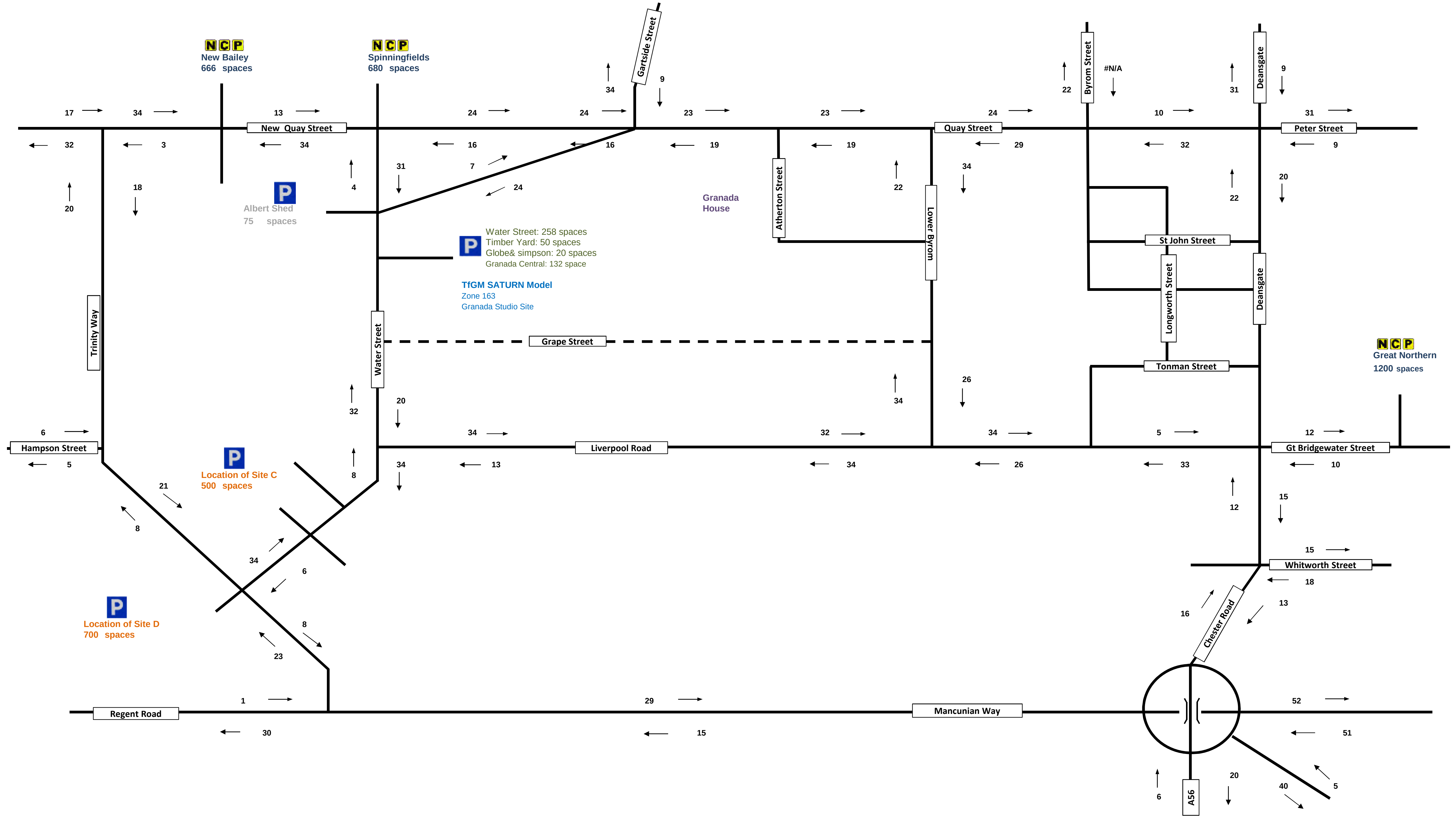

Figure 11.4

St Johns Masterplan
2014 Base Case
AM Peak (08:00 - 09:00)

SATURN Model Traffic Speeds
(kph)

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M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

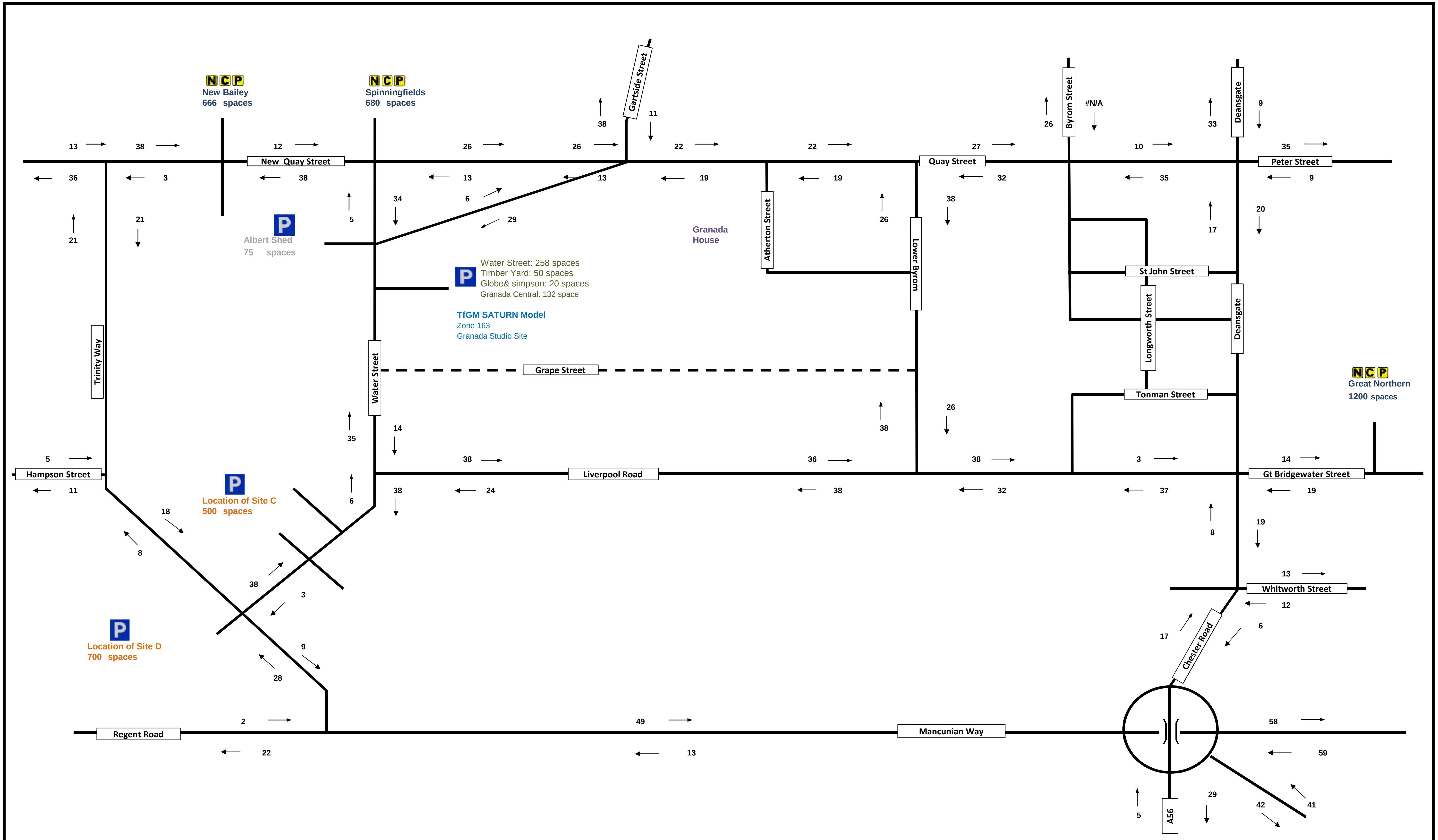

Figure 11.5

St Johns Masterplan
2014 Base Case
PM Peak (17:00 - 18:00)

SATURN Model Traffic Speeds
(kph)

vectos
transport planning specialists
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Tel: 0161 228 1008 www.vectos.co.uk

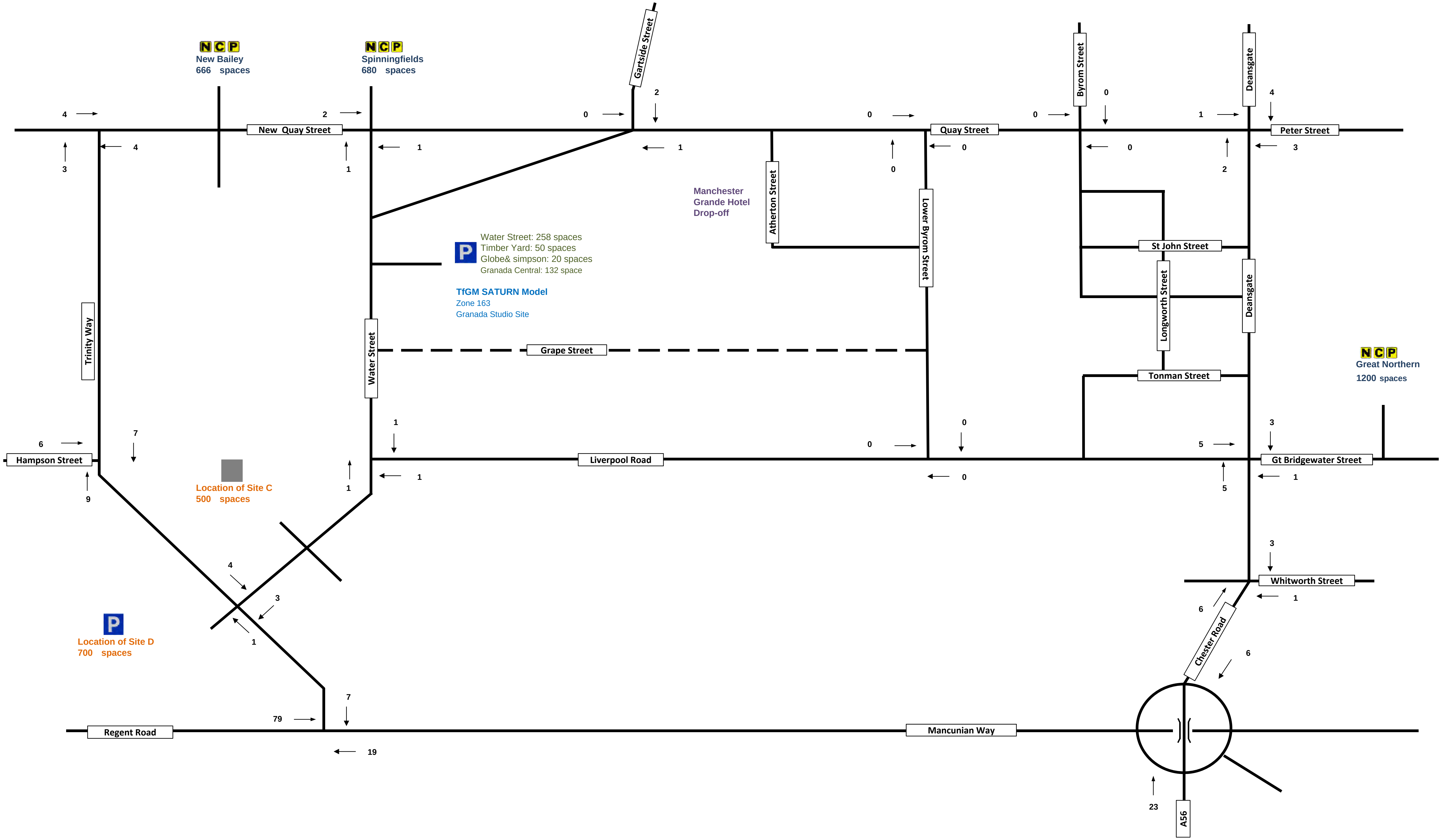


Figure 11.6

St Johns Masterplan
2014 Base Case
AM Peak (08:00 - 09:00)

SATURN Model Traffic Queues
(Average Queue During Peak Hour)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

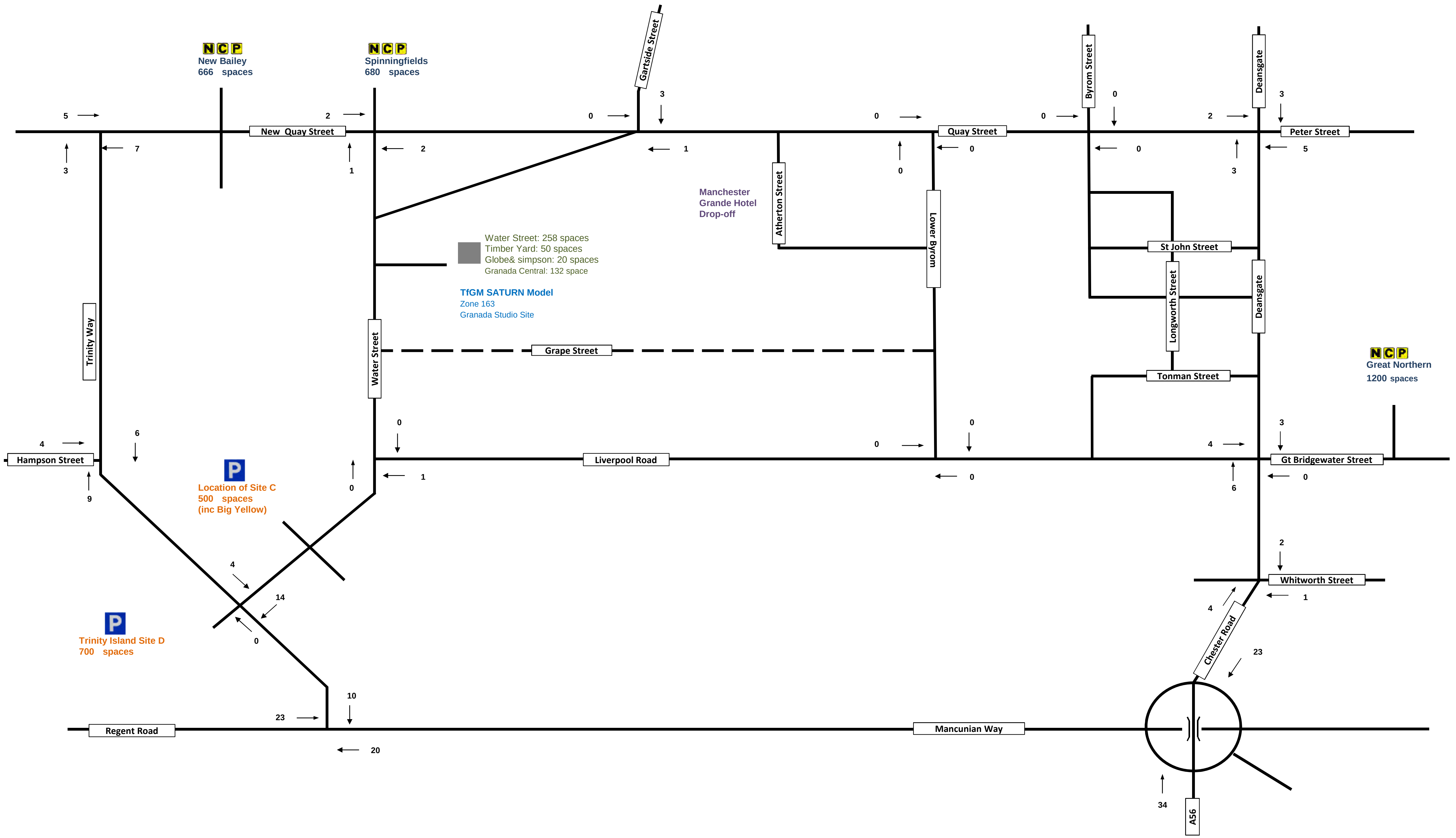
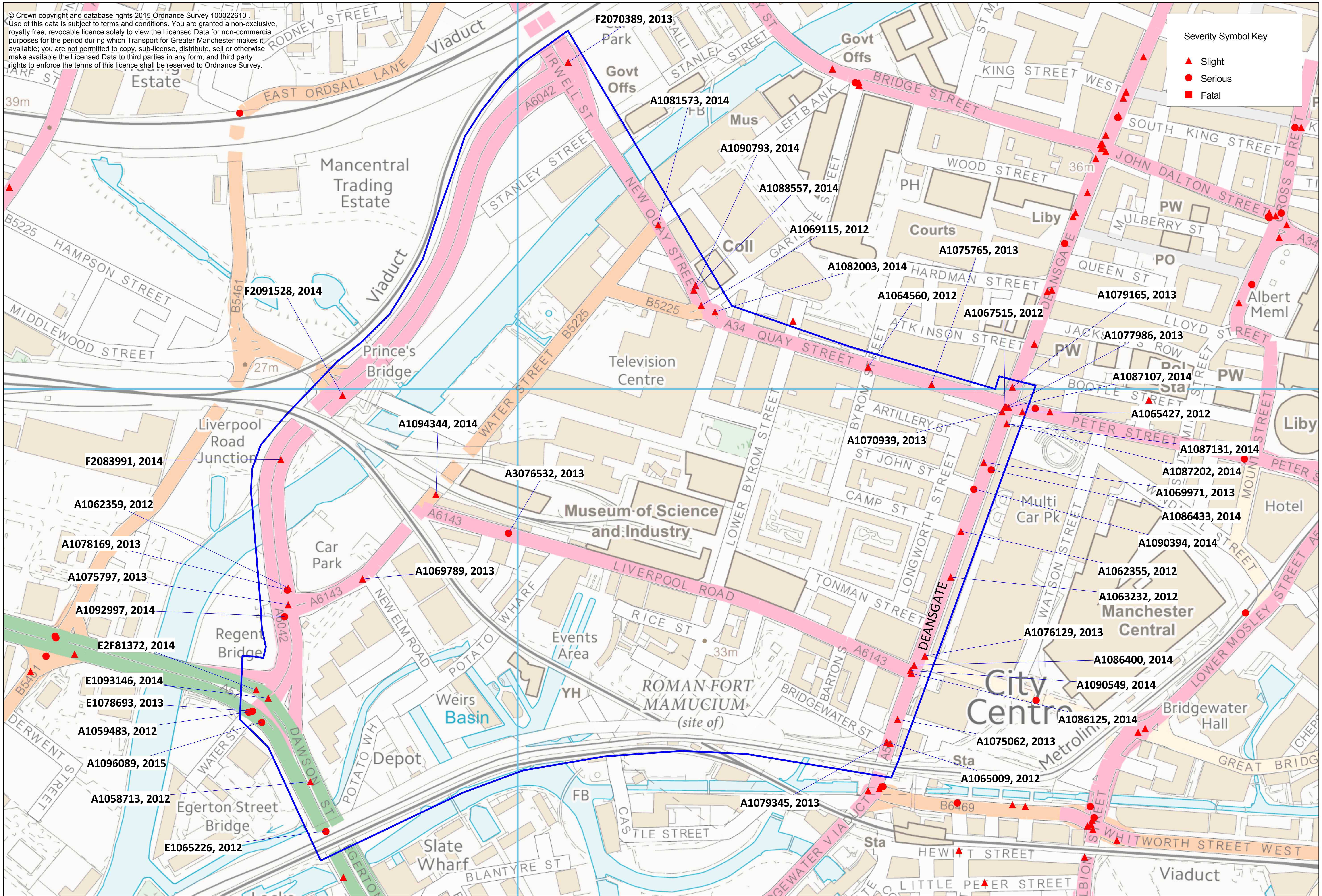


Figure 11.7

St Johns Masterplan
2014 Base Case
PM Peak (17:00 - 18:00)

SATURN Model Traffic Queues
(Average Queue During Peak Hour)

vectos transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk



Transport for Greater Manchester
2 Piccadilly Place,
Manchester,
M1 3BG

Reported Road Injury Accidents in the Specified Area of Water Street, Deansgate, Quay Street and Inner Relief Road, Manchester City Centre. 01/02/2012 - 31/01/2015

Drawn By : R Beesley	Note: A road accident which occurs at or within 20m of a junction, is coded as a junction accident	Date : 11/03/2015	**Figure 11.8**

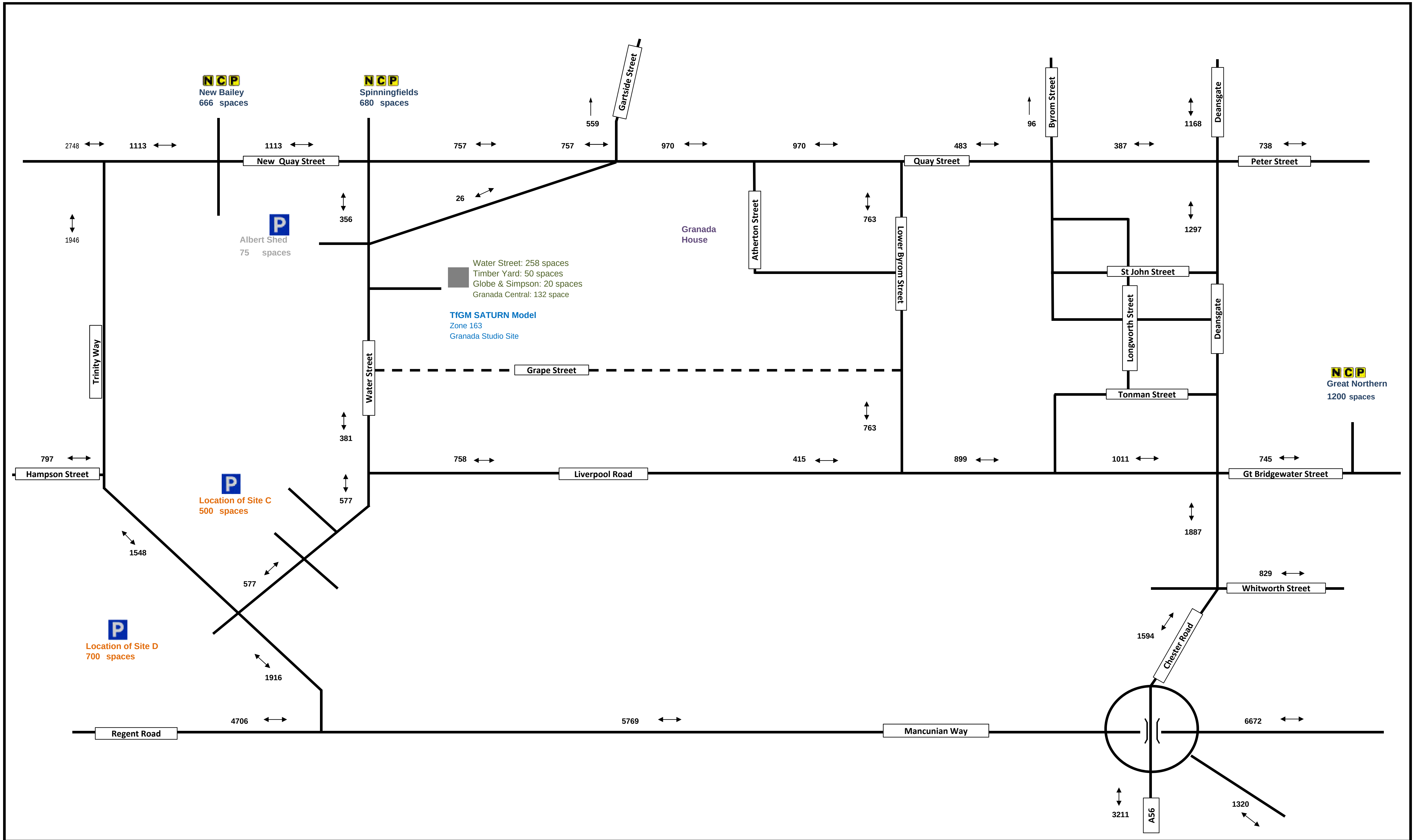


Figure 11.9

St Johns Masterplan
2017 Do Minimum Scenario
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

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M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

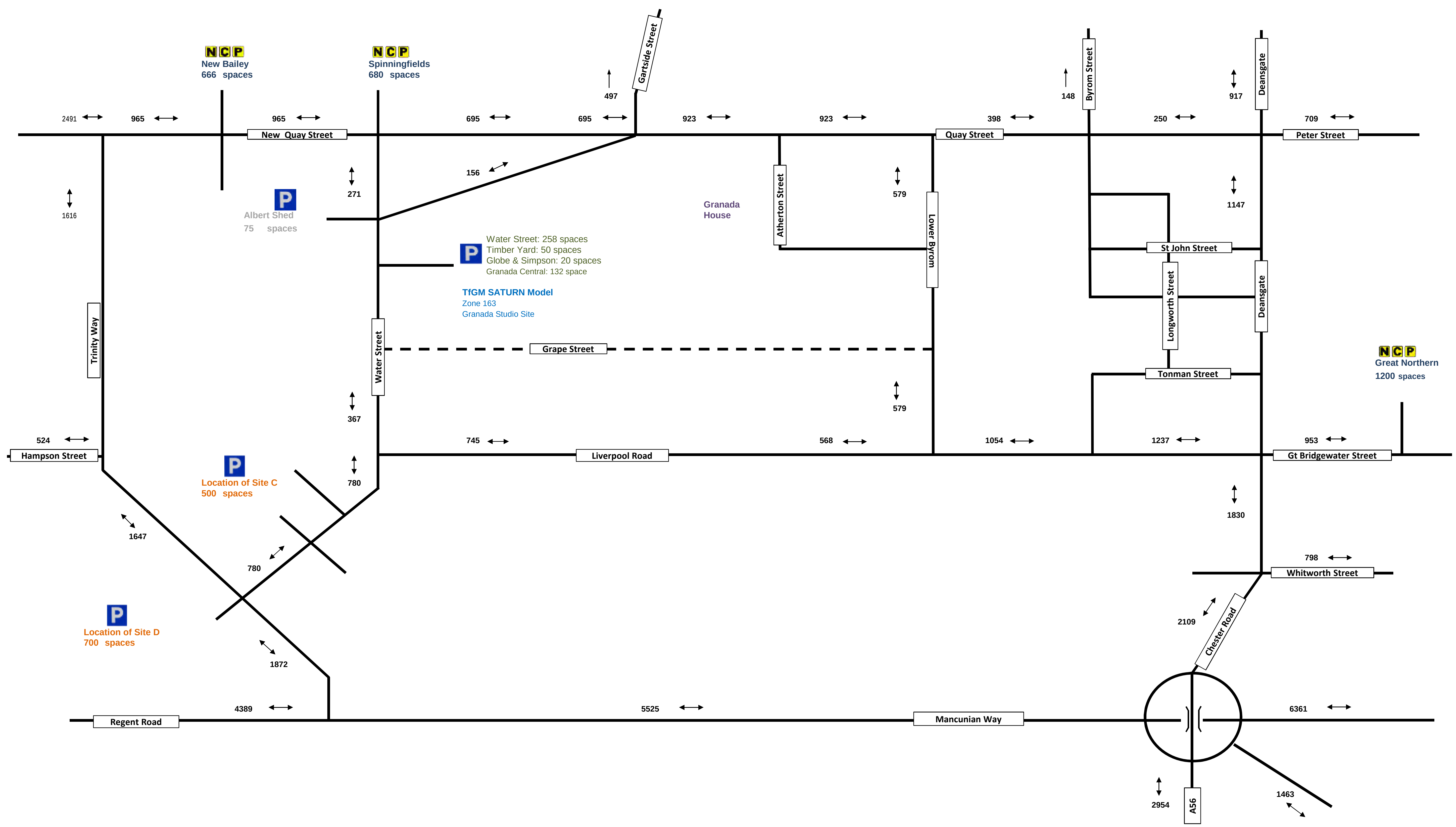

Figure 11.10

St Johns Masterplan
2017 Do Minimum Scenario
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos transport planning specialists
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M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

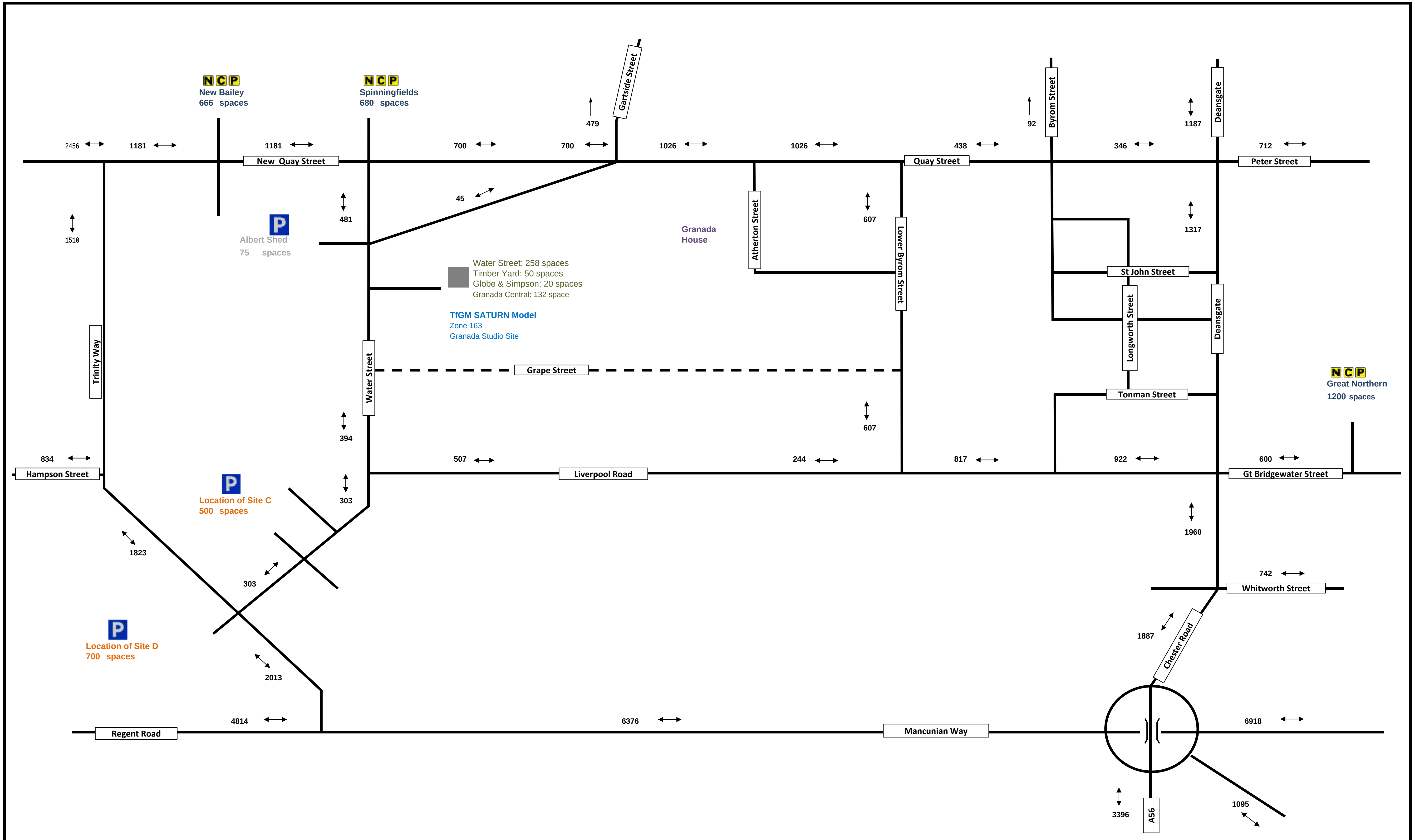

Figure 11.11

St Johns Masterplan
2032 Do Minimum Scenario
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows (Two Way) (PCUs)

vectos transport planning specialists
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M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

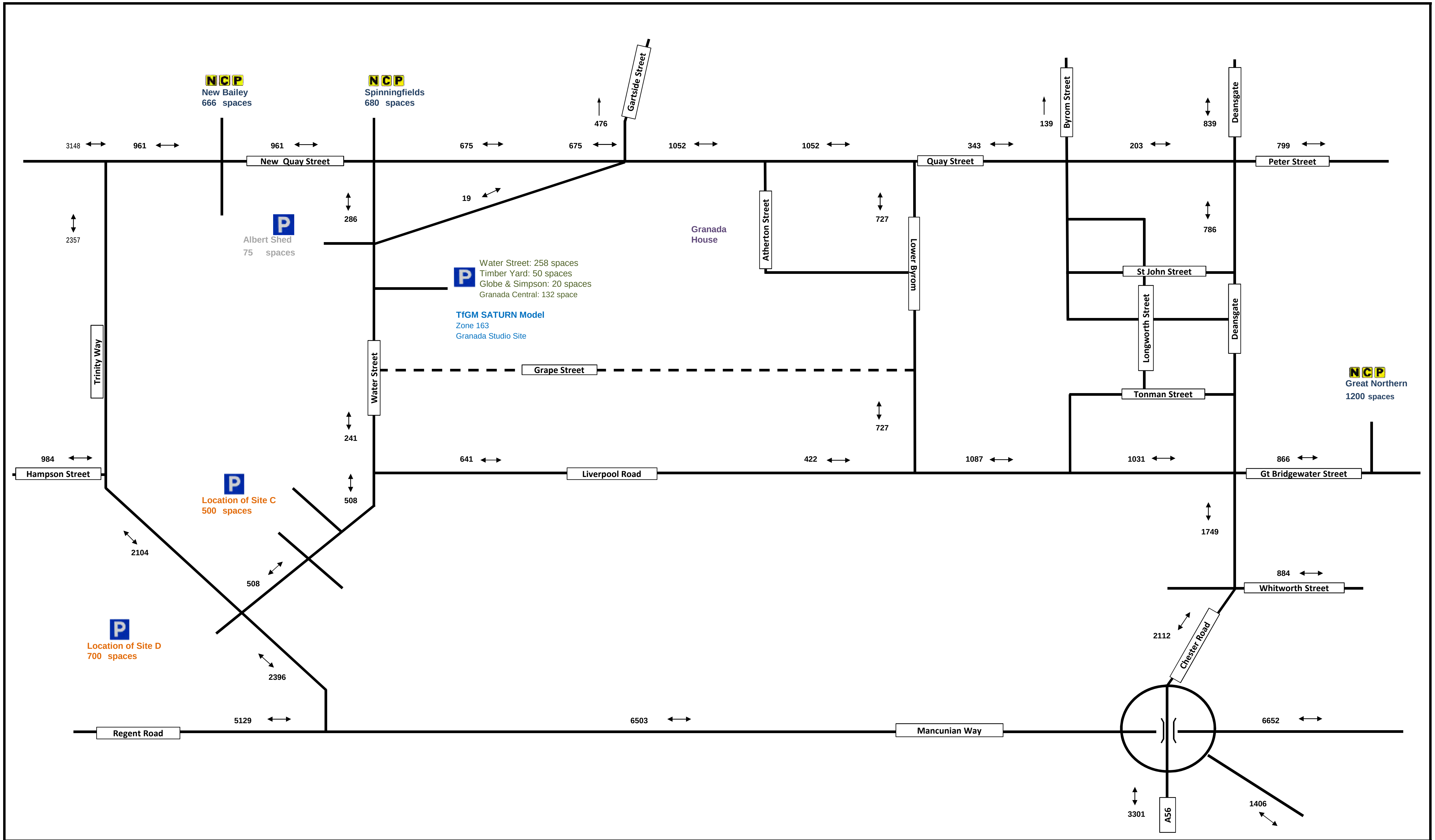

Figure 11.12

St Johns Masterplan
2032 Do Minimum Scenario
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

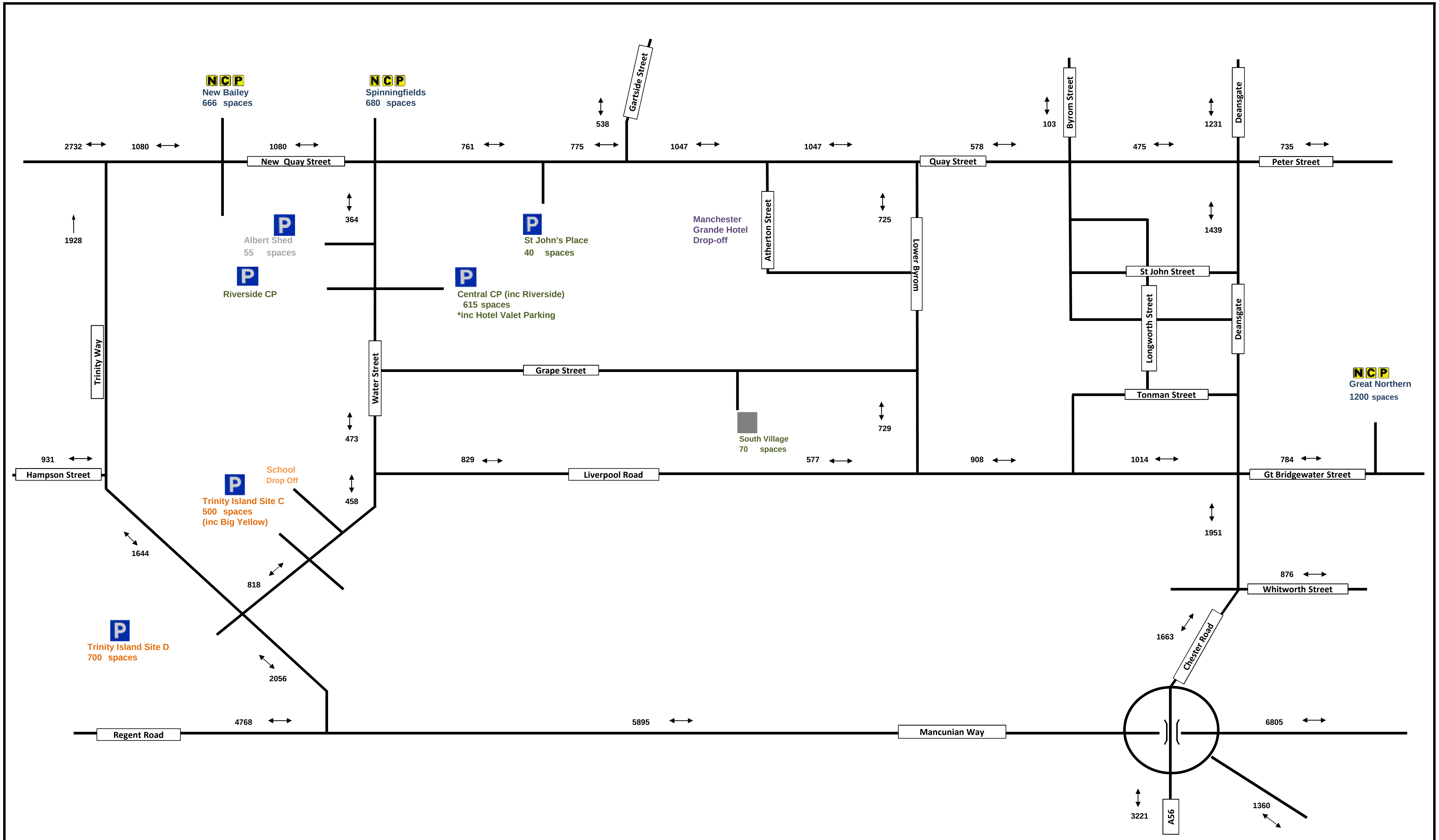

Figure 11.13

St Johns Masterplan
2017 Development Scenario
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

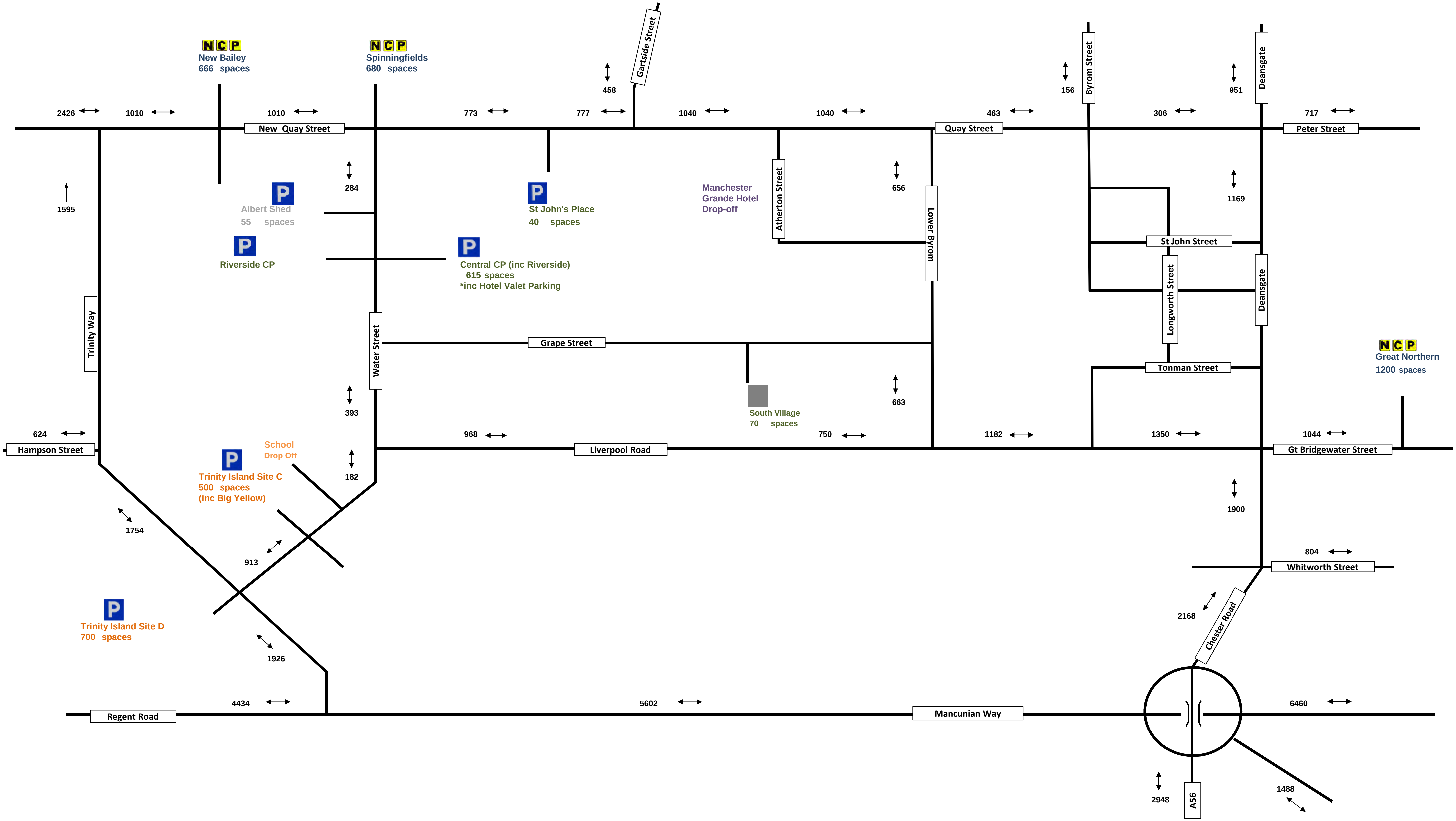

Figure 11.14

St Johns Masterplan
2017 Development Scenario
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

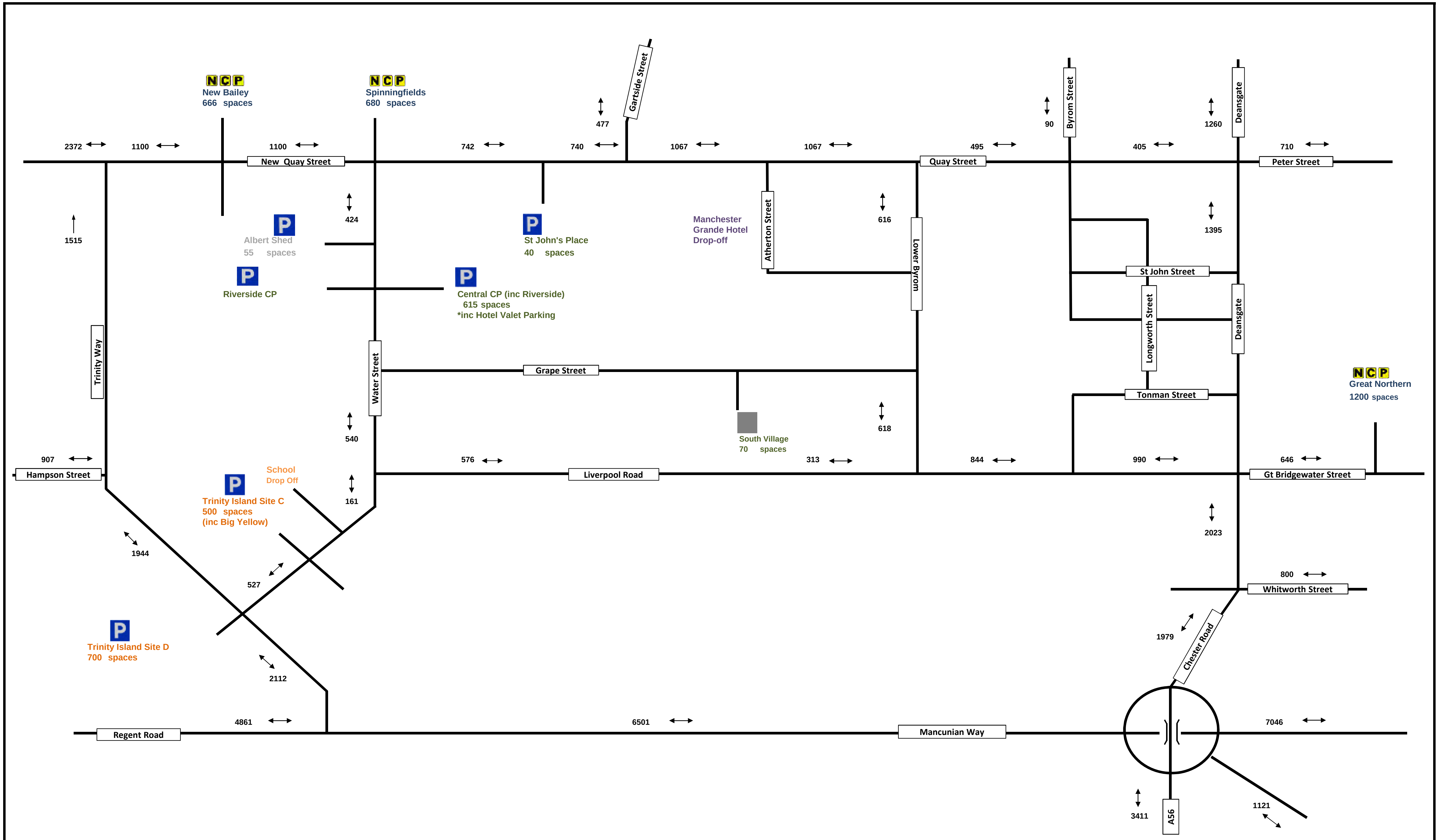

Figure 11.15

St Johns Masterplan
2032 Development Scenario
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

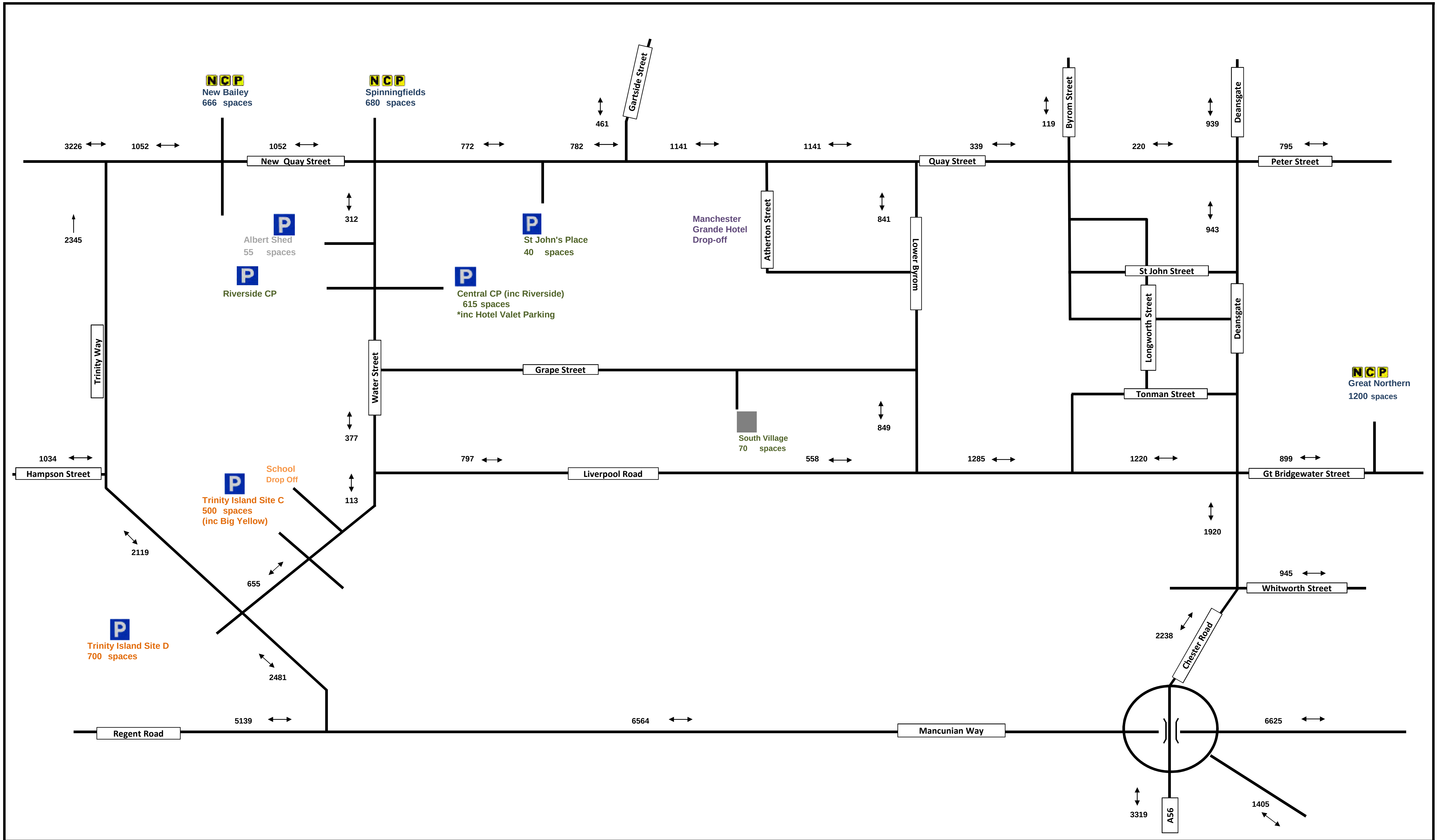

Figure 11.16

St Johns Masterplan
2032 Development Scenario
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

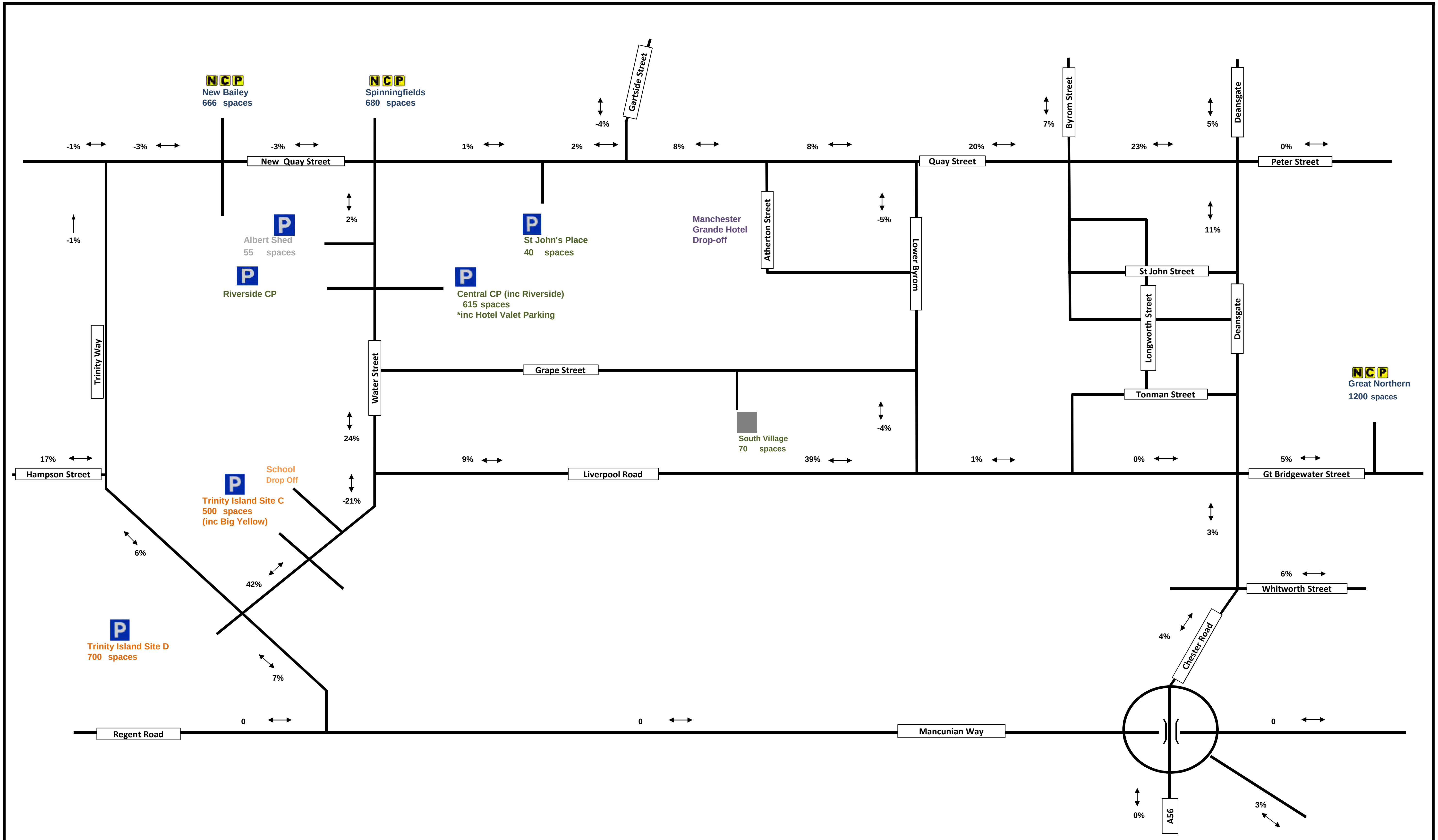

Figure 11.17

St Johns Masterplan
2017 Percentage Change
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

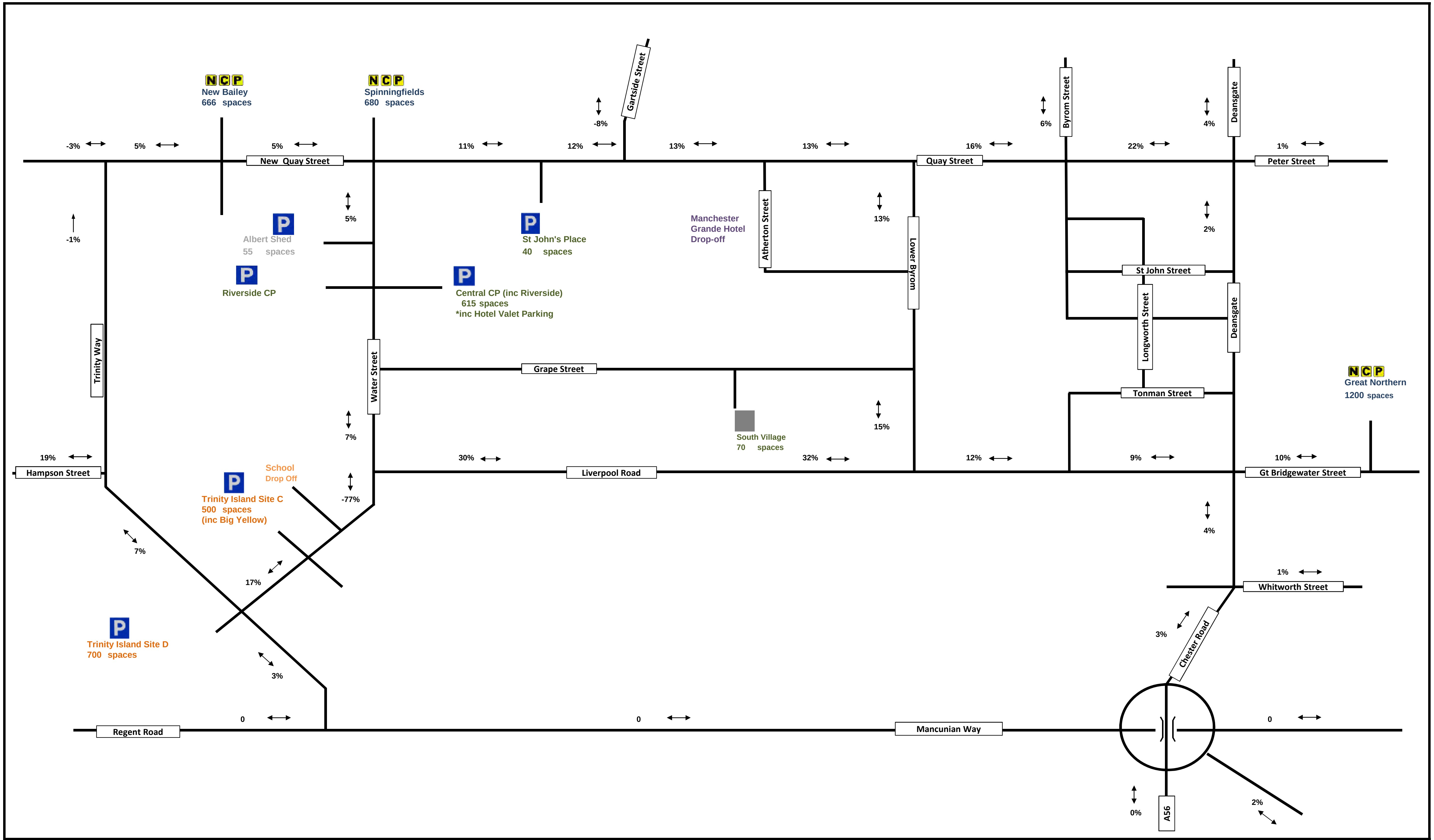

Figure 11.18

St Johns Masterplan
2017 Percentage Change
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

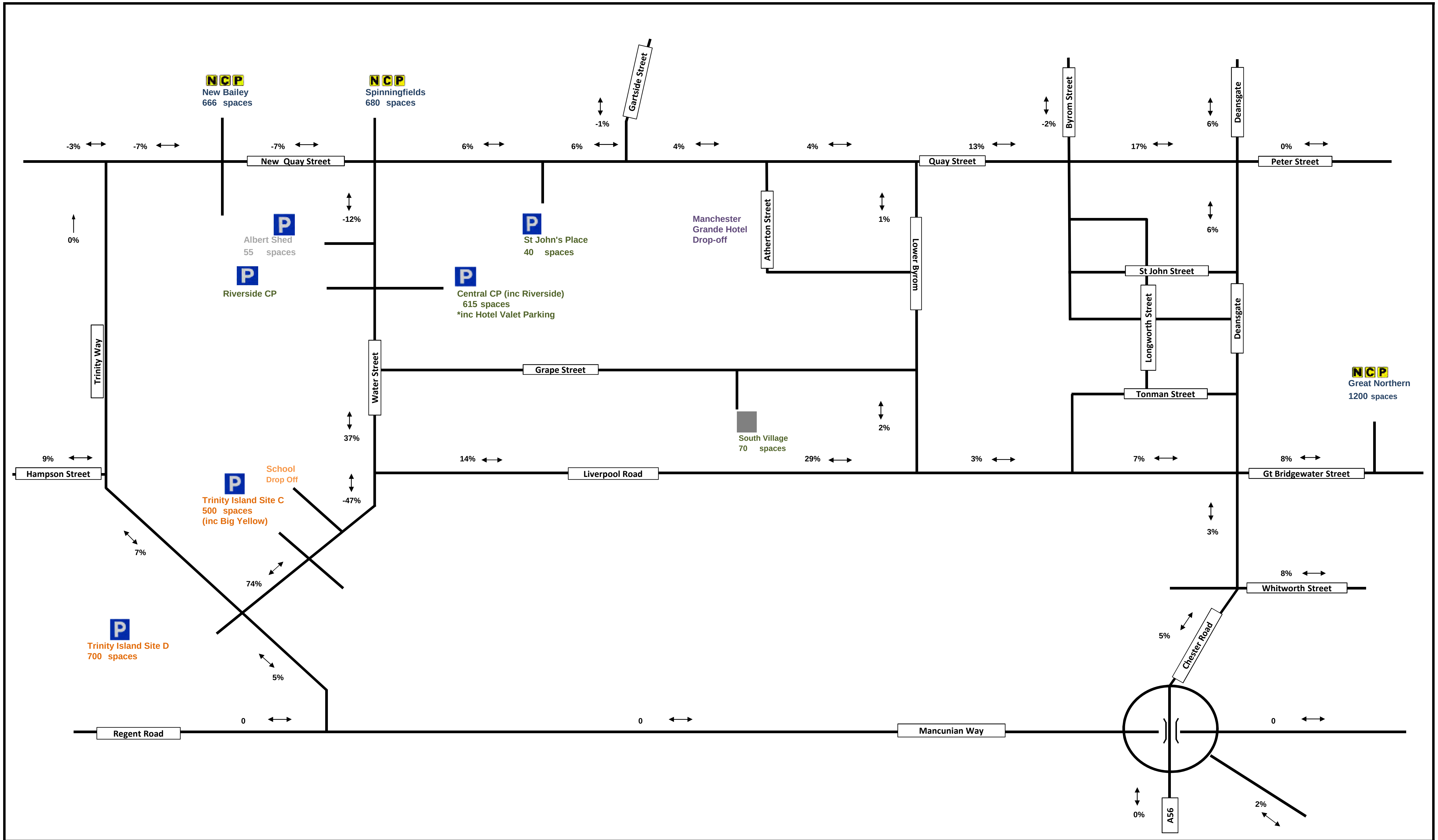

Figure 11.19

St Johns Masterplan
2032 Percentage Change
AM Peak (08:00 - 09:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos
transport planning specialists
3rd Floor Oxford Place, 61 Oxford Street, Manchester
M1 6EQ
Tel: 0161 228 1008 www.vectos.co.uk

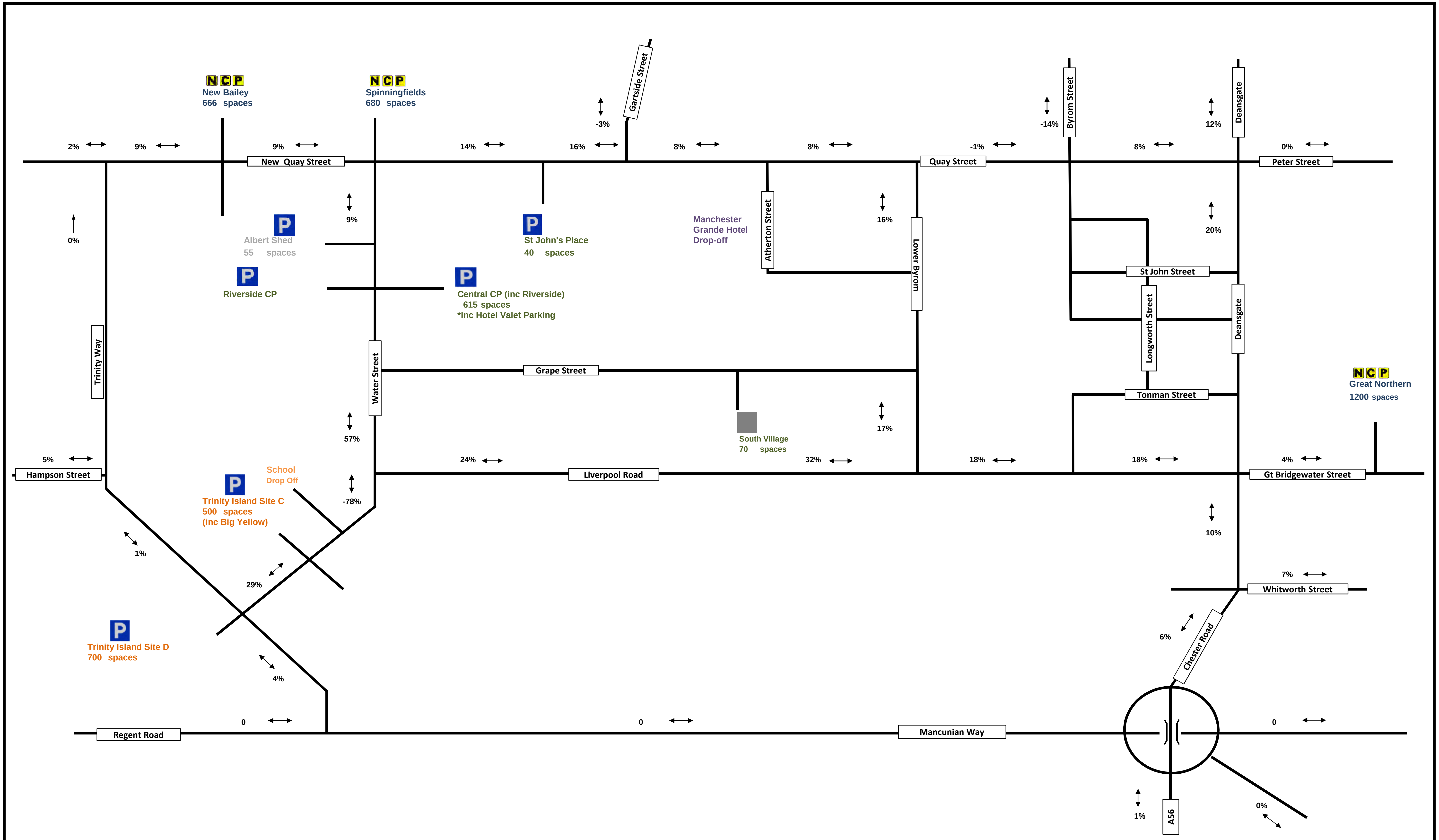

Figure 11.20

St Johns Masterplan
2032 Percentage Change
PM Peak (17:00 - 18:00)

SATURN Model Traffic Flows (Two Way)
(PCUs)

vectos transport planning specialists
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M1 6EQ
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12 Ground Conditions

Introduction

12.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to Ground Conditions. 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.

12.2 This Chapter has been prepared by Buro Happold.

Policy Context

National Planning Policy

12.3 Land contamination is regulated under several regimes, including environmental protection, pollution prevention and control, waste management, planning and development control and health and safety legislation. The primary regulatory regimes under which contaminated land are managed in the UK are: the planning process described in the National Planning Policy Framework[1]DCLG, 2012) and Part 2A of the Environmental Protection Act[2] [34](DEFRA, 1990).

12.4 The framework for the assessment of potential land contamination adopted in this assessment will be based on current guidance documents regarding the implementation of these regimes and the assessment of potentially contaminated land, with particular reference to: the Environment Agency Model Procedures[5](Environment Agency, 2004) and their Guiding Principles on Land Contamination; and the relevant British Standard 10175[6](British Standards Institute, 2011).

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[1] Department for Communities and Local Government (DCLG) (2012); National Planning Policy Framework (NPPF).

[2] Part IIA of the Environmental Protection Act 1990

[3] Department of the Environment Transport and the Regions (2000). “Contaminated Land-Implementation of Part IIA of the Environmental Protection Act 1990”. DETR Circular 02/2000, HMSO

[4] Department of Environment Food and Rural Affairs (DEFRA) Circular 01/2006 EPA 1990 Part 2A. 2006

[5] Environment Agency/ DEFRA Model Procedures for the management of land contamination (CLR 11). 2004

[6] British Standards Institute (BSI) BS 10175:2011+A1:2013.

Local Planning Policy

12.5 Reference will also be made to regional and local planning policy, namely:

- Manchester City Council: Contaminated Land Strategy[7].
- Manchester City Council: Planning Guidance in Relation to Ground Contamination[8].
- Manchester City Council: Core Strategy Policy EN 18 Contaminated Land and Ground Stability[9].

Assessment Methodology and Significance Criteria

12.6 This assessment includes the following:

- Details of existing information and any previous site investigations to assess geoenvironmental baseline conditions with respect to soil and ground conditions, hydrogeology and hydrology;
- Identification of potential sources of contamination from historical land uses on the Site or within the immediate vicinity;
- Development of a Conceptual Site Model and preliminary risk assessment to assess impacts of the development during construction and operation on identified receptors. (Impacts of development on surface waters are included in Chapter 13 Water Resources, Drainage and Flood Risk);
- Determination of the need for and scope of any additional site investigation required following the results of the preliminary risk assessment;
- Mitigation measures to account for any identified significant impacts.

Spatial Scope

12.7 An assessment of ground conditions has been made for the Site. It takes into account:

- Any impact on receptors at the Site and within the immediate vicinity from potential sources of contamination within this boundary during construction and operation phases;
- Any impact on receptors at the Site from potential sources of contamination outside the boundary during construction and operation phases.

Temporal Scope

12.8 This assessment summarises historical information available from Ordnance Survey (OS) maps. Potential contamination arising from significant historical activities at the Site or in the surrounding area

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[7] Manchester City Council: Contaminated Land Strategy (Updated March 2011).

[8] Manchester City Council: Planning Guidance in Relation to Ground Contamination: Guidance Note for Applicants, Developers, Land Owners and Consultants - Version 5.00, October 2013.

[9] Manchester City Council: Manchester's Local Development Framework - Core Strategy Development Plan Document - Policy EN 18 Contaminated Land and Ground Stability, Adopted 11th July 2012

will be detailed. Potential impacts from these potential contamination sources will be assessed with respect to the construction phase and site.

12.9 The ground conditions assessment will establish baseline conditions in 2016. Enabling works may be undertaken prior to the main construction works, dependent upon programme and risk profile associated with archaeology and ground contamination. The final construction deadline is anticipated to be within late spring 2019.

12.10 The assessment of potential impacts of construction and operational activities resulting from the development will therefore be made to this 2016 baseline.

Technical Scope

12.11 The technical scope of this assessment will:

- Identify existing baseline conditions;
- Identify potential impacts on ground conditions from earthworks, construction and operation;
- Identify potential receptors and their sensitivity;
- Assess the likely magnitude of change of identified impacts on receptors;
- Assess any cumulative effects with respect to adjacent developments;
- Identify the need for specific mitigation measures, where significant impacts are identified;
- Identify any residual impacts following the application of mitigation measures.

Methodology

12.12 Following the procedure set out in the Environment Agency Contaminated Land Report 11 (EA, 2004), baseline and post-construction conceptual site models (CSM) have been developed to illustrate source-pathway-receptor linkages identified for the Site. From these conceptual models, the likely relevant impacts due to contamination have been identified in Paragraphs 12.21 to 12.68 and 12.52 to 12.87. Proposed mitigation measures are outlined in Paragraphs 12.88 to 12.92. The conceptual site models are presented in Figures 12.1 and 12.2.

12.13 The significance of potential effects posed by potential sources of contamination to receptors both on and off the Site is assessed by the methodology set out in Paragraphs 12.14 to 12.17 with the identification and evaluation of key effects being outlined in Paragraphs 12.66 to 12.87.

Determination of Significance

12.14 Criteria for assessing the significance of identified effects are based on a qualitative assessment of the receptor sensitivity and the magnitude of the effect, or how far the effect deviates from the baseline condition.

Prediction of Receptor Sensitivity

12.15 A qualitative assessment of receptor sensitivity has been made according to the criteria in Table 12.1 with the key receptors being outlined in Paragraphs 12.49 to 12.65.

Table 12.1: Methodology for Determining 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.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

Prediction of Impact Magnitude

12.16 The qualitative criteria used to assess how far an impact effect deviates from the baseline condition, i.e. the magnitude of change, are described in Table 12.2.

Table 12.2: Methodology for Assessing Magnitude of Change

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.

Magnitude of Impact	Criteria for assessing impact
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Assessment of Effect Significance

12.17 The assessment of magnitude of change and sensitivity of the receptor will be used to qualitatively assess the impact significance of the Proposed Development, as shown in Table 12.3. Impacts may be either adverse or beneficial.

Table 12.3: Effect 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
Minor	Moderate - Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor - Negligible
Negligible	Negligible	Negligible	Negligible

Baseline Conditions

12.18 An assessment of the baseline conditions at the Proposed Development has been based on the following information. Please also see the site constraints plan (Appendix 12.1).

- Landmark Envirocheck Report (Ref: 79633581_1_1) including historical OS maps (Landmark Information Group Service, 2016)[10];
- The Coal Authority Non- Residential Coal Mining Report – 121 Water Street, Manchester (ref: 79633581_2), dated 10 February 2016, on behalf of the Landmark Information Group[11] (Appendix 12.2);
- British Geological Society geological maps (BGS, Sheet 85 & 87, 1970 and 1975)[12];
- National Rivers Authority Groundwater Vulnerability Map 1996 (Sheet 17)[13],

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[10] Landmark Information Group Service (2016) Envirocheck Report Order Number 79633581_1, 121 Water Street, Manchester.

[11] Coal Authority Report entitled 'Non- Residential Coal Mining Report – 121 Water Street, Manchester' (ref: 79633581_2), dated 10 February 2016, on behalf of the Landmark Information Group.

[12] British Geological Survey (BGS) England and Wales Sheet 85 Manchester, 1970, Solid and Drift Geology (1" to 1 mile edition) and England and Wales Sheet 85 Manchester, 1975, Solid Geology (1:50,000 edition).

- Buro Happold Report entitled 'Ground Engineering Desk Study Report –Factory, Manchester' (Ref: 034933), dated September 2016, on behalf of Manchester City Council[14]. (Appendix 12.3)
- PLANIT UXB Limited report entitled 'Explosive Ordnance Threat Assessment (EOTA) Report' (Ref: 0123 EOTA MCC Factory), dated February 2016, on behalf of Manchester City Council[15]. (Appendix 12.4)
- Stephen Levrant Heritage Architecture report entitled 'Heritage Appraisal: St John's Quarter, Manchester', dated May 2014, on behalf of Manchester City Council'[16] (Appendix 12.5)
- Stephen Levrant Heritage Architecture Limited Report, 'Heritage Statement: Significance and Impact. Factory, St John's, Manchester'. Dated August 2016[17].
- Salford Archaeology report, 'Archaeological Desk-Based Assessment and Watching Brief: The Factory, Water Street, Manchester. Dated September 2016[18].
- ERAP Limited report, 'Ecological Survey and assessment (Including a Licensed Bat Survey) – The Factory, Manchester. Dated July 2016[19].
- RoC Consulting report entitled 'Phase 1 Desktop Study – St. John's Core Development Sites, Manchester' (Ref: JB/AS/csp1 3233), dated July 2015, on behalf of Manchester Quays Limited[20] (Appendix 12.6).
- Manchester Central Library Archive;
- Published technical reports;
- Documents found during internet searches; and
- Any information provided by the Client i.e. previous desk study or ground investigation / utilities information.

12.19 Please note that some of the ground investigation works have been undertaken beyond the application redline boundary.

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[13] National Rivers Authority Groundwater Vulnerability Map 1996 (Sheet 17).

[14] BuroHappold Engineering Report entitled ''Ground Engineering Desk Study Report – Factory, Manchester' (Ref: 034933), dated September 2016, on behalf of Manchester City Council.

[15] PLANIT report entitled 'Explosive Ordnance Threat Assessment (EOTA) (ref: 0123 EOTA MCC Factory), dated February 2016, on behalf of Manchester City Council.

[16] Stephen Levrant Heritage Architecture report entitled 'Heritage Appraisal: St John's Quarter, Manchester'. Dated May 2014, on behalf of Manchester City Council'

[17] Stephen Levrant Heritage Architecture Limited Report, 'Heritage Statement: Significance and Impact. Factory, St John's, Manchester'. Dated August 2016

[18] Salford Archaeology report, 'Archaeological Desk-Based Assessment and Watching Brief: The Factory, Water Street, Manchester. Dated September 2016

[19] ERAP Limited report, 'Ecological Survey and assessment (Including a Licensed Bat Survey) – The Factory, Manchester. Dated July 2016

[20] RoC Consulting report entitled 'Phase 1 Desktop Study – St. John's Core Development Sites, Manchester' (Ref: JB/AS/csp1 3233), dated July 2015, on behalf of Manchester Quays Limited

12.20 The Proposed Development redline boundary is included within Figure 12.1. Please note, the Envirocheck Report was originally obtained in respect of the Factory site only, thus the boundary indicated on the Envirocheck report is not that of the full site. The site wide RoC Desktop Study[20] should be read in conjunction with the BH Desk Study[14] for full details of the site history.

Site History

12.21 Ordnance Survey (OS) maps covering the site have been studied to detail the historical development of the Site and the surrounding area. Extracts of historical maps are included in the BuroHappold Desk Study Report (Appendix 12.3) and are not reproduced herein although a summary constraints plan is included as Appendix 12.1. Key features are identified in the following paragraphs in chronological order.

12.22 The site was occupied by two roads (Water Lane and Charles Street) and around the periphery, a 'Slate Wharf', 'Cotton Store', warehouses and other unnamed buildings are recorded until approximately 1891, where 'Liverpool Road and Salford Goods Station' has expanded to cover the site comprising railway lines, associated infrastructure and buildings.

12.23 Following this, the site has been occupied by various commercial/industrial land uses including, but not limited to, a timber yard, warehouses, Pineapple Hotel, various unnamed buildings, Liverpool Road Goods Depot and a builders yard. During the 1950-1951 'Granada Television Centre' was built immediately to the north, encroaching on the northern extent of the site[16 17].

12.24 No major changes to the site layout are recorded until 1986-1990 when the site is recorded as a 'Television Centre' and a number of areas/buildings have been expanded.

12.25 The majority of the site is in its current layout from 1990 – i.e. surface car parking (the western extent is currently occupied by Network Rail/Skanska as a construction site compound), the Starlight Theatre (overlying railway arches) and a number of structures and buildings associated with the formerly use by ITV for filming and events (including the 5 storey 19th century Bonded Warehouse), Water Street (running centrally through the Site (oriented SW-NE)) and the Grade II Listed Colonnaded Railway Viaduct (in part), which was also in use by ITV for filming and storage. For the purposes of this report the two sets of adjacent railway arches present on site are referred to as the 'St John's arches' (northern) and the 'Museum of Science and Industry (MSI) arches' (southern) (Appendix 12.3 refers).

12.26 Please note, the former car park between Water Street and the River Irwell is currently occupied by Network Rail/BAM/Skanska in relation to the new Ordsall Chord development – a new section of railway line linking Piccadilly and Victoria Railway Stations. It has not been possible to investigate this area during the ESG GI.

12.27 Numerous commercial/industrial uses have surrounded the site for varying periods since at least 1851, including various works (engineering/compound), slate wharf, timber yard/saw mill, Liverpool Road and Salford Goods Station, and associated railway lines/buildings and Granada Television Centre,. A more detailed description of the site history is given in Section 3.4 of the BuroHappold Desk Study Report (Appendix 12.3)[14].

Ground Conditions

Published Geology

12.28 The British Geological Survey (BGS) Map and Regional Geology Guide have been obtained and reviewed as part of this study, with relevant information presented below.

Drift Geology

12.29 The 1” to 1 mile British Geological Survey (BGS) map was studied to determine the probable nature and extent of any drift deposits under the site and in the surrounding area. The maps indicate that no drift deposits are present onsite, although Boulder Clay is recorded to the immediate west of the Site. The Envirocheck Report also indicates that no drift deposits are present onsite, although Alluvium is recorded to the immediate west of the Site. The total thickness of the drift deposits is not recorded on either the geological map or within the Envirocheck Report.

Solid Geology

12.30 The 1” to 1 mile and 1:50,000 British Geological Survey (BGS) maps indicate the solid geology on site to be Triassic Sherwood Sandstone (formerly Bunter Sandstone). The Envirocheck Report indicates the solid geology to be the Triassic Chester Pebble Beds Formation (part of the Sherwood Sandstone Group). The Sherwood Sandstone Group typically comprises well cemented medium and coarse grained sandstones and pebbly sandstones/conglomerates with occasional red brown mudstones. The Sherwood Sandstone is indicated to be underlain by the Manchester Marls (mudstone) over the Collyhurst Sandstone lying unconformably over Carboniferous Upper Coal Measures (Westphalian C) typically comprising a mixture of mudstones, siltstones and sandstones with coal seams. Four named coal seams (Openshaw, Charlotte, Bradford Three-quarter and Bradford Four Foot) are indicated to outcrop between 3.0 km and 3.5 km northeast of the Site. The geological map cross-section indicates that productive coal measures strata are at least 1000 m beneath the proposed development site.

12.31 The Site is located between two faults both trending northwest-southeast, namely, the West Manchester Fault which is indicated to run approximately 500 m northeast of the Site, downthrown to the northeast by approximately 250 m, and the Pendleton Fault approximately 250 m southwest of the Site, downthrown to the northeast by an unknown magnitude. The angle and direction of dip of the bedrock strata between these faults is recorded to be approximately 8° to the southwest.

Unpublished Geology

12.32 As part of this study the BGS Geoscience Database (BGS GD) has been consulted to ascertain whether any exploratory hole records exist for the Site or the immediate surrounding area. A scheme specific ground investigation is currently being undertaken by ESG Limited (herein referred to as the ESG GI), however, limited information is available at the time of writing this report.

12.33 Borehole records from the BGS GD have been obtained and examined. The stratigraphic succession and indicative depths and thicknesses encountered in the deeper exploratory holes is summarised in Table 12.4 with a full assessment of the ground conditions being presented in the BuroHappold Desk Study Report (Appendix 12.3) which should be read in conjunction with this report.

Table 12.4: Summary of Ground Conditions in BGS Boreholes

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalized Description
0.00	1.20 – 6.50	Black and dark brown clayey SAND with ash, brick, coal, pottery and sandstone. AND Soft to firm black and dark brown slightly gravelly sandy silty CLAY with ash, brick, clinker, coal and wood. AND Soft brown sandy silty CLAY with sandstone and brick. [MADE GROUND]
3.00 – 6.50 (Encountered in 3 No. of 7 No. boreholes)	0.70 – 1.90	Soft to firm black organic silty CLAY with occasional wood and peat. AND Soft to firm brown silty sandy CLAY with sandstone. AND Loose to dense brown clayey SAND/GRAVEL with sandstone. [ALLUVIUM]
1.20 – 2.50 (Encountered in 2 No. of 7 No. boreholes)	0.40 – 1.80	Stiff to very stiff brown sandy CLAY with sandstone and coal. AND Dense brown gravelly clayey SAND.

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalized Description
		[GLACIAL TILL]
2.10 – 8.40	>9.25	Dense red brown fine to medium SAND with sandstone fragments. Completely weathered. AND Weak to moderately weak red brown fine to medium grained SANDSTONE. Moderately to highly weathered. [CHESTER PEBBLE BEDS FORMATION - SHERWOOD SANDSTONE GROUP]

Note: Groundwater was not recorded in any BGS boreholes.

12.34 It is considered that the succession recorded in Table 12.4 (Made Ground overlying Alluvium (cohesive/granular) or Glacial Till (cohesive/granular) overlying sandstone strata) does not generally accord with the site specific published geology insofar as no drift deposits are recorded onsite. However it does generally accord with the published geology of the wider area.

Hydrogeological Regime

12.35 The Envirocheck Report indicates that the Site is:

- Underlain by a Principal (formerly Major) Aquifer (highly permeable);
- There are no water abstractions within the Site boundary or within 250 m of the site boundary.
- There are 5 No. abstraction locations within 1 km of the Site namely: Her Majesty's Court Service (427 m NE), CDS Computer Design Systems Ltd (688 m SW), Threlfalls (Salford) Ltd (821 m NNW), CEMEX UK Materials Ltd (829 m NW) and British Telecommunications Plc (961 m NE).

12.36 The Envirocheck Report records that there have been no pollution incidents to controlled waters within 500 m of the Site.

12.37 Limited data from the ESG GI indicates that groundwater was encountered during drilling at approximately 3m BGL. This has been confirmed by ongoing post fieldwork groundwater monitoring.

12.38 Deeper groundwater conditions within the weathered and intact sandstone bedrock are likely to be controlled by the hydraulic conductivity of the sandstone (degree of cementation, degree of fissuring, faults etc.).

Hydrological Setting

12.39 Examination of the general topography and hydrology of the locality, based on the current and historic OS maps indicates that the prevailing direction of groundwater flow is likely to be towards the west/southwest, towards and in the direction of flow of the nearest watercourse – the River Irwell, flowing to the southwest. The Bridgewater Canal is located approximately 175 m south of the Site.

12.40 The central and western portions of the Site are indicated to be within Flood Zone 2 as presented in the Envirocheck Report. Certain areas of the Site are recorded to undergo surface water flooding, namely, the centre (low risk – 1000 year return), the majority of Water Street (western portion of Site; low risk – 1000 year return) and along the central eastern boundary (medium risk – 100 year return), as presented in as presented in the Envirocheck Report**Error! Bookmark not defined.**, based on the relevant Environment Agency information and reproduced in reproduced in the BH Desk Study (Appendix 12.3).

Landfill Activity

12.41 The Envirocheck Report identifies 1 No. historic landfill site, identified simply as Wilburn Street (122m W). No further details about this historic landfill are provided. The landfill is located downstream on the opposite bank of the River Irwell from the site and as such there is unlikely to be an active pathway for contaminants including ground gas to migrate to the site.

12.42 Also identified is 1 No. waste management site, namely Soil & Water Remediation Ltd (218 m SW); 2 No. waste transfer sites, namely Spray Shop Supplies Ltd (185 m S) and Supertune Automotive Ltd (486 m NNE); and 1 No. waste treatment/disposal site, namely Manchester Wharf Steel Ltd (Scrapyard; 200 m SW) within a 500 m radius of the site. Given distance of the majority of these facilities from the Site and the fact that only one is located directly up hydraulic gradient of the Site, the potential impact of contamination arising from the aforementioned facilities on the proposed development site is considered to be low.

Baseline Soil Contamination Assessment

12.43 A review of the historical maps and site history of the Site has shown that there has been a reasonable degree of historical development. Land uses considered to be potentially contaminative with respect to human health, controlled waters, ecosystems and/or the built environment can be summarised as follows.

Within the Site Boundary

- Made Ground;
- Historical Land Uses – Industrial: - various warehouses/goods sheds/stores, railway tracks, slate wharf/timber yard, builders' yard, chimney (presumed industrial).
- Historical Land Uses - Car park and any oil/petrol spills.

Outside the Site Boundary

- Historical Land Uses – Industrial; various wharfs (slate, 'New Botany Yard'), tank, various works (engineering works, compound works, unspecified), Numerous warehouses, livestock (pig) markets, garage, concrete depot, coal yard, timber yard, saw mill/ladder works, factory, ruins, electricity substation, railway tracks and associated depot/stores.

12.44 A site specific ground investigation has been undertaken including chemical testing of a number of soil samples. Out of the 12 No. samples tested, there are no exceedances above the relevant Commercial Assessment Threshold.

Baseline Groundwater Contamination Assessment

12.45 Groundwater was not encountered in any of the BGS exploratory holes. Limited data from the ESG GI indicates that groundwater was encountered during drilling at approximately 3m BGL. This has been confirmed by ongoing post-fieldwork groundwater monitoring.

12.46 Areas of infilled ground represent potential sources of contamination to groundwater at the Site.

12.47 A site specific ground investigation has been undertaken including chemical testing of a number of soil samples. Out of the 12 No. samples tested, there are no exceedances above the relevant Commercial Assessment Threshold.

Baseline Summary

12.48 The baseline analysis suggests that the Proposed Development of the Site is a suitable end use with respect to the identified ground conditions. Potential sources of contamination within the Site boundary are considered to be the residual contamination from any infilled ground, former industrial usage and car parks. Limited remediation may be required in these areas to enable the development to proceed.

Current Receptors and Potential Contamination Pathways

12.49 The site specific source-pathway-receptor linkages set out in Table 12.5 have been considered for the Site with respect to the current site use.

12.50 Off-site water receptors such as the former Manchester & Salford Junction Canal (M&SJC) and Bridgewater Canal have not been considered during this assessment due to the distance of the receptors from the Site as the pathway would be via groundwater which is in itself sensitive and needs to be protected. In addition, the potential risk to the canals arise from the leaching of the ground contamination (if any) within the Made Ground material that underlies the Site. Given the impermeable nature of the canal walls and distance from the site, there is no plausible pathway for the contaminants to enter the canals, thus the risk to these receptors is considered to be negligible under baseline conditions and is not considered further within this report.

12.51 The potential indirect effects of the Proposed Development on water bodies such as the River Irwell through influences on the Combined

Sewer System and associated Combined Sewer Overflows is considered in Chapter 13 Water Resources, Drainage and Flood Risk.

Table 12.5 - Current Potential Contamination Receptor Pathways

Receptor Type	Receptor	Sensitivity	Pathway
Human Health	Current site users	High	Exposure pathways to contamination in Made Ground - oral ingestion of soil, dermal contact of soil, soil dust inhalation, asbestos fibre inhalation. Migration of ground gas from Made Ground. Concrete hardstanding present.
	Off-site public	High	Exposure pathways to contamination in Made Ground - oral ingestion of soil, dermal contact of soil, soil dust inhalation, asbestos fibre inhalation. Migration of ground gas from Made Ground. Concrete hardstanding present. .
Environment	Chester Pebble Beds Principal Aquifer	High	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks
	River Irwell	High	Vertical migration of leachate from on-site Made Ground. Spillage from fuel in car parks
	Onsite vegetation (Green Space)	Low	Plant uptake of phytotoxic metals from Made Ground.
Property	On-site Property	High	Migration of ground gas - fire/explosion in confined spaces.
	Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.

Maintenance of Existing Conditions

12.52 The 'do minimum' scenario is considered to be the maintenance of existing conditions at the Site. This section considers this scenario with respect to existing baseline conditions.

Human Receptors

12.53 The Site is currently occupied by the former ITV Quay Street estate (currently part of the wider St. John's Masterplan which is still in use for filming and workspace) with associated car parking which was created on previously developed land. In addition, the area of land between Water Street and the River Irwell is currently occupied by Network Rail/BAM/Skanska in relation to the new Ordsall Chord development – a new section of railway line linking Piccadilly and Victoria Railway Stations.

12.54 At present the site users are transient i.e. the workers using the Site daily. Based on available data, the degree of hardstanding currently present and the transient nature of the human receptors, it is considered that the risk to current site users under the baseline conditions can be considered to be low.

12.55 Potential sources of contamination on Site include on-site car parking facilities (potential for fuel/oil leaks from vehicles). At present no pathway is considered to exist between this potential source of contamination and the current site users thus it is considered that the risk to the current site users under the baseline conditions can be considered to be low.

12.56 The presence of Made Ground is also another source of contamination on Site. At present a site specific ground investigation is currently being carried out; however, there is no site specific chemical test data available at the time of writing this report. Further assessment will be undertaken once the chemical testing results are available. No pathway is considered to exist between this potential source of contamination and the current site users due to the presence of hardstanding across the site thus it is considered that the risk to the current site users under the baseline conditions can be considered to be low.

12.57 The site history for the surrounding area (Paragraphs 12.21 to 12.27) indicates that there are a number of potential sources of ground contamination identified in the immediate surrounding area that are likely to lie within the zone of influence of the Site (i.e. up hydraulic gradient / to the north/northeast) including a variety of former mill, factory and works sites.

Environmental Receptors

12.58 The Chester Pebble Beds (CPB - Sherwood Sandstone) underlying the Site is classified by the EA as a Principal Aquifer. This is considered to be a highly sensitive receptor. Limited data from the ESG GI suggests bedrock is recorded around 4.00 m BGL and separated from the Made Ground by a 0.50 – 2.50 m thickness of Glacial Till, part of which includes cohesive strata. Please note, the cohesive Glacial Till is not recorded in all exploratory holes. The potential risk to the CPB arises from the leaching of the ground contamination (if any) within the Made Ground material that underlies the Site. Given the degree of hardstanding currently present on Site and the presence of some cohesive layers within the Glacial Till, it is considered that under baseline conditions, the risk to this receptor is moderate.

12.59 The River Irwell (RI) is recorded to the immediate north-western boundary of the Site and is considered to be a high sensitive receptor. The potential risk to the RI arises from the leaching of the ground contamination (if any) within the Made Ground material that underlies the Site. Given the degree of hardstanding on the Site and the presence of a number of impermeable nature of the Glacial Till, there is limited pathways for the contaminants to enter the RC, thus the risk to this receptor is considered to be moderate under baseline conditions.

12.60 There is currently a small amount of soft landscaping at locations around the periphery of the Site. The presence of the on-site vegetation (existing/non crop) indicates that this is not being too adversely affected by the existing situation thus the risk to on-site vegetation under baseline conditions is considered to be low.

12.61 A site specific ground investigation has been undertaken including chemical testing of a number of soil samples. Out of the 12 No. samples tested, there are no exceedances above the relevant Commercial Assessment Threshold.

Property Receptors

12.62 The risk to off-site property (existing residential apartments / hotel / commercial (office / leisure) / public realm) from the migration of ground gas under baseline conditions is considered to be moderate based on limited non site specific available information. The data indicates the Made Ground encountered is mainly comprised of and ash, however fragments of coal and clinker are recorded. At present a site specific ground investigation is currently being carried out, however, there is no site specific chemical test data available at the time of writing this report. Further assessment will be undertaken once the exploratory hole logs and post fieldwork ground gas monitoring results are available.

Future Receptors and Potential Contamination Pathways

12.63 The Proposed Development will be a mixed use development comprising a new cultural facility and performance venue including leisure, office usage as well as hardstanding and soft landscaping. The Proposed Development will be a predominantly hard cover development.

12.64 The site specific source-pathway-receptor linkages set out in Table 12.6 have been considered for the Site with respect to future site use.

12.65 The following sections discuss potential impacts of the Proposed Development on identified receptors and possible mitigation measures required. A review of the impacts and mitigation measures will need to be undertaken following any future phases of ground investigation undertaken.

Table 12.6 - Future Potential Contamination Receptor Pathways

Receptor Type	Receptor	Sensitivity	Pathway

Receptor Type	Receptor	Sensitivity	Pathway
Human Health	Construction Workers	High	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation. Migration of ground gas into confined spaces created during construction.
	Off-site public	High	Limited outdoor inhalation of dust. Migration of ground gas.
Human Health	Commercial site end user	High	Limited exposure to on-site Made Ground in areas of soft landscaping (oral ingestion of soil, dermal contact, soil, soil dust inhalation). Migration of ground gas into confined spaces.
Environment	Chester Pebble Beds Principal Aquifer	High	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel from construction plant or storage areas/site compound.
	River Irwell	High	Vertical migration of leachate from on-site Made Ground during earthworks. Spillage from fuel from construction plant or storage areas/site compound.
Property	On-site property	High	Migration of ground gas - fire/explosion in confined spaces.
	Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.

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Identification & the Evaluation of Key Impacts

12.66 The elements of the Proposed Development that could potentially mobilise contamination sources and affect sensitive receptors are described in this section. For an impact to occur there needs to be a pathway (e.g. direct contact, inhalation, leaching) from a contamination source to a sensitive receptor. Please note that temporary pathways are typically considered to be 'Minor' with respect to this assessment due to their transient nature (chronic situations being the exception to this).

12.67 The impact of identified contamination sources at and around the Site is considered in respect of the following two stages, namely:

- The demolition and construction stage;
- The post-construction/operational stage.

12.68 Conditions during the demolition and construction stage differ from the other situations in that materials may be exposed to agents such as water and air that may lead to dispersion of contamination and to direct contact with construction personnel, particularly in respect to the reuse of material(s) if any.

Assessment of Demolition and Construction Impacts

12.69 The identified demolition and construction impacts in this section are considered to be worst case due to limited baseline data regarding the composition of Made Ground on Site. Potential impacts from sources of contamination on identified receptors for the construction phase are summarised in Table 12.7.

Human Receptors

12.70 The excavation and removal of potentially contaminated soils during the formation of the Proposed Development i.e. building foundations, drainage / utilities and basements (if any) could bring site users (construction workers and off-site public) into direct contact with potentially contaminated soils and soil dust. As such, the impact on these receptors is considered to be Minor as a temporary pathway is created during construction only, therefore the significance of the effect is Moderate-Minor (Adverse) despite the High sensitivity of the receptors.

12.71 Site works could also result in gas / vapour accumulations in confined spaces (e.g. drainage areas). The potential impact is considered to be Minor with respect to onsite workers during construction due to the fact that the workers are considered to be a temporary receptor introduced during construction only and are likely to be open to the atmosphere. The significance of the activities is therefore considered to pose a Moderate-Minor (Adverse) impact on these high sensitivity receptors during the construction phase. The potential impact and significance of gas / vapour accumulations in confined spaces (e.g. drainage areas) during construction in respect of the off-site public is considered to be Negligible due to no foreseeable change in conditions.

12.72 In terms of offsite public receptors, any such exposure due to demolition and construction activities will also be via a temporary pathway thus the magnitude of impact is considered to be Minor in terms of this receptor also. The significance of the impact is therefore considered to be Moderate-Minor (Adverse) impact on these high sensitivity receptors during the demolition and construction phase.

Environmental Receptors

12.73 There is a risk of increased migration of leachate from Made Ground materials during earthworks operations. These temporary pathways are considered to represent a potentially Minor impact on the High sensitivity CPB and RI and thus the significance of the effect is Moderate - Minor (Adverse) for both receptors.

12.74 There is also a risk of increased migration of spillage of fuel from construction plant and storage areas/site compound during the construction phase. These temporary pathways are considered to represent a potentially Minor impact on the High sensitivity CPB and

RI and thus the significance of the effect is Moderate - Minor (Adverse) for both receptors.

12.75 The potential impact and significance of plant uptake of phytotoxic metals from Made Ground is considered to be Negligible due to no foreseeable change in conditions and/or reduction of this receptor.

Property Receptors

12.76 The works associated with the Proposed Development could also result in gas / vapour migration and accumulation in confined spaces to off-site property. The potential impact and significance are considered to be Negligible due to no foreseeable change in conditions and/or reduction of the potential Made Ground source.

12.77 The works associated with the Proposed Development could also result in off-site property (e.g. MSI listed buildings) being brought into direct contact with potentially contaminated soils and soil dust. Dust has been considered as part of Chapter 8 – Air Quality and an appropriate mitigation plan will be put in place prior to works commencing. As such, the impact on these receptors is considered to be Minor as a temporary pathway is created during demolition and construction only, therefore the significance of the effect is Moderate-Minor (Adverse) despite the High sensitivity of these receptors.

Table 12.7 - Predicted Construction Impacts

Receptor	Receptor sensitivity	Impact	Magnitude of impact	Significance of effect
Construction Workers	High	Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas into confined spaces created during construction.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
Off-site public	High	Outdoor inhalation of site dust.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Migration of ground gas.	Negligible (no foreseen change)	Negligible
Chester Pebble Beds (Principal Aquifer)	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse)
River Irwell	High	Migration of leachate from on-site Made Ground.	Minor (temporary pathway only)	Moderate – Minor (Adverse
		Spillage from fuel in from construction plant or storage areas/site compound.	Minor (temporary pathway only)	Moderate – Minor (Adverse
Onsite vegetation (Green Space)	Low	Plant uptake of phytotoxic metals from Made Ground.	Negligible (no foreseen change)	Negligible
Off-site property	High	Migration of ground gas - fire/explosion in confined spaces.	Negligible (no foreseen change)	Negligible

Receptor	Receptor sensitivity	Impact	Magnitude of impact	Significance of effect
		Migration of site derived dust during earthworks.	Minor (temporary pathway only)	Moderate – Minor (Adverse)

Assessment of Operational Impacts

12.78 The identified operational impacts in this section are again considered to be worst case due to limited baseline data regarding the composition of Made Ground and the potential for contamination on Site. Potential impacts from sources of contamination on identified receptors for the operational phase are summarised in Table 12.8.

Human Receptors

12.79 The Proposed Development will be a mixed use development comprising a new cultural facility and performance venue including leisure, office usage as well as hardstanding and soft landscaping. The Proposed Development will be a predominantly hard cover development with only suitable topsoil / subsoil being used in any podium planting or planters. As such, exposure pathways between potential ground contamination, if any, and future human end users are likely to be broken. Therefore, the magnitude of the impact on the future commercial/residential site end users is thus considered to be Minor as the potential Made Ground source will be reduced and covered in hardstanding, therefore the significance of the effect is considered to be Minor (Beneficial).

12.80 Made Ground on Site represents a potential source of ground gas and / or vapour which represents a potential risk of asphyxiation and fire / explosion in confined spaces (e.g. drainage areas) during the operational phase of the development. The potential magnitude of the impact on future site users and future on-site buildings is considered to be Minor as the Made Ground source will be reduced and covered in hardstanding, therefore the significance of the effect is considered to be Minor (Beneficial).

12.81 The migration of potentially contaminated dust arising from the on-site Made Ground materials may have an impact on off-site members of the public. The Proposed Development will result in the majority of the Site being covered by development buildings and the Made Ground source will be reduced and covered in hardstanding. As such, the magnitude of the impact on the off-site public is thus considered to be Minor, therefore the significance of the effect is considered to be Minor (Beneficial).

12.82 The potential for gas migration to the off-site members of the public is considered to be Negligible during the operational phase of the Proposed Development, therefore, the magnitude of the impact and the resultant significance of the effect are also considered to be Negligible.

Environmental Receptors

12.83 The migration of leachate from on-site Made Ground to the CPB and RI during the operational phase is considered to be Minor with the majority of the Site being covered by development buildings and the Made Ground source will be reduced and covered in hardstanding. As such, the magnitude of the impact on the groundwater receptors is considered to be Minor, therefore the significance of the effect is considered to be Minor (Beneficial).

12.84 Fuel spills in car parking and service areas will occur within a managed environment during the operational phase thus the pathway to groundwater receptors will be broken. This also includes any lorry deliveries which will enter the site from the western area (in between Water Lane and the River Irwell) via a lorry lift. As such, the magnitude of the impact on the groundwater receptors is considered to be Minor, therefore the significance of this effect is considered to be Minor (Beneficial).

12.85 Plant uptake of phytotoxic metals from Made Ground or risk from fuel spills will be Minor during the operational phase due to source reduction and no plausible pathways will be present. As such, the significance of this effect is considered to be Minor (Beneficial).

Property Receptors

12.86 The risk associated with gas / vapour migration and accumulation in confined spaces within on and off-site property during the operational phase of the Proposed Development is considered to be unlikely (Negligible), therefore the magnitude of the impacts and the resultant significance of the effects are also considered to be Negligible.

12.87 The migration of potentially contaminated dust arising from the on-site Made Ground materials to both on-site and off-site property during the operational phase of the Proposed Development is considered to be unlikely due to cover of development buildings and the Made Ground source reduction. As such, the magnitude of the impact on these receptors is considered to be Minor and thus the significance of the effect is considered to be Minor (Beneficial).

Table 12.8 - Predicted Operational Impacts

Receptor	Receptor sensitivity	Impact	Magnitude of impact	Significance of effect
Residential / commercial site end user	High	On-site Made Ground materials removed/reduced and replaced with hardstanding.	Minor	Minor (Beneficial)
		Migration of ground gas into confined spaces	Minor	Minor (Beneficial)
Off-site public	High	Migration of ground gas.	Negligible (no foreseen change)	Negligible

Receptor	Receptor sensitivity	Impact	Magnitude of impact	Significance of effect
Chester Pebble Beds Principal Aquifer	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
River Irwell	High	Migration of leachate from on-site Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site vegetation (Green Space)	Low (no pathway)	Plant uptake of phytotoxic metals from Made Ground.	Minor	Minor (Beneficial)
		Spillage from fuel in car parks or waste storage areas.	Minor	Minor (Beneficial)
On-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)
Off-site property	High	Migration of ground gas – fire / explosion in confined spaces.	Negligible (no foreseen change)	Negligible
		Migration of dust.	Minor	Minor (Beneficial)
Off-site public	High	Outdoor inhalation of site dust	Minor	Minor (Beneficial)

Mitigation Measures

12.88 Mitigation measures to address identified potential impacts are summarised in the following sections. Mitigation measures have been derived by considering risks to identified receptors in accordance with CLR11 Model Procedures **Error! Reference source not found.**. Results of future site investigation may preclude any or all of the following mitigation measures.

Demolition and Construction Impact Mitigation Measures

12.89 The demolition and construction phase mitigation measures listed here are considered to be worst case. Risks to construction workers from contaminants during site development may be clarified by further investigation.

12.90 Mitigation measures will include the following:

- Appropriate hazard identification and risk mitigation of any contamination where unacceptable risks to site receptors are identified;
- Determine whether any deep excavations would introduce preferential pathways for vertical migration of contaminants to the CPB (Sherwood Sandstone);
- The use of personal protective equipment (PPE) and respiratory protective equipment (RPE) where necessary. Construction workers should remain vigilant of ground conditions at all times and should report any suspected areas of potential contamination immediately;

- Dust suppression measures where necessary to inhibit the generation of contaminated dust and to prevent its migration off-site;
- Adequate gas monitoring where required. Avoidance of the creation of confined spaces, or where this is not possible, appropriate controls on entry into confined spaces;
- Where asbestos contaminated materials (ACM) are identified, these will be managed and dealt with appropriately;
- Temporary drainage measures should be provided to prevent the generation of surface water run-off and potential migration of contaminants;
- Stockpiling of contaminated materials, if any, should be avoided if possible and any such stockpiles should be covered when not in use. Drainage from the stockpiles should be managed to prevent the generation of contaminated run-off;
- Implementation of pollution control measures for the storage of hazardous materials and spillage containment;
- Containment of fuel and / or chemicals within suitably bunded storage areas;
- Refuelling and washing down of plant and equipment in contact with contaminated materials in suitably bunded and controlled areas.

Operational Impact Mitigation Measures

12.91 Limited site investigation data obtained to date indicates that the Site is likely to be suitable for commercial usage with minimal remediation, if any. It is considered that in areas of hardcover and buildings any potential direct pathways between contamination sources and receptors will be negated. Mitigation measures listed here reflect a potential worst case scenario with respect to ground contamination:

- Remediation of contamination where unacceptable risks are identified to site receptors. Possible remediation options that might be considered are excavation and disposal of contaminated material (bearing in mind the basement excavations proposed), physical, chemical or biological remediation technologies or physical removal of exposure pathways. A range of remediation technologies are available in the UK and may be carried out in-situ or ex-situ, depending on the Site, the nature of the contamination and development specific constraints;
- Removal of all source-pathway-receptor linkages within the Proposed Development. Where soft landscaping is to be present on site, clean capping barriers will be considered, where necessary. Where the Site is to be covered with hardstanding, such as building floor slabs, roads and car parking areas, risks posed by contaminants through direct contact, ingestion and inhalation will be mitigated;
- At present a site specific ground investigation is currently being carried out, however, there is no site specific chemical test data or post fieldwork ground gas monitoring data available at the time of writing this report. Further assessment will be undertaken once the information is available. Notwithstanding this, the inclusion of an appropriate ground gas membrane will provide an effective barrier and the requirement for gas protection measures, including gas proof membranes and under floor ventilation features, will be

considered further at the building design stage of the development;

- Where necessary, service trenches will be lined with an impermeable membrane and backfilled with clean material to prevent contaminants entering the public water supply. Similarly these measures will also prevent build-up of potential ground gas and vapours within trenches that could prove harmful to maintenance workers;
- Specific mixes of concrete may be required for building foundations where the underlying ground conditions are identified as being potentially aggressive to concrete;
- To minimise potential impact on controlled waters from fuel spills along access roads, parking and loading areas, drains will be fitted with filtration units and oil-water interceptors, as good practice.

12.92 Further mitigation for the protection of Water Resources, Drainage and Flood Risk is included in Chapter 13.

Cumulative Effects

12.93 The location of a number of committed developments in the vicinity can typically have a cumulative adverse effect on High sensitivity receptors in particular the groundwater receptors and on and off-site public receptors.

12.94 The cumulative effects have been assessed in terms of the envisaged combination of individual impacts on particular receptors from the Proposed Development and the effects from any concurrent developments considered to be in the zone of influence. Construction and demolition works associated with the Proposed Development and the concurrent developments within a 250 m radius of the Site are the only plausible activities in respect of ground related aspects likely to have cumulative effects and it is these activities that have been considered below. The planned developments within the vicinity of the Site are set out within Appendix 2.2.

12.95 Two types of cumulative effects have been assessed and are discussed below, namely:

- Type 1 Effects: The combination of individual effects (for example noise, dust and visual effects) from a development on a particular receptor;
- Type 2 Effects: Effects from several developments, which individually might be insignificant, but when considered together could create a significant cumulative effect.

12.96 Other developments within a 250 m radius of the Site are considered unlikely to have a significant cumulative effect in terms of ground and groundwater due to the nature of the baseline ground conditions and amount of hardstanding in the immediate vicinity (Paragraph 12.48). The combination of the individual effects from these developments and the Proposed Development such as dust, traffic, noise etc. (Chapters 8, 9 and 11), may have a small impact on a number of receptors, primarily the High sensitivity current site users and off-site public.

12.97 The groundwater receptors may also be impacted due to construction activities such as excavation or increased likelihood of leachate pathways from any Made Ground. During operation, the Proposed Development is Minor (Beneficial) in this regard, thus, it is anticipated that the cumulative effects should also be improved overall.

12.98 However, as good practice, mitigation measures such as appropriate health and safety and operational controls, the development of safe working procedures, dust suppression, gas monitoring where necessary, prevention / control of confined spaces, spillage containment for fuel and waste storage areas, hygiene and the use of personal protective equipment (PPE / RPE) should be implemented on all the development sites within the assessment area. It is therefore expected that if the planned developments incorporate appropriate measures as far as is reasonably practicable then no significant cumulative effects of ground related activities are anticipated on the identified receptors.

Residual Effects

12.99 Residual effects following implementation of identified mitigation measures and the overall effects for the Proposed Development are within Table 12.9. Residual effects will be reviewed as further information becomes available, prior to demolition and construction, as part of the detailed design process.

12.100 Residual effects resulting from contaminated land are not likely to be significant during the demolition and construction or operational phases of redevelopment provided:

- Appropriate hazard identification and risk assessment of potential contamination and ground gas are undertaken as part of the site works to confirm baseline conditions;
- Mitigation measures are reviewed and adopted based on site observations during the works;
- Good practice procedures are adhered to in both construction and health and safety during remediation and site development.

Table 12.9 – Summary of Residual Effects

Likely Significant Effect	Receptor	Mitigation	Residual Effect
Demolition and Construction Phase			
Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation.	Construction Workers	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Hygiene. Use of PPE / RPE. Development of safe working procedures. Dust	Minor (Adverse) (Temporary)

Likely Significant Effect	Receptor	Mitigation	Residual Effect
Migration of ground gas into confined spaces created during construction.		suppression. Prevention / control of confined spaces	
Outdoor inhalation of dust. **Migration of ground gas.**	Off-site public	Dust suppression, operational controls. Appropriate on-site Health and Safety controls and gas monitoring as necessary.	Minor (Adverse) (Temporary)
Vertical migration of leachate from on-site Made Ground during earthworks. **Spillage from fuel in from construction plant or storage areas/site compound.**	Chester Pebble Beds Principal Aquifer	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control. Spillage containment for fuel / waste storage areas as good practice.	Negligible (Temporary)
Vertical migration of leachate from on-site Made Ground. during earthworks. **Spillage from fuel in from construction plant or storage areas/site compound.**	River Irwell	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control. Spillage containment for fuel / waste storage areas as good practice.	Negligible (Temporary)
Plant uptake of phytotoxic metals from Made Ground. **Spillage from fuel in car parks or proposed waste storage areas.**	On-site vegetation (Green Space)	Operational and pollution controls. Spillage containment for fuel /waste storage areas as good practice.	Negligible (Temporary)
Migration of ground gas - fire/explosion in confined spaces. **Migration of site derived dust during earthworks.**	Off-site property	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Prevention/control of confined spaces. Development of safe working procedures	Minor (Adverse) (Temporary)
Operational Phase			
On-site Made Ground materials removed/reduced and replaced with hardstanding. **Migration of ground gas into confined spaces**	Residential / commercial site end user	Removal of all source-pathway-receptor linkages. Design of appropriate gas protection measures where necessary. Clean trenches for water supply pipes as good practice.	Minor (Beneficial)
Outdoor inhalation of dust. **Migration of ground gas.**	Off-site public	Removal of all source-pathway-receptor linkages.	Minor (Beneficial)
Migration of leachate from on-site Made Ground. **Spillage from fuel in car parks or waste storage areas.**	Chester Pebble Beds Principal Aquifer	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads	Minor (Beneficial)

Likely Significant Effect	Receptor	Mitigation	Residual Effect
		and parking areas.	
Migration of leachate from on-site Made Ground. **Spillage from fuel in car parks or waste storage areas.**	River Irwell	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads and parking areas.	Minor (Beneficial)
Plant uptake of phytotoxic metals from Made Ground. **Spillage from fuel in car parks or waste storage areas.**	On-site vegetation (green space)	None required.	Minor (Beneficial)
Migration of ground gas – fire / explosion in confined spaces. **Migration of dust**	On-site property Off-site Property	Design of appropriate gas protection measures where necessary as good practice. Operational and pollution controls.	Minor (Beneficial)

Acronyms/ Glossary

BGL Below Ground Level.

CLEA Contaminated Land Exposure Assessment Model. A model produced by the Department for Environment, Food and Rural Affairs (DEFRA) that estimates child and adult exposures to soil contaminants for those potentially living, working and/or playing on contaminated sites over long periods and is used to produce the Soil Guideline Values (SGV) for the United Kingdom.

cSAC Candidate Special Areas of Conservation, designated under the European Directive commonly known as the 'Habitats' Directive (Directive 92/43/EEC)

CSM Conceptual Site Model. A simplified representation of the site to indicate potential source-pathway-receptor linkages.

EA Environment Agency.

GAC Generic Assessment Criteria, derived in-house for the assessment of land affected by contamination. The GACs consider the most sensitive receptors in the respective CLEA standard land- uses scenarios (the 0 to 6 year old child for the residential with and without plant uptake scenarios and the adult for the commercial / industrial land-use scenario) using the software model 'CLEA 1.03 beta' and associated handbook (August 2008).

ICRCL Inter Departmental Committee for the Redevelopment of Contaminated Land (UK). Former guidance adopted in estimation of contamination land now replaced by CLEA model.

NNR National Nature Reserve. The National Parks and Access to the Countryside Act 1949 enabled the National Conservancy Council for England, now English Nature, to establish Nature Reserves.

OD Ordnance Datum, the levelling datum for the Government agency responsible for mapping in Britain.

PPE Personal Protective Equipment

RPE Respiratory Protective Equipment, such as dust masks and respirators.

SGV Soil Guideline Values, derived from the former CLEA model and formerly used as “intervention values” in the regulatory framework for assessment of risks in relation to land-use.

SPA Special Protected Areas, strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC), also known as the Birds Directive, which came into force in April 1979.

SSSI Site of Special Scientific Interest, designated under the Wildlife and Countryside Act 1981 (amended 1985) for special interest by reason of flora, fauna, geological or physiographical features.

Figure 12.1: Pre Construction Conceptual Model (CSM)

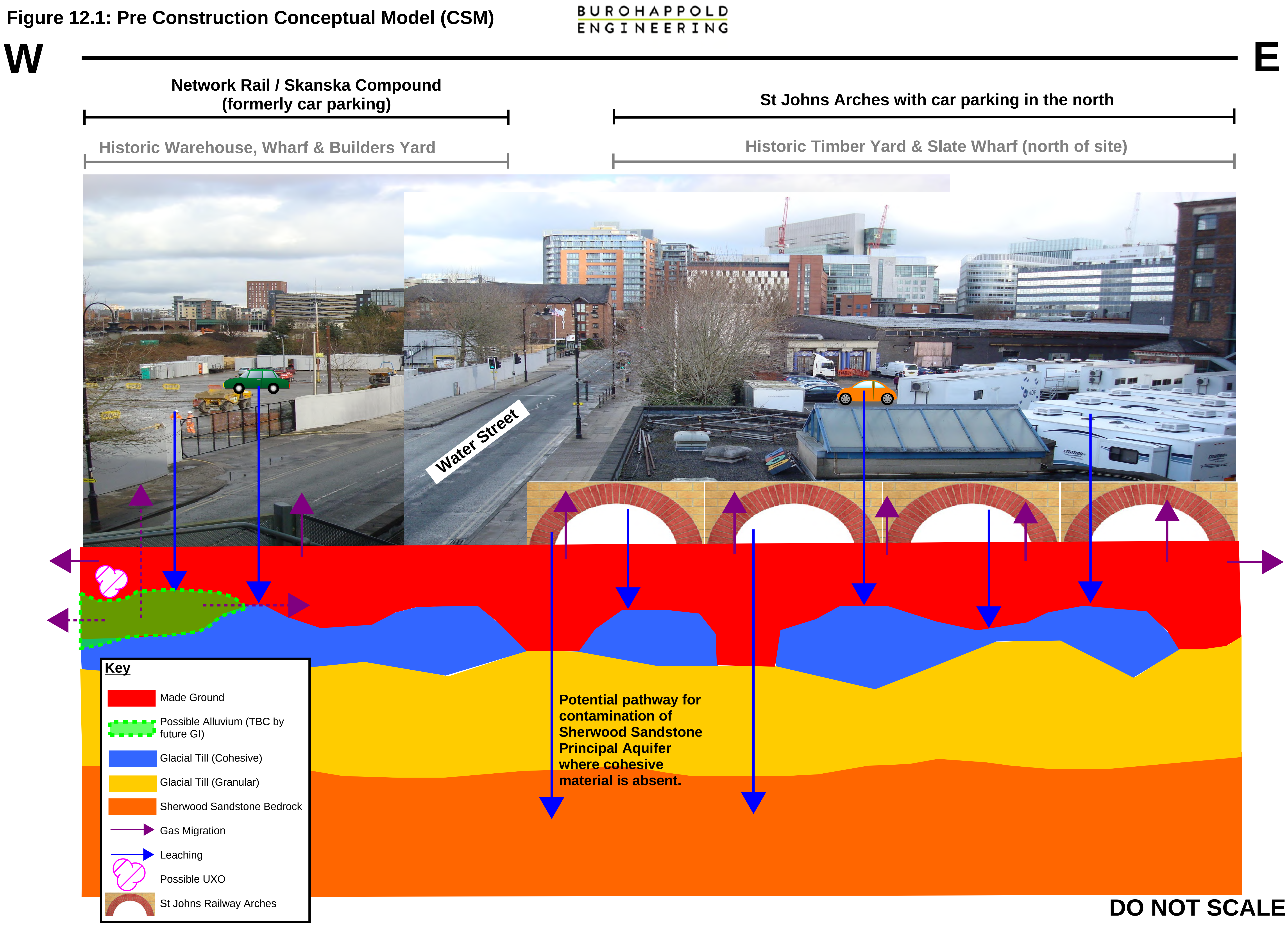
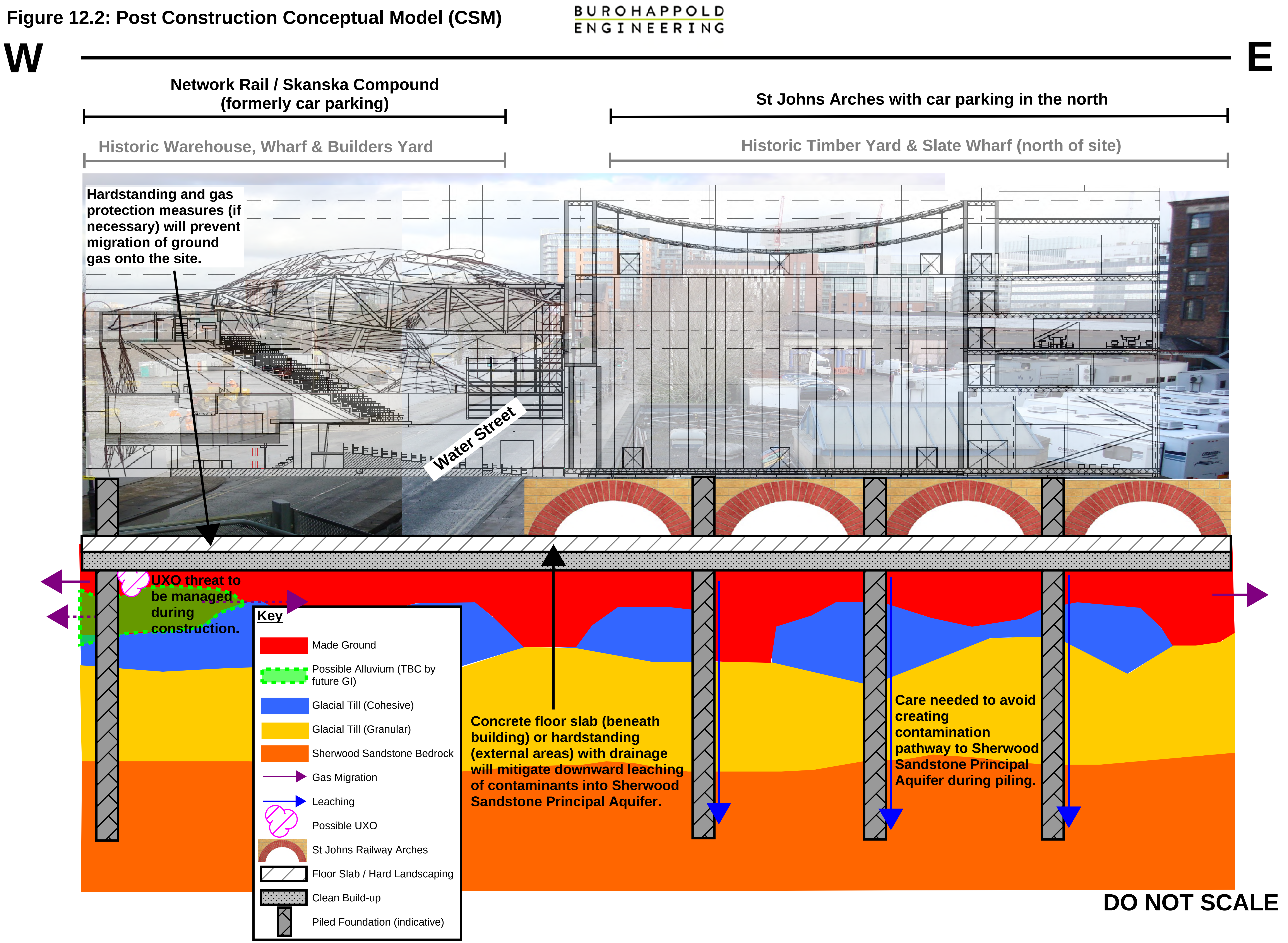


Figure 12.2: Post Construction Conceptual Model (CSM)



13 Water, Resources, Drainage & Flood Risk

Introduction

13.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to water resources, flood risk and the wider water environment. 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.

13.2 The following issues have been addressed within this chapter:

- Flood risk (fluvial and surface water)
- Drainage Infrastructure (surface and foul water), and
- Water quality

13.3 This chapter of the ES is also supported by a Flood Risk Assessment and Drainage Statement (FRA) which can be found at Appendix 13.1 (ES Volume 2).

Legislative and Policy Context

Legislation

The Flood and Water Management Act 2010

13.4 The Flood and Water Management Act sets out how flood and coastal risk management in England and Wales will be managed in the future, and provides the basis for a legislative framework supporting a more integrated approach to water and drainage management.

13.5 The intentions of the Act are summarised below:

- Deliver improved security, service and sustainability for people and their communities;
- Clarify responsibilities for managing all sources of flood risk;
- Protect essential water supplies by enabling water companies to control more non-essential uses of water during droughts;
- Modernise the law for managing the safety of reservoirs;
- Encourage more sustainable forms of drainage in new developments through new arrangements for adoption and future operation of such features; and
- Make it easier to resolve misconnections to sewers.

Water Framework Directive

13.6 The Water Framework Directive 2000/60/EC is a European Union directive designed to improve and integrate the way water, from all sources, is managed throughout Europe. In the UK, much of the implementation work is undertaken by competent authorities such as the Environment Agency and Local Authorities. It came in to force in December 2000 and was transposed in to UK law in 2003. Member States are required to achieve good chemical and ecological status for their inland and coastal waters by 2015.

Water Resources Act 1991

13.7 Protects and improves the quality of 'controlled' waters. It is an offence to "cause or knowingly permit poisonous, noxious or polluting matter or any solid waste to enter controlled waters" unless it is covered by a consent to discharge issued by the Environment Agency. Failure to comply may result in a fine. This includes discharge to surface water drains.

National Planning Policy

National Planning Policy Framework

13.8 The National Planning Policy Framework (NPPF) and its associated Technical Guide were introduced in March 2012, and included the government's spatial planning policy with regard to development and flood risk. The Technical Guide has subsequently been replaced in March 2014 by Planning Practice Guidance. Of specific relevance to this document is the section entitled Flood Risk and Coastal Change. These documents have superseded a broad range of Planning Policy Statements including PPS25 Development & Flood Risk. The NPPF and its associated Planning Practice Guidance retains many of the previous design principles and standards included in PPS25 and its related Practice Guide. Clauses 99-104 within the NPPF are specific to flood risk and flooding mitigation.

13.9 The NPPF aims to ensure that flood risk is taken into account by all relevant statutory bodies from regional to local authority planning departments to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk. Where new development is, exceptionally necessary in high risk areas, the policy framework aims to make it safe, ensure that it will not increase flood risk elsewhere and, where possible, reduce overall flood risk in the local area.

13.10 Local authorities should only consider development in flood risk areas as appropriate where it is informed by a site-specific Flood Risk Assessment, based upon the Environment Agency's Standing Advice on flood risk. The Assessment should identify and assess the risks of all forms of flooding to and from the development and demonstrate how flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

13.11 The NPPF Technical Guide includes a hierarchy of flood risk management which is reproduced in Table 13.1.

Table 13.1: Flood Risk Management Hierarchy

Approach	What it means
1 Assess	Undertake studies to collect data at the appropriate scale and level of detail to understand the level of flood risk.
2 Avoidance/ Prevention	Allocate development to areas of least risk and apportion development types vulnerable to the impact of flooding to areas of least flood risk.
3 Substitution	Substitute less vulnerable development types for those incompatible with the degree of flood risk present.
4 Control	Implement flood risk management measures to reduce the impact of new development on flood frequency and use appropriate design.
5 Mitigation	Implement measures to mitigate residual risks.

13.12 The NPPF Planning Practice Guidance defines spatial flood risk zones based on the annual exceedance probability (AEP) of fluvial flooding occurring:

- Flood Zone 1 Low probability <0.1% AEP fluvial and tidal flooding
- Flood Zone 2 Medium probability 0.1-1.0% AEP fluvial or 0.5-0.1% AEP tidal flooding
- Flood Zone 3a High probability 1-5% AEP fluvial or >0.5% AEP tidal flooding
- Flood Zone 3b Functional floodplain >5% AEP fluvial

13.13 Development should be directed as far as is practicable towards Flood Zone 1 areas to avoid flood risk wherever possible. For any proposed development, if the site area is greater than 1ha, a Flood Risk Assessment will be required to address design issues related to the control of surface water runoff and climate change, as well as considering any other potential sources of flood risk. The assessment of climate change allowances was amended in February 2016 and now is a function of the following:

- Catchment Basin
- Flood Zone
- Development Type

Regional Planning Policy

Manchester Core Strategy 2012 to 2027 – Development Plan Document

13.14 This document was published in July 2011 and incorporates a number of policies that aim to achieve sustainable development in the region. The core policies that impact on water resources and flood risk are as follows:

- Policy EN 7 "Energy Infrastructure Opportunities" - Flood risk, through the Manchester-Salford-Trafford Strategic Flood Risk Assessment. In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where these have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.
- Policy EN 8 "Adaption to Climate Change" - All new developments will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change, developers should have regard to the following, although this is not an exhaustive list:
- Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water permeability
- Policy EN 14 "Flood Risk" – In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).
- In addition to the requirements for site specific Flood Risk Assessments (FRAs) set out in NPPF, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.
  - All new developments should minimise surface water run-off, through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure. Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.
  - The City of Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.
- Policy EN 17 "Water Quality" - With reference to the Manchester-Salford-Trafford SFRA and other relevant documents:
  - Developments should avoid any adverse impact on water quality, during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological;
  - Developments should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses;
  - Developments close to a watercourse should also ensure that waste or litter cannot enter the watercourse from the site;
  - Developments should, where feasible and appropriate, seek to open up any culverted or hidden watercourse beneath

the site to improve the ecological status of that watercourse.

- Policy DM 1 – “Development Management” – All developments should have regard to the following specific issues:
  - Flood Risk and Drainage

River Basin Management Plan – North West River Basin District (2009)

13.15 This document was published in December 2009 by the Environment Agency in conjunction with DEFRA and aims to protect of the existing water course within the North West both in terms of pollution and the biological classification of river and also the general provision water running within the watercourse.

13.16 The management plan identifies the following key pressures that need to be addressed

- Diffuse pollution from rural areas
- Point source pollution caused by discharge from sewerage systems
- Diffuse pollution from roads and urban areas
- Physical modification of rivers and coastlines
- Point source pollution caused by discharge from industry
- Abstraction and other artificial flow regulation

13.17 The plans intent was that by 2015 the following will have occurred.

- 21% of surface waters will have improved for at least one biological, chemical or physical element
- 33% of surface water will be at good or better ecological status
- 28% of groundwater bodies will be at good
- 41% of surface waters will be at good or better biological status

13.18 The intended target for cycle 1 of the plans’ implementation would provide the result of the first cycle and therefore the targets of the second cycle are currently awaited at time of writing.

Local Planning Policy

Manchester City, Salford City and Trafford Councils Level 2 Hybrid (SFRA)

13.19 Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy.

13.20 The Manchester City, Salford City and Trafford Council’s Level 2 Hybrid SFRA is one of these documents and it assesses the risks associated with all types of flooding and is used to identify the amount and types of suitable developments permitted in an area.

13.21 The Manchester City, Salford City and Trafford Council’s Level 2 Hybrid SFRA is a combined Level 1 and Level 2 SFRA providing both comments on the wider flooding issues and detailed review of specific development plots.

13.22 The above document was prepared by JBA Consulting on behalf of Manchester City, Salford City and Trafford Councils with the final version of the report issued in March 2011.

Assessment Methodology and Significance Criteria

Methodology

13.23 The assessment methodology of the issues presented in paragraph 13.3 has primarily involved a desk study to collate relevant information, and applying appropriate analytical methods to predict the effect of the Proposed Development. Details of the specific assessment methodology and significance criteria for each issue stated above are given below.

13.24 The following authorities have been consulted to inform the assessment.

- Environment Agency;
- Manchester Ship Canal Company (Peel Holdings);
- United Utilities; and
- Manchester City Council – Flood Risk Management Team

13.25 Details of the correspondence can be found in the Flood Risk Assessment in Appendix 13.1.

Flood Risk

13.26 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. A copy is included in Appendix 13.1. This document identifies and quantifies the risk to the Site from the various sources of flood risk. It also addresses how the Proposed Development will impact on flood risk in the surrounding area. The FRA draws on information obtained from the Environment Agency, Manchester City, Salford City and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessments, site observations and other publicly available online data, mainly from the Environment Agency and the British Geological Society.

13.27 The risk associated with fluvial surface water and breach inundation from the wider network of reservoirs has been assessed using available information. The risk of flooding from other sources is considered low hence have been scoped out of the assessment.

13.28 A summary of the significance criteria used to assess the effects of flood risk is given in Table 13.2. Table 13.3 details the impact on receptor sensitivity.

Table 13.2: Flood Risk Management Hierarchy

Significance of Effect	Fluvial	Surface Water	Reservoir Breach
Major	Change of more than	Change in surface	Change in extent of

Significance of Effect	Fluvial	Surface Water	Reservoir Breach
	one flood zone classification	water flows and/or routing affecting properties internally	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 13.3: Flood Risk impact on receptor sensitivity – Watercourse Flood Levels

Sensitivity	Drainage Infrastructure
High	Increase in water levels results in a change of flood zone based on requirement of the Manchester Ship Canals Hydraulic Model
Moderate	Increase in Water levels which does not result in a change of flood zone
Low	No noticeable increase in water level

Drainage Infrastructure

13.29 Drainage infrastructure includes the private drainage system within the Site and the public combined water sewerage systems which run through the Site and sit at or beyond the Site boundary owned and maintained by United Utilities.

13.30 United Utilities has been consulted regarding the impact of the Proposed Development on the local combined sewerage system. The Environment Agency, The Manchester Ship Canal Company and United Utilities have been consulted regarding the surface water drainage strategy for the Site. The FRA provides details of the existing conditions and the proposed surface water drainage strategy thus enabling the impact of the Proposed Development on the local surface water drainage and sewerage system to be assessed.

13.31 A summary of the significance criteria used to assess the effect on and from the combined sewerage systems is shown in Table 13.4. Table 13.5 details the impact on the receptors sensitivity.

Table 13.4: Drainage infrastructure magnitude of change assessment criteria

Significance of Effect	Drainage Infrastructure

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 13.5: Drainage infrastructure impact on receptor sensitivity – Performance of the Sewer Network

Sensitivity	Drainage Infrastructure
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 the 1 in 100 year storm event
Low	Operation of the network is visually unaffected. No increase in the levels or frequency of surface water flooding

Water Quality

13.32 The assessment of the likely effect of the Proposed Development on water quality considers both watercourses and groundwater.

13.33 The water quality within the local watercourses has been assessed based on information obtained from the Environment Agency website. This information is primarily qualitative.

13.34 To date, there have been no intrusive ground investigation works undertaken on the Site hence the quality of the groundwater beneath it is currently unknown. The assessment has been based on information obtained from the Environment Agency website regarding the vulnerability of the groundwater to pollution. As with the watercourse quality information, this data is primarily qualitative.

13.35 The assessment of the likely effects of the Proposed Development on water quality will be qualitative. Details of the corresponding impact significance criteria are given in Table 13.6. Impact on the receptors sensitivity are provided in Table 13.7

Table 13.6: Water quality magnitude of change assessment criteria

Approach	Water Course	Groundwater
Major	Change in both ecological and chemical water quality	Change in both the chemical and quantitative water quality
Moderate	Change in either ecological or chemical water quality	Change in either chemical or quantitative water quality
Minor	Minor change in water quality	Minor change in water quality

Approach	Water Course	Groundwater
Negligible	No change in quality	No change in quality

Table 13.7: Water quality impact on receptor sensitivity - Measurable change in the Water Quality Classification

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.

13.36 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity whereby the impacts can be positive or negative. The impact significance Matrix is set out in table 13.8

Table 13.8: 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
Minor	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor – Negligible
Negligible	Negligible	Negligible	Negligible

Limitations and Assumptions

13.37 The assessments described above are subject to the following limitations and assumptions:

- The assessment of the performance of the existing adopted sewer networks is based on qualitative information only.
- The assessment of watercourse quality is based on qualitative information only.
- The assessment of groundwater quality is qualitative only.
- Assessment of groundwater is based on desk study information which has not been tested through an intrusive phase 2 site investigation.

Baseline Conditions

Flood Risk

13.38 This section summarises the existing flood risk that is experienced by the Site in its current condition and the surrounding area. Further details are provided in the FRA included in Appendix 13.1. Only the flooding sources that have been identified as presenting a specific risk on the Site and within the surrounding area has been considered.

Fluvial Flooding

13.39 The Environment Agency Flood Map indicates that the Site is located within Flood Zone 2 associated with the River Irwell which flows some 100m to the western boundary of the Site. Drawing number FRA001 in Appendix C of the FRA illustrates the flooding extents within the Site based on the flood zoning criteria as advised in the NPPF using the 1 in 100 year plus climate change and the 1 in 1000 year events determined via the Environment Agency's River Irwell hydraulic model. The maximum depth of flooding on the proposed development is approximately 0.6m. The Environment Agency has built a detailed hydraulic model of this water course extending past this Site. The predicted water levels for the 1 in 100 year plus climate change at 30% storm event is 26.6mAOD.

Surface Water Flooding

13.40 The Environment Agency Surface Water Flood Map identifies one area of surface water flooding within the Site. The area of flooding adjacent to Water Street corresponds to a low spot identified as part of the topographic survey. The area of flooding is predominantly defined as low risk except for a very small area to the east which is identified as medium risk.

Reservoir Breach

13.41 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 extents mirrors that are defined for the Flood Zone 2 storm events.

Infrastructure

13.42 The United Utilities sewer records show that there are public combined sewers running across the development and within Water Street. These sewers vary in size from 300mm and 750*550mm which cross the development to 800*520mm increasing to 920*610mm as you move downstream within Water Street. One Combined Sewer Overflow (CSO) is also detailed on the plans connecting to the identified 920*610mm sewer within the vicinity of the development. This CSO crosses the site to the west of the development, running parallel with the existing viaduct. CSO's act to prevent flooding from the sewers by directing the water out of the sewer via a weir into a separate outfall then into the awaiting watercourse. CSO structures are suitable on a combined sewer system because the foul water in the system is pushed through to the treatment works at the start of the storm and the remaining water in the system as it starts to surcharge before it floods is considered to be surface (clean) water.

13.43 The onsite private sewer network is not currently known other than what has been determined from various site walkover inspections. It is assumed that the sewer network served the industrial building which previously occupied the Site, but has subsequently been demolished.

13.44 Following discussions with United Utilities and having reviewed the SFRA the surrounding adopted sewer network is defined as being a critical drainage area (CDA). This would suggest that it currently does not provide the required level of service and is therefore considered to be under capacity.

Water Quality

Watercourses

13.45 The Environment Agency method for classifying the water quality of rivers and canals is known as the General Quality Assessment Scheme (GQA). This scheme allocates one for six grades (A-F) to each stretch of river. The GQA assessment of the Irwell River is a grade E which is poor for both chemically and Biology.

Groundwater

13.46 According to the Environment Agency mapping for the area including the Site, the quantitative quality and chemical quality of the groundwater is not known both now and in the future.

13.47 The whole of the Site is located outside of any Source Protection Zone.

13.48 The superficial deposits beneath the Site are identified as a Secondary A aquifer; and, the bedrock is denoted as a principal aquifer. The aquifer within the superficial deposits is classified as un-productive.

Identification and Evaluation of Significant Effects

13.49 The effects predicted within this section are based on a pre-mitigation scenario. Mitigation measures are described later in this chapter. Both the construction and operational scenarios are considered.

13.50 As noted above, the Site is positively drained and discharges in its entirety to the adopted combined sewer network which runs to the west and south of the site. The proposed drainage strategy is as follows:

- Discharge of the surface water from the Site is via a private surface water network into the River Irwell which will also serve the wider St John's Masterplan. Peak flows will not be restricted but the velocity at the point of discharge into the River Irwell cannot exceed 3m/s and should preferably be at 2m/s. This proposal has been discussed with the Manchester Ship Canal Company who considers that they can accommodate a discharge of this nature. The detailed design of the proposed network has however yet to be completed but will include the site wide network and will allow the prediction of final flow rates and velocities. This strategy has been reviewed and agreed with Manchester City Council, in their role as the Lead Flood Authority.

13.51 This proposed drainage strategy would remove approximately 100% of the existing area which currently drains into the adopted sewer networks and drain it into the River Irwell which is a more Sustainable outfall and drainage solution.

Fluvial Flooding

Construction

13.52 During construction, the preparation of the ground in readiness for the commencement of construction will impact slightly on the levels of the Site but these changes will be minimal and will not impact on flood zone classification or the extents to which the generated overland flows travel. On this basis, the pre-mitigation effect significance for fluvial flood risk during construction is considered to be **Negligible**.

Operation

13.53 The Proposed Development will have the same impermeable areas compared to the Site in its existing condition, therefore the volume of surface water generated by the Site will be unchanged; however through the proposed drainage strategy this surface water will now drain to the River Irwell. Therefore the only water entering the sewerage network will be the foul water. The increase in flow to the River Irwell due to the outfall of surface water could have the potential to increase flooding. This will be reviewed by the Manchester Ship Canal and if necessary the flows attenuated to prevent an increase in the risk of flooding.

13.54 The buildings which are proposed within the extent of the Flood Zone 2 classification have Less Vulnerable usages which under the requirements of the NPPF is considered as suitable. The buildings are sited such that they maintain the existing flow paths through to Water Street. There will be some reduction in flood storage, but this will be minimal and will be compensated through the extent of flooding experience on Water Street, which does not affect properties.

13.55 On this basis, the operational pre-mitigation effect significance for fluvial flood risk is considered to be **Minor Adverse**.

Surface Water Flooding

Construction

13.56 The areas identified by the Environment Agency as being susceptible to surface water flooding are isolated but are to be developed as part of the building proposals. As such there is the potential for the generation of new surface water flow paths which may affect areas that currently are not affected. This is considered a short term issue that will cease once the Proposed Development are complete. On this basis, the pre-mitigation impact significance for surface water flood risk during the construction phase is considered to be **Minor Adverse**.

Operation

13.57 There is no increase in the area of impermeable surface on the Site as a result of the Proposed Development and therefore the volume of surface water run-off will remain the same. The areas denoted as being susceptible to surface water flooding are adjacent to the River Irwell and the intention is to develop up to this boundary. As such the low spots will be removed and the extent of surface flooding will reduce. On this basis, the operational pre-mitigation effect significance for surface water flood risk is considered to be **Minor Beneficial**.

Reservoir Breach

13.58 The flooding which results from a reservoir breach manifests itself in exactly the same way as fluvial flooding, which would occur with an increase in the water level of the River Irwell. As noted above, the construction of the building and the building usages at ground floor will not impact on this type of flooding. On this basis, both the construction and operational pre-mitigation effect significance for reservoir breach flood risk is considered to be **Negligible.**

Infrastructure – Combined Sewers

Construction

13.59 The primary impact on off-site surface water sewerage during construction is silt and other debris being washed into the pipework. The Site drains to the United Utilities sewers, which run within Water Street. 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.

13.60 A further impact is potential structural damage due to construction traffic. The sewers adjacent to the Site are relatively deep (<3.0m) but the depth of the overflow associated with the sewers is currently unknown. Based on the extent of the Proposed Development and the foundation proposals, this may be affected. If this is the case then there will be a requirement to either divert the sewer away from the building/foundation footprint or adapt the structural design of the building such that a building over agreement can be negotiated with United Utilities.

13.61 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 existing rates.

13.62 On the basis of the above, the pre-mitigation effect significance on the surface water sewerage infrastructure during construction is considered to be **Minor Adverse**.

Operation

13.63 The proposed drainage solution would remove 100% of the existing surface water flows from the sewer network. This will dramatically improve the operation of the adopted sewer network by freeing up the available capacity within the network, which in turn will aid to reduce sewer surcharging and flooding within the wider area.

13.64 The Proposed Development is likely to increase to amount of discharge elements which connect to the local foul water sewerage system when compared to the existing situation. This will result in an increase in the flow rates and volumes of foul water that will be discharged into the local foul water sewerage system. This increase however is limited and is more than offset through the reduction in the surface water flows. This strategy has been both discussed and agreed with United Utilities.

13.65 The operational, pre-mitigation effect significance on the local combined sewerage infrastructure is considered to be **Major - Moderate Beneficial**.

Water Quality – Watercourses

Construction

13.66 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 topography of the Site. Potential pollutants include silt, fuel, oil and hydraulic fluid from construction plant, cement and concrete and other construction-related chemicals. These will have an adverse ecological impact, particularly in terms of the chemical water quality.

13.67 On the basis of the above, the pre-mitigation effect significance on watercourse water quality during construction is considered to be **Moderate Adverse**.

Operational

13.68 The Proposed Development includes service yard areas which are capable of generating polluted surface water run-off as a result of the vehicles that use them. The drainage strategy for the Proposed Development has the capability to convey run-off and hence pollutants more efficiently to the River Irwell. The substances involved will have an adverse ecological impact on the watercourse.

13.69 In light of the above, the operational, pre-mitigation effect significance on water watercourse water quality is considered to be **Moderate Adverse.**

Water Quality – Groundwater

Construction

13.70 During construction, there is a potential risk to groundwater quality as a result of pollutants arising from construction operations and materials being able to infiltrate into the ground. Disruption of the surface during construction may create more direct flow paths for any contaminants to reach the groundwater. As the ground conditions, namely the coefficient of infiltration is currently unknown, the rate at which the contaminants could reach the ground water cannot be determined.

13.71 On this basis, the pre-mitigation effect significance on groundwater water quality during construction is considered to be **Moderate Adverse**.

Operational

13.72 The Proposed Development will result in the ground within the Site being completely covered by a building and surrounding paved areas. All surfaces will be positively drained and the proposed system is not intending to use infiltration as a disposal technique. There is therefore minimal likelihood of infiltration occurring. The operational, pre-mitigation effect significance on groundwater water quality is considered to be **Negligible**.

Mitigation Measures

Fluvial Flooding

Construction

13.73 As the pre-mitigation impact significance for fluvial flood risk during construction is considered to be negligible, no mitigation measures are required.

Operational

13.74 The Proposed Development will be included within a positive surface water drainage system developed for the wider St John's development which will discharge into the River Irwell. This discharge will not be limited in terms of peak discharge rate but will be limited with regard to discharge velocity. This discharge philosophy will be tested with the Navigation Authority using the detailed hydraulic model prepared for the River Irwell which will determine the impact of the Proposed Development on flood levels. Initial discussions with the Manchester Ship Canal have been favourable in terms of the discharge proposals and the associated impact on fluvial flooding.

13.75 The ability to change levels on the site is limited due to the constraints imposed by the requirement to tie back into both Water Street and the banks of the River Irwell. The ability to lower levels on the site bellow existing and potentially increase flood risk is limited.

13.76 As part of the discussions with Manchester City Council a site levels strategy was agreed in as much as the site must be raised to its maximum level but without compromising the ability to provide DDA compliant access. The aspirational levels that the site is looking to achieve would be 26.9m AOD. This is not feasible and as a consequence the uses at ground level may be subject to flooding and as such will include flood resilience in the design of the units and the specification of materials. This is as per the agreement with Manchester City Council in their role as Lead Flood Authority.

13.77 On this basis, the proposed mitigation measures allow the operational impact significance of fluvial flooding from the Proposed Development to remain as **Minor Adverse**.

Surface Water Flooding

Construction

13.78 Surface water flood risk from the Site during construction will be managed by planning excavations and the placement of materials such that surface flow paths will not be blocked or new routes created. In addition, positive measures such as the use of cut-off ditches and bunds can be used to safely direct any flows within the Site.

13.79 These measures are effective, but are wholly reliant on timely and correct implementation. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition and therefore, the impact significance of surface water flooding during the construction phase remains unchanged as **Minor Adverse**.

Operational

13.80 As the pre-mitigation impact significance for surface water flood risk during operation is considered to be **minor beneficial**, no mitigation measures are required.

Reservoir Breach Flooding

13.81 As the pre-mitigation impact significance for surface water flood risk both during construction and operation is considered to be **negligible**, no mitigation measures are required.

Infrastructure – Combined Sewers

Construction

13.82 The control of sediment entering the local combined water sewerage system is the primary mitigation measure required to limit the impact of construction activities on the system. Silt control measures such as traps and settlement plant will be required to mitigate this risk. Additionally, to control the quantity of silt washed into the local sewerage network from the public highway, a regime of road sweeping in conjunction with wheel washing for all construction vehicles will be implemented at all Site accesses.

13.83 The combined water sewers should be regularly monitored by the Contractor using CCTV to check for debris accumulation and any structural deformation or other defects. As required, debris can be removed by jetting and appropriate remedial actions can be put in place to address structural issues.

13.84 These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. The proposed mitigation measures allow construction phase impact significance to be reduced from Minor Adverse to **Negligible**.

Operational

13.85 As the pre-mitigation impact significance for surface water flood risk during operation is considered to be **Major/Moderate Beneficial,** no mitigation measures are required.

Water Quality – Watercourses

Construction

13.86 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 through the use of 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 trench to intercept the overland flow routes will also prevent pollution.

13.87 The risk of fuel and other oils entering the watercourse can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills. The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are put in place to limit their movement over the surface of the Site.

13.88 These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition.

13.89 On this basis, the mitigation measures allow the impact significance of construction on watercourse water quality to be reduced from Moderate Adverse to **Minor Adverse**.

Operational

13.90 Surface water from paved areas within the Proposed Development will be passed through trapped gullies and, if appropriate, an interceptor. These will remove suspended solids and also separate out a proportion of any oils that are present.

13.91 On this basis, the mitigation measures enable the operational effect significance of the Proposed Development on watercourse water quality to be reduced from Moderate Adverse to **Negligible**.

Water Quality – Groundwater

Construction

13.92 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 of fuel and other oils being spilled can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills.

13.93 The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are put in place to limit the degree of infiltration that can occur. This may involve the use of impermeable membranes over the surface of the ground, spill trays and other containment measures.

13.94 These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition.

13.95 On this basis, the mitigation measures allow the impact significance of construction on groundwater water to remain unchanged as **Minor Adverse.**

Operational

13.96 As the operational, pre-mitigation impact significance on groundwater quality is considered to be **negligible**, no mitigation measures are required.

Cumulative Effects

Fluvial Flooding

Construction

13.97 The cumulative effects on fluvial flood risk that other development, which are in close proximity pose to this Proposed Development are considered minimal. It is assumed that the development will implement a CEMP which should ensure fluvial flood risk is not increased in the area.

Operational

13.98 The operational cumulative effects of developments in the vicinity of the Proposed Development on the risk of fluvial flooding is considered to be minimal. Each development must comply with the requirements of the Environment Agency and those included in the Manchester SFRA in terms of flood risk management. It is assumed that the measures included in the approved Flood Risk Assessment for each development will be implemented to ensure that flood risk in the wider area is not increased. As all FRA's submitted will be reviewed by Manchester City Council then cumulative affects remain within their control. All discharges into the River Irwell are controlled and modelled by Peel Holding and the Manchester Ship Canal and therefore cumulative effects are accounted for ahead of any agreement to provide a discharge agreement.

Surface Water Flooding

Construction

13.99 The cumulative effects of the developments in the vicinity of the Proposed Development during construction on the risk of surface water flooding is considered to be minimal. It is possible that, individually, the construction of each development may affect surface water flooding behaviour in the immediate vicinity of each site; however, the geographical separation of each site is sufficient to prevent these localised effects from combining to have a wider impact.

Operational

13.100 The operational cumulative effects of the developments in the vicinity of the Proposed Development on the risk of surface water flooding is considered to be minimal. It is expected that each development will have a localised impact that will be managed by the approved Flood Risk Assessment prepared for each in accordance with the Manchester SFRA and the requirements of the Environment Agency. The spatial separation of each development is such that any localised effects will not be able to combine to have a wider impact.

Reservoir Breach Flooding

Construction

13.101 The cumulative effects on reservoir breach flooding that other developments within or in close proximity pose to the development, is considered minimal. It is assumed that the development will implement a CEMP which should ensure fluvial flood risk is not increased in the area.

Operational

13.102 The operational cumulative effects of the developments in the vicinity of the Proposed Development on the risk of reservoir breach flooding is considered to be minimal. Each development must comply with the requirements of the Environment Agency and those included in the Manchester SFRA in terms of flood risk management. It is assumed that the measures included in the approved Flood Risk Assessment for each development will be implemented to ensure that flood risk in the wider area is not increased.

Infrastructure – Combined Sewers

Construction

13.103 The cumulative effects on the combined water sewerage network of the developments in the vicinity of the Proposed Development during construction are expected to be minimal. During construction it is expected that foul water flow rates from each development site will be reduced. The CEMP’s for each development should ensure that the quantity of silt and other debris entering the system is minimised. On this basis, it is expected that the cumulative impact of the various developments together with the Proposed Development is minimal.

Operation

13.104 United Utilities have confirmed that there is sufficient capacity within the existing adopted combined sewer network to accept the foul flows from the Proposed Development without restriction. Surface water flows from the Proposed Development will be removed entirely from the combined sewer network. This drainage option for the Proposed Development have been discussed with both United Utilities who have confirmed that this is their preferred drainage solution and Manchester City Council who have confirmed their preference for the implementation of this strategy.

Water Quality – Watercourses

Construction

13.105 The cumulative effect during construction of the developments in the vicinity of the Proposed Development on the water quality of local watercourses is considered to be minimal. The CEMP's associated with each development should ensure that appropriate pollution control measures are implemented to prevent contaminants from reaching watercourses via overland flow routes.

Operational

13.106 The operational cumulative effects of the developments in the vicinity of the Proposed Development on the water quality of watercourses are anticipated to be minimal. Each development in the area must comply with the Environment Agency and Core Strategy - Development Plan in terms of the provision of measures to ensure that the water quality of any surface run-off will not adversely affect the water quality in local watercourses. This may include the provision of interceptors and/or the inclusion of a SUDS water treatment train appropriate to the nature of the development.

Water Quality – Groundwater

Construction

13.107 The cumulative effects of the developments in the vicinity of the Proposed Development during construction on groundwater quality are considered to be minimal. The CEMP's for each development should ensure that protection measures, appropriate to the type of development and construction methodology, are implemented to limit the opportunities for pollutants to infiltrate into the ground and adversely affect groundwater quality.

Operational

13.108 The operational cumulative effects of the developments in the vicinity of the Proposed Development on groundwater quality are anticipated to be minimal. The underlying ground conditions are not known and therefore the potential to create a direct drainage pathway for contamination to reach groundwater cannot be ruled out.

As such the introduction of impermeable barriers around drainage features will prevent the creation of drainage pathways back to ground, therefore mitigating the potential contamination risk. In addition, the development is expected to incorporate positive drainage systems and significant paved areas which block the routes for run-off to directly enter groundwater. On this basis, developments in the area will not adversely affect groundwater quality.

Residual Effects

Fluvial Flooding

Construction

13.109 There are no residual risks associated with fluvial flooding from the Proposed Development during construction. As the pre-mitigation impact significance for fluvial flood risk during construction is considered to be **negligible**, no mitigation measures are required.

Operational

13.110 If a rainfall event occurs that exceeds the design parameters of the proposed surface water drainage systems, there will be no control on the flow rate that leaves the Site. There is therefore a residual risk that fluvial flood risk downstream could be exacerbated under such circumstances.

13.111 The effect of fluvial flooding from the Proposed Development is **Minor Adverse**.

Surface Water Flooding

Construction

13.112 The mitigation measures proposed to control the potential impact of the Proposed Development on surface water flooding during construction are primarily associated with the correct implementation of these measures by site operatives in accordance with the CEMP.

13.113 The measures implemented during construction are temporary and will have a limited capacity hence could be overwhelmed by run-off from an extreme rainfall event. Under such circumstances, surface water flood risk beyond the Site boundary could be exacerbated.

13.114 The effect of surface water flooding during the construction phase is **Minor Adverse**.

Operational

13.115 Whilst the Proposed Development incorporates a positive drainage system designed to collect and dispose of any run-off from the Site, there is a residual risk of an extreme rainfall event that overwhelms the collection measures. This would result in uncontrolled run-off from the Proposed Development with the potential to increase surface water flood risk beyond the Site boundary.

13.116 All drainage systems require regular maintenance. If this maintenance is not carried out, then there is the potential for a reduction in capacity which can manifest itself in the form of surface water flooding during lower order storm events.

13.117 The operational effect of surface water flooding from the Proposed Development is **Minor Adverse**.

Reservoir Breach Flooding

13.118 There are no residual risks associated with reservoir breach flooding from the Proposed Development both during construction and operation. As the pre-mitigation impact significance for fluvial flood risk during both construction and operation is considered to be negligible, no mitigation measures are required.

Infrastructure – Combined Sewers

Construction

13.119 The mitigation measures proposed to control silt ingress are reliant on procedures that must be undertaken regularly by site operatives in accordance with the requirements of the CEMP.

13.120 Should the above residual risk occur, it is possible that there would be an increase in flood risk elsewhere and the normal drainage of water through the system would be impeded.

13.121 The construction phase effect on surface water sewerage is **Minor Adverse**.

Operation

13.122 If a rainfall event occurs that exceeds the design parameters for the proposed surface water drainage systems that serves the Proposed Development, there will be both surcharging and flooding. This flooding will be controlled such that it is directed away from any building but this could direct it back towards the highway. This could result in water from the site entering the adopted sewer network via the gullies included to drain the highway.

13.123 The operational effect on the local surface water sewerage system from the Proposed Development is therefore reduced to **Minor Beneficial** because of this residual risk.

Water Quality – Watercourses

Construction

13.124 The mitigation measures associated with protecting water quality in local watercourses during construction are reliant on their timely implementation in the event of a release of polluting substances in accordance with the requirements of the CEMP.

13.125 The effect of construction on watercourse water quality is **Minor Adverse**.

Operational

13.126 On completion of the Proposed Development, there are residual effects associated with a potential failure to maintain any interceptors or other water quality improving facilities that could result in a release of pollution into watercourses downstream of the Site.

13.127 The operational effect of the Proposed Development on watercourse water quality is **Minor Adverse**.

Water Quality – Groundwater

Construction

13.128 The mitigation measures associated with protecting groundwater quality during construction are reliant on their timely implementation in the event of a release of polluting substances in accordance with the requirements of the CEMP.

13.129 The effect of surface water flooding during the construction phase is **Minor Adverse**.

Operational

13.130 Operational, it is concluded that there are no residual effects associated with groundwater quality.

13.131 The operational effect on groundwater quality is considered to be **Negligible**.

Table 13.9 – Summary of Receptors, Likely Significant Effects, Mitigation Measures, and Residual Effects

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Construction Phase			
Negligible effects on fluvial flooding	River Irwell	As the pre-mitigation impact significance for fluvial flood risk during construction is considered to be negligible, no mitigation measures are required.	Negligible effects on fluvial flooding
Minor adverse effects on surface water flooding	Surface Water	Surface water flood risk from the Site during construction will be managed by planning excavations and the placement of materials such that surface flow paths will not be blocked or new routes created. In addition, positive measures such as the use of cut-off ditches and bunds can be used to safely direct any flows within the Site. These measures are effective, but are wholly reliant on timely and correct implementation. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition and therefore, the impact significance of surface water flooding during the construction phase remains unchanged as Minor Adverse.	Minor adverse effects on surface water flooding.
Negligible reservoir breach flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk both during construction and operation is considered to be negligible, no mitigation measures are required.	Negligible effects reservoir breach flooding
Minor adverse effects on Infrastructure – Combined	Combined Sewer Network	The control of sediment entering the local combined water sewerage system is the primary mitigation measure required to limit the impact of construction activities on the system. Silt control measures such as traps and settlement plant will be required to mitigate this risk. Additionally, to control the	Minor adverse effects on infrastructure – combined sewers.

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Sewers		quantity of silt washed into the local sewerage network from the public highway, a regime of road sweeping in conjunction with wheel washing for all construction vehicles will be implemented at all Site accesses. The combined water sewers should be regularly monitored by the Contractor using CCTV to check for debris accumulation and any structural deformation or other defects. As required, debris can be removed by jetting and appropriate remedial actions can be put in place to address structural issues. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. The proposed mitigation measures allow construction phase impact significance to be reduced from Minor Adverse to Negligible.	
Moderate adverse effects on water quality - watercourse	River Irwell	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 through the use of 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 trench to intercept the overland flow routes will also prevent pollution. The risk of fuel and other oils entering the watercourse can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills. The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are put in place to limit their movement over the surface of the Site. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. On this basis, the mitigation measures allow the impact significance of construction on watercourse water quality to be reduced from Moderate Adverse to Minor Adverse.	Minor adverse effects on water quality - watercourse.
Moderate adverse effects on water quality - groundwater	Groundwater	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 of fuel and other oils being spilled can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills. The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are put in place to limit the degree of infiltration that can occur. This may involve the use of impermeable membranes over the surface of the ground, spill trays and other containment measures. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. On this basis, the mitigation measures allow the impact significance of construction on groundwater water to remain unchanged as Minor Adverse.	Minor adverse effects on water quality - groundwater.
Operational Phase			

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Minor adverse effects on fluvial flooding	Surface Water	The Proposed Development will be included within a positive surface water drainage system developed for the wider St John's development which will discharge into the River Irwell. This discharge will not be limited in terms of peak discharge rate but will be limited with regard to discharge velocity. This discharge philosophy will be tested with the Navigation Authority using the detailed hydraulic model prepared for the River Irwell which will determine the impact of the Proposed Development on flood levels. Initial discussions with the Manchester Ship Canal have been favourable in terms of the discharge proposals and the associated impact on fluvial flooding. The ability to change levels on the site is limited due to the constraints imposed by the requirement to tie back into both Water Street and the banks of the River Irwell. The ability to lower levels on the site bellow existing and potentially increase flood risk is limited As part of the discussions with Manchester City Council a site levels strategy was agreed in as much as the site must be raised to its maximum level but without compromising the ability to provide DDA compliant access. The aspirational levels that the site is looking to achieve would be 26.9m AOD. This is not feasible and as a consequence the uses at ground level may be subject to flooding and as such will include flood resilience in the design of the units and the specification of materials. This is as per the agreement with Manchester City Council in their role as Lead Flood Authority. On this basis, the proposed mitigation measures allow the operational impact significance of fluvial flooding from the Proposed Development to remain as Minor Adverse.	Minor adverse effects on fluvial flooding
Minor Beneficial effects on surface water flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk during operation is considered to be minor beneficial, no mitigation measures are required	Minor Adverse effects on surface water flooding. The effect has been reduced because the drainage networks are designed to accommodate a finite storm (1 in 30 year). Storms in excess of this will still result in surface water flooding. So although the removal of surface water will aid in reducing flooding it cannot prevent it or make a major impact because of the actual design.
Negligible reservoir breach flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk both during construction and operation is considered to be negligible, no mitigation measures are required.	Negligible effects reservoir breach flooding
Major/Moderate Beneficial effects on Infrastructure – combined sewers	Combined Sewer Network	As the pre-mitigation impact significance for surface water flood risk during operation is considered to be Major/Moderate Beneficial, no mitigation measures are required.	Minor Beneficial effects on Infrastructure – combined sewers. The effect has been reduced because the

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
			drainage networks are designed to accommodate a finite storm (1 in 30 year). Storms in excess of this will still result in surface water flooding. So although the removal of surface water will aid in reducing flooding it cannot prevent it or make a major impact because of the actual design.
Moderate Adverse effect on water quality – watercourse	River Irwell	Surface water from paved areas within the Proposed Development will be passed through trapped gullies and, if appropriate, an interceptor. These will remove suspended solids and also separate out a proportion of any oils that are present. On this basis, the mitigation measures enable the operational effect significance of the Proposed Development on watercourse water quality to be reduced from Moderate Adverse to Negligible.	Minor Adverse effects on water quality – watercourse
Negligible effects on water quality – groundwater	Groundwater	As the operational, pre-mitigation impact significance on groundwater quality is considered to be negligible, no mitigation measures are required.	Negligible effects on water quality – groundwater.

14 Summary of Residual Impacts

14.1 This section contains a summary of the residual effects of the Proposed Development.

Townscape and Visual Impact Assessment

14.2 Table 14.1 below provides a summary of the residual effects before and after mitigation for the operational phase.

Table 14.1: Summary of Impact – Townscape and Visual Impact Assessment

Development only (Residual Effect)		Relevant cumulative scheme	Cumulative impact
Location			
Heritage Views			
1,2,3,4,8			
Sensitivity	High	St Johns	
Magnitude	Major beneficial	Trinity islands	
Significance	Major beneficial		**Moderate beneficial**
H5			
Sensitivity	Low / high	St Johns	
Magnitude	Minor beneficial		
Significance	Minor negligible / Moderate beneficial		**Negligible**
H6			
Sensitivity	Low		
Magnitude	Major beneficial		
Significance	Moderate beneficial		**Moderate beneficial**
H7			
Sensitivity	High		
Magnitude	Negligible		
Significance	Negligible		**Negligible**
Townscape Views			
1			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
2			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
3			
Sensitivity			
Magnitude			

Development only (Residual Effect)		Relevant cumulative scheme	Cumulative impact
Significance	No impact		**No impact**
4			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
5			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
6			
Sensitivity	Moderate /low	St Johns	
Magnitude	Minor	OGS	
Significance	Minor /negligible		**No impact**
7			
Sensitivity	Moderate	St Johns	
Magnitude	Minor	OGS	
Significance	Minor beneficial		**No impact**
8			
Sensitivity	Low	St Johns	
Magnitude	Major beneficial		
Significance	Moderate beneficial		**Negligible**
9			
Sensitivity	High / low	St Johns	
Magnitude	Minor beneficial	Trinity islands	
Significance	Moderate to minor beneficial		**No impact**
10			
Sensitivity	Low	St Johns	
Magnitude	Negligible	Salford Central	
Significance	Negligible		**Negligible**
11			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
12			
Sensitivity			
Magnitude			
Significance	No impact		**No impact**
13			
Sensitivity	Low / moderate	St Johns	
Magnitude	Moderate / beneficial	Trinity islands	
Significance	Moderate / minor beneficial	OGS	**Minor beneficial**
14			
Sensitivity	Low	St Johns	
Magnitude	Minor beneficial	Trinity islands	

Development only (Residual Effect)		Relevant cumulative scheme	Cumulative impact
Significance	Negligible	Astley & Byrom House Middlewood Locks	**Negligible**

Historic Built Environment

14.3 Table 14.2 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.2: Summary of Impact – Historic Built Environment

Receptor	Likely Significant Effect	Mitigation	Residual Effect
Demolition and Construction Phase			
Bonded Warehouse (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Colonnaded Viaduct (physical)	Minor Adverse	Construction methodology and programme	**Minor Adverse**
Colonnaded Viaduct (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Stephenson's bridge (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
1830s viaduct (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Zig-Zag bridge (setting)	Minor Adverse	Construction methodology and programme	**Minor Adverse (temporary)**
Operational Phase			
1) Stephenson's Bridge (setting)	Negligible	n/a	**Negligible**
2) Liverpool Road Station Building (setting)	Negligible	n/a	**Negligible**
3) 1830 Warehouse (setting)	Negligible	n/a	**Negligible**

Receptor	Likely Significant Effect	Mitigation	Residual Effect
4) 1830 Viaduct (setting)	Negligible	n/s	**Negligible**
5) Colonnaded Railway Viaduct (physical)	Minor adverse	Public benefits	**Negligible**
5) Colonnaded Railway Viaduct (setting)	Minor adverse	Public benefits	**Negligible**
6) Manchester South Junction and Altrincham Railway Viaduct (setting)	Negligible	n/a	**Negligible**
7) Giants Basin (setting)	Negligible	n/a	**Negligible**
8) Pair of culvert arches over River Medlock and associated overflow channel (setting)	Negligible	n/a	**Negligible**
9) Commercial Hotel, Liverpool Road (setting)	Negligible	N/a	**Negligible**
10) 123 Liverpool Road (setting)	Negligible	n/a	**Negligible**
11) MSI Power Hall (setting)	Negligible	n/a	**Negligible**
12) MSI Warehouse (setting)	Negligible	n/a	**Negligible**
13) Great John Street Hotel (setting)	Negligible	n/a	**Negligible**
14) Victoria and Albert Warehouse (setting)	Negligible	n/a	**Negligible**
15) Zig-Zag viaduct	Negligible	n/a	**Negligible**
16) Girder Bridge (Salford side) (setting)	Negligible	n/a	**Negligible**
17) Stephenson's Bridge (Salford side) (setting)	Negligible	n/a	**Negligible**

Receptor	Likely Significant Effect	Mitigation	Residual Effect
18) Manchester and Salford Junction Canal Tunnel (setting)	Negligible	n/a	**Negligible**
19) Bonded Warehouse (setting)	Minor beneficial	n/a	**Minor beneficial**
20) Castlefield (character and appearance)	Minor beneficial	n/a	**Minor beneficial**
21) St Johns (character and appearance	Negligible	**n/a**	**Negligible**

Air Quality

14.4 Table 14.3 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.1: Summary of Impact – Air Quality

Impact	Receptor(s)	Mitigation Measure	Residual Effect
Construction			
Major adverse cumulative effect of dust soiling	Residential properties, museums and significant buildings	Generic and activity specific measures to control dust generation and emission from site, liaison with local stakeholders, liaison with other developments and, where possible, avoidance of significant dust-generating activities simultaneously (see Tables 8.37 and 8.38).	**Negligible effects on dust soiling from Proposed Development and minor adverse effect overall**
Major adverse cumulative effect on human health from dust	Residential, education, commercial, industrial and office buildings	Generic and activity specific measures to control dust generation and emission from site, liaison with local stakeholders, liaison with other developments and, where possible, avoidance of significant dust-generating activities simultaneously (see Tables 8.37 and 8.38).	**Negligible effects on human health from Proposed Development and minor adverse effect overall**
Operational			
Negligible and slight adverse effects on NO_2 concentrations	Varies by receptor, see Table 8.32	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions.	**Negligible effects on NO_2 concentrations**

Impact	Receptor(s)	Mitigation Measure	Residual Effect
Negligible effects on PM_{10} concentrations	All	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions.	**Negligible effects on PM_{10} concentrations**
Negligible effects on $PM_{2.5}$ concentrations	All	Paragraph 8.112: Adoption of strategic and sustainable practices as part of a Travel Plan will give rise to further reductions in vehicular emissions.	**Negligible effects on $PM_{2.5}$ concentrations**

Noise and Vibration

14.5 Table 14.4 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.4: Summary of Impact – Noise and Vibration

Impact	Description	Pre-mitigation Significance	Post-mitigation Significance
Demolition and construction phase			
Demolition and construction traffic noise	Effects of vehicle movements off site	Not significant	**Not significant**
Site noise	Effects on dwellings inc hotels	Not significant	**Not significant**
	Effects on MSI	Significant at 1830 Warehouse and Technical Services office	**Significant at 1830 Warehouse**
Site vibration	Effects on dwellings (inc hotels)	Not significant	**Not significant**
	Effects on MSI	Significant effect at Store 4 Not significant elsewhere	**Not significant**
Operational phase			
Event noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Building services plant noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**

Impact	Description	Pre-mitigation Significance	Post-mitigation Significance
Deliveries and loading noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Traffic noise	Effects on all existing noise sensitive receptors	Not significant	**Not significant**
Patrons noise	**Effects on all existing noise sensitive receptors**	**Not significant**	**Not significant**

Wind Microclimate

14.6 Table 14.5 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.5: Summary of Impact – Wind Microclimate

Impact	Description	Pre-mitigation Significance	Post-Mitigation Significance
Demolition and Construction			
Increased Wind Speed	Effect on nearby pedestrian activity	Negligible	**Negligible**
Operation			
Increased Wind Speed	Pedestrian Safety	Negligible	**Negligible**
Increased Wind Speed	Pedestrian Comfort	Negligible / Minor Adverse	**Negligible / Minor Adverse**

Traffic and Transport

14.7 Table 14.6 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.6: Summary of Impact – Traffic and Transport

Receptor	Pre-Mitigation Significance	Post-Mitigation Significance
Construction Phase		
Vulnerable Road Users (Pedestrians and Cyclists)	Minor Adverse	**Minor – Negligible**
Operational Phase		
Residents of	Moderate – Minor Adverse	**Minor Adverse**

Receptor	Pre-Mitigation Significance	Post-Mitigation Significance
Liverpool Road, Lower Byrom Street and Left Bank Apartments Facing New Quay Street		
Pedestrians	Minor Adverse	**Minor – Negligible**
Cyclists	Minor Adverse	**Minor – Negligible**

Ground Conditions

14.8 Table 14.7 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.7: Summary of Impact – Ground Conditions

Likely Significant Effect	Receptor	Mitigation	Residual Effect
Demolition and Construction Phase			
Exposure pathways to contamination in Made Ground (if any) - oral ingestion of soil, dermal contact of soil, soil dust inhalation. **Migration of ground gas into confined spaces created during construction.**	Construction Workers	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Hygiene. Use of PPE / RPE. Development of safe working procedures. Dust suppression. Prevention / control of confined spaces	**Minor (Adverse)** **(Temporary)**
Outdoor inhalation of dust. **Migration of ground gas.**	Off-site public	Dust suppression, operational controls. Appropriate on-site Health and Safety controls and gas monitoring as necessary.	**Minor (Adverse)** **(Temporary)**
Vertical migration of leachate from on-site Made Ground during earthworks. **Spillage from fuel in from construction plant or storage areas/site compound.**	Chester Pebble Beds Principal Aquifer	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control. Spillage containment for fuel / waste storage areas as good practice.	**Negligible** **(Temporary)**
Vertical migration of leachate from on-site Made Ground during earthworks. **Spillage from fuel in from construction**	River Irwell	Avoidance of stockpiling. Covering of stockpiles where possible. Implementation of pollution controls. Drainage control.	**Negligible** **(Temporary)**

Likely Significant Effect	Receptor	Mitigation	Residual Effect
plant or storage areas/site compound.		Spillage containment for fuel / waste storage areas as good practice.	
Plant uptake of phytotoxic metals from Made Ground. **Spillage from fuel in car parks or proposed waste storage areas.**	On-site vegetation (Green Space)	Operational and pollution controls. Spillage containment for fuel /waste storage areas as good practice.	**Negligible** **(Temporary)**
Migration of ground gas - fire/explosion in confined spaces. **Migration of site derived dust during earthworks.**	Off-site property	Appropriate on-site Health and Safety controls and gas monitoring where necessary. Prevention/control of confined spaces. Development of safe working procedures	**Minor (Adverse)** **(Temporary)**
Operational Phase			
On-site Made Ground materials removed/reduced and replaced with hardstanding. **Migration of ground gas into confined spaces**	Residential / commercial site end user	Removal of all source-pathway-receptor linkages. Design of appropriate gas protection measures where necessary. Clean trenches for water supply pipes as good practice.	**Minor (Beneficial)**
Outdoor inhalation of dust. **Migration of ground gas.**	Off-site public	Removal of all source-pathway-receptor linkages.	**Minor (Beneficial)**
Migration of leachate from on-site Made Ground. **Spillage from fuel in car parks or waste storage areas.**	Chester Pebble Beds Principal Aquifer	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads and parking areas.	**Minor (Beneficial)**
Migration of leachate from on-site Made Ground. **Spillage from fuel in car parks or waste storage areas.**	River Irwell	Removal of all source-pathway-receptor linkages. Appropriate storage of potentially polluting materials. Drainage controls in roads and parking areas.	**Minor (Beneficial)**
Plant uptake of phytotoxic metals	On-site vegetation (green space)	None required.	**Minor (Beneficial)**

Likely Significant Effect	Receptor	Mitigation	Residual Effect
from Made Ground. **Spillage from fuel in car parks or waste storage areas.**			
Migration of ground gas – fire / explosion in confined spaces. **Migration of dust**	**On-site property** **Off-site Property**	**Design of appropriate gas protection measures where necessary as good practice.** **Operational and pollution controls.**	**Minor (Beneficial)**

Water Resources and Drainage

14.9 Table 14.8 below provides a summary of the residual effects before and after mitigation for both the construction and operational phase.

Table 14.8: Summary of Impact – Water Resources and Drainage

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
Construction Phase			
Negligible effects on fluvial flooding	River Irwell	As the pre-mitigation impact significance for fluvial flood risk during construction is considered to be negligible, no mitigation measures are required.	**Negligible effects on fluvial flooding**
Minor adverse effects on surface water flooding	Surface Water	Surface water flood risk from the Site during construction will be managed by planning excavations and the placement of materials such that surface flow paths will not be blocked or new routes created. In addition, positive measures such as the use of cut-off ditches and bunds can be used to safely direct any flows within the Site. These measures are effective, but are wholly reliant on timely and correct implementation. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition and therefore, the impact significance of surface water flooding during the construction phase remains unchanged as Minor Adverse.	**Minor adverse effects on surface water flooding.**
Negligible reservoir breach flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk both during construction and operation is considered to be negligible, no mitigation measures are required.	**Negligible effects reservoir breach flooding**
Minor adverse effects on Infrastructure – Combined Sewers	Combined Sewer Network	The control of sediment entering the local combined water sewerage system is the primary mitigation measure required to limit the impact of construction activities on the system. Silt control measures such as traps and settlement plant will be required to mitigate this risk. Additionally, to control the quantity of silt	**Minor adverse effects on infrastructure – combined sewers.**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
		washed into the local sewerage network from the public highway, a regime of road sweeping in conjunction with wheel washing for all construction vehicles will be implemented at all Site accesses. The combined water sewers should be regularly monitored by the Contractor using CCTV to check for debris accumulation and any structural deformation or other defects. As required, debris can be removed by jetting and appropriate remedial actions can be put in place to address structural issues. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. The proposed mitigation measures allow construction phase impact significance to be reduced from Minor Adverse to Negligible.	
Moderate adverse effects on water quality - watercourse	River Irwell	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 through the use of 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 trench to intercept the overland flow routes will also prevent pollution. The risk of fuel and other oils entering the watercourse can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills. The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are put in place to limit their movement over the surface of the Site. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. On this basis, the mitigation measures allow the impact significance of construction on watercourse water quality to be reduced from Moderate Adverse to Minor Adverse.	**Minor adverse effects on water quality - watercourse.**
Moderate adverse effects on water quality - groundwater	Groundwater	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 of fuel and other oils being spilled can be controlled by limiting where refuelling activities can take place, placing static plant such as pumps on spill trays, ensuring that all plant is well maintained in order to prevent leaks and having spill kits available to clear up any spills. The impacts associated with other contaminants can be controlled by limiting where materials are stored and ensuring that appropriate containment measures are	**Minor adverse effects on water quality - groundwater.**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
		put in place to limit the degree of infiltration that can occur. This may involve the use of impermeable membranes over the surface of the ground, spill trays and other containment measures. These measures will be included within the Construction Environment Management Plan (CEMP) which will be agreed via planning condition. On this basis, the mitigation measures allow the impact significance of construction on groundwater water to remain unchanged as Minor Adverse.	
Operational Phase			
Minor adverse effects on fluvial flooding	Surface Water	The Proposed Development will be included within a positive surface water drainage system developed for the wider St John's development which will discharge into the River Irwell. This discharge will not be limited in terms of peak discharge rate but will be limited with regard to discharge velocity. This discharge philosophy will be tested with the Navigation Authority using the detailed hydraulic model prepared for the River Irwell which will determine the impact of the Proposed Development on flood levels. Initial discussions with the Manchester Ship Canal have been favourable in terms of the discharge proposals and the associated impact on fluvial flooding. The ability to change levels on the site is limited due to the constraints imposed by the requirement to tie back into both Water Street and the banks of the River Irwell. The ability to lower levels on the site bellow existing and potentially increase flood risk is limited As part of the discussions with Manchester City Council a site levels strategy was agreed in as much as the site must be raised to its maximum level but without compromising the ability to provide DDA compliant access. The aspirational levels that the site is looking to achieve would be 26.9m AOD. This is not feasible and as a consequence the uses at ground level may be subject to flooding and as such will include flood resilience in the design of the units and the specification of materials. This is as per the agreement with Manchester City Council in their role as Lead Flood Authority. On this basis, the proposed mitigation measures allow the operational impact significance of fluvial flooding from the Proposed Development to remain as Minor Adverse.	**Minor adverse effects on fluvial flooding**
Minor Beneficial effects on surface water flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk during operation is considered to be minor beneficial, no mitigation measures are required	**Minor Adverse effects on surface water flooding.** **The effect has been reduced**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
			because the drainage networks are designed to accommodate a finite storm (1 in 30 year). Storms in excess of this will still result in surface water flooding. So although the removal of surface water will aid in reducing flooding it cannot prevent it or make a major impact because of the actual design.
Negligible reservoir breach flooding	Surface Water	As the pre-mitigation impact significance for surface water flood risk both during construction and operation is considered to be negligible, no mitigation measures are required.	**Negligible effects reservoir breach flooding**
Major/Moderate Beneficial effects on Infrastructure – combined sewers	Combined Sewer Network	As the pre-mitigation impact significance for surface water flood risk during operation is considered to be Major/Moderate Beneficial, no mitigation measures are required.	**Minor Beneficial effects on Infrastructure – combined sewers.** **The effect has been reduced because the drainage networks are designed to accommodate a finite storm (1 in 30 year). Storms in excess of this will still result in surface water flooding. So although the removal of surface water will aid in reducing flooding it**

Likely Significant Effect	Receptor(s)	Mitigation Measure	Residual Effect
			cannot prevent it or make a major impact because of the actual design.
Moderate Adverse effect on water quality – watercourse	River Irwell	Surface water from paved areas within the Proposed Development will be passed through trapped gullies and, if appropriate, an interceptor. These will remove suspended solids and also separate out a proportion of any oils that are present. On this basis, the mitigation measures enable the operational effect significance of the Proposed Development on watercourse water quality to be reduced from Moderate Adverse to Negligible.	**Minor Adverse effects on water quality – watercourse**
Negligible effects on water quality – groundwater	Groundwater	As the operational, pre-mitigation impact significance on groundwater quality is considered to be negligible, no mitigation measures are required.	**Negligible effects on water quality – groundwater.**