Appendix 2.1

PHASE 1 PRELIMINARY GEO-ENVIRONMENTAL RISK ASSESSMENT

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

REPORT N^{O} 70010925/001/10465

JACKSON'S ROW

PHASE I PRELIMINARY GEO-ENVIRONMENTAL RISK ASSESSMENT

CONFIDENTIAL

JANUARY 2016

WSP | PARSONS BRINCKERHOFF

JACKSON'S ROW

PHASE I PRELIMINARY GEO-ENVIRONMENTAL RISK ASSESSMENT

Jackson's Row Developments Limited

Phase I Preliminary Geo-Environmental Risk Assessment
Confidential

Project no: 70010925/001/10465
Date: January 2016

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QUALITY MANAGEMENT

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1 EXECUTIVE SUMMARY

On the instruction of Jackson's Row Developments Limited., a preliminary Geo-Environmental Risk Assessment has been undertaken for a site located between Jackson's Row, Bootle Street, and South Mill Street in Manchester City Centre. The aim of the assessment is to identify issues associated with soil and groundwater conditions that are likely to impact on the development of the site.

The geological mapping and boreholes from the surrounding area suggest that the site is underlain by Made Ground overlying Chester Pebble Beds sandstone of the Sherwood Sandstone Group.

Historic land use on the site includes a printing works, garage, public house, and police station. Currently, the land use includes car parking and a synagogue. The building that housed the police station is still present but is vacant.

Historical mapping and local records indicate that the site suffered bomb strikes during World War II including damage to the police station in the south-eastern corner and complete ruin of buildings in the north-western corner. A specialist survey has categorised approximately one third of the site as a Medium Risk Zone with respect to unexploded ordnance and the remainder of the site as a Low Risk Zone. Appropriate consideration will need to be given to UXO risk at investigation and construction stage.

Widespread soil and groundwater contamination is not anticipated, however localised contamination associated with former land uses and underground fuel storage tanks may be present. Any demolition derived Made Ground may be a potential source of asbestos.

Waste disposal from the basement excavation will represent a significant cost. Whilst potential markets may exist for processed demolition rubble and as dug bedrock, Made Ground soils will likely need to go to landfill and additional works is required to ensure that disposal costs are minimised as much as practicable.

The presence of shallow bedrock and a deep basement excavation suggest that a raft foundation may be utilised for the proposed towers. The presence of the West Manchester Fault presents the possibly that rock strength may locally be reduced and the need for some additional remedial works at formation level cannot be discounted.

A propped contiguous or secant bored pile wall will likely be required to support the basement excavation, with the rock providing hard digging conditions.

It is anticipated that dewatering may be required to facilitate basement construction. Analysis is required to establish the chemical quality of the groundwater.

It is recommended that an intrusive ground investigation be completed to determine the contamination status of the site and provide geotechnical data to facilitate economic design of foundations and basement retention.

WSP | Parsons Brinckerhoff UK Limited

2 INTRODUCTION

2.1 AUTHORISATION

On the instruction Jackson's Row Developments Limited, WSP | Parsons Brinckerhoff has been commissioned to undertake a Phase I Preliminary Geo-Environmental Risk Assessment for a proposed development at the location of Jackson's Row, Manchester.

2.2 OBJECTIVES

The purpose of this report is to provide details on the potential geotechnical and contamination status of the site and identify associated issues that could impact on redevelopment of the site. The report includes an assessment of the potential risk associated with contamination due to current and historical uses and presents a preliminary conceptual site model.

2.3 BACKGROUND AND DEVELOPMENT PROPOSALS

Three buildings currently occupy the site along with car parking areas. The buildings comprise a public house, the Manchester Reform Synagogue, and a former police station.

The proposed development involves the demolition of the existing structures and construction of a two towers of 21 and 31 storeys in height, with a one level basement, which will occupy the full footprint of the site. The towers will be of mixed use including residential, retail, office space, and gardens.

Development proposals are presented in **Appendix B**.

2.4 INFORMATION SOURCES

The information presented in this report has been collated from the following sources:

- Site walkover completed by WSP | Parsons Brinckerhoff on 14 October 2015;
- Landmark Envirocheck Report: 70010278-100, dated 05 October 2015;
- British Geological Survey (BGS) mapping;
- BGS borehole scans available online at the BGS Geoindex;
- Department of the Environment Industry Profile. Profile of miscellaneous industries, incorporating printing and bookbinding works;
- Department of the Environment Industry Profile. Road vehicle fuelling, service and repair – garages and filling stations;
- WWII bomb damage maps available online at The University of Manchester Library Image Collections;
- Dynasafe BACTEC Explosive Ordnance Desktop Threat Assessment. Site: Jackson's Row. Ref: 6239TA;
- Information available online at the Environment agency (EA) website; and,
- Information available online at the Coal Authority website.

2.5 CONFIDENTIALITY STATEMENT

The report is addressed to and may be relied upon by the following:

Jackson's Row Developments Limited
4 Jordan Street
Manchester
M15 4PY

This assessment has been prepared for the sole use of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP | Parsons Brinckerhoff. No responsibility will be accepted where this report is used in its entirety, or in part, by any other party.

Information provided by others is taken in good faith as being accurate. WSP | Parsons Brinckerhoff cannot and will not accept liability for any deficiencies in third party information.

General limitations are presented in **Appendix A**.

3 SITE INFORMATION

3.1 SITE LOCATION & DESCRIPTION

The site is located in Manchester City Centre, approximately 100m west of Manchester Library and 100m southwest of the Manchester Town Hall.

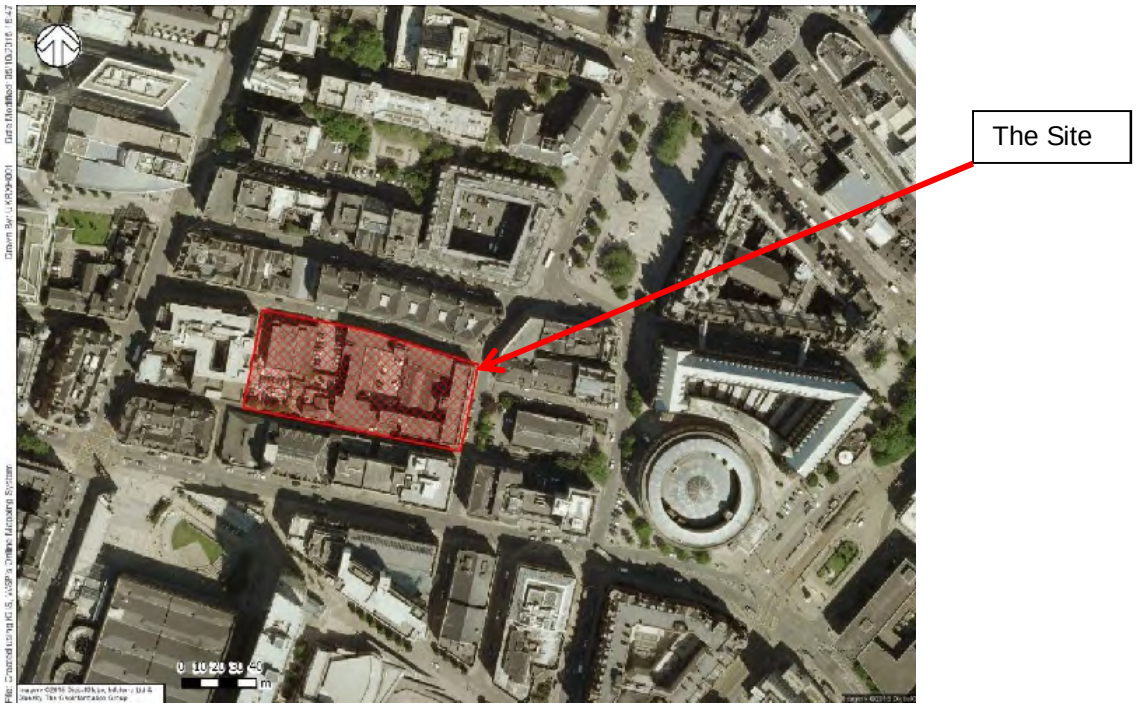
The approximate centre of the site is located at National Grid Reference 383668E, 398023N.

A site location plan is presented as **Figure 1** in **Appendix C** and an aerial photograph of the site is presented below.

The site covers an area approximately 0.6 hectares. A former police station occupies the eastern half of the site. The building is four storeys tall along with a basement and contains a central courtyard area. The western half of the site comprises a public house, the Manchester Reform Synagogue and car parking areas. The elevation on-site gently decreases from approximately 39.5m AOD in the north-east corner to approximately 36.0m AOD in the southwest corner.

The site is bound to the north by Jackson's Row, with a five storey building beyond of mixed use including office space, cafes, a gymnasium, and nightclub. To the south lie Bootle Street and the Albert Hall theatre, an office, restaurants, and a public house. The western boundary is formed by 210 Deansgate, an office building with retail units on the ground floor, with Deansgate itself beyond. To the east lie South Mill Street and the Friends Meeting House Manchester

Aerial Photograph of Site



3.2 BULK HAZARDOUS MATERIALS STORAGE

No bulk materials storage was observed at the time of the site walkover.

4 ENVIRONMENTAL SETTING

4.1 GEOLOGY

Published geological mapping [1] indicates that the eastern half of the site, beneath the former police station, is underlain by Glacial Till and Chester Pebble Beds Formation of the Sherwood Sandstone Group. The western half of the site is indicated to be directly underlain by the Chester Pebble Beds Formation. Glacial Fluvial Sheet Deposits (sand & gravel) are indicated to outcrop immediately to the south of the eastern half of the site.

The conjectured outcrop of the West Manchester Fault is indicated to cross the southwest corner. The fault trends northwest-southeast with the downthrown side to the northeast.

There are no BGS boreholes on the site, however there are several boreholes located within 50m of the site boundary. The boreholes indicate the area to be underlain by Made Ground, deposits of sand and gravel, or stiff clay, and sandstone at depths ranging between 3.5m below ground level (BGL) and 5.0m BGL. The BGS borehole logs are presented in **Appendix D**.

4.2 COAL MINING

According to the Coal Authority website, the site lies within the LANCS Coal Mining Reporting Area. However the Sherwood Sandstone Group is not a coal bearing unit and due to the thickness of the formation, it is considered unlikely that the site will be affected by coal mining.

4.3 GROUND STABILITY HAZARDS

According to the Envirocheck Report [2] the potential for collapsible ground, compressible ground, ground dissolution, running sand, shrinking or swelling clay ground stability hazards are classed as either Very Low or No Hazard.

4.4 HYDROGEOLOGY

The Environment Agency (EA) website indicates the Chester Pebble Beds to be a Principal Aquifer. Principal Aquifers are layers that have high intergranular or fracture permeability meaning that they usually provide a high level of water storage. They may support water supply or river base flow on a strategic scale.

If present on site, the Glacial Fluvial Sheet Deposits have been designated as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases form an important source of base flow to rivers.

The Glacial Till has been classified as Unproductive Strata with low permeability and negligible significance for water supply or river base flow.

BGS hydrogeological maps [3] suggest that the groundwater level lies approximately between 20m AOD and 25m AOD. Groundwater is indicated to lie at approximately 10m BGL in BGS borehole SJ89NW219, which is located approximately 60m north of the site (corner of Albert Square and Lloyd Street).

4.5 HYDROLOGY

The nearest surface water feature is the Rochdale Canal (Western Section), which lies approximately 270m to the south east. According to the EA website, the canal has a Current

Ecological Quality rating of Good Potential. The Current Chemical Quality does not require assessment.

4.6 SENSITIVE LAND USES

According to the Envirocheck Report [2], there are no sensitive land uses on site or within 500m of the site boundary.

4.7 RADON

The Envirocheck Report [2] indicates that the site is located in a lower probability area where less than 1% of homes are above the action level and therefore radon protective measures are not required for developments in this area.

5 HISTORICAL LAND USE

5.1 SITE HISTORY

Historical Ordnance Survey (OS) maps and Insurance Plans included within the Envirocheck Report, bomb damage maps available from the University of Manchester, and historic OS map sheets of the City of Manchester have been reviewed and the history of the site and surrounding area is summarised below in **Table 5.1**. A selection of historical maps is presented in **Appendix E**.

Table 5.1 – Summary of site history

YEAR	ON SITE	SURROUNDING AREA
1848	The map shows Jackson's Row, Bootle Street, and Deansgate to be present and in their current arrangement. Buildings are indicated on the site; although no specific land uses are indicated.	The surrounding area has a high density of buildings. Land uses are not indicated.
1850	Several small courtyards are indicated on the map and in conjunction with the small size of the buildings; this suggests that the site is predominantly residential. Two alleys named Roger's Row and South Sea connect Jackson's Row and Bootle Street in the eastern half of the site. To the east of the South Sea alley a Cotton Dye Works is indicated.	The surrounding land use in the immediate vicinity appears to be mixed residential and industry along with three burial grounds to the west, south, and east. Industrial land use includes a tannery and cotton dye works to the northeast, timber yards to the north and south, a coach manufacturer to the north, and an iron yard to the south.
1894 – 1896	A courtyard at the centre of the site has been created by closing off the southern entry to Roger's Row and demolishing some buildings.	Manchester Town Hall has been built approximately 100m to the northwest of the site. A large railway station has been built approximately 100m south.
1908 – 1909	The public house is marked on the map in its present location. The courtyard on site is marked as a Fire Engine Station. Many of the smaller buildings and courtyards have been replaced by larger structures which are likely small workshops.	Deansgate, Peter Street, Mount Street, and Albert Square have had tramlines built on them. Land use within 100m of the site includes a number of theatres, halls, and offices. The station to the south has expanded to include an additional building and more railway lines. The station now comprises the Central Station building, the Cheshire Lines Railway Good Station, and the G.N.R. Goods Station. A hospital is shown approximately 200m to the east of the site. The Midland hotel is present 100m to the southeast of the site. A gas works and Corporation Yard are shown approximately 500m to the south.
1922 – 1933	The Fire Engine Station is no longer shown and no land use is indicated. No other changes have occurred.	No change of note.
1937	During the site walkover a commemoration stone was noted that indicates the police station was opened in 1937.	-
1938	No change of note.	The Central Public Library has been built approximately 100m to the east. No other changes of note.
1940 - 1941	A high explosive bomb landed on the corner of Bootle Street and South Street damaging the building on the southeast corner of the site. The Public House was also damaged. A building on the northwest corner of the site was destroyed by bomb damage.	A large number of bomb strikes are recorded in the surrounding area. Five fire bombs are indicated to have fallen on the Albert Hall immediately to the south of the site. Reference should be made to the Extract from Bomb Damage Map in **Appendix E**.

1948	The Public House has been repaired and is marked on the map. The bombed building in the northwest corner of the site is marked as a ruin. The police station appears on the map for the first time. The Southsea alley no longer exists.	The tram lines have been removed from the surrounding streets. A Public House is now present on Jackson's Row immediately to the north of the site. A commercial garage has been built on the western boundary of the site. There are several ruined buildings in the surrounding area; including on the corner of Deansgate and Jackson's Row, on the corner of Cumberland Street and Deansgate, and between Queen Street and Lloyd Street Buildings to the south of the Town Hall have been demolished and replaced with an extension to the Town Hall. The stations to the south are now marked as Central Station, Goods Station, and Deansgate Goods Station.
1955	The Reform Synagogue has been built in the place of the ruin in the northwest corner of the site. There are now five buildings remaining on site; the police station, public house, Reform Synagogue, the Manchester Poster Services Ltd print works covering much of the southwest corner, and a Lost Property Depository located between the Synagogue and police station. A sunken petrol tank is noted on the northern border of the police station. The print works includes a garage located immediately to the north of the public house.	Sunken petrol tanks are indicated within the garage immediately to the west of the site.
1958	No changes of note.	Only the ruin between Queen Street and Lloyd Street remains. The surrounding buildings are still used for a mixture of theatres, offices, halls, and public houses.
1962	The Lost Property Depository has become a garage. A sunken petrol tank is indicated within the garage associated with the print works.	No changes of note.
1964	No changes of note.	No changes of note.
1970	The print works and associated garage have been demolished and replaced with car parks.	No changes of note.
1972 – 1973	No changes of note.	The ruin between Queen Street and Lloyd Street has been redeveloped. The Central Station and Goods Station are now disused. The Deansgate Goods Station has been redeveloped as a car park.
1980 – 1981	No changes of note.	No changes of note.
1985	No changes of note.	The Goods Station (disused) has become a car park. Buildings on the corner of Brazennose Street and Albert Square have been demolished and replaced with a car park. Buildings on the corner of Lloyd Street and Albert Square have been demolished.
1986 – 1990	The garage (former Lost Property Depository) has been demolished.	The vacant plot on the corner of Lloyd Street and Albert Square has been developed with a building with a central courtyard. The car park on Brazennose Street has been redeveloped as several buildings. Central Station is now an exhibition and events centre.
1992 – 1995	No changes of note.	No changes of note.
2006	No changes of note.	No changes of note.
2015	No changes of note.	No changes of note.

5.2 ASBESTOS CONTAINING MATERIALS

Given the age of the structures, as detailed in **Table 5.1**, it is considered possible that asbestos containing materials (ACMs) may be present within the construction of the buildings. Any ACM identified should be removed under appropriate controls prior to any work commencing.

The site history reveals that there have been previous phases of demolitions and therefore ACMs may be present in any demolition derived Made Ground.

5.3 UNEXPLODED ORDNANCE (UXO)

Bomb damage maps available online from The University of Manchester show that the Deansgate area was heavily bombed during WWII and the site itself suffered at least one direct hit. On this basis an Explosive Ordnance Threat Assessment [4] (EOTA) was ordered from Dynasafe BACTEC. The assessment is presented in **Appendix F** and an extract of the bomb map is presented below.

Extract of Bomb Damage Map courtesy of the University of Manchester



Key
Red dot = Fire Bomb Strike, Blue dot = High Explosive Bomb Strike
Solid Red = Demolished Building, Hatched red = Damaged Building (Still Standing)

The EOTA [4] states that the site was located in an area of high bombing density and that one High Explosive bomb strike was recorded on the south-eastern corner of the site. The report also notes that a 1kg incendiary bomb shower caused buildings in the north-western corner to be gutted.

The EOTA [4] states that a maximum bomb penetration depth range of 6 – 8m below WWII ground level is possible based on geological mapping [1] and BGS boreholes (**Appendix D**).

A risk map is presented in Annex L of the EOTA [4] (**Appendix F**). The western third of the site has been classified by Dynasafe BACTEC as a Medium Risk Zone based on the bombing density of the area and the possibility that rubble and debris associated with bomb damage to the former structures in this area of the site could have obscured any High Explosive bomb entries at a later date.

The remainder of the site has been classified by Dynasafe BACTEC as a Low Risk Zone. This is based on the fact that the police station and hard standing remained relatively undamaged thus significantly reducing the likelihood of High Explosive bomb entry points being unrecorded.

Risk mitigation measures are presented in **Section 10.3**.

6 REGULATORY INFORMATION & CONSULTATIONS

6.1 POLLUTION INCIDENTS TO CONTROLLED WATERS

The Envirocheck Report [2] records two pollution incidents to controlled waters within 500m of the site boundary. The nearest incident occurred 441m to the north of the site at the River Irwell on 26 May 1992. The incident involved an unknown pollutant and was classified as a Category 3 – Minor Incident.

6.2 DISCHARGE CONSENTS

According to the Envirocheck Report [2] there are five current Discharge Consents within 500m of the site boundary. The closest consent is operated by The Lord Chancellor at the Manchester Civil Justice Centre, approximately 430m to the northwest of the site. The consent relates to the discharge of cooling water into the River Irwell.

6.3 ENFORCEMENT & PROHIBITION NOTICES

One Enforcement Notice has been issued within 500m of the site boundary. This notice regards a breach of conditions relating to accumulation and disposal of radioactive wastes at Manchester Children's Hospital. The enforcement of the notice is dated to 4 August 1995.

6.4 LOCAL AUTHORITY POLLUTION PREVENTION AND CONTROLS

There are two current Local Authority Pollution Prevention and Controls (LAPPC) within 500m of the site boundary. The nearest LAPPC is operated by Johnson Cleaners UK Ltd located approximately 200m to the northeast of the site. The control refers to PG6/46 dry cleaning business operations.

6.5 SUBSTANTIATED POLLUTION INCIDENT REGISTER

According to the Envirocheck Report [2], there have been no Substantiated Pollution Incidents within 1000m of the site boundary.

6.6 WASTE MANAGEMENT / LANDFILLS / MINERAL SITES

According to the Envirocheck Report [2] and the EA website there are no landfills within 500m of the site boundary. There is one Licensed Waste Management Facility within 500m of the site boundary. This is operated by Hillhouse Remediation Ltd 323m to the southeast of the site and is licensed to operate mobile plant for reclamation and restoration.

6.7 CONTEMPORARY TRADE DIRECTORY

According to the Envirocheck Report [2] there are 161 Contemporary Trade Directory Entries within 500m of the site boundary. The two closest entries are located 16m to the northeast of the site. These entries are for Boda Skins and Manchester Chemicals and Pigments Ltd which are respectively, a leather garments and products supplier and chemical distributor and wholesaler.

6.8 HAZARDOUS SUBSTANCES & SITES

According to the Envirocheck Report [2], there are no Control of Major Accident Hazards (COMAH) sites, Explosive Sites, Notifications of Installations Handling Hazardous Substances (NIHHS), Planning Hazardous Substance Consents, or Planning Hazardous Substance Enforcements within 1000m of the site boundary.

6.9 ENVIRONMENT AGENCY

No significant issues have been identified that warrant consultation with the EA.

7 CONCEPTUAL SITE MODEL

7.1 PRELIMINARY GROUND MODEL

Based on the available information, it is anticipated that the site is likely underlain by a sequence of Made Ground underlain by Chester Pebble Beds Formation. Glacial Till may be present beneath any Made Ground over the eastern half of the site. Depth to rockhead is anticipated to be between 3.5m BGL and 5.0m BGL.

7.2 POLLUTANT LINKAGE ASSESSMENT

As detailed in **Table 5.1**, parts of the site have formerly been used as a printing works and a garage. According to the Department of the Environment Industry Profile for printing works [5] the following contaminants are typically associated with printing processes:

- Metals and metalloids including chromium, magnesium, lead, cadmium, copper, and zinc;
- Inorganic ions including silver halides and nitrates;
- Sulphuric and phosphoric acid;
- Asbestos; and,
- Organic compounds including organic dyes, ink solvents, cleaning and degreasing solvents, polychlorinated biphenyls (PCBs), and hydrocarbon fuels.

The Department of the Environment Industry Profile for garages [6] details the following contaminants typical of workshop areas:

- Metals and their compounds, including lead, chromium, zinc, copper, and vanadium;
- Asbestos; and,
- Organic compounds, including polycyclic aromatic hydrocarbons (PAHs), diesel and petrol.

The potential sources, pathways, and receptors relevant to the future land use (residential with no landscaping) have been identified and are presented in **Table 7.1**.

Table 7.1 – Conceptual Site Model

SOURCE	PATHWAY	RECEPTOR
Asbestos associated with the building structures and former structures	▪ Inhalation of asbestos	▪ Construction workers ▪ Local residents
Potential contamination (including asbestos) within Made Ground (demolition waste from former structures and soil bound contaminants from historic land use)	▪ Direct contact, ingestion, inhalation of soil bound contaminants / dust ▪ Inhalation of vapours / ground gas associated with soil contamination ▪ Leaching of contamination into groundwater followed by migration of groundwater to the wider environment or surface waters	▪ Construction workers ▪ Future site users ▪ Future maintenance users ▪ Underlying Principal Aquifer ▪ Local residents

Given that the development will require the removal of all Made Ground soils to facilitate the basement construction, the potentially complete pollutant linkages are considered to be as follows:

- Direct contact with or inhalation / ingestion of shallow soil-bound contaminants including ACM (if present) by construction workers and local residents and business users during redevelopment.
- If significant volumes of ground gas or vapours associated with off-site Made Ground and/or volatile contaminants are present, migration into confined spaces followed by inhalation by construction workers or future site users.
- On-site migration of contaminated groundwater from off-site source(s), this would be particularly associated with dewatering.

8 POTENTIAL GEO-ENVIRONMENTAL CONSTRAINTS

8.1 SOILS

Based on the development proposals and the assumption that Made Ground will be removed for the basement excavation, widespread remediation of soils is considered to be unlikely to be required. However, localised areas of impacted soils (e.g. sites of former garage and print works and sunken fuel tanks) may exist that require treatment prior to removal from site.

The presence of Made Ground, which may contain construction and demolition fill and be potentially associated with ACMs, will require suitable control measures to be in place during construction activities involving earthworks to mitigate the risks to construction workers and the local residents.

8.2 GROUNDWATER

Significant widespread groundwater contamination is not anticipated, however localised contamination associated with on / off-site fuel storage cannot be ruled out. This may have an impact on future dewatering works.

8.3 GROUND GAS

No significant sources of natural (e.g. organic soil deposits) or anthropogenic (e.g. landfill) hazardous ground gases have been identified. However, given the likely presence of Made Ground and the potential that this may contain some materials capable of generating ground gas, it is recommended that basic ground gas protection measures be considered at this time. Intrusive site investigation works should include scope for ground gas monitoring to enable the assessment of the ground gas risk.

8.4 WASTE DISPOSAL

The Made Ground on site will be classified as either Non-Hazardous or Hazardous depending on the contamination status of the site. Any excavated superficial soils and Sherwood Sandstone are likely to be classified inert waste.

The cost of waste disposal from the basement excavation is likely to be significant and site investigation to inform waste classification post demolition, together with the production of a sufficiently robust Materials Management Plan are likely to be necessary in advance of construction (see **Section 9.3**).

Analysis of groundwater will inform disposal options for the dewatering operation.

9 POTENTIAL GEOTECHNICAL CONSTRAINTS

9.1 GROUND CONDITIONS, FOUNDATIONS AND BASEMENT CONSTRUCTION

Based on the available geological information, it is considered likely that the site is underlain by a sequence of Made Ground and Sherwood Sandstone bedrock, which is anticipated to lie between 3.5m BGL and 5.0m BGL. Glacial Till may be present on the eastern half of the site, although these deposits are likely to be relatively thin and may have been excavated during previous stages of development.

Given that the basement excavation will likely be within the region of 11m deep, it is considered at this stage that, the development could in theory be founded on a raft foundation.

The possible presence of the West Manchester Fault on the south western corner of the site is noted in **Section 4.1**. It is possible that the rock mass in the immediate vicinity of the fault may have an increased weathering profile or have a weakened / broken state compared to the typical rock mass. Such zones may be very localised and difficult to locate through investigation, particularly as the position of the fault is conjectured.

If such weathered/weakened zones are encountered during foundation excavation an appropriately qualified engineer should inspect the formation to determine the appropriate remedial action. This may comprise grouting, or the deepening of the foundations locally.

The basement construction will likely require the use of a contiguous or secant bored pile wall. Propping of the basement wall is likely to be required to control deflections and ground movement on the site boundaries. Further details are required as to the nature of the foundations for the structure on the western boundary (210 Deansgate) to determine if any additional remedial works need to be undertaken in advance of basement excavation.

It is anticipated that the groundwater will be encountered for the lower levels of the excavation and dewatering will be required. Groundwater level and the permeability of the bedrock will need to be confirmed as part of any future ground investigation. Analysis is required to establish the chemical quality of the groundwater, which may have an impact on disposal costs.

9.2 OBSTRUCTIONS & EXCAVATABILITY

As well as the existing foundations, below ground obstructions, associated with previous phases of development should be anticipated. Other features, such as underground fuel tanks may also be present.

The majority of the basement excavation will be undertaken through bedrock, which based on past experience, may range between very weak and moderately strong. Discontinuities are typically closely to medium spaced. Rock coring and laboratory strength testing is required to assess the excavation methodology required, but at this stage it is anticipated that hard digging, possibly with the use of hydraulic breakers and ripping techniques may be required to reach formation level.

9.3 MATERIAL REUSE

Following appropriate asbestos removal, the crushed and screened demolition arisings may have some value as a recycled aggregate.

It is anticipated that excavated Made Ground soils will need to go to landfill and as discussed in **Section 8.4**, detailed waste characterisation will be required that disposal cost are appropriately managed.

Sherwood Sandstone is frequently used in the local area as a general fill material and it is possible that a ready market could be found for the arisings from the basement excavation.

9.4 UXO

The site has been divided by Dynasafe BACTEC [4] into a Low Risk Zone and a Medium Risk Zone. The following risk mitigation measures are recommended by Dynasafe BACTEC to support the proposed works:

BOTH RISK ZONES

- Site specific explosive ordnance safety and awareness briefings to all personnel conducting intrusive investigation and contraction works; and,
- The provision of unexploded ordnance site safety instructions to all personnel.

MEDIUM RISK ZONE ONLY

- The presence of an Explosive Ordnance Disposal (EOD) engineer to supervise open excavations; and,
- Intrusive Magnetometer Survey of any borehole locations down to the maximum bomb penetration depth.

It is the responsibility of the principal contractor to ensure that the UXO risk is appropriately addressed and mitigated during the groundworks. In planning mitigation measures, reference should be made to CIRIA 681 [7].

10 CONCLUSIONS & RECOMMENDATIONS

10.1 CONCLUSIONS

- It is considered that the risk of widespread contamination being encountered on the site is low. However localised areas of more contaminated ground may be present at the sites of former industries and around sunken fuel tanks.
- No significant sources of hazardous ground gases have been identified. However, given the absence of any site specific data, it is considered appropriate that basic gas protection measures be allowed for all new structures.
- Significant widespread contamination of groundwater is not anticipated, however localised contamination associated with on / off-site fuel storage cannot be ruled out.
- Waste disposal from the basement excavation will represent a significant cost. Whilst potential markets may exist for processed demolition rubble and as dug bedrock, Made Ground soils will likely need to go to landfill and additional post-demolition works are required to ensure that disposal costs are minimised as much as practicable.
- The presence of shallow bedrock and a deep basement excavation suggest that a raft foundation may be utilised for the proposed towers. The presence of the West Manchester Fault presents the possibility that rock strength may locally be reduced and the need for some additional remedial works at formation level cannot be discounted.
- A propped contiguous or secant bored pile wall will likely be required to support the basement excavation, with the rock providing hard digging conditions.
- It is anticipated that dewatering may be required to facilitate basement construction. Analysis is required to establish the chemical quality of the groundwater.
- Appropriate consideration will need to be given to UXO risk at investigation and construction stage.

10.2 RECOMMENDATIONS

- It is recommended that an intrusive ground investigation be completed to determine the contamination status of the site and provide geotechnical data to facilitate economic design of foundations and basement retention.

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1. British Geological Survey. 2004. Manchester and Salford. Sheet SJ89NW. Solid and Drift Edition. 1:10,000.
2. Landmark Information Group, 2015. Envirocheck Report: Jackson's Row. Report Ref: 73295769_1_1
3. British Geological Survey. 1989. Sheet 19: Hydrogeological Map of Clwyd and the Cheshire Basin. 1:100,00
4. Dynasafe BACTEC Limited. 2015. Explosive Ordnance Desktop Threat Assessment. Site: Jackson's Row, Manchester. Report Ref: 6239TA.
5. Department of the Environment. 1996. DOE Industry Profile, "*Profile of miscellaneous industries, incorporating charcoal works, dry-cleaners, fibreglass and fibreglass resins manufacturing works, glass manufacturing works, photographic processing industry, printing and bookbinding works".*
6. Department of the Environment. 1996. DOE Industry Profile, "*Road vehicle fuelling, service and repair – garages and filling stations".*
7. CIRIA C681. 2009. "*Unexploded Ordnance (UXO): a guide for the construction industry".* UK.

Appendix A

GENERAL LIMITATIONS

Revised: 24/05/2016

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective

effects of any future changes or amendments to these values. Specific assumptions associated with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be

accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

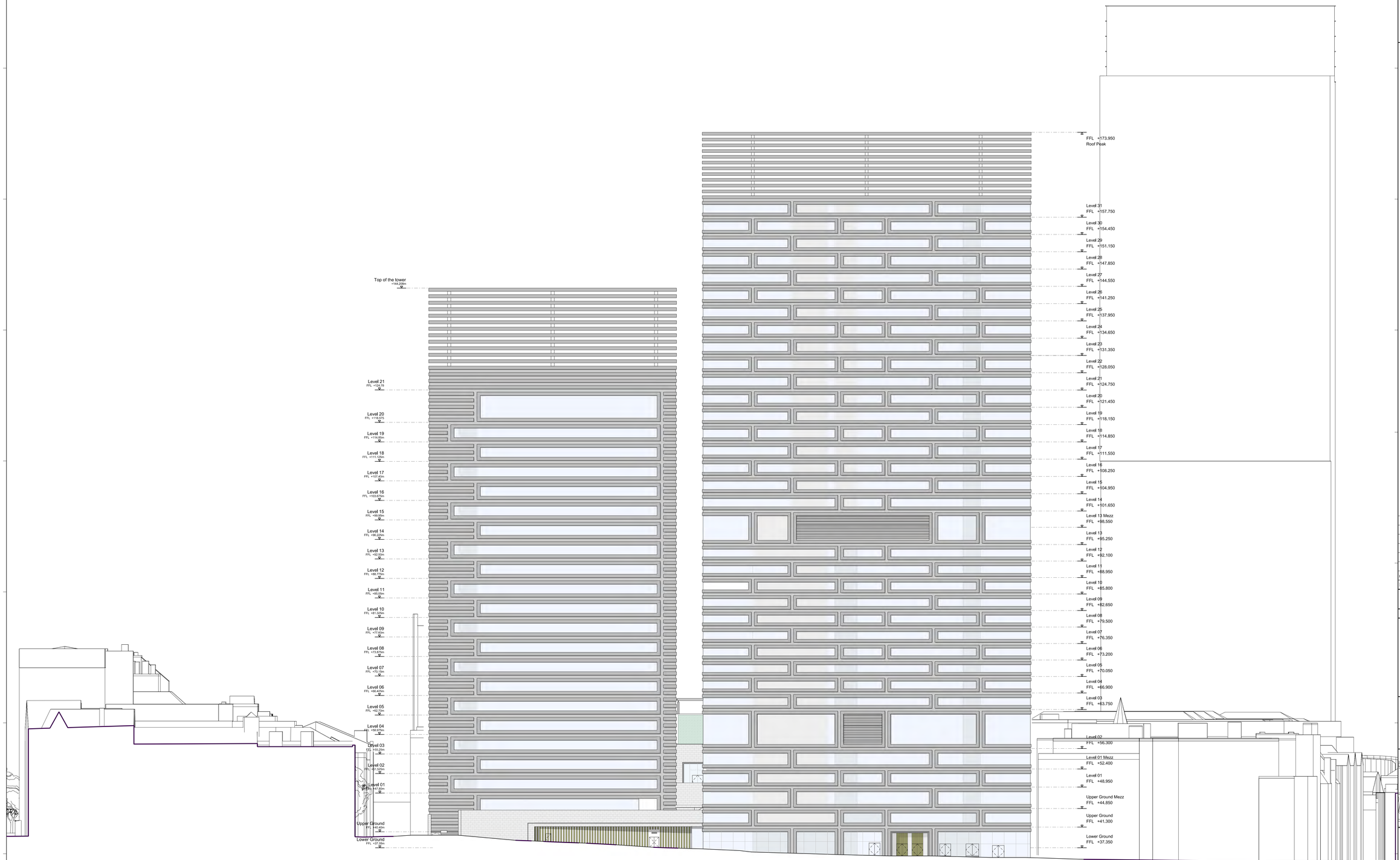
MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix B

DEVELOPMENT PROPOSALS



General Notes

1. Dimensions are in millimetres unless stated otherwise.
2. Levels are in metres AOD unless stated otherwise.
3. Dimensions govern. Do not scale off drawing.
4. All dimensions to be verified on site before proceeding.
5. All discrepancies to be notified in writing to Make Limited.

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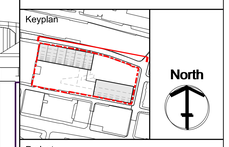
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tel +44 (0) 20 7636 5151

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Client
Jacksons Row Developments

Keyplan

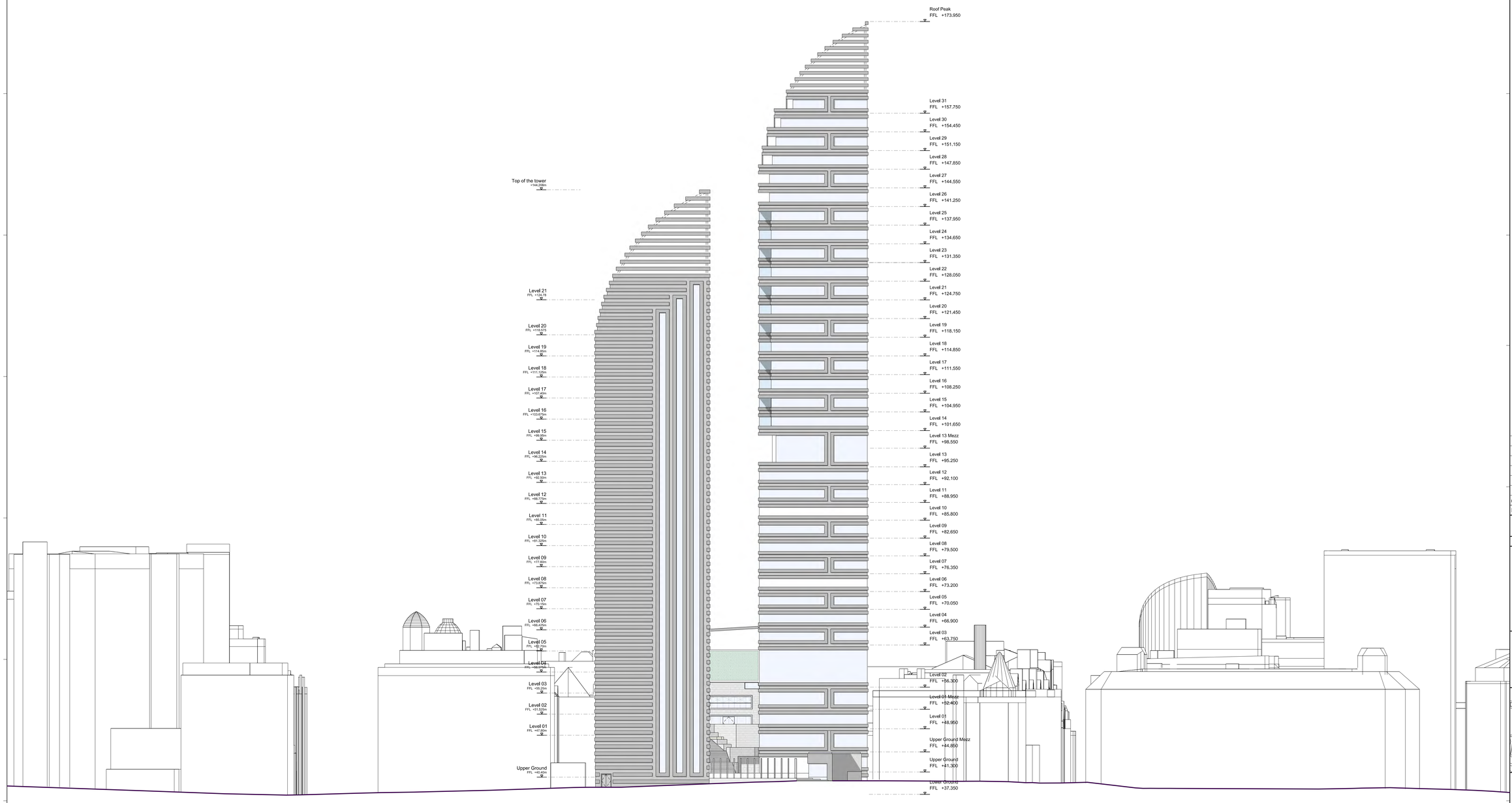


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Drawing Title
Proposed
North Elevation

Scale	Paper Size	Date
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Project No.	Draw No.	Rev No.
0853	P2100	00



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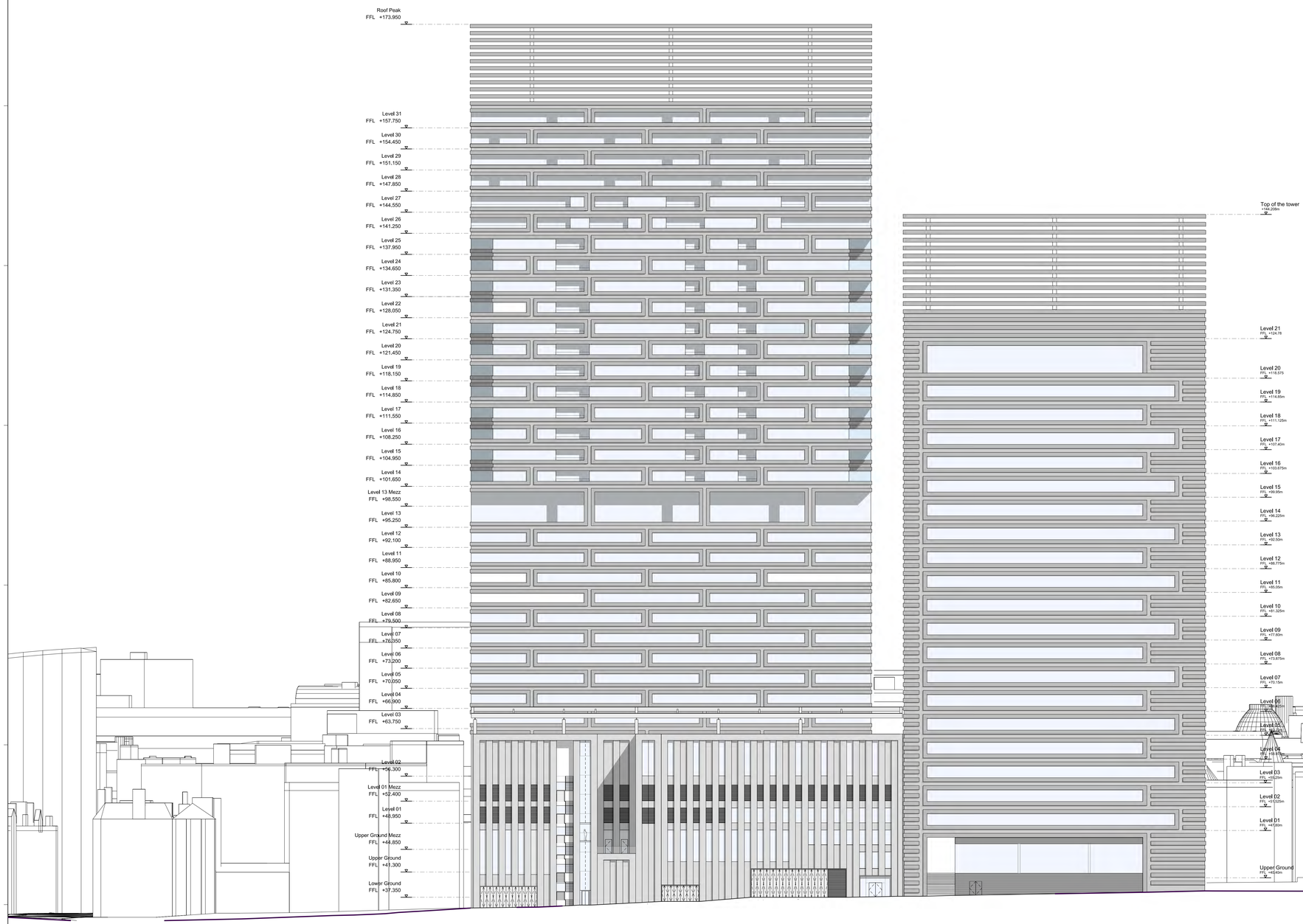
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Project
Jacksons Row, Manchester

Drawing Title
Proposed
East Elevation

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Project No.	Draw No.	Rev No.
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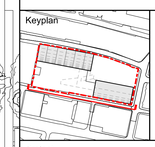
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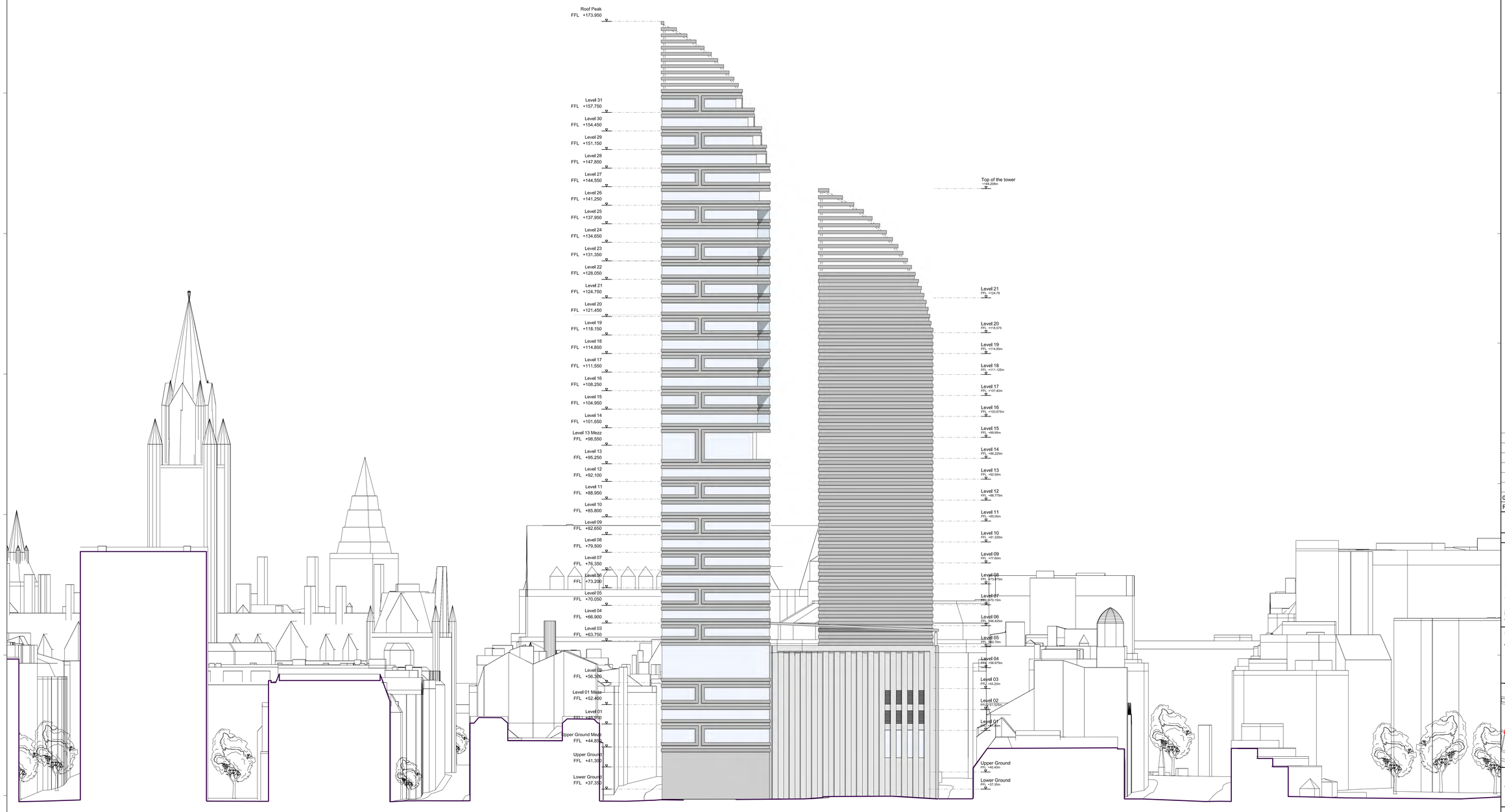
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Project
Jacksons Row, Manchester

Drawing Title
Proposed
South Elevation

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Project No.	Draw No.	Rev No.
0853	P2102	00



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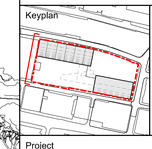
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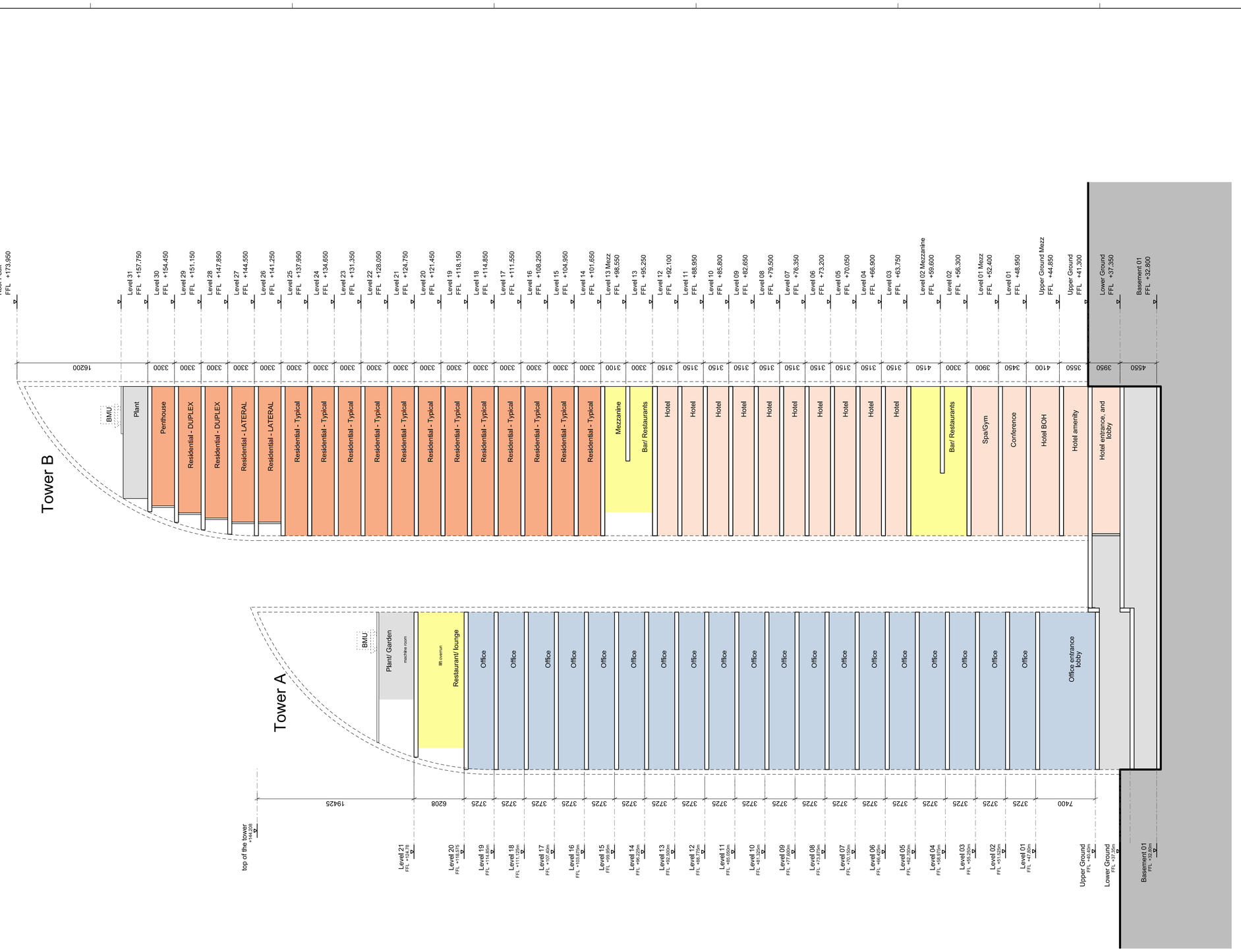
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Proposed
West Elevation

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Project No.	Draw No.	Rev No.
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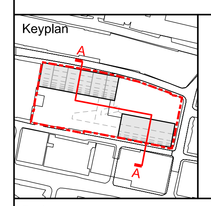
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Keyplan



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Project
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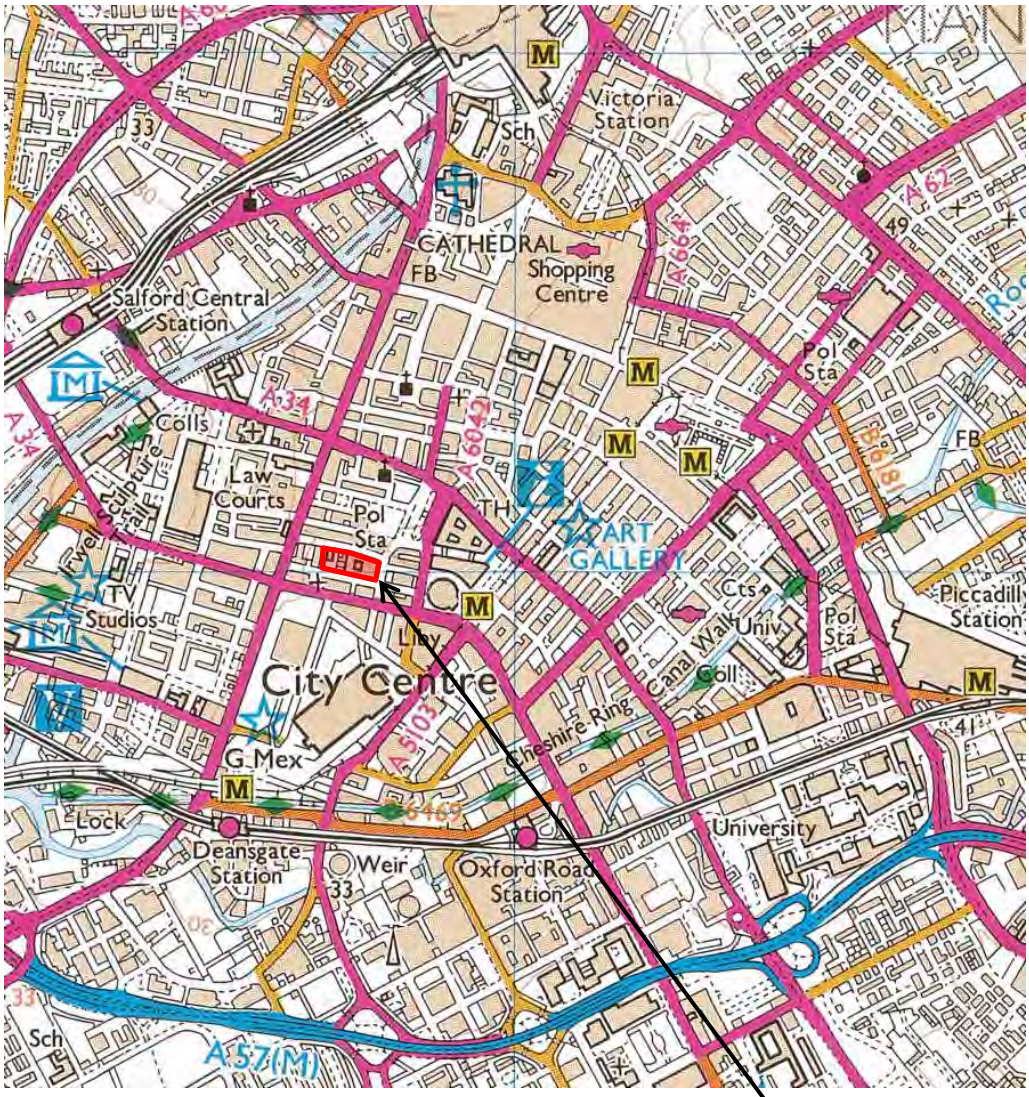
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Section AA

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Project No.	Draw No.	Rev No.
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Appendix C

FIGURES



REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. LICENSE NO. 100048755

WSP | PARSONS BRINCKERHOFF

Site: Jackson's Row
Ref: 70010925/001/10465
Title: Figure 1 – Site Location Plan
Scale: NTS

Appendix D

BGS BOREHOLES

MANCHESTER CITY COUNCIL

CITY ENGINEER AND SURVEYORS DEPARTMENT

SITE INVESTIGATION FOR	Main Drainage	DATE COMMENCED	13.11.83
LOCATION	Lloyd Street REF:	BORING METHOD	Cable Percussive
BOREHOLE No.	3	BORING DIAMETER	150mm 383593
GRID REFERENCE		SCALE:	1:50 approx. 398098

DATE	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	SAMPLE DEPTH PENETRATION To	No. of Blows	Legend
13.11.83			0.05		Bituminous Surfacing					
			0.20		Setts					
			0.50		Ashes, bricks etc.	D1	0.5			
			0.70		Clay, bricks, gravel etc.					
			2.2		Firm brown silty and sandy CLAY with stone inclusions.	D2 P1 D3	1.0 1.35 1.7	1.65	4	
			3.50		Dense SAND and GRAVEL	U2 D4 P2 B1 B2	2.2 2.5 2.75 2.6 3.20	2.45 3.05	29	
13.11.83	4.0	Dry	5.0		Very dense red/brown silty fine/medium SANDSTONE	P3 D5 P4	3.70 4.0 4.55	3.825 4.80	50 50	

WATER OBSERVATIONS DURING BORING

DEPTH OF WATER ENTRY (m)	ESTIMATED SEEPAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION

DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:-

SAMPLE TEST KEY

D – DISTURBED SAMPLE B – BULK SAMPLE U – UNDISTURBED SAMPLE
P – SPT SAMPLE W – WATER SAMPLE

NOTE: WHERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED PENETRATION IS GIVEN (NOT N – VALUE)

ALL DEPTHS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

REMARKS

Trial hole excavated to 1.20m below ground level, laid brickwork located at 1.0m below ground level in southern edge of trial hole.

Borehole backfilled on completion, no final overnight water level observed.

M/c 5931

(8214) Wt. 5903—5/33 2000 6/22 Gp. 147 M.K.Co.Ltd.

SECTION OF Borehole at Messrs. Blackburn Bro, [illegible] Albert Square, Manch[illegible]

SJ89NW219

GSM No.

Maps: One-inch ..... Six-inch 104 SW SE County Lancs.

Height above O.D. 120. Latitude ..... Longitude .....

Communicated by Sir. Wm. Boyd Dawkins. Date of sinking 1885.

Made by Hickling 68. Trans. Inst. Min. E. Vol. LIV. 1918. Dip of Strata .....

M/c 6 8

	Thickness.			Depth from Surface.		
Water level 39 feet from surface.						
Alluvium (approx. thickness)	4·57	15	–	4·57	15	–
Red sandstone	51·85	170	–	56·39	185	–

Synopsis, App. III as above.

Yield 14,000 g/day.

MANCHESTER CITY COUNCIL

CITY ENGINEER AND SURVEYORS DEPARTMENT

SITE INVESTIGATION FOR	Main Drainage	DATE COMMENCED	6.11.83
LOCATION	Lloyd Street REF:	BORING METHOD	Cable Percussive
BOREHOLE No.	2	BORING DIAMETER	150mm 383669
GRID REFERENCE		SCALE:	1:50 approx. 398084

DATE	CASING DEPTH (m)	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW GL	Reduced Level	DESCRIPTION	No. and Type of Sample	SAMPLE DEPTH PENETRATION From	SAMPLE DEPTH PENETRATION To	No. of Blows	Legend
6.11.83			0.15		Bituminous Surfacing onto Setts					
			1.2		Ashes and Bricks.					
			2.2		Soft/firm brown silty and sandy CLAY with sand lenses Stone and coal inclusions and brick pieces.	U1 D1 U2	1.2 1.7 2.0	1.65 2.45		
			4.9		Compact to dense silty SAND and GRAVEL. X	D2 P1 D3 P2 D4	2.5 31.5 3.5 4.15 4.5	 3.45 4.45 	 25 35 	
					Very dense red/brown fine/medium grained SANDSTONE.	P3 P4	5.15 6.50	5.30 6.63	67 50	
6.11.83	5.0	Dry	6.5							

WATER OBSERVATIONS DURING BORING			
DEPTH OF WATER ENTRY (m)	ESTIMATED SEE PAGE	STANDING LEVEL (m)	DEPTH OF CASING WHEN SEALED (m)
—			

WATER LEVEL IN CASED/UNCASED BOREHOLE ON COMPLETION		
DATE	WATER LEVEL	DEPTH OF CASING

REMARKS:–

SAMPLE TEST KEY: D – DISTURBED SAMPLE; B – BULK SAMPLE; U – UNDISTURBED SAMPLE; P – SPT SAMPLE; W – WATER SAMPLE

NOTE: WHERE FULL 0.3 PENETRATION HAS NOT BEEN ACHIEVED, THE NUMBER OF BLOWS FOR THE QUOTED PENETRATION IS GIVEN (NOT N – VALUE)

ALL DEPTHS AND REDUCED LEVELS IN (m) UNLESS OTHERWISE STATED

REMARKS

Trial hole excavated to 1.20m below ground level
Borehole backfilled on completion, no final standing water level observed.
SPT sample P4 recorded 50 blows for 127mm penetration within the initial 150mm penetration.

M/c 5931

(D11957) W.& A.M. [illegible] 5,000 12/20 Gp. 160. O.A.

4th G.S.M. Nos. 75-79

SJ 89NW 64-68

SECTION OF Sewer Shafts at Deansgate, Manchester

Maps; One-inch 85 Six-inch 104 S.W. County Lancs.

Height above O.D. Latitude Longitude

Communicated by Manchester Corporation Date of Sinking

Made by Dip of Strata

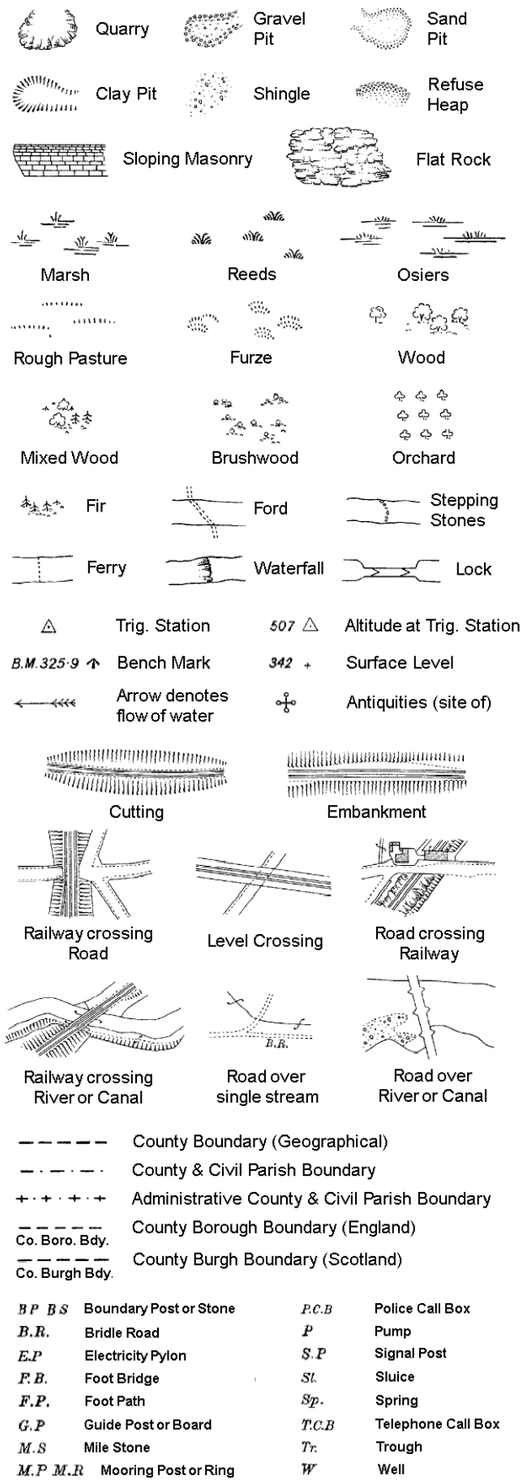
		Thickness. Metres			Depth from Surface. Metres		
No. 68 / 68	Deansgate. Corner of Lombard St.						
	Made ground,	3·66	12	–	3·66	12	–
	Sandstone	7·01	23	–	10·67	35	–
No. 76 / 67	02. Deansgate opposite Camp St. Corner.						
	Ballast & made ground.	2·13	7	–	2·13	7	–
	Sandstone.	11·28	37	–	13·41	44	–
No. 77 / 66	03. Deansgate. opposite St. John's Street corner.						
	Ballast & loose ground.	3·66	12	–	3·66	12	–
	Ballast & loose ground	4·27	14	–	7·93	26	–
	Sandstone.	5·18	17	–	13·11	43	–
No. 78 / 65	05. Deansgate, Jackson's Row Corner.						
	Ballast & loose ground	3·66	12	–	3·66	12	–
	Sandstone.	9·14	30	–	12·80	42	–
No. 79 / 64	07. Deansgate, Corner of John Dalton Street.						
	Made ground } Ballast & gravel }	3·35	11	–	3·35	11	–
	Gravel, sand, & marl.	3·05	10	–	6·40	21	–
	Sandstone	7·32	24	–	13·72	45	–

Appendix E

HISTORICAL OS MAPS & INSURANCE PLANS

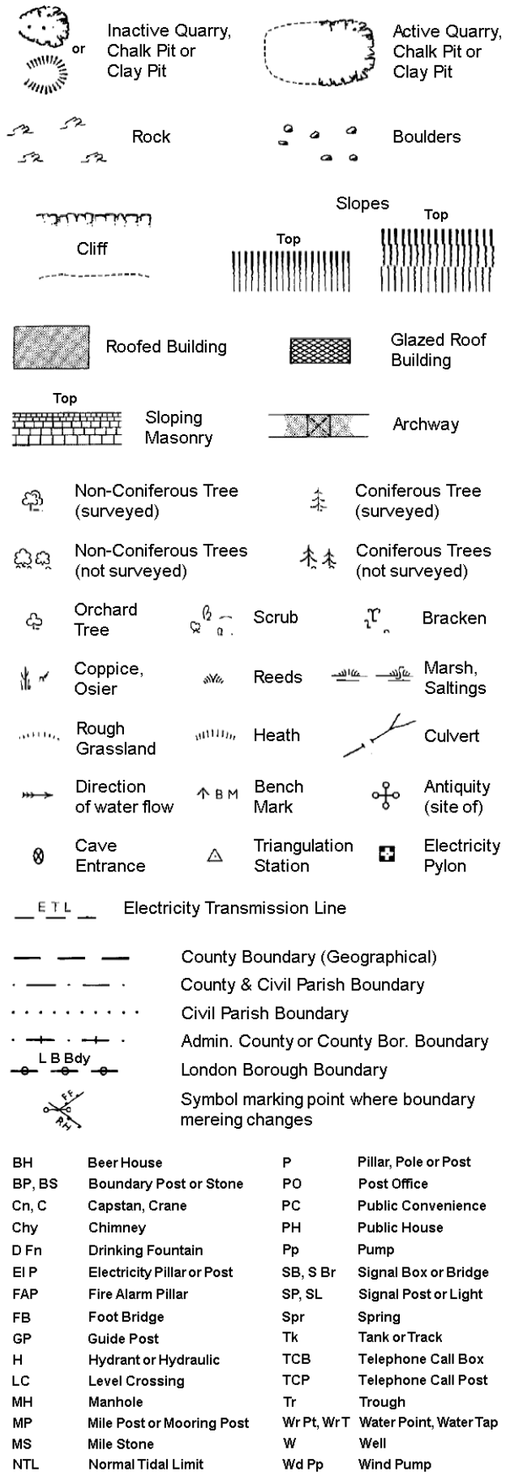
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



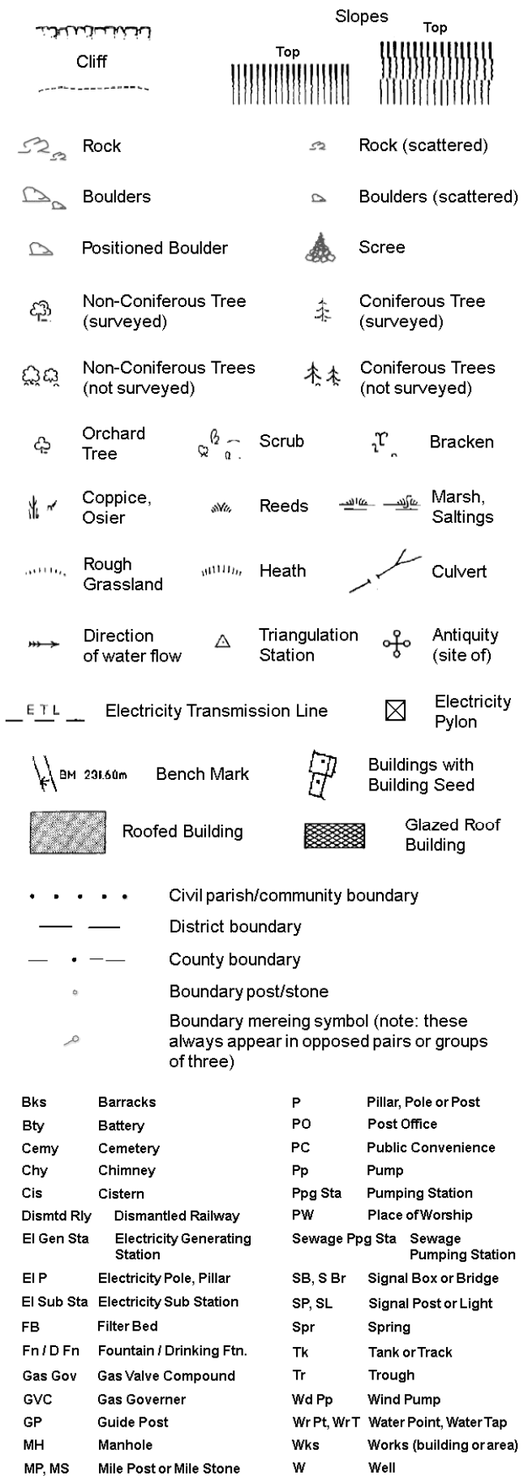
B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



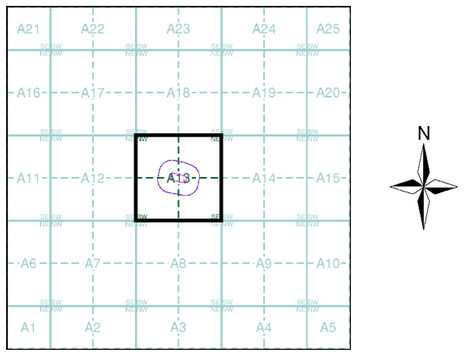
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

WSP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1892	2
Lancashire And Furness	1:2,500	1908	3
Lancashire And Furness	1:2,500	1922 - 1933	4
Ordnance Survey Plan	1:1,250	1948	5
Ordnance Survey Plan	1:2,500	1950 - 1951	6
Ordnance Survey Plan	1:1,250	1951 - 1964	7
Ordnance Survey Plan	1:2,500	1955 - 1958	8
Ordnance Survey Plan	1:1,250	1962 - 1973	9
Ordnance Survey Plan	1:2,500	1963 - 1965	10
Ordnance Survey Plan	1:2,500	1969 - 1971	11
Ordnance Survey Plan	1:1,250	1973 - 1988	12
Supply of Unpublished Survey Information	1:1,250	1974 - 1975	13
Additional SIMs	1:1,250	1980 - 1985	14
Additional SIMs	1:1,250	1986 - 1990	15
Additional SIMs	1:1,250	1990	16
Large-Scale National Grid Data	1:1,250	1992	17
Large-Scale National Grid Data	1:1,250	1994 - 1995	18
Large-Scale National Grid Data	1:1,250	1995	19
Large-Scale National Grid Data	1:1,250	1996	20
Large-Scale National Grid Data	1:1,250	1996	21

Historical Map - Segment A13



Order Details

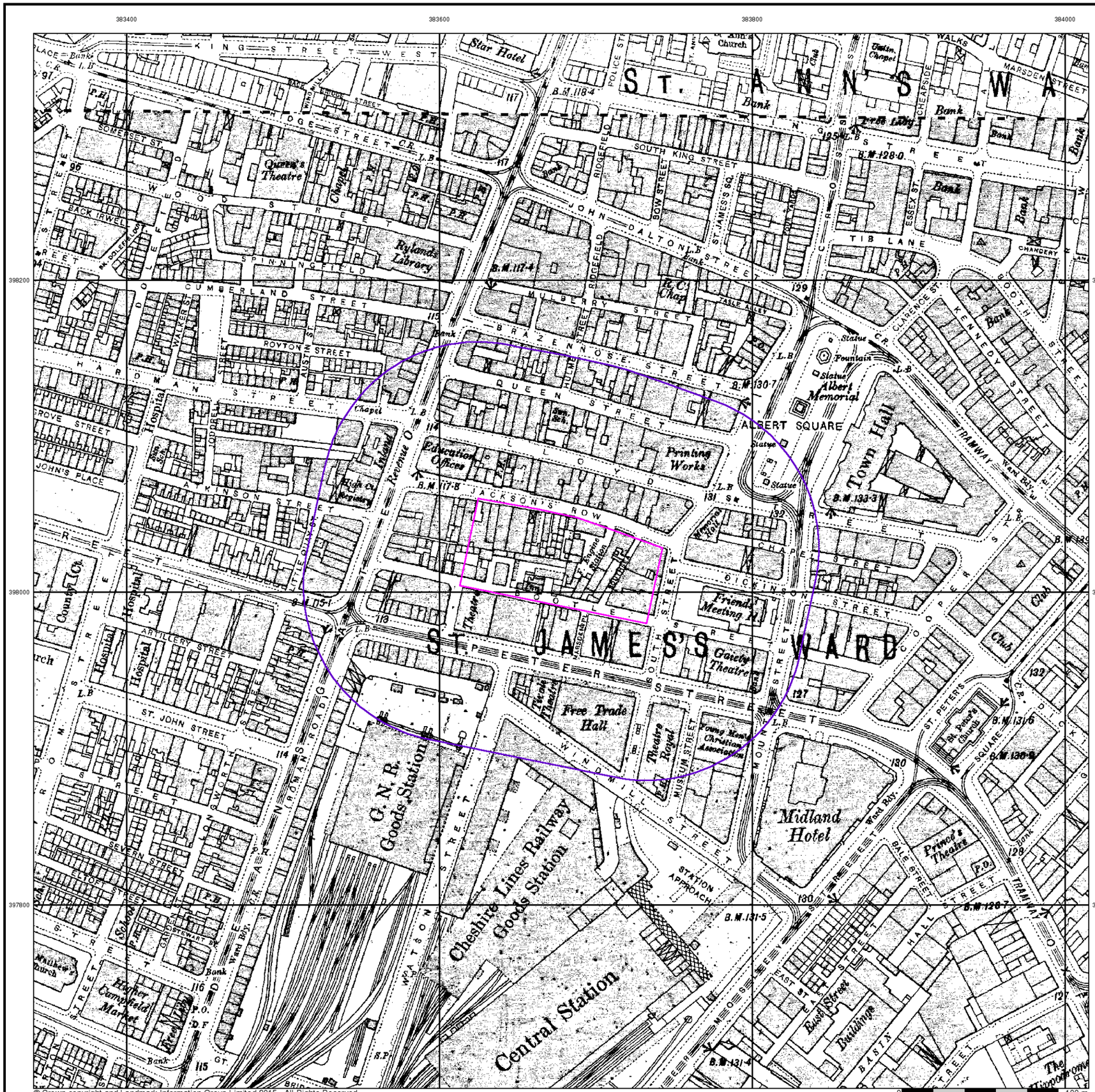
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Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

Jacksons Row, MANCHESTER, M2 5WD

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WSP

Lancashire And Furness

Published 1908

Source map scale - 1:2,500

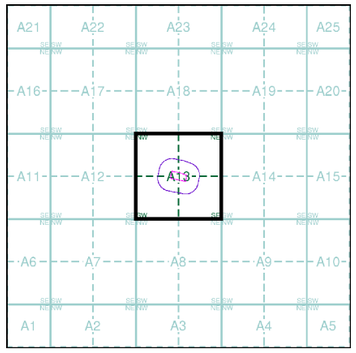
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

104_06
1908
1:2,500

104_10
1908
1:2,500

Historical Map - Segment A13



Order Details

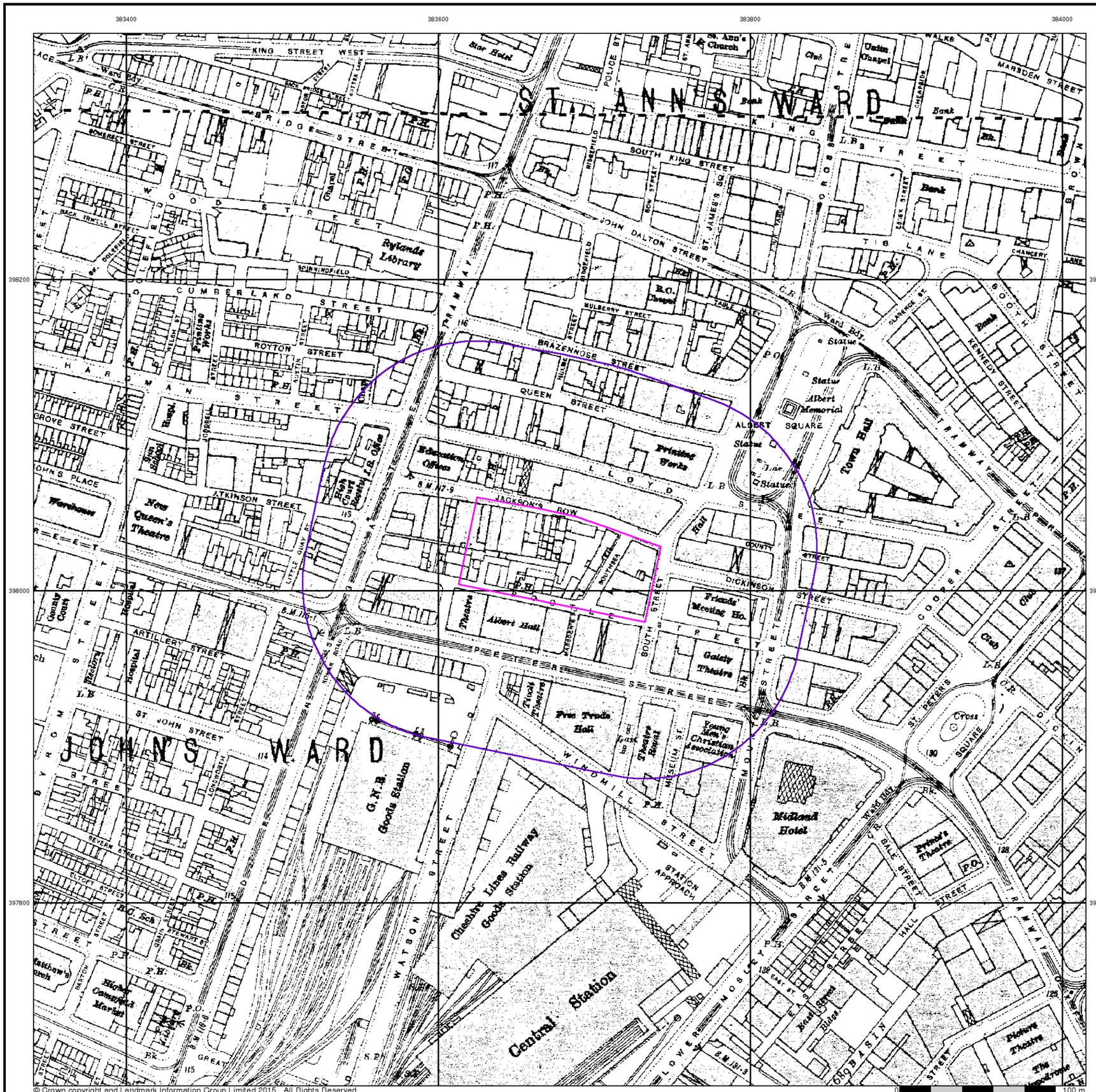
Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

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Lancashire And Furness

Published 1922 - 1933

Source map scale - 1:2,500

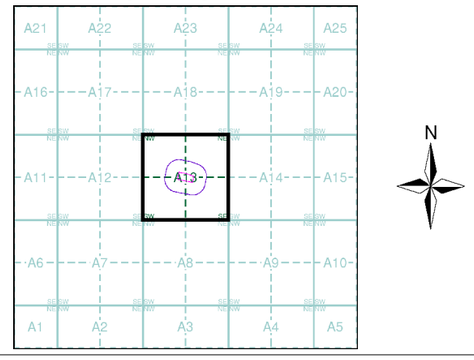
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

104_06
1933
1:2,500

104_10
1922
1:2,500

Historical Map - Segment A13



Order Details

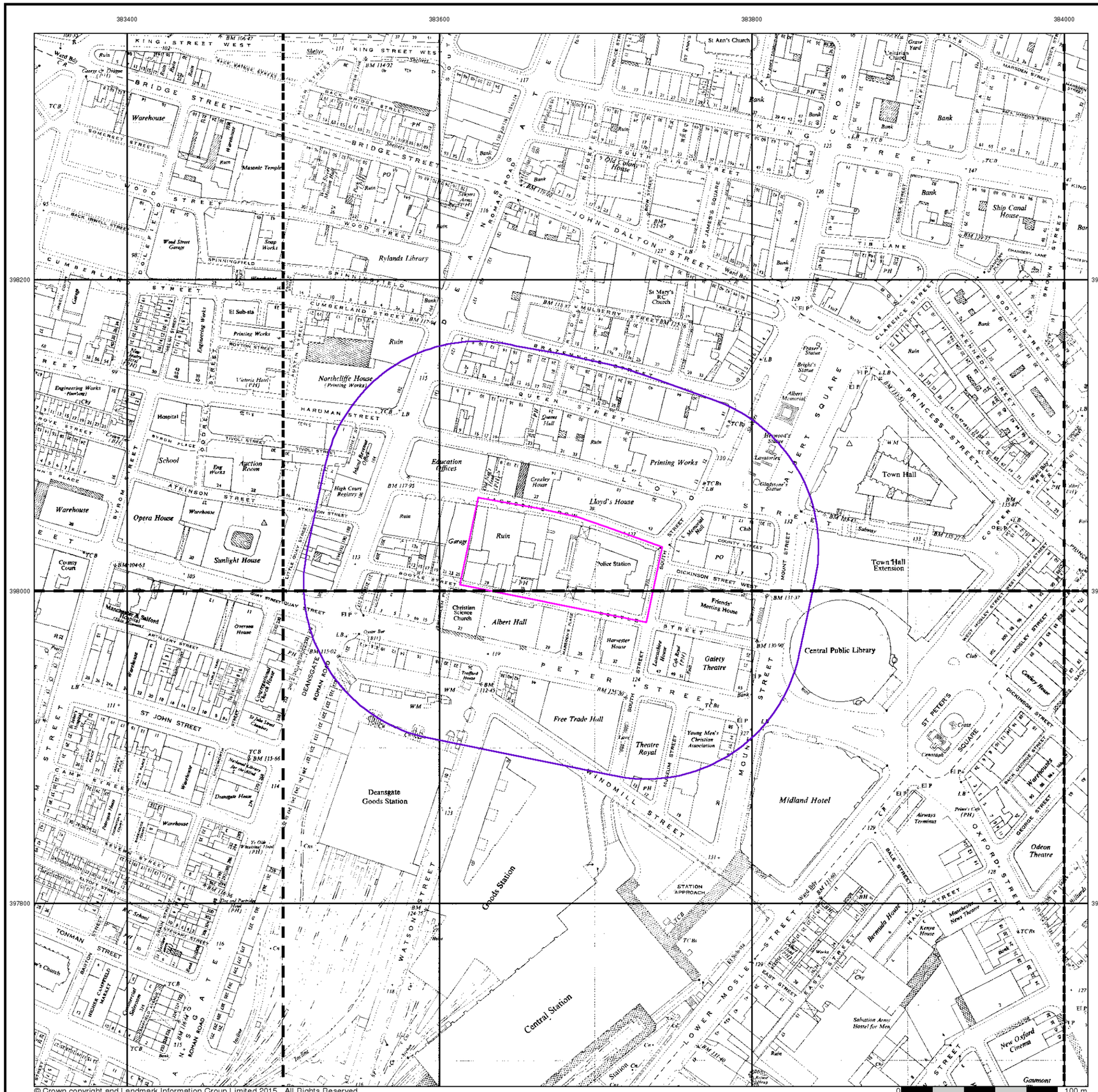
Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

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Ordnance Survey Plan

Published 1948

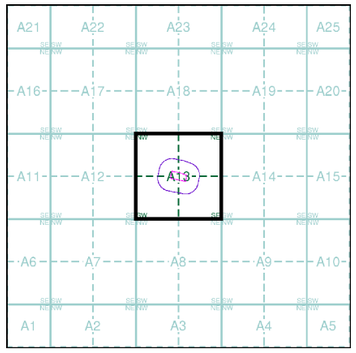
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398SW 1948 1:1,250	SJ8398SE 1948 1:1,250	SJ8498SW 1948 1:1,250
SJ8397NW 1948 1:1,250	SJ8397NE 1948 1:1,250	SJ8497NW 1948 1:1,250

Historical Map - Segment A13



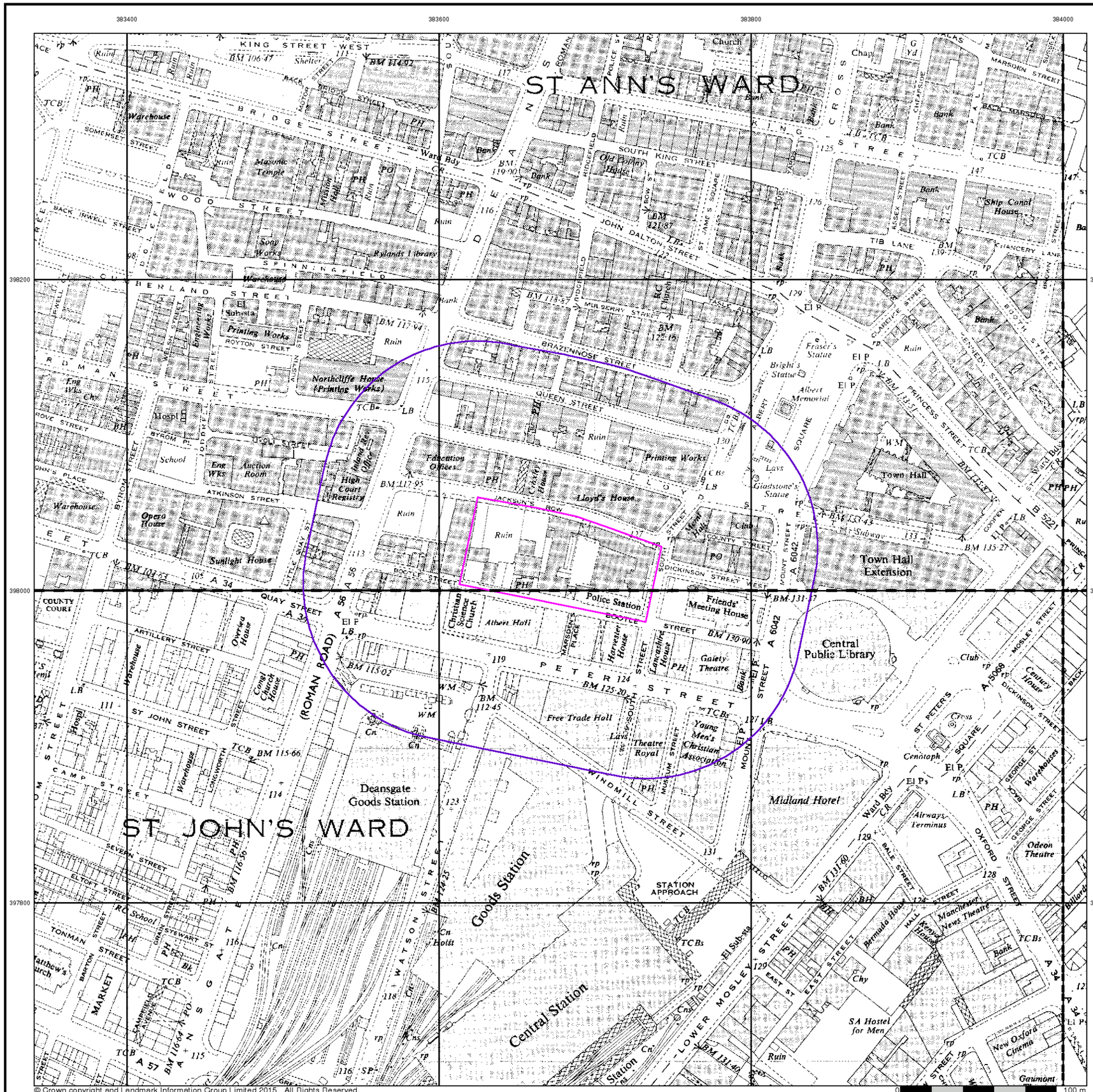
Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

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Ordnance Survey Plan

Published 1950 - 1951

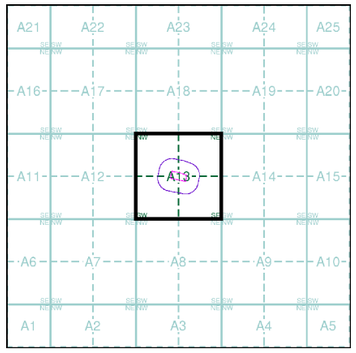
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398 1951 1:2,500	SJ8498 1951 1:2,500
SJ8397 1950 1:2,500	SJ8497 1950 1:2,500

Historical Map - Segment A13



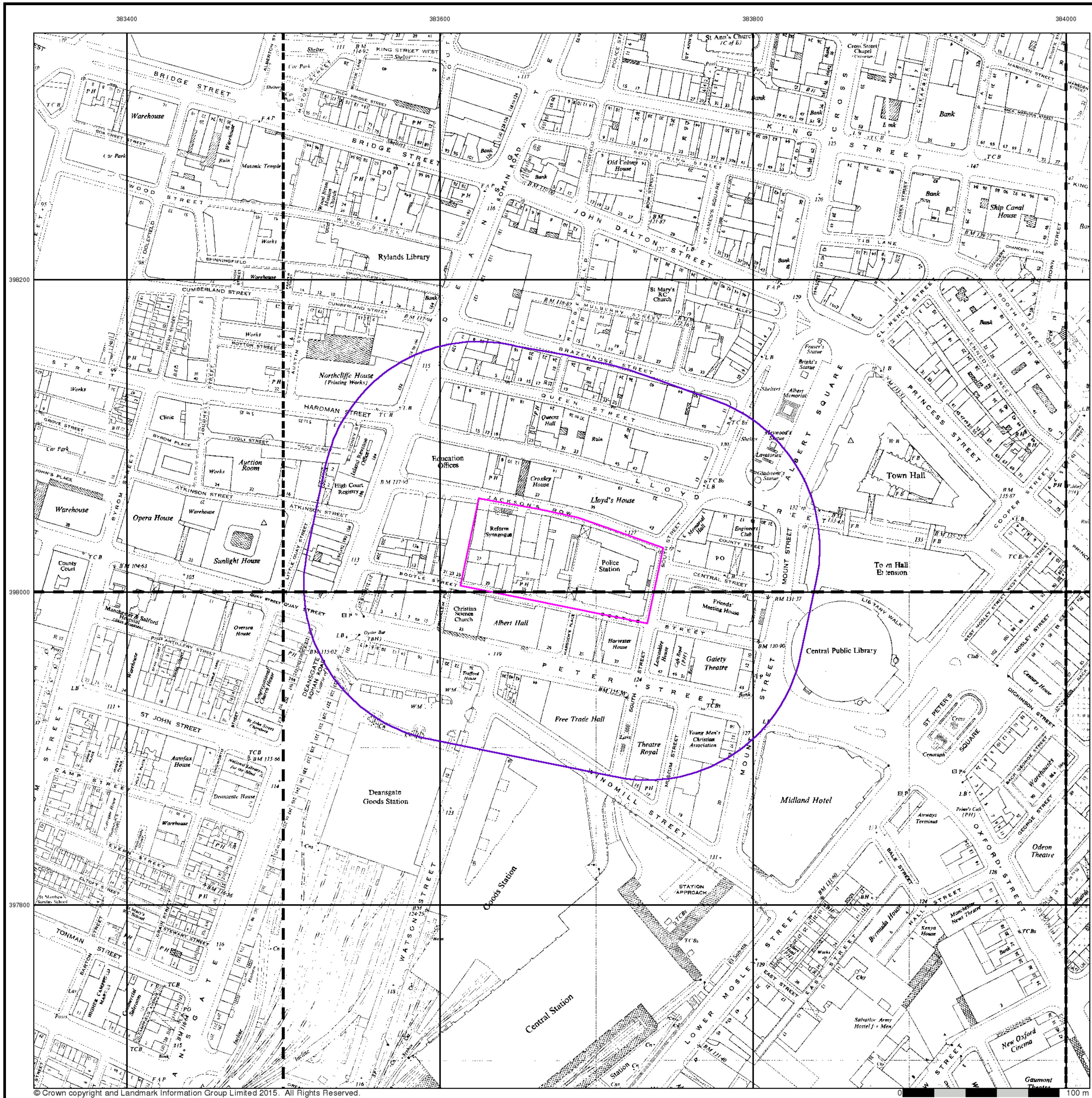
Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

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Ordnance Survey Plan

Published 1951 - 1964

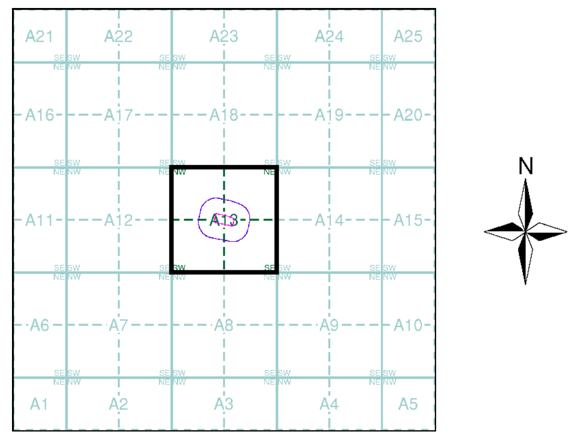
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398SW 1957 1:1,250	SJ8398SE 1956 1:1,250	SJ8498SW 1951 1:1,250
SJ8397NW 1955 1:1,250	SJ8397NE 1951 1:1,250	SJ8497NW 1964 1:1,250

Historical Map - Segment A13



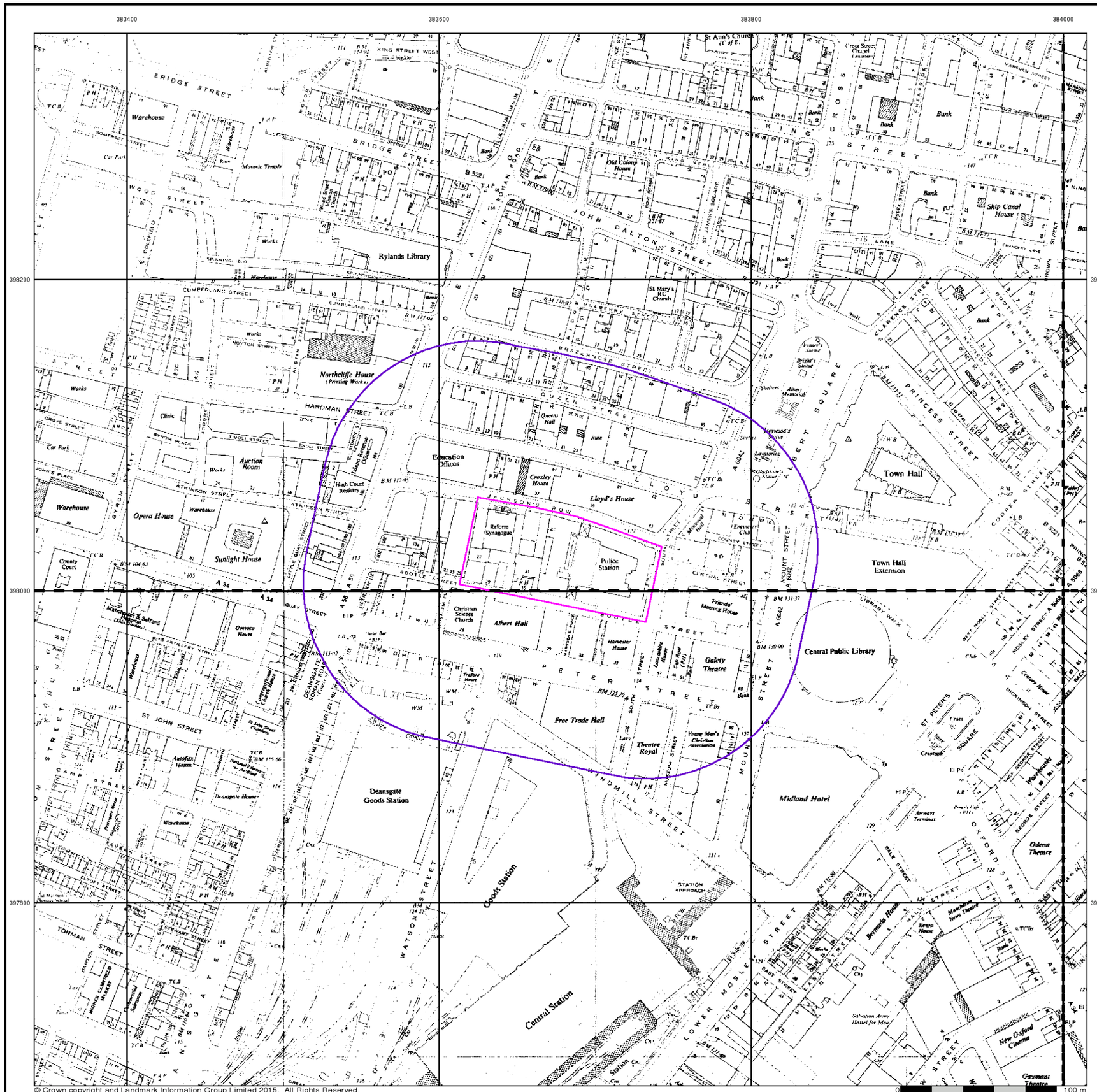
Order Details

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Customer Ref: 70010278-100
National Grid Reference: 383680, 398020
Slice: A
Site Area (Ha): 0.68
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1955 - 1958

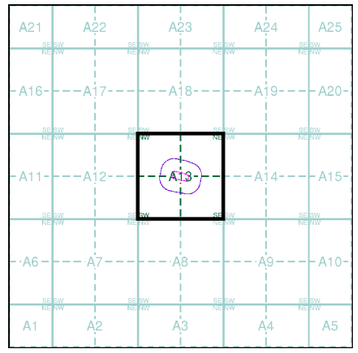
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398 1958 1:2,500	SJ8498 1955 1:2,500
SJ8397 1956 1:2,500	SJ8497 1955 1:2,500

Historical Map - Segment A13



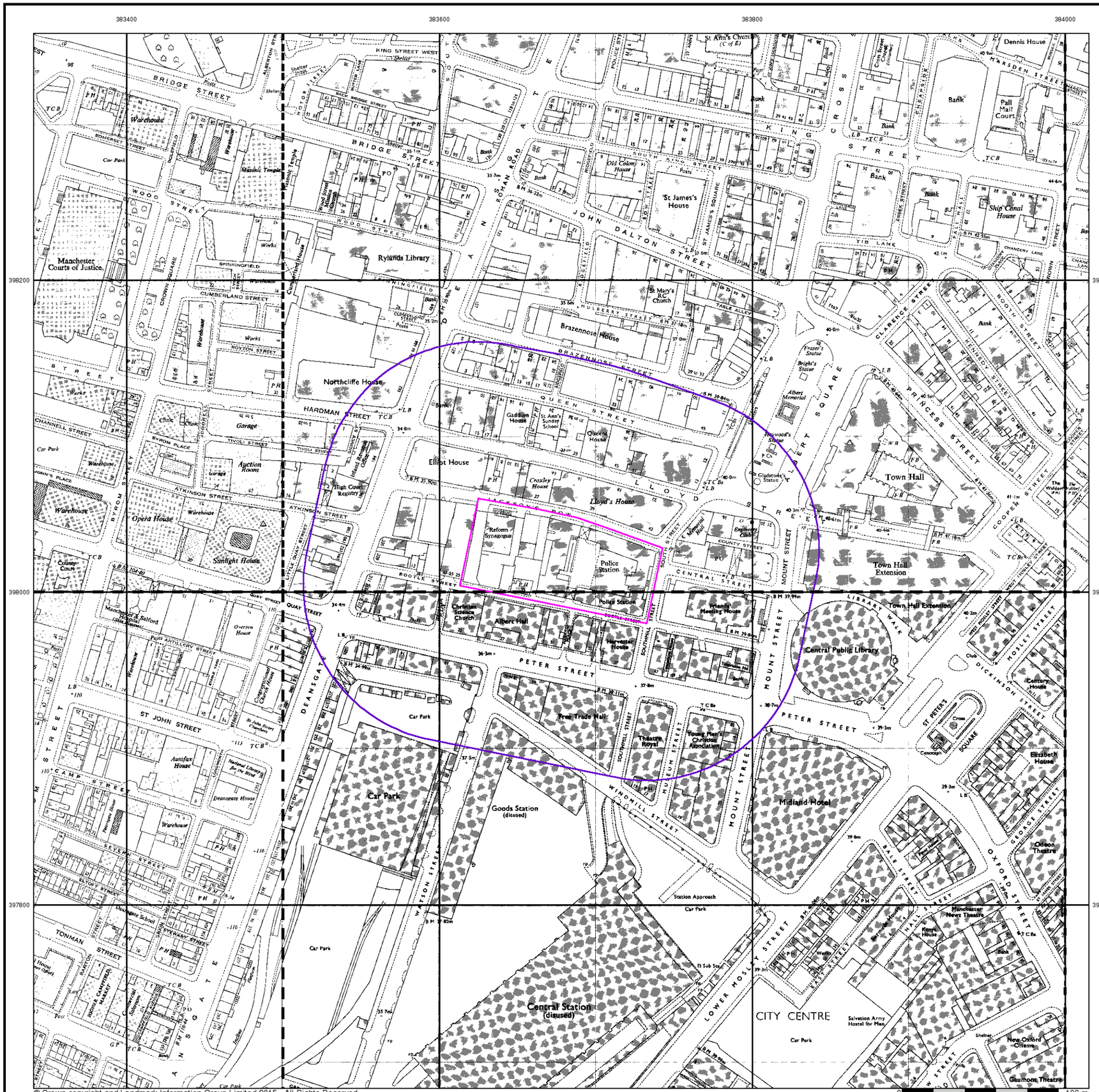
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Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

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Ordnance Survey Plan

Published 1962 - 1973

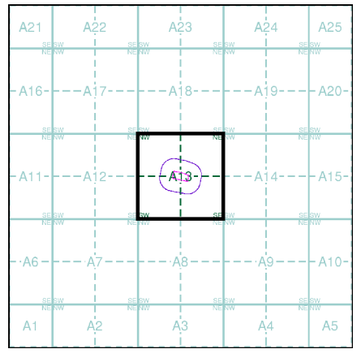
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398SW 1962 1:1,250	SJ8398SE 1970 1:1,250	SJ8498SW 1968 1:1,250
SJ8397NW 1963 1:1,250	SJ8397NE 1973 1:1,250	

Historical Map - Segment A13



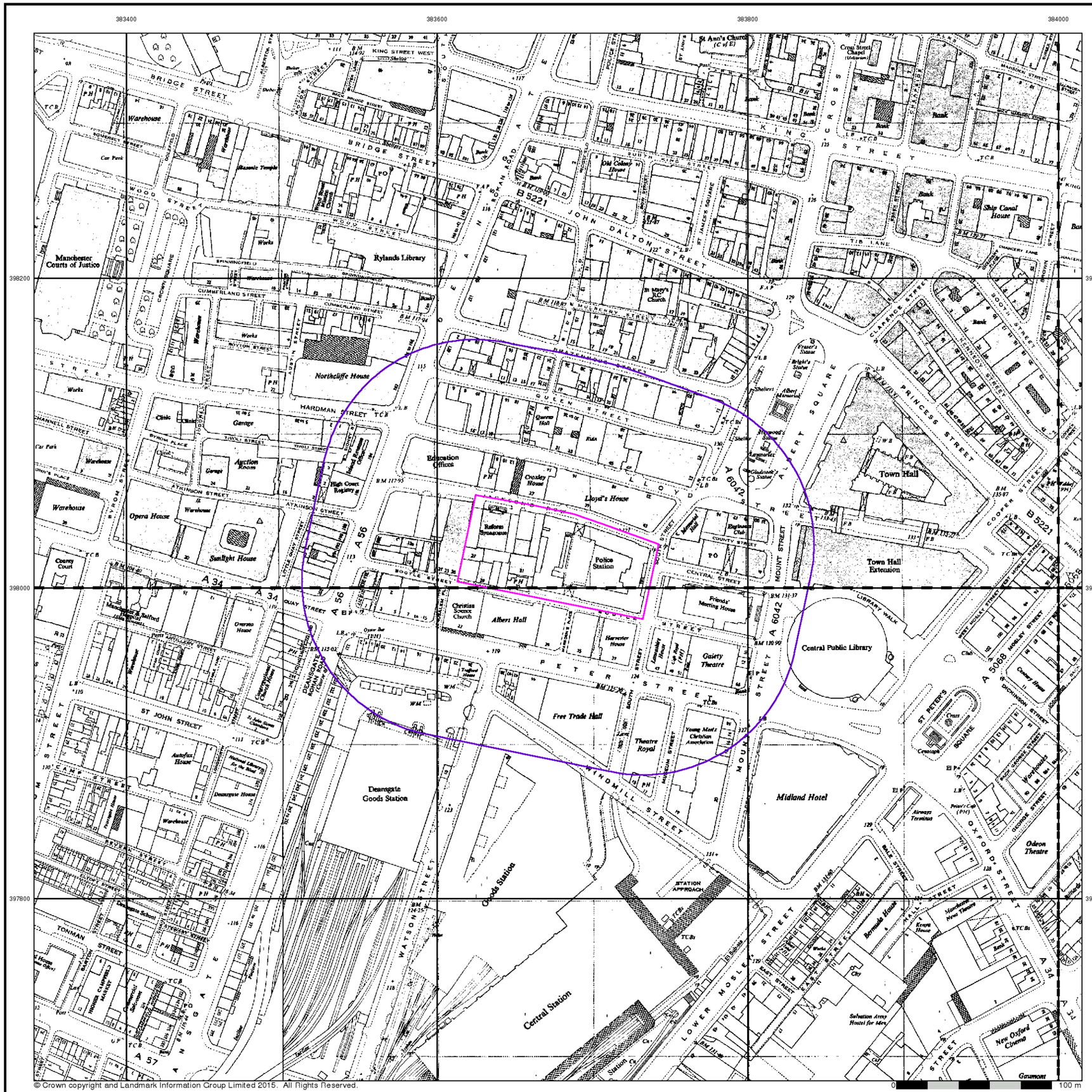
Order Details

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Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

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WSP

Ordnance Survey Plan

Published 1963 - 1965

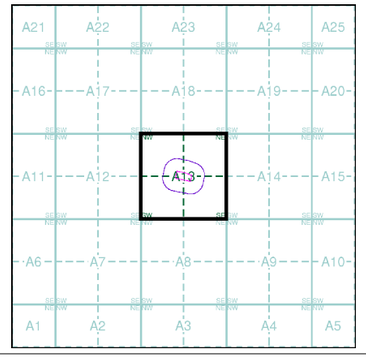
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SJ8398 1963 1:2,500	SJ8498 1965 1:2,500
SJ8397 1965 1:2,500	SJ8497 1965 1:2,500

Historical Map - Segment A13



Order Details

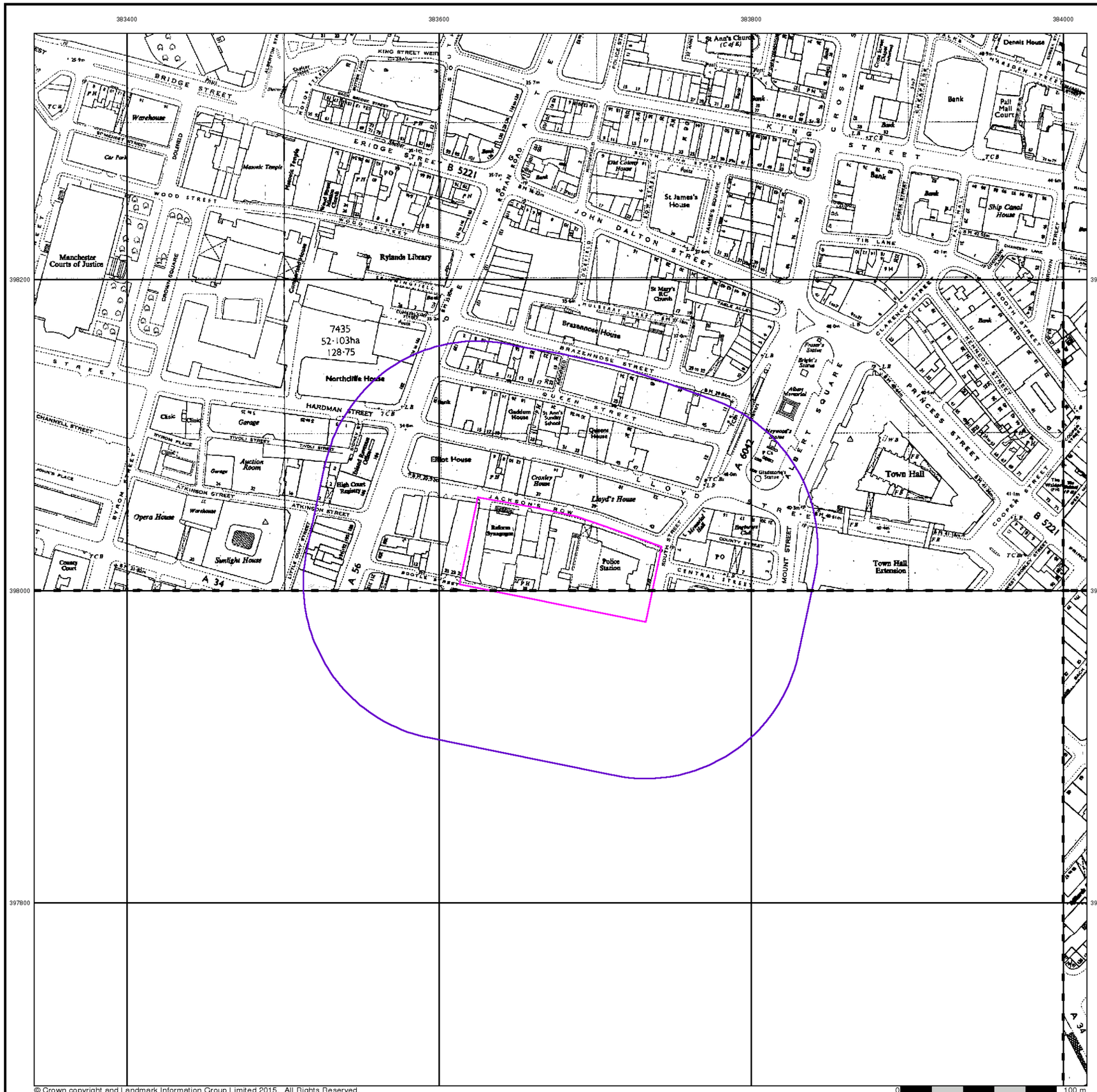
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Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

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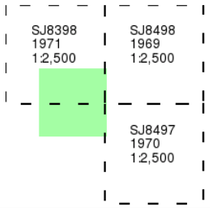
Ordnance Survey Plan

Published 1969 - 1971

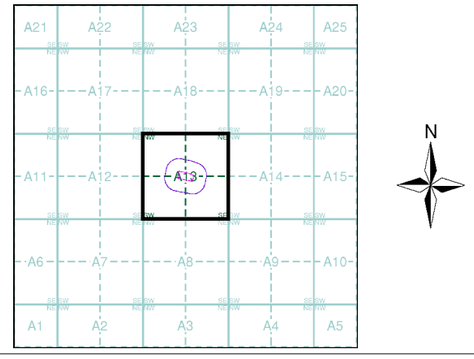
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



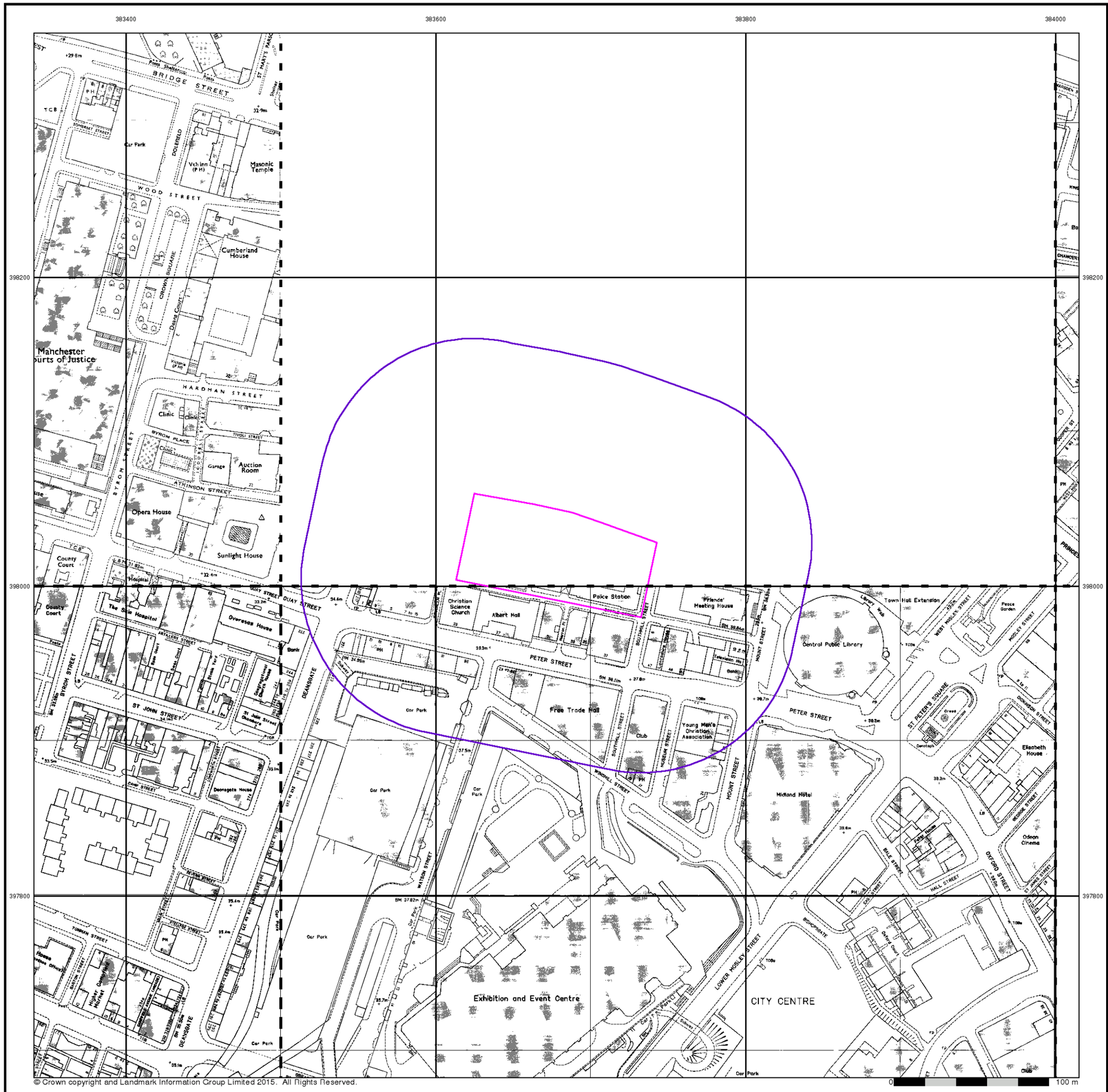
Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

Jacksons Row, MANCHESTER, M2 5WD

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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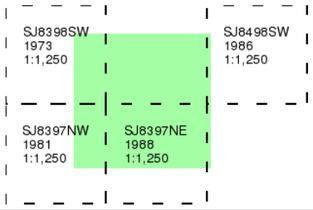
Ordnance Survey Plan

Published 1973 - 1988

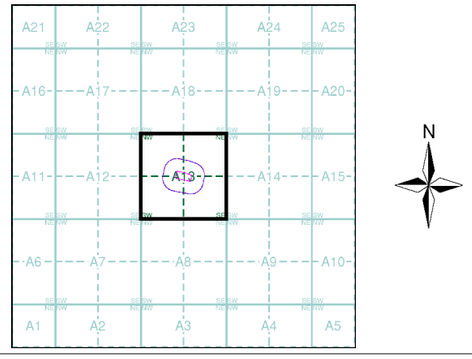
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



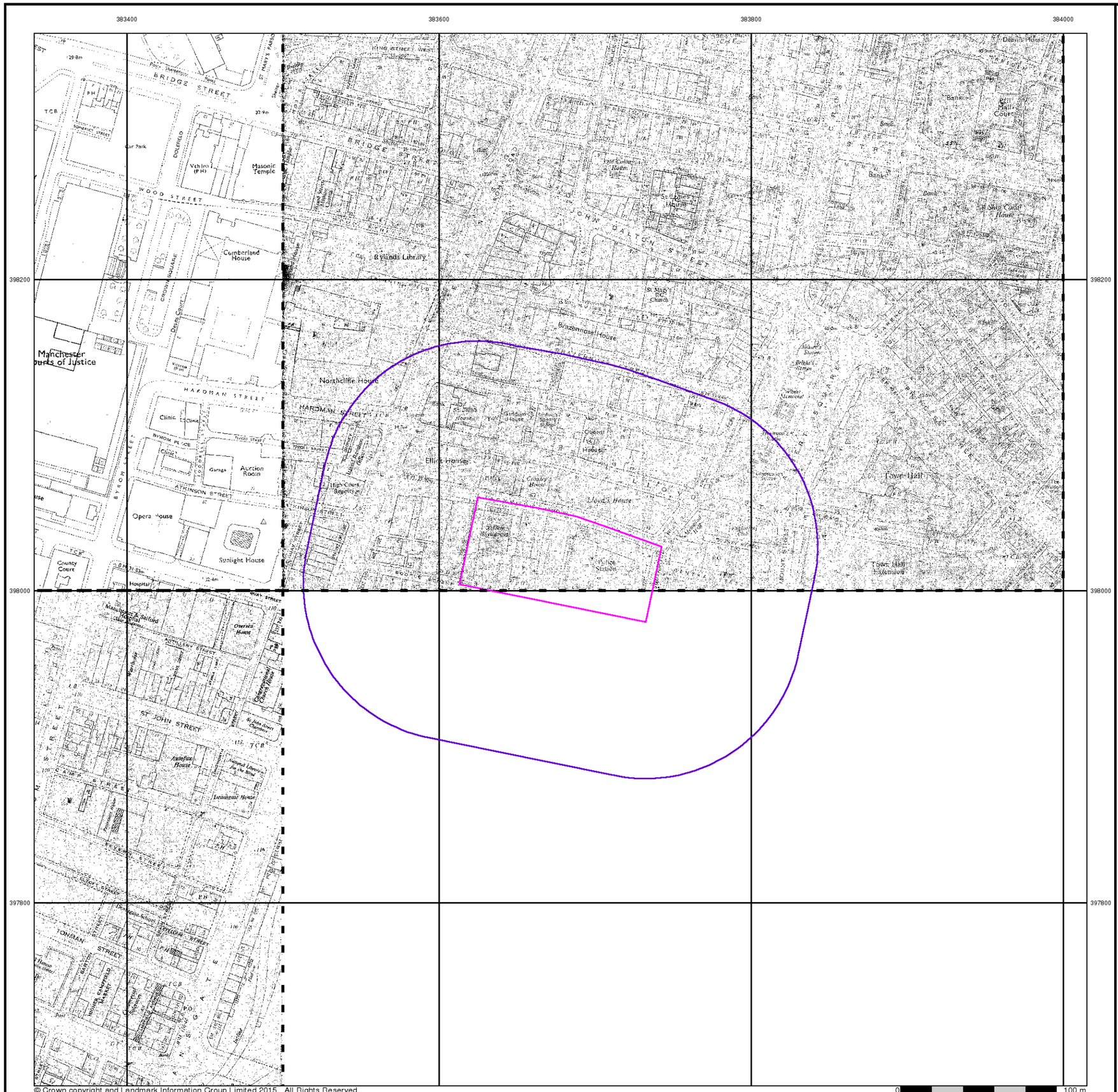
Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
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0 100 m

WSP

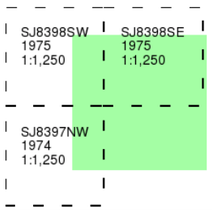
Supply of Unpublished Survey Information

Published 1974 - 1975

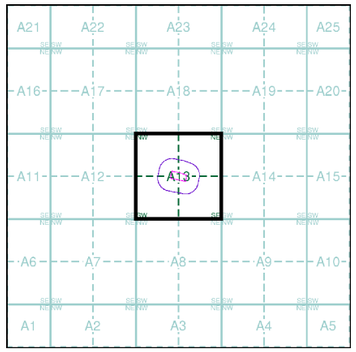
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

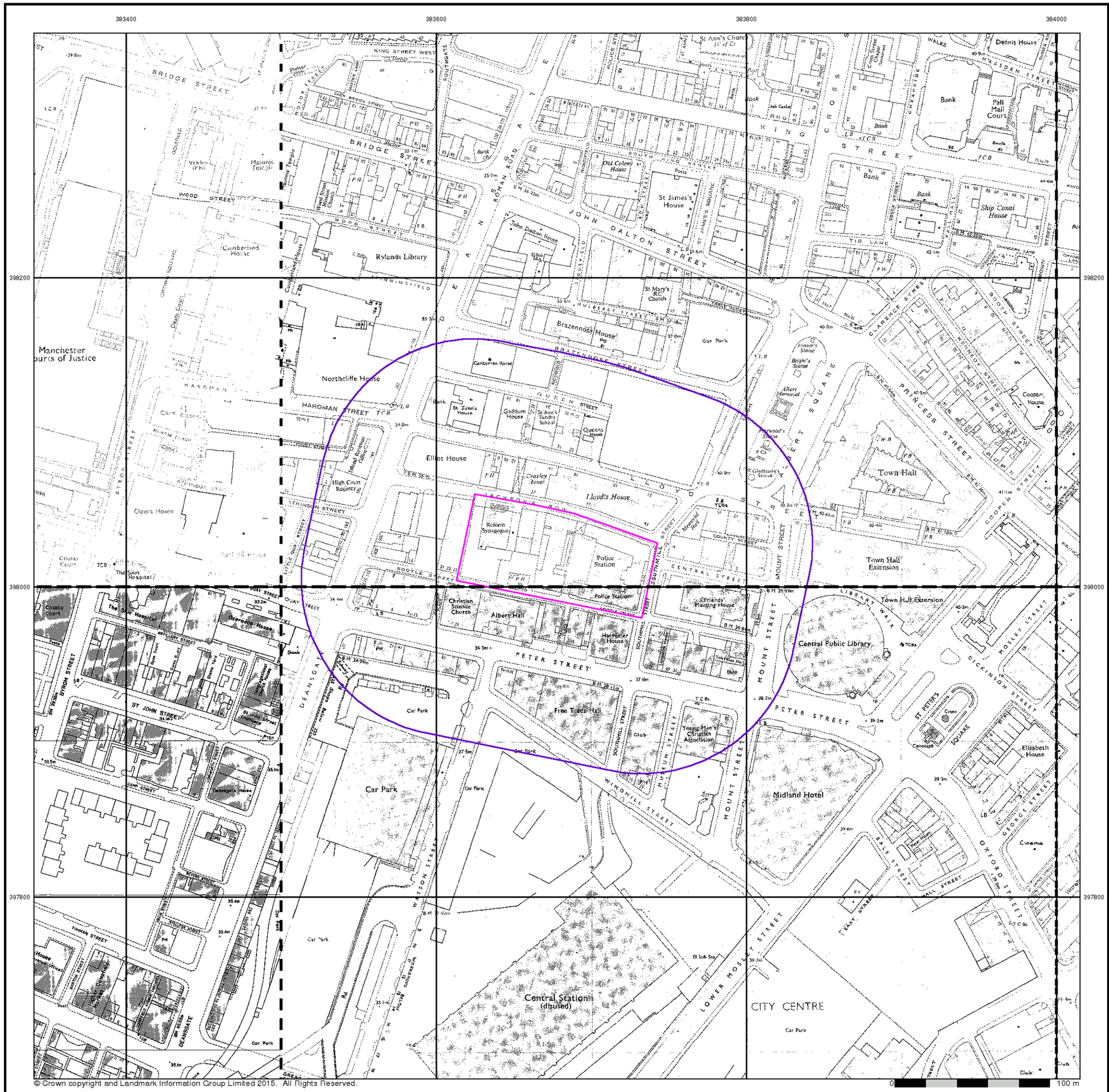
Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

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Additional SIMs

Published 1980 - 1985

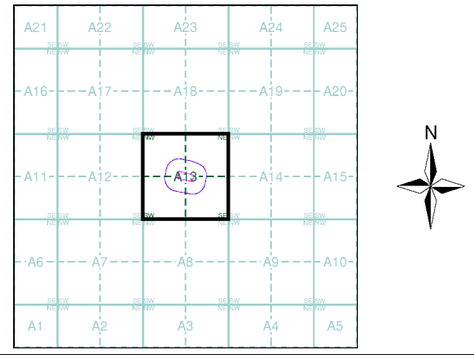
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SJ8398SW 1984 1:1,250	SJ8398SE 1980 1:1,250	SJ8498SW 1980 1:1,250
SJ8397NW 1981 1:1,250	SJ8397NE 1985 1:1,250	SJ8497NW 1985 1:1,250

Historical Map - Segment A13



Order Details

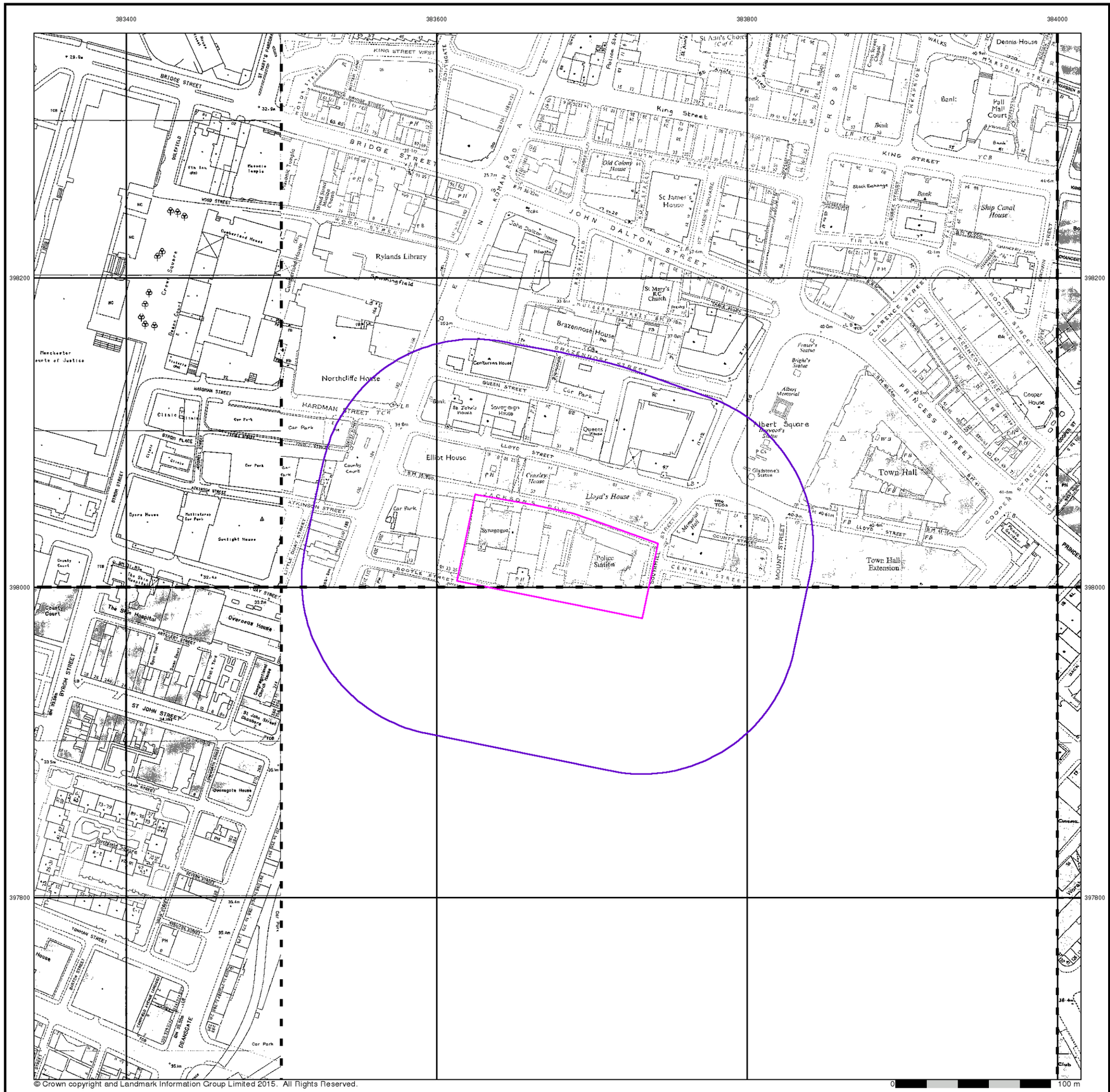
Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
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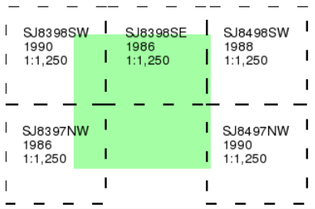
Additional SIMs

Published 1986 - 1990

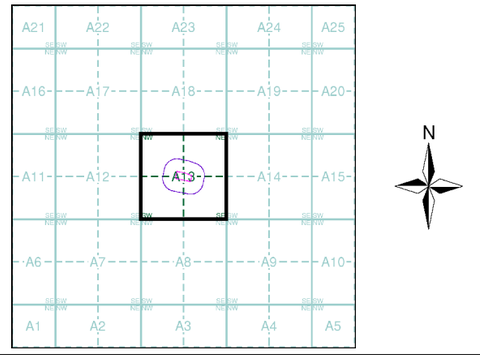
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

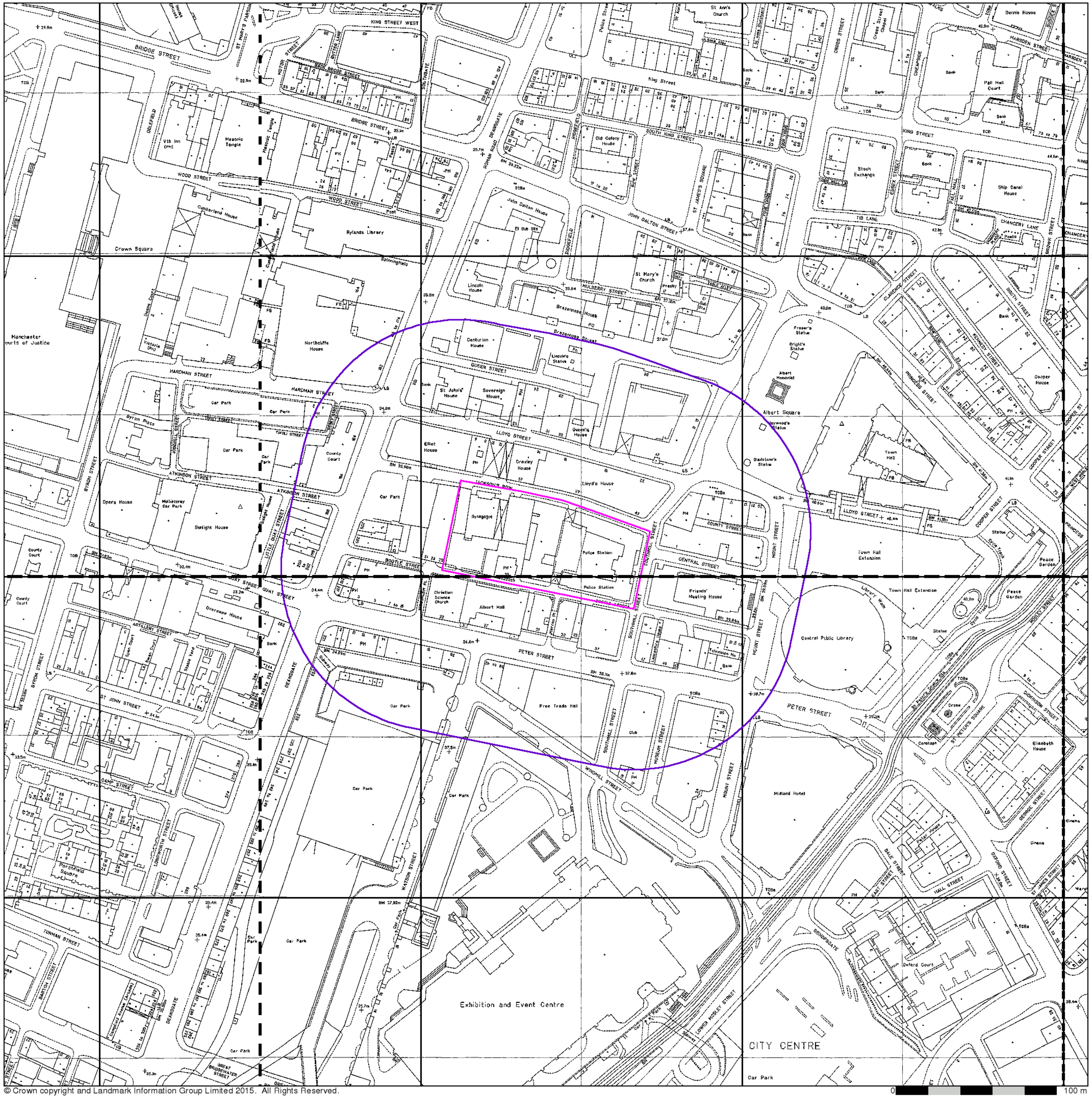
Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

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Large-Scale National Grid Data

Published 1992

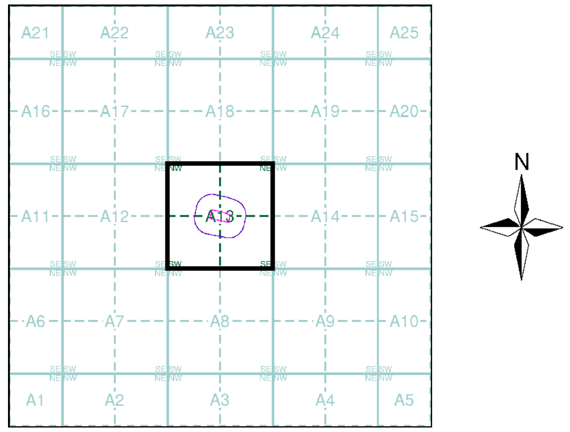
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SJ8398SW 1992 1:1,250	SJ8398SE 1992 1:1,250	SJ8498SW 1992 1:1,250
SJ8397NW 1992 1:1,250	SJ8397NE 1992 1:1,250	SJ8497NW 1992 1:1,250

Historical Map - Segment A13



Order Details

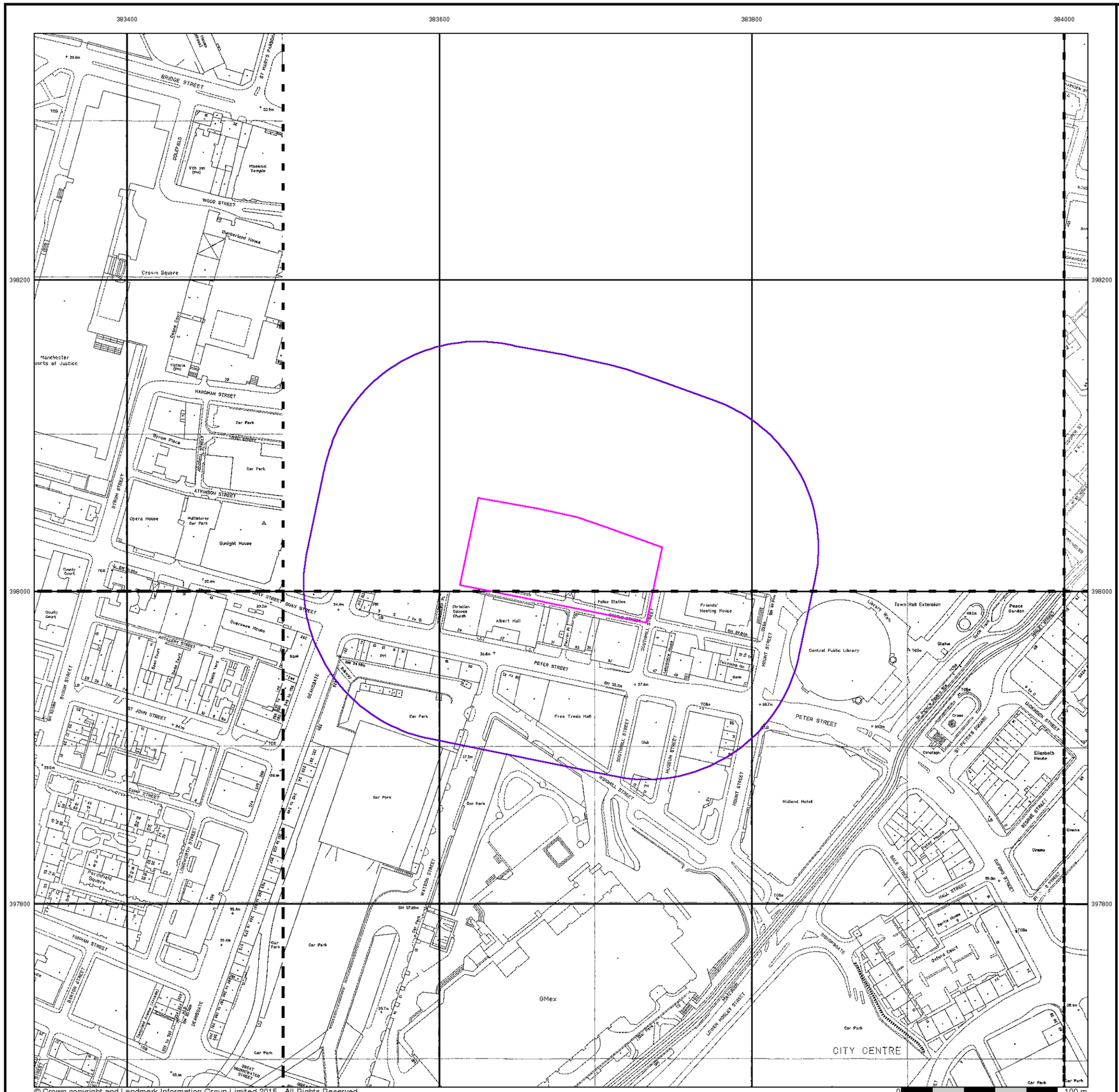
Order Number: 73295769_1_1
Customer Ref: 70010278-100
National Grid Reference: 383680, 398020
Slice: A
Site Area (Ha): 0.68
Search Buffer (m): 100

Site Details

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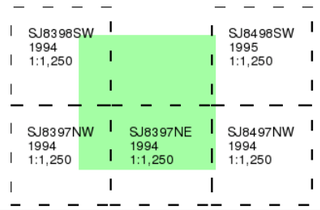
Large-Scale National Grid Data

Published 1994 - 1995

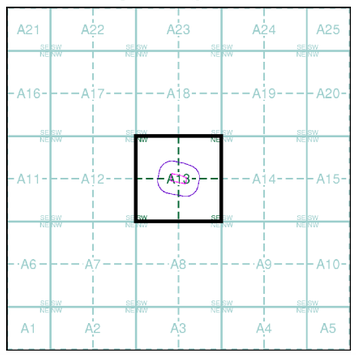
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



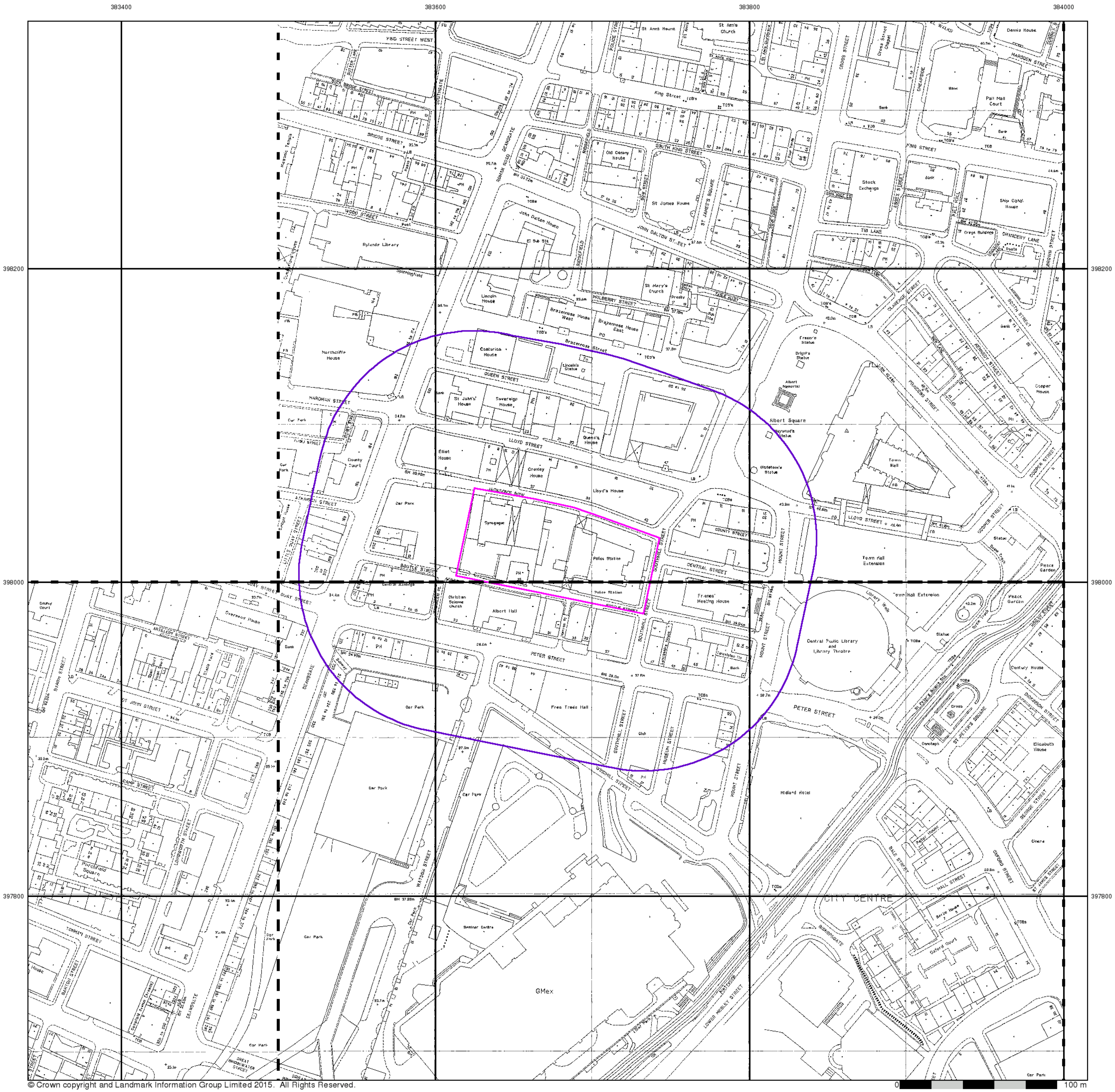
Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

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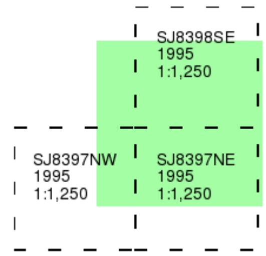
Large-Scale National Grid Data

Published 1995

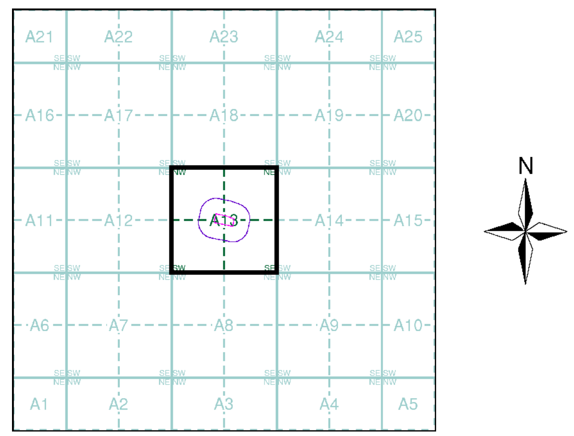
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

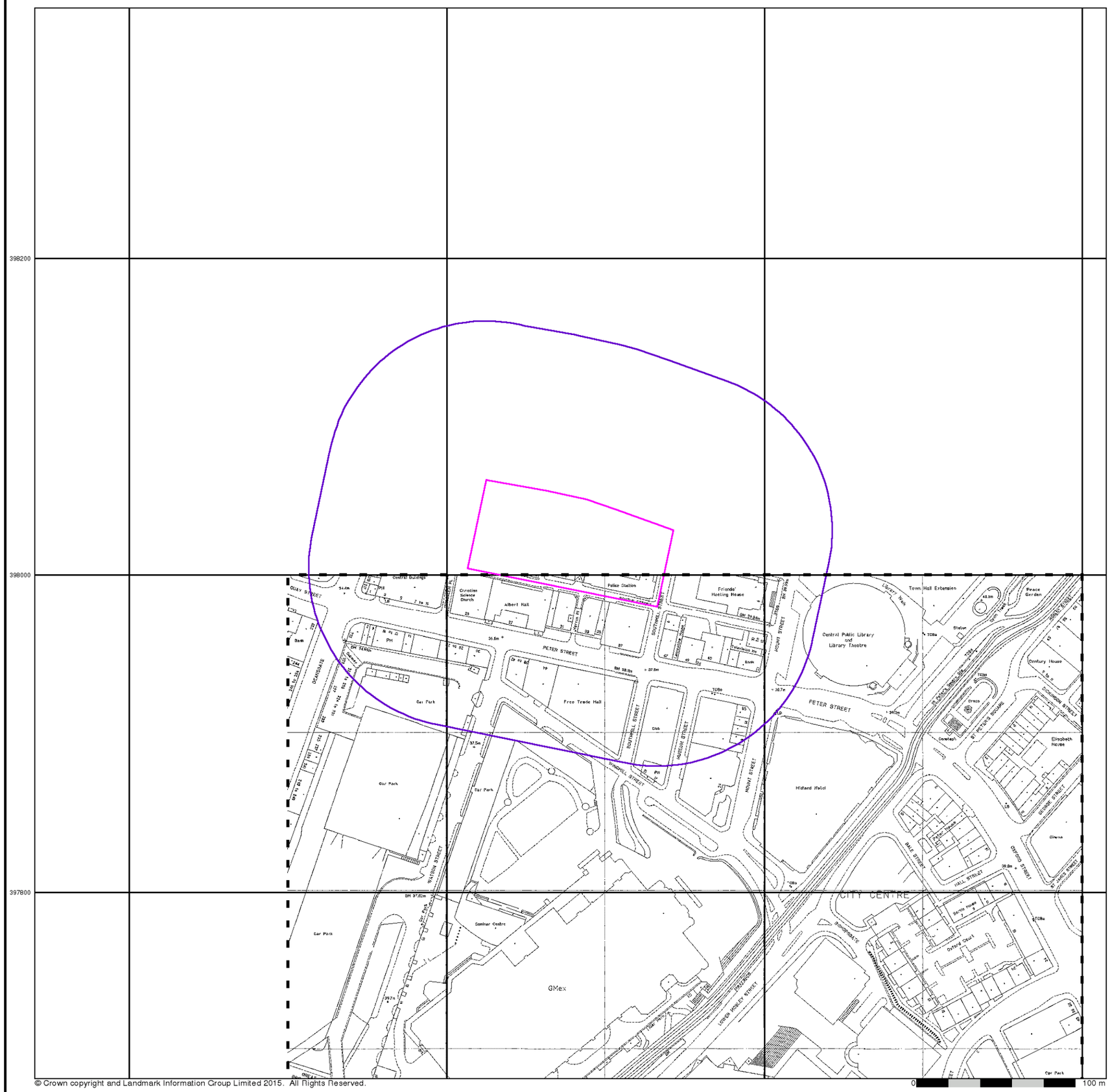
Order Number: 73295769_1_1
Customer Ref: 70010278-100
National Grid Reference: 383680, 398020
Slice: A
Site Area (Ha): 0.68
Search Buffer (m): 100

Site Details

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Large-Scale National Grid Data

Published 1996

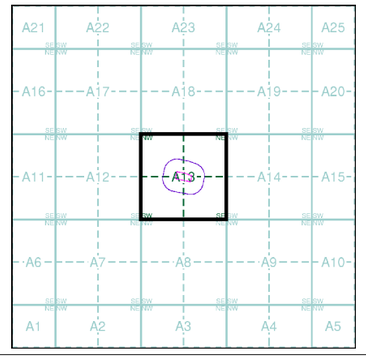
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SJ8397NE
1996
1:1,250

Historical Map - Segment A13



Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	100

Site Details

Jacksons Row, MANCHESTER, M2 5WD

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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Sloping Masonry
Pylon
Electricity Transmission Line
Pole
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

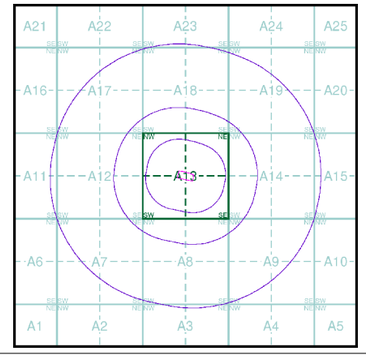
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Mud
Sand
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

WSP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1848	3
Cheshire	1:10,560	1882	4
Lancashire And Furness	1:10,560	1894 - 1896	5
Lancashire And Furness	1:10,560	1909	6
Lancashire And Furness	1:10,560	1923	7
Lancashire And Furness	1:10,560	1931 - 1933	8
Lancashire And Furness	1:10,560	1938	9
Ordnance Survey Plan	1:10,000	1956	10
Ordnance Survey Plan	1:10,000	1968	11
Ordnance Survey Plan	1:10,000	1972	12
Manchester	1:25,000	1975	13
Ordnance Survey Plan	1:10,000	1980 - 1981	14
Ordnance Survey Plan	1:10,000	1985 - 1987	15
Ordnance Survey Plan	1:10,000	1989	16
Ordnance Survey Plan	1:10,000	1993 - 1994	17
10K Raster Mapping	1:10,000	2006	18
VectorMap Local	1:10,000	2015	19

Historical Map - Slice A



Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
Slice:	A
Site Area (Ha):	0.68
Search Buffer (m):	1000

Site Details

Jacksons Row, MANCHESTER, M2 5WD

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Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Fireproof Building
- Prominent Fireproof Building
- Non-fireproof Building
- Non-fireproof Building (non-dwelling)
- Factory, mill, and flour mill, with chimneys
- Factory, mill, and flour mill, without chimneys
- Power Station, drawn to scale
- Hydroelectric Power Station
- Radio Station, drawn to scale
- Telephone Station, drawn to scale
- Abandoned Open-pit Mine or Quarry
- Open-pit Salt Mine
- Pit
- Oil Deposit or Well
- Oil Seepage
- Tailings Pile
- Fuel Storage Tanks
- Natural Gas Tank
- Bench Mark
- Drill Hole
- Burial Mound
- Triangulation Point on Burial Mound
- Single-track Railroad
- Double-track Railroad and Station Building
- Coniferous Forest
- Deciduous Forest
- Mixed Forest
- Lawns
- Citrus Orchard
- Wet Ground
- Scattered Vegetation

243,8 — Values for prominent elevations

186.0 — Numbers for spot elevations, depth soundings, contour lines, etc.

0,2 — Velocity of the current, width of river bed, depth of river

Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	ъ (–)
Д д (D)	Л л (L)	У у (U)	ы (Y)
Е е (E)	М м (M)	Ф ф (F)	ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

- Government and Administrative Buildings
- Military and Industrial Buildings
- Military and Communication Areas
- Subway Entrance
- Partly Demolished Buildings
- Demolished Buildings
- Built-Up Area with Fireproof Buildings Predominant
- Built-Up Area with Non-Fireproof Buildings Predominant
- Individual Fireproof Building
- Prominent Industrial Building
- Individual Dwelling, Fireproof
- Ruins of an Individual Dwelling
- Factory or Mill Chimney
- Factory or Mill with Chimney
- Factory or Mill without Chimney
- Mine or Open Pit Mine
- Operating Shaft or Mine
- Non-Operating Shaft or Mine
- Salt Mine
- Tailings Pile
- Pit
- Stone Quarry
- Gas Pump or Service Station
- Fuel Storage or Natural Gas Tank
- Oil or Natural Gas Derrick
- Small Hydroelectric Power Station
- Power Station
- Transformer Station
- Cemetery
- Burial Mound (height in metres)
- Triangulation Point on Burial Mound
- Triangulation Point
- Bench Mark
- Bench Mark (monumented)
- Telegraph Office
- Telephone Station
- Radio Station
- Radio Tower
- Airfield or Seaplane Base
- Landing Strip
- Main Highway
- Highway under Construction
- Improved Dirt Road (former truck road)
- Double-track Railroad with First Class Station
- Dismantled Railroad
- Railroad Under Construction
- Shore Embankment
- River or Ditch with Embankment
- Water Gauge
- Direction and velocity of current
- Water Level Mark
- Well
- Water Reservoir or Rain Water Pit
- Spring
- Isobath with value
- Heavy (Index) Contour Line
- Contour Line and Value
- Half Contour Line
- Spot Elevation Value
- Coniferous
- Deciduous
- Mixed
- Scrub

Key to Numbers on Mapping

SJ89_Manchester

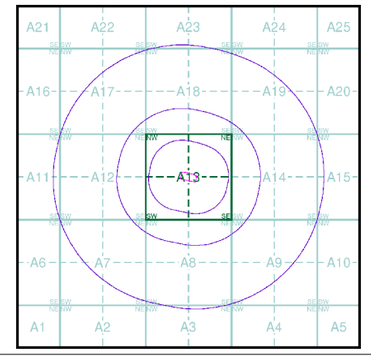
No.	Description
1	Airfield/Airport
6	Railway Station
62	Factory (Gas)
66	Factory (Gas)
168	Post Office
197	Railway Station

WSP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1848	3
Cheshire	1:10,560	1882	4
Lancashire And Furness	1:10,560	1894 - 1896	5
Lancashire And Furness	1:10,560	1909	6
Lancashire And Furness	1:10,560	1923	7
Lancashire And Furness	1:10,560	1931 - 1933	8
Lancashire And Furness	1:10,560	1938	9
Ordnance Survey Plan	1:10,000	1956	10
Ordnance Survey Plan	1:10,000	1968	11
Ordnance Survey Plan	1:10,000	1972	12
Manchester	1:25,000	1975	13
Ordnance Survey Plan	1:10,000	1980 - 1981	14
Ordnance Survey Plan	1:10,000	1985 - 1987	15
Ordnance Survey Plan	1:10,000	1989	16
Ordnance Survey Plan	1:10,000	1993 - 1994	17
10K Raster Mapping	1:10,000	2006	18
VectorMap Local	1:10,000	2015	19

Russian Map - Slice A



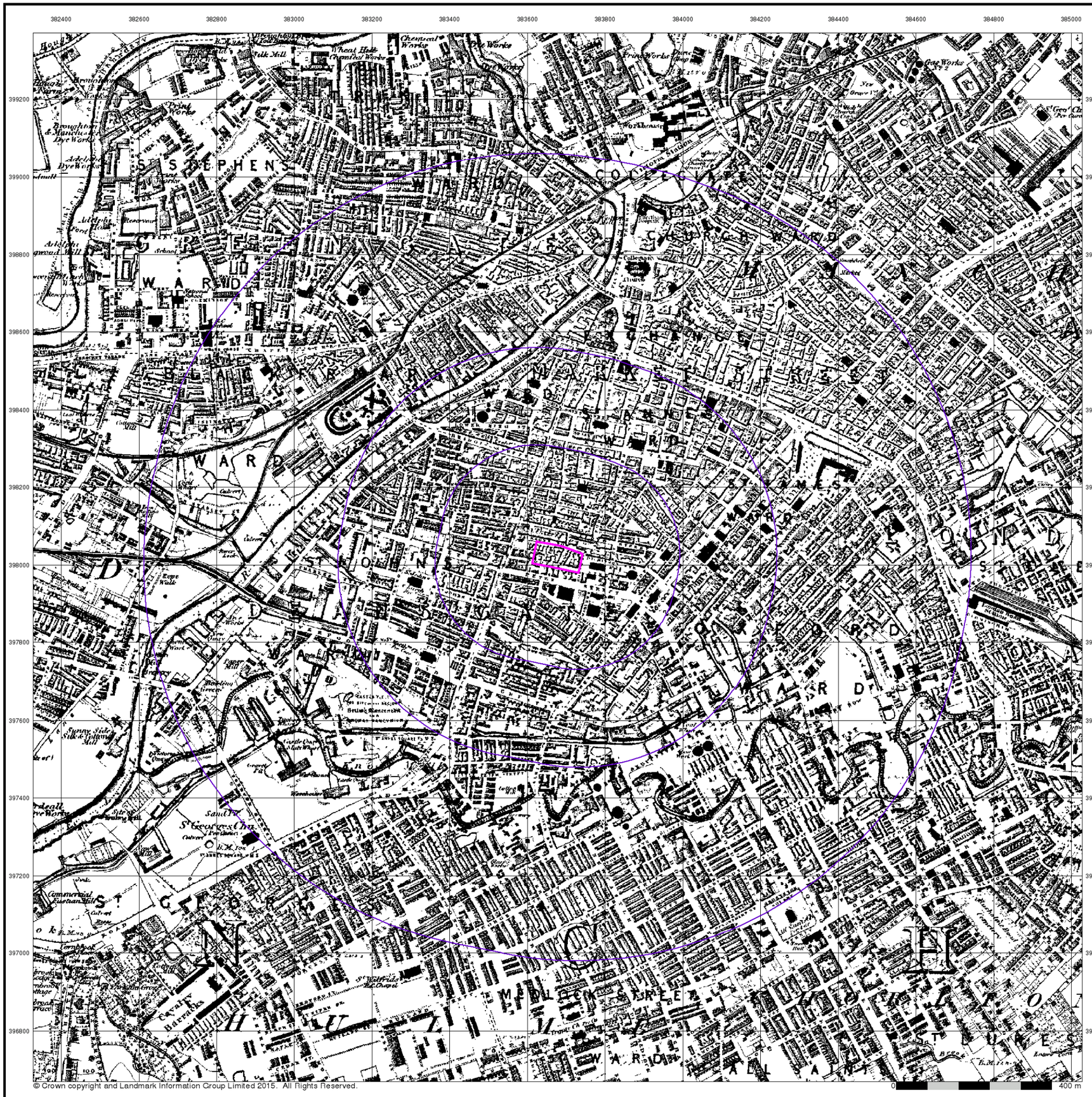
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National Grid Reference: 383680, 398020
Slice: A
Site Area (Ha): 0.68
Search Buffer (m): 1000

Site Details

Jacksons Row, MANCHESTER, M2 5WD

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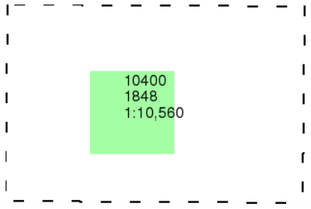
Lancashire And Furness

Published 1848

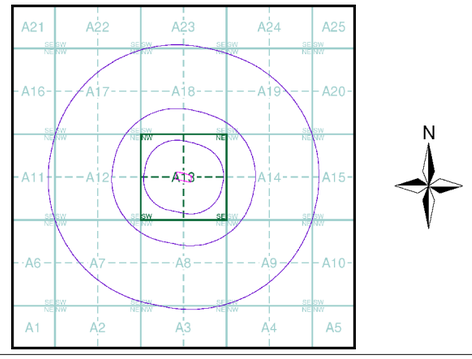
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

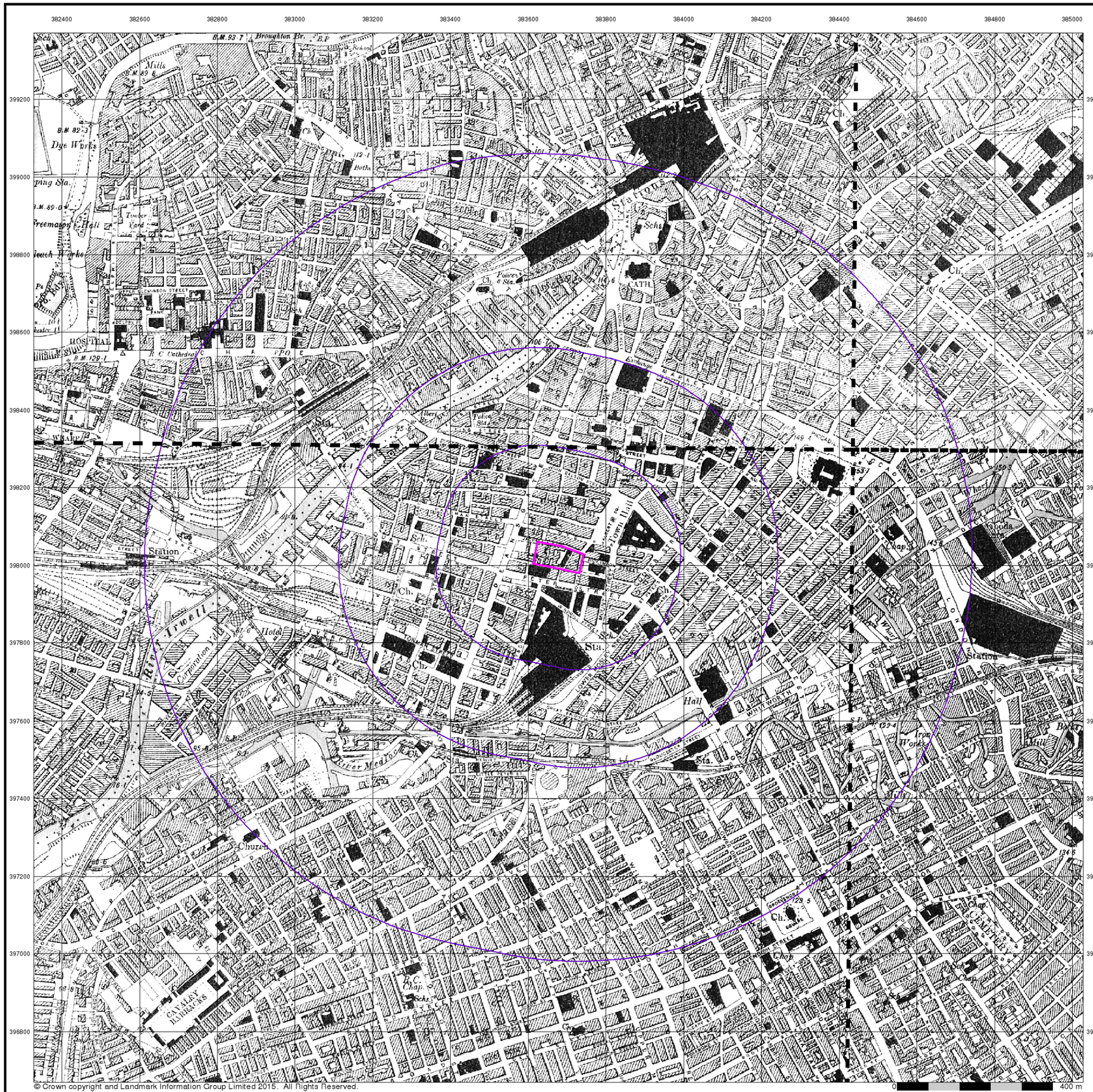
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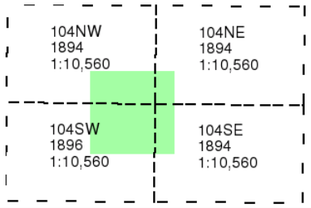
Lancashire And Furness

Published 1894 - 1896

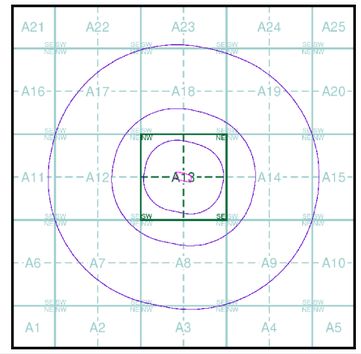
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

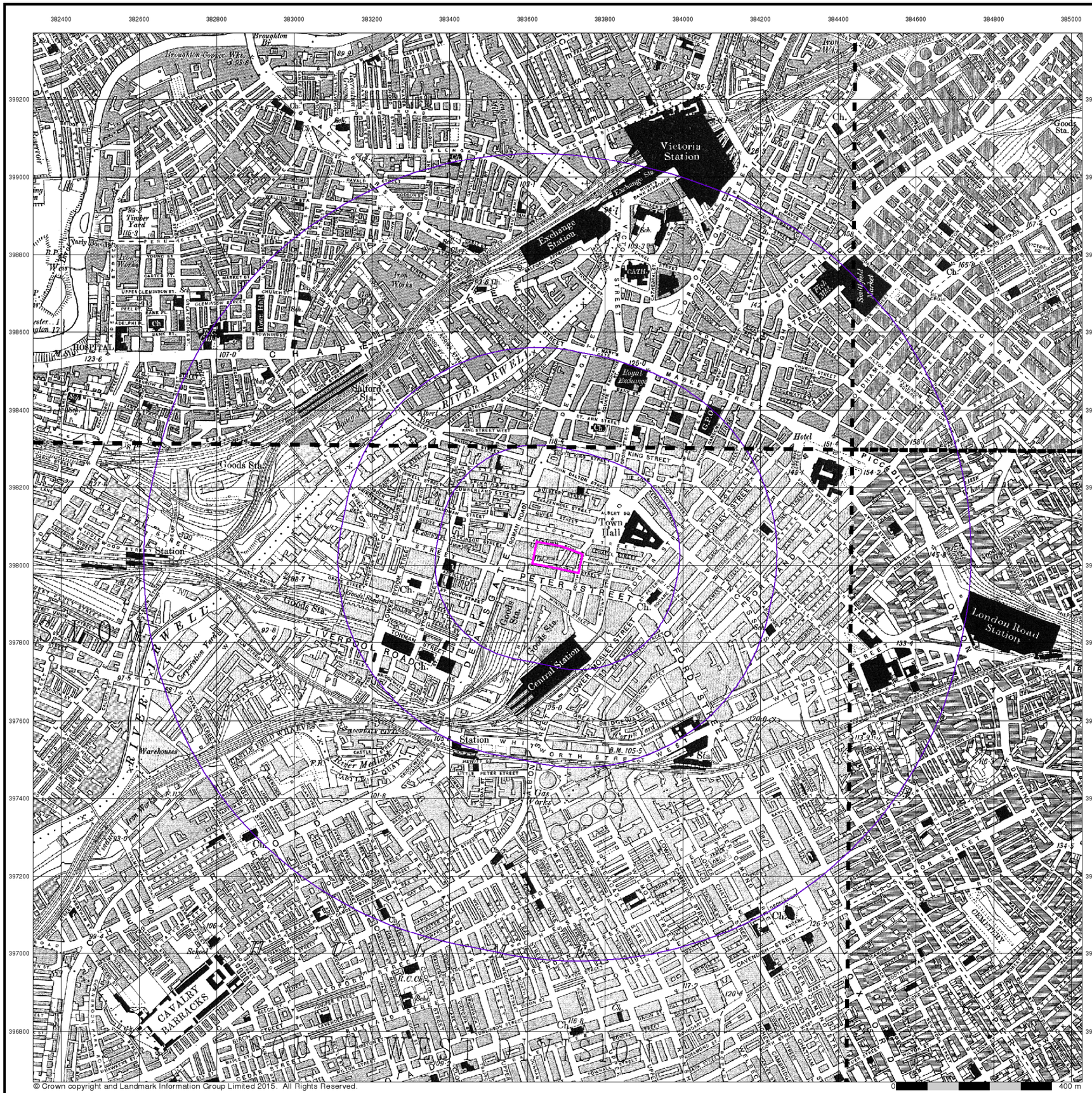
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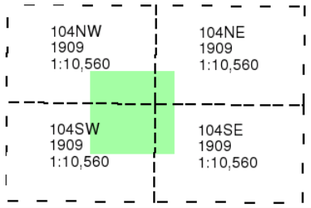
Lancashire And Furness

Published 1909

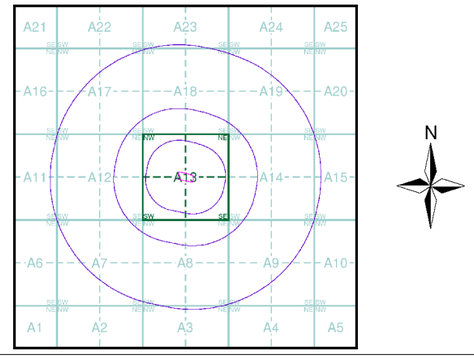
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

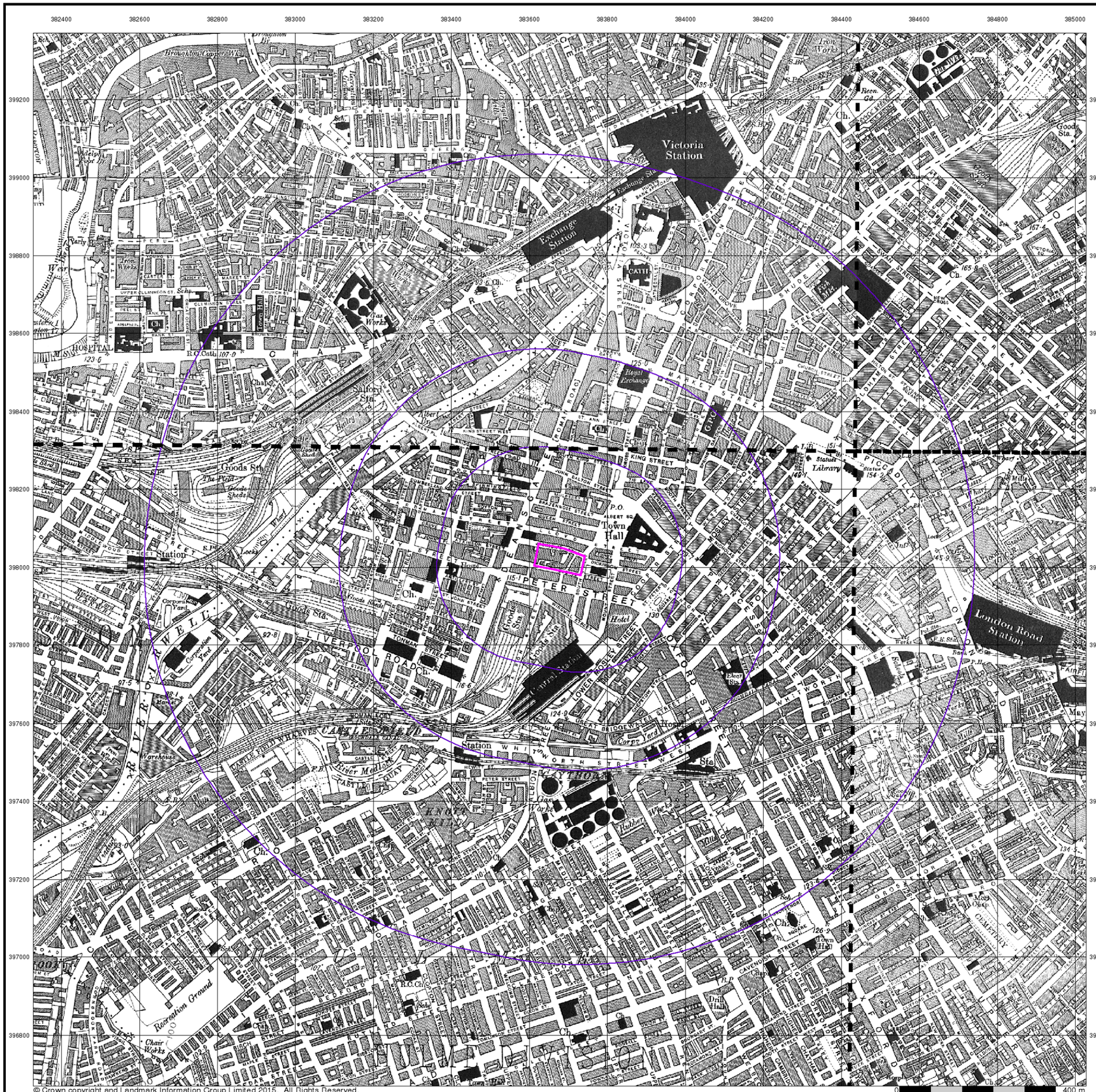
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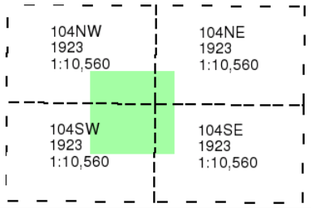
Lancashire And Furness

Published 1923

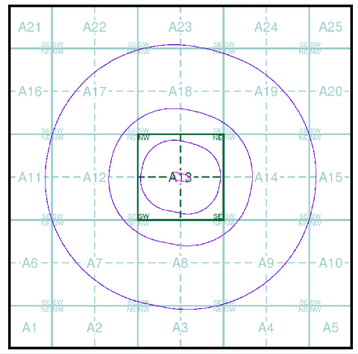
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Map Name(s) and Date(s)



Historical Map - Slice A



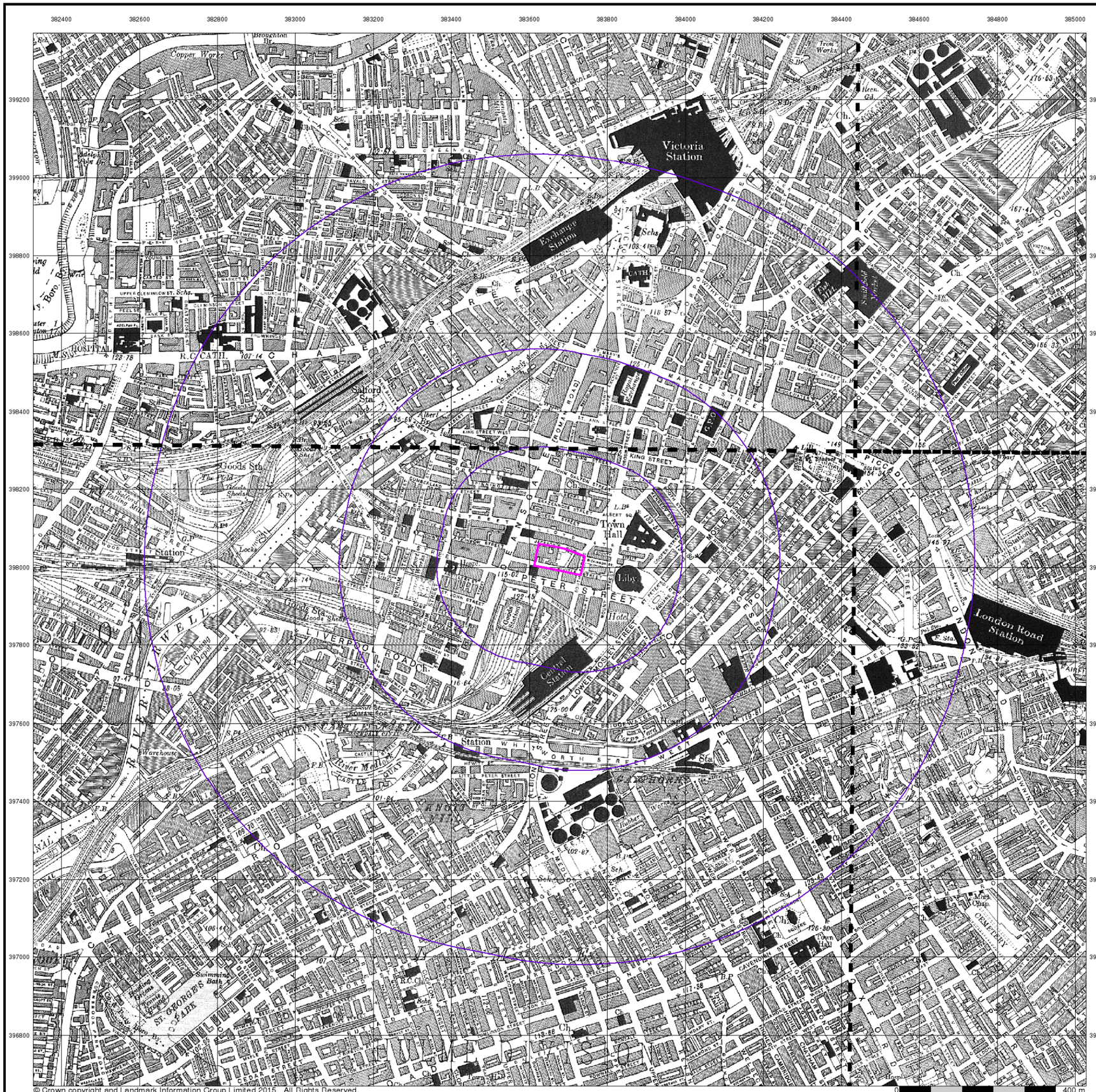
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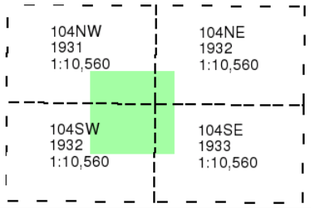
Lancashire And Furness

Published 1931 - 1933

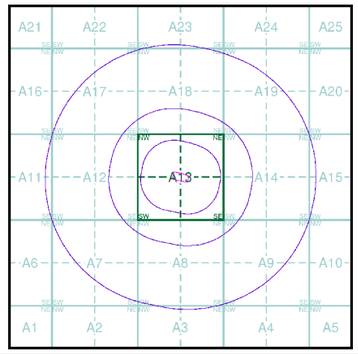
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

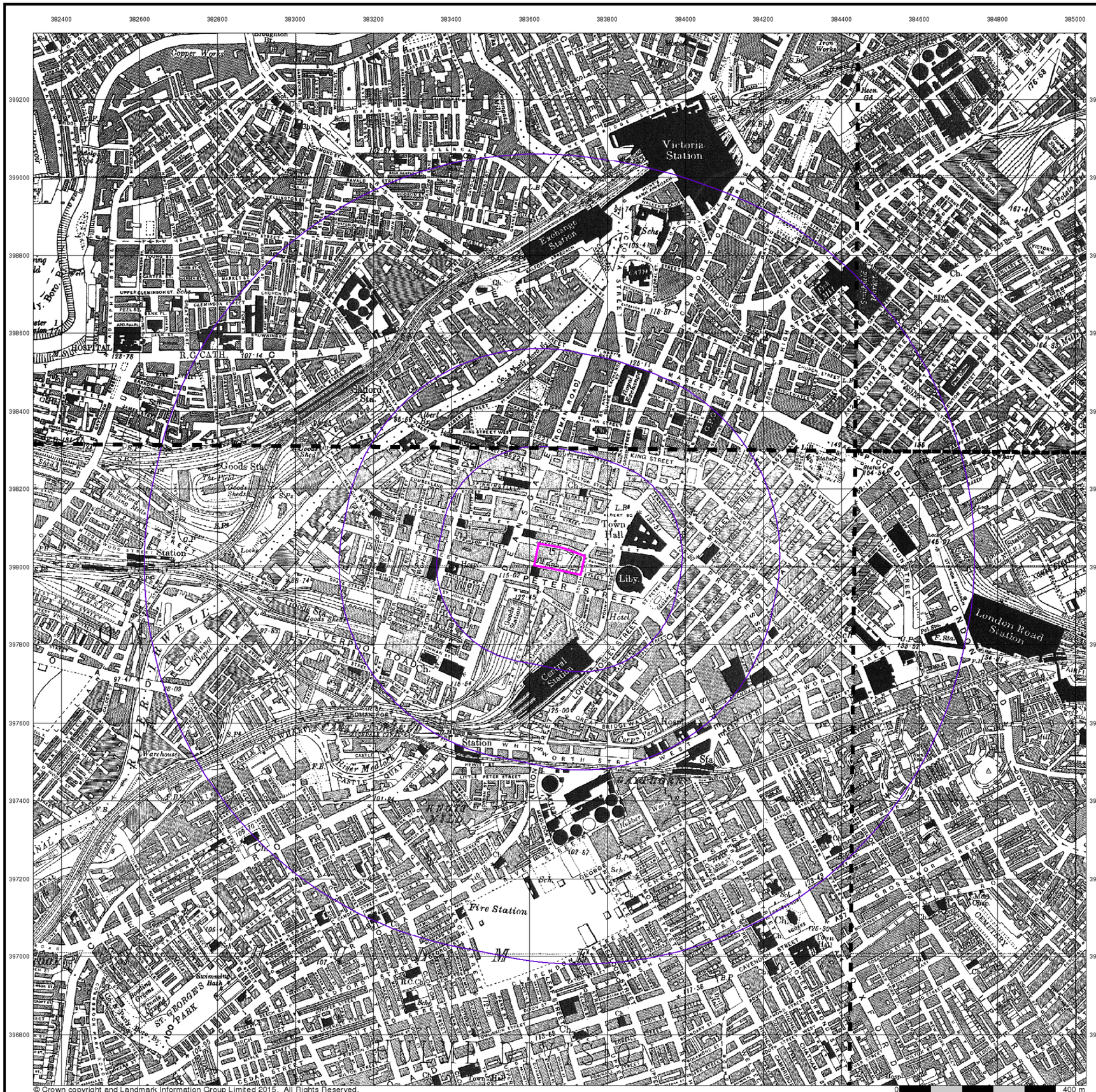
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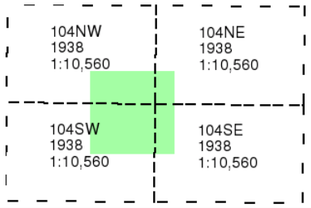
Lancashire And Furness

Published 1938

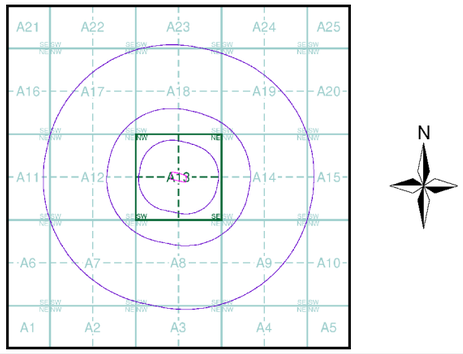
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

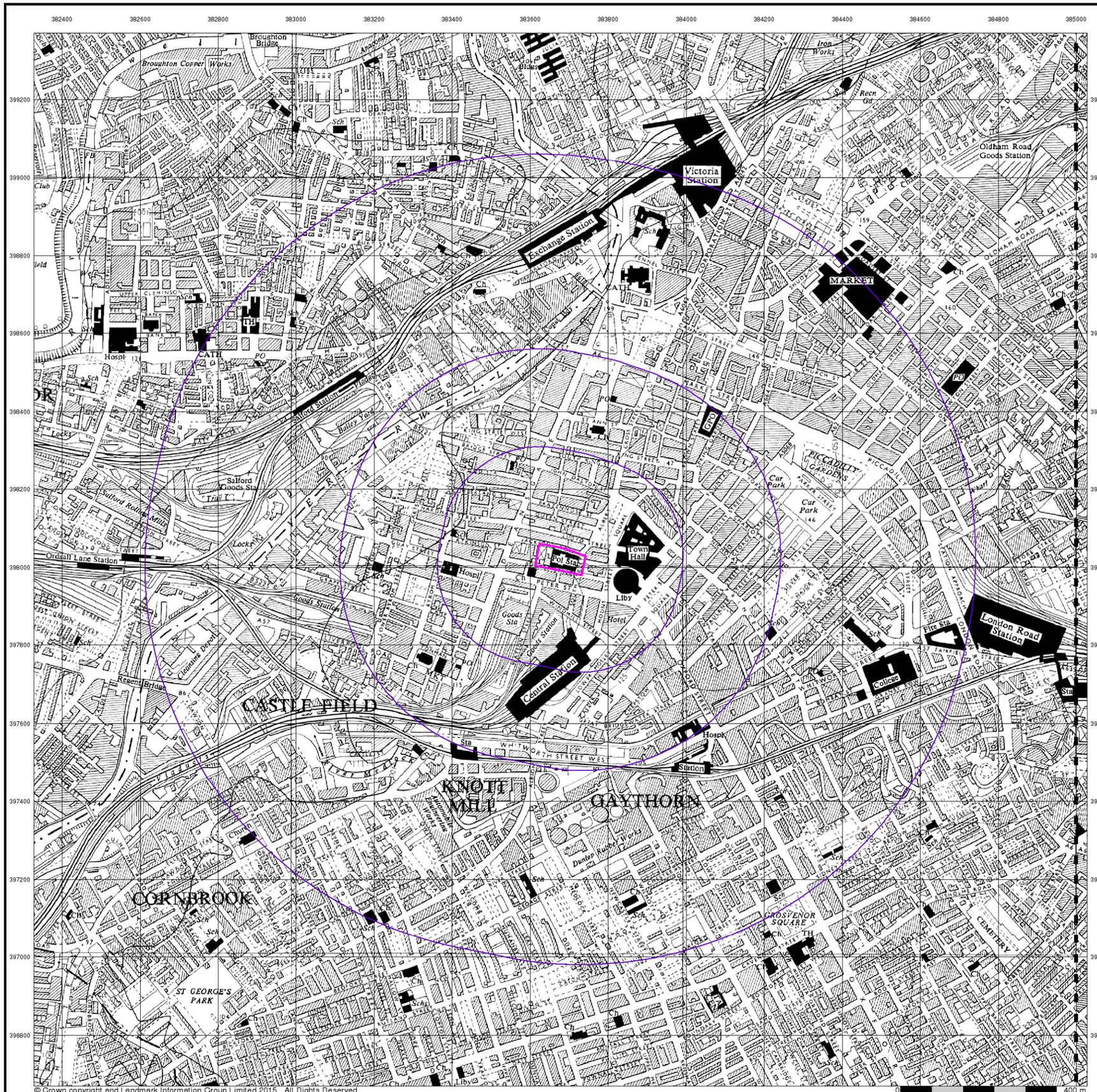
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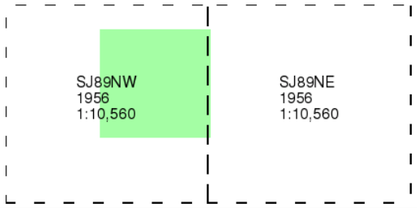
Ordnance Survey Plan

Published 1956

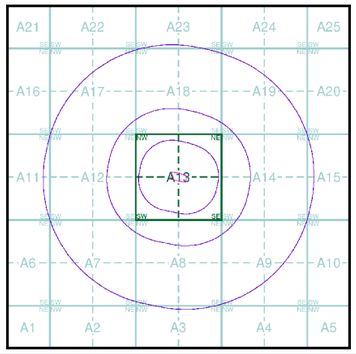
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Map Name(s) and Date(s)



Historical Map - Slice A



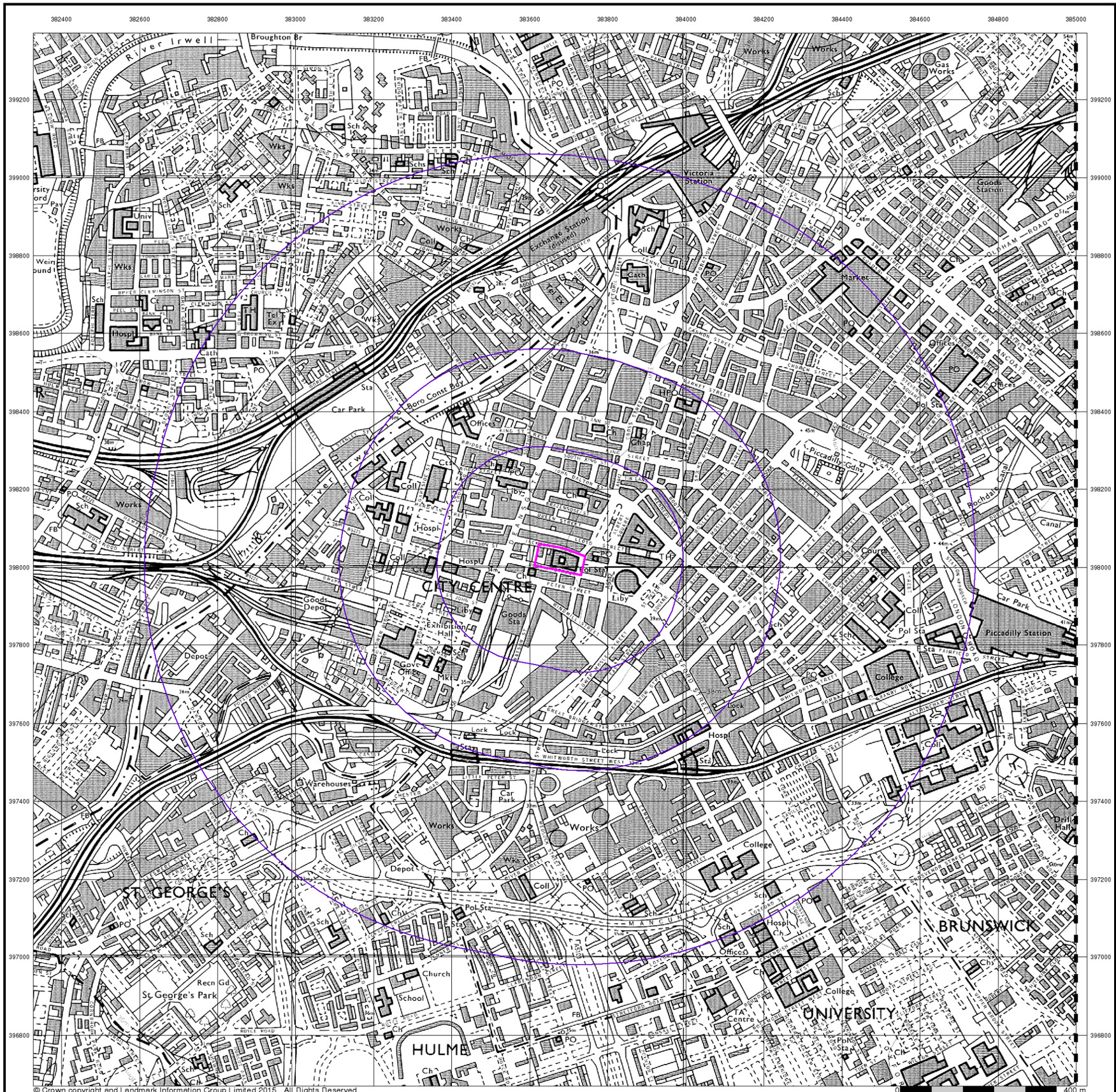
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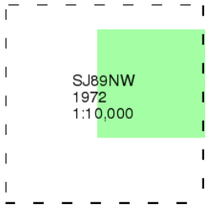
Ordnance Survey Plan

Published 1972

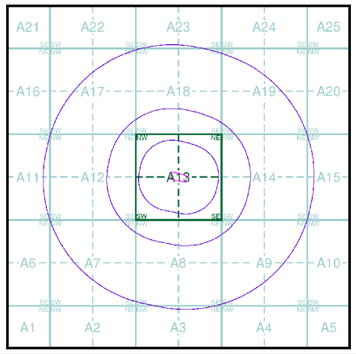
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	73295769_1_1
Customer Ref:	70010278-100
National Grid Reference:	383680, 398020
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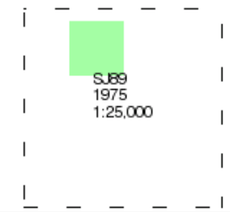
Manchester

Published 1975

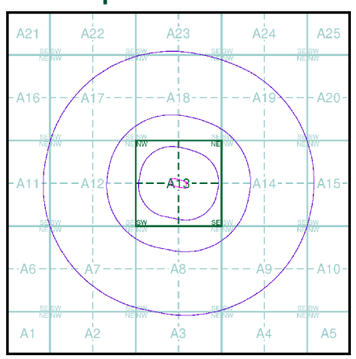
Source map scale - 1:25,000

These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use.
They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)



Russian Map - Slice A



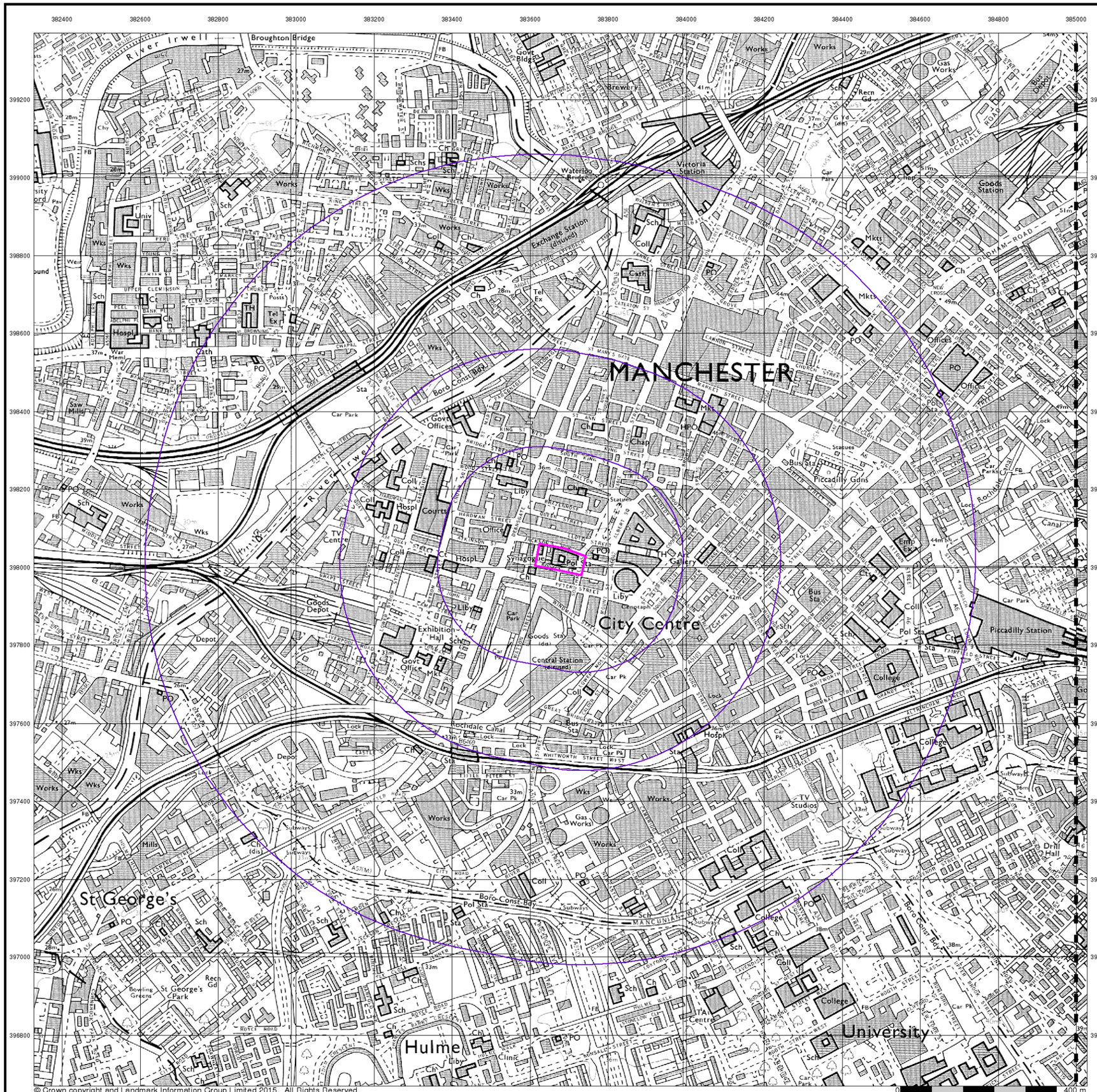
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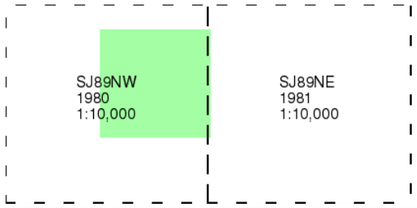
Ordnance Survey Plan

Published 1980 - 1981

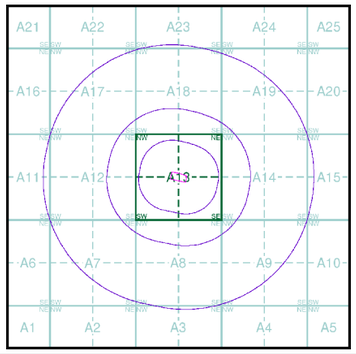
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

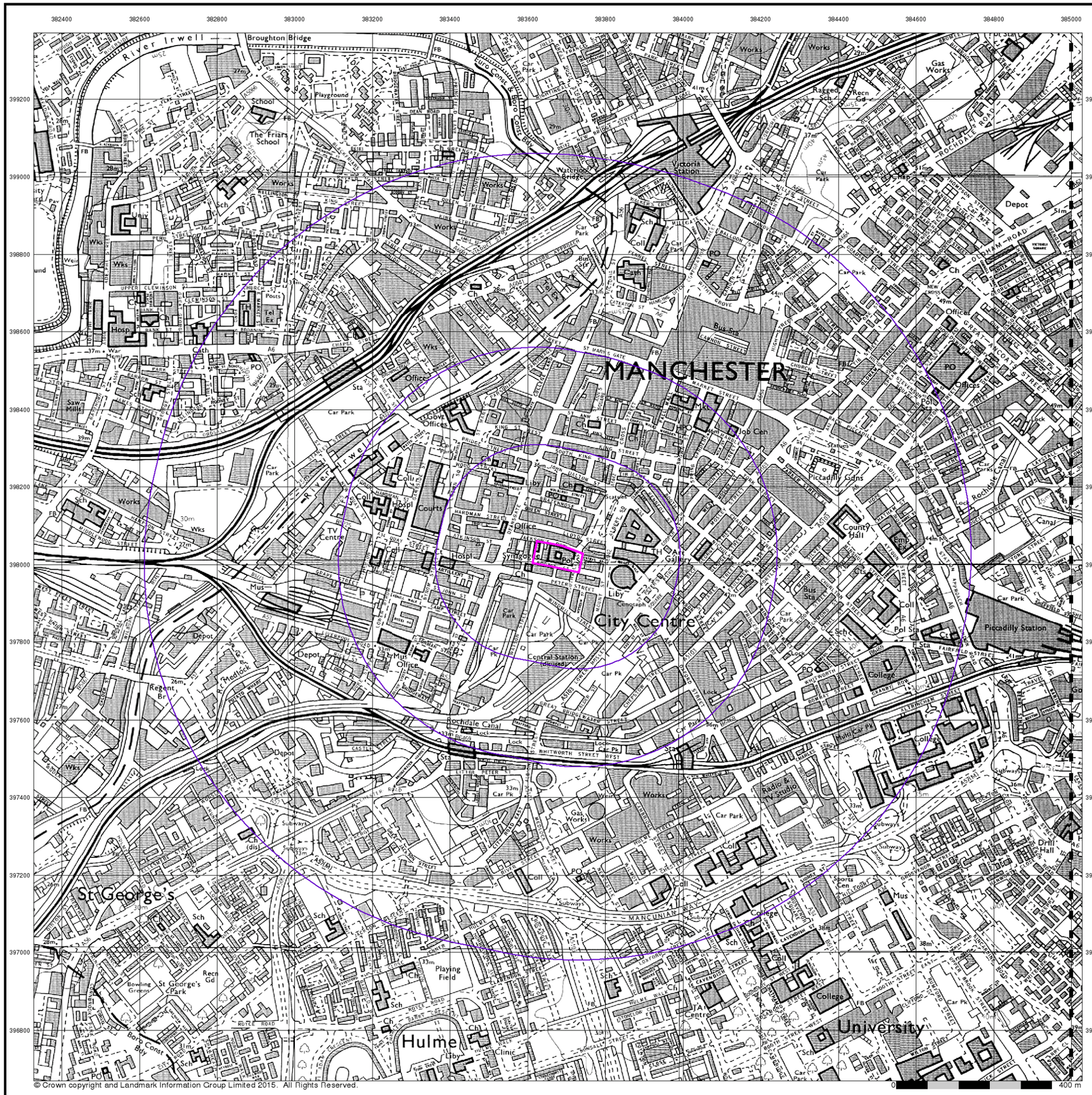
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Search Buffer (m):	1000

Site Details

Jacksons Row, MANCHESTER, M2 5WD

Landmark Information Group

Tel: 0844 844 9952
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0 400 m

WSP

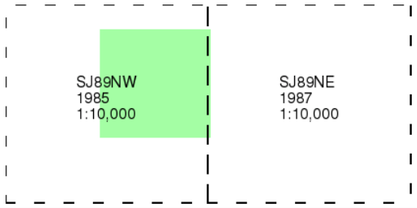
Ordnance Survey Plan

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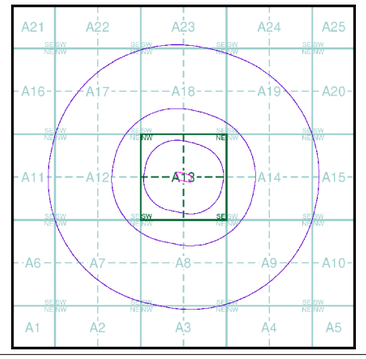
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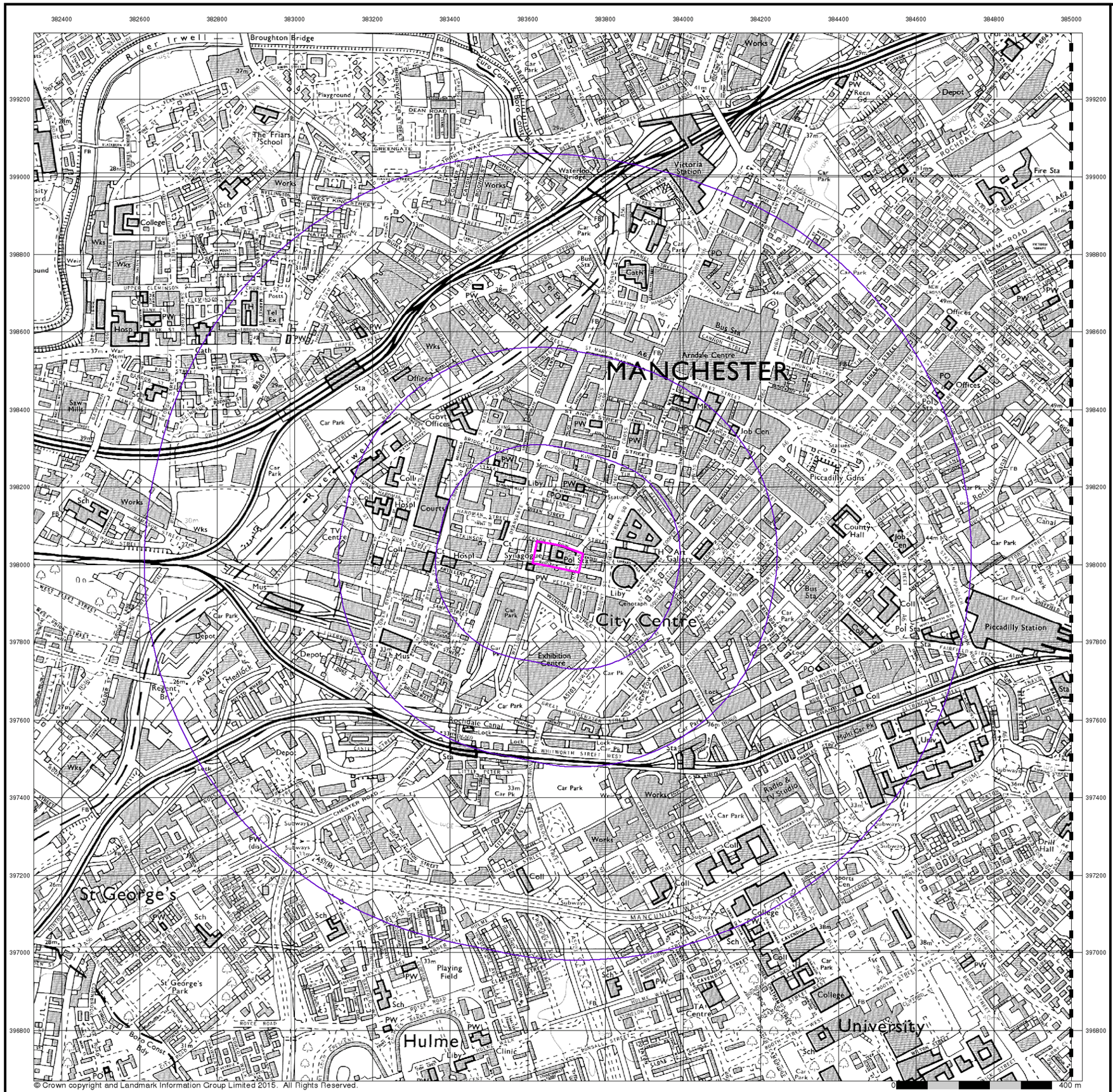
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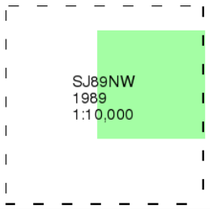
Ordnance Survey Plan

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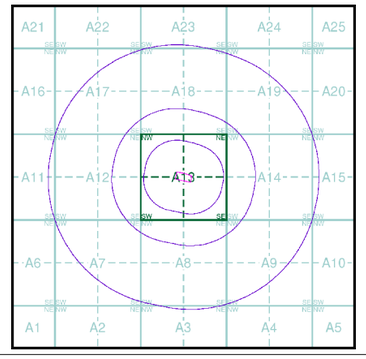
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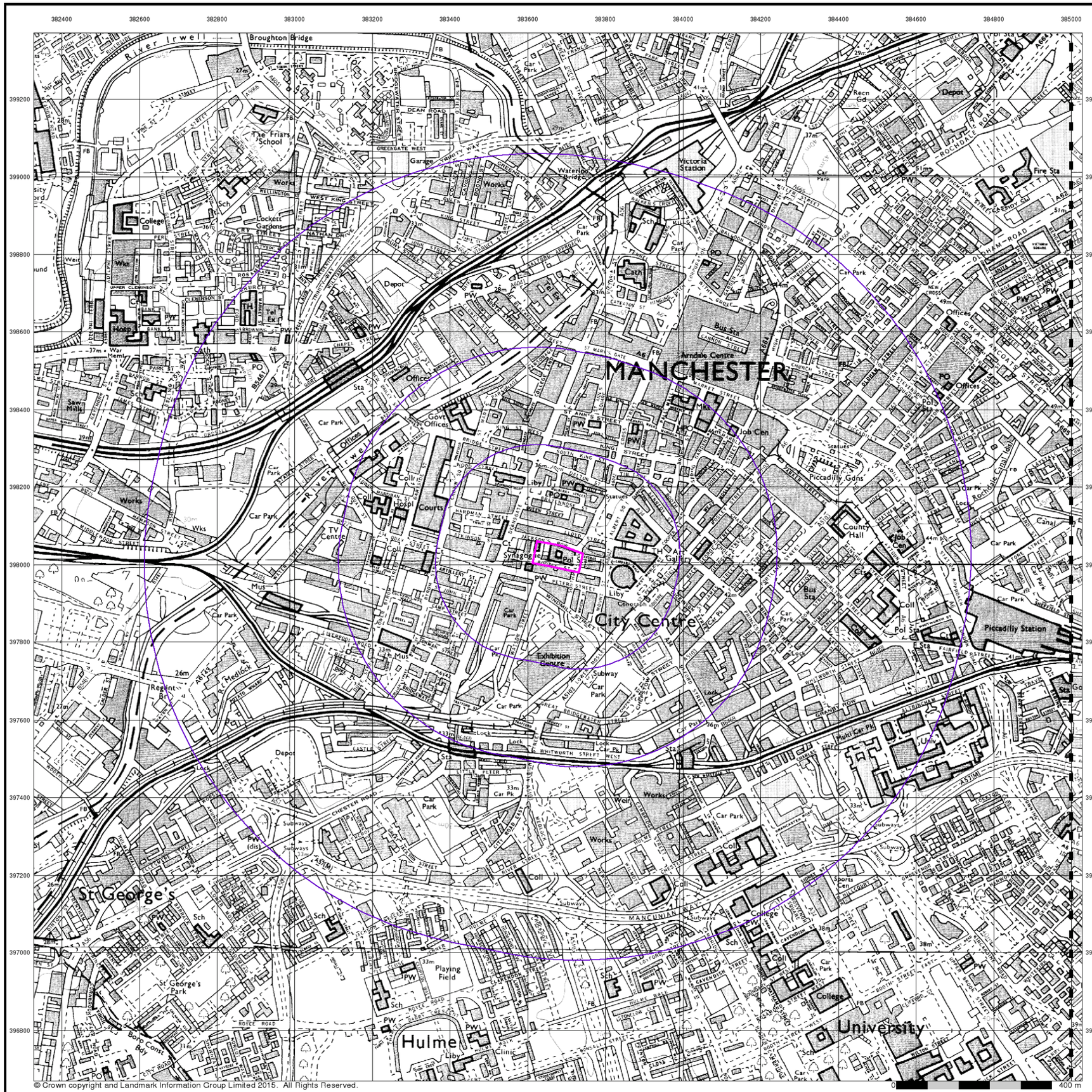
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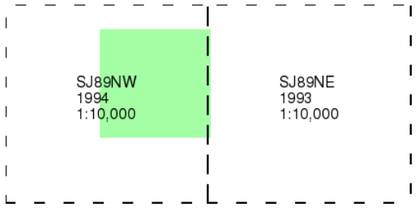
Ordnance Survey Plan

Published 1993 - 1994

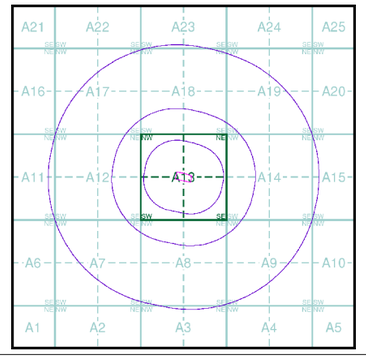
Source map scale - 1:10,000

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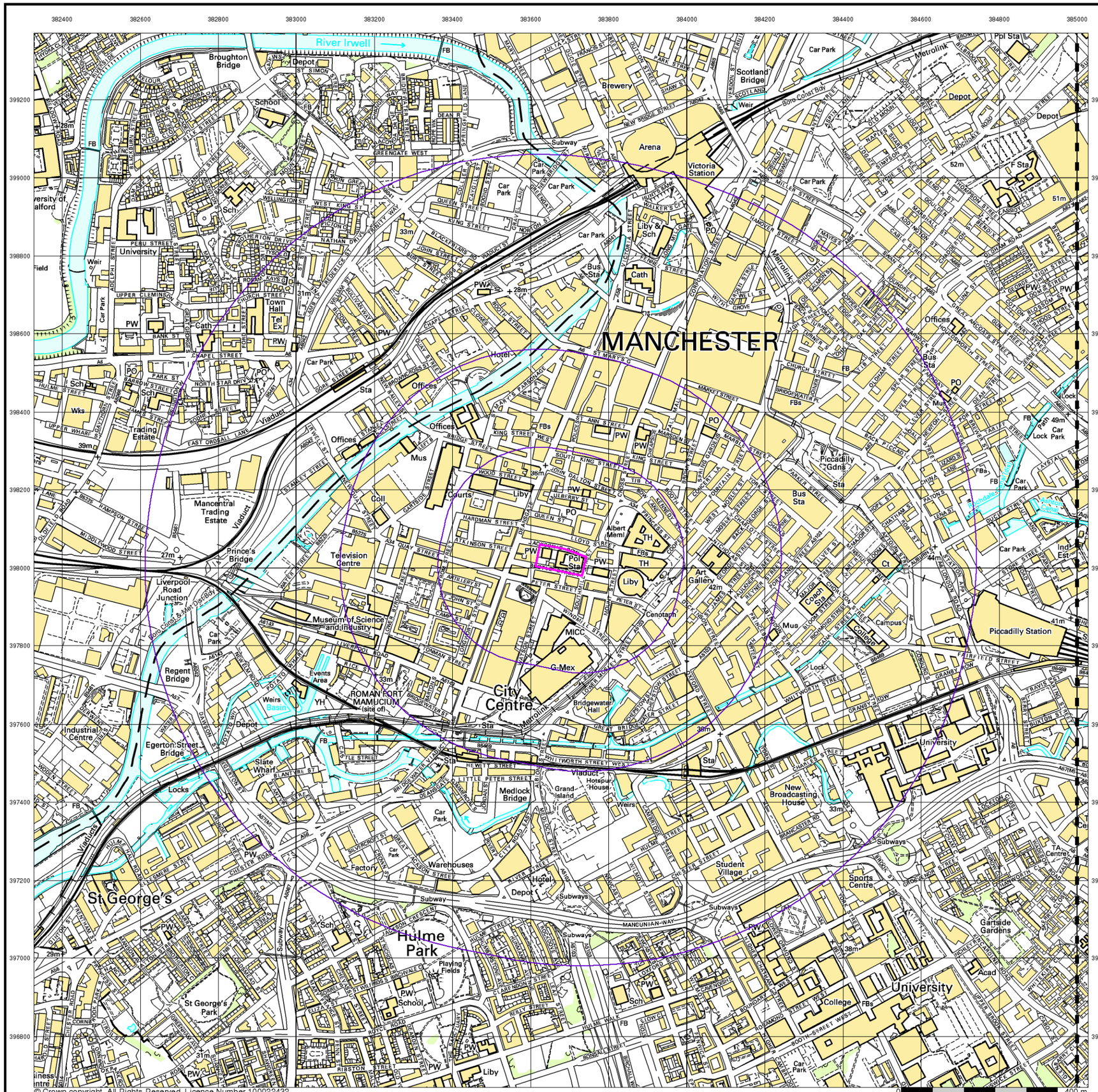
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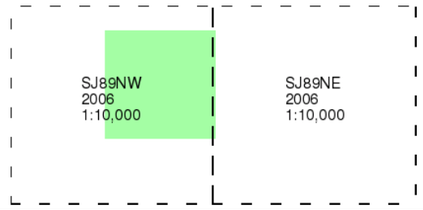
10k Raster Mapping

Published 2006

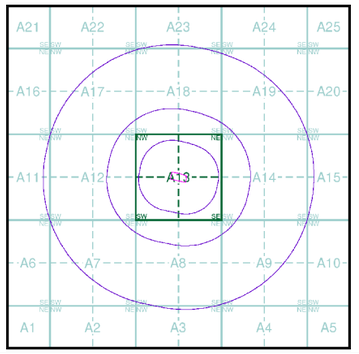
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	73295769_1_1
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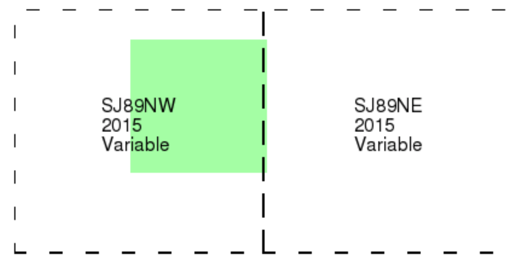
VectorMap Local

Published 2015

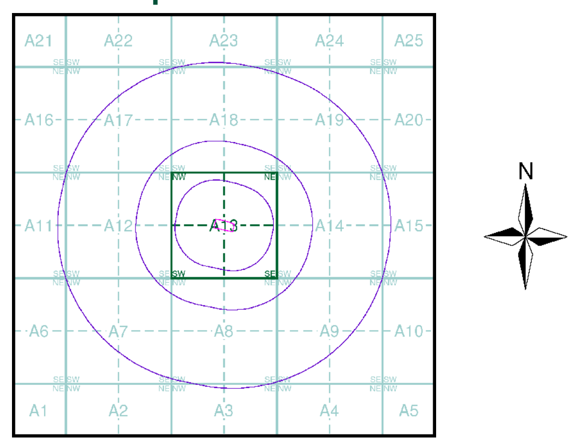
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)



Historical Map - Slice A



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Order Number: 73295769_1_1
Customer Ref: 70010278-100
National Grid Reference: 383680, 398020
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Site Area (Ha): 0.68
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Site Details

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EXPLANATION OF SIGNS
USED ON
INSURANCE PLANS OF TOWNS & CITIES

CHAS. E. GOAD, LTD. CIVIL ENGINEERS — 56 CROUCH HILL LONDON N.4.

ABBREVIATIONS

ASB.	ASBESTOS
CORR.	CORRUGATED IRON
D.I.D.	DOUBLE IRON DOORS
DRA.	DRAPERY
D	DWELLING
ELECT.	ELECTRICIAN
(E.M.)	ELECTRIC MOTORS
(ENG.)	STEAM ENGINE
FURNE.	FURNITURE
GAR	GARAGE
(G.E.)	GAS ENGINE
H.W.	HARDWARE
I.COLS.	IRON COLUMNS OR STEEL STANCHIONS
JWLY.	JEWELLERY
M.CL.	METAL CLAD
M.W.	MANCHESTER WAREHOUSE
m.l.	MATCH (OR WOOD) LINED
OIL	OIL & COLOR
(O.E.)	OIL ENGINE
P.H.	PUBLIC HOUSE
S.	SHOP
S.I.D.	SINGLE IRON DOORS
S.I.S.	SINGLE IRON SHUTTERS
TAI.	TAILORS
TENS.	TENEMENTS
W.G.	WIRED GLASS
W.N.	WIRE NETTING OVER GLASS.

COLORS

- BRICK, STONE OR CONCRETE
- WOOD
- AREAS CLEARED DUE TO ENEMY ACTION
- SKYLIGHTS ON 1 & 2 STORY BUILDINGS
- SKYLIGHTS ON HIGHER BUILDINGS
- METAL BUILDINGS.
- TIMBER PILED OR STACKED

WALLS

- PARTY WALL 2 STORIES OR OVER, A PROBABLE FIRE CUT OFF
- ENTIRE WALL, BUT DOUBTFUL AS FIRE CUT OFF
- DEFECTIVE WALL — IMPERFECT
- WALL ABOVE, IRON COLS: UNDER
- WALL SOME FLOORS ONLY (OR WOOD OR PLASTER PARTITION)
- ABOVE ROOF 6" TO 1'-6"
- — Dº — 1'-6" TO 2'-6"
- m.l. MATCH OR WOOD LINED
- WOOD CLAD WITH CORRUGATED IRON

OPENINGS

- PASSAGE UNDER
- ON ALL FLOORS
- SOME FLOORS ONLY — UNPROTECTED
- ALL FLOORS (PROTECTED)
- ALL FLOORS (SOME PROTECTED) — SINGLE IRON DOORS
- SOME FLOORS ONLY (PROTECTED)
- ALL FLOORS (SOME PROTECTED)
- ALL FLOORS (PROTECTED) — DOUBLE IRON DOORS
- SOME FLOORS ONLY (PROTECTED)
- WOOD LOADING DOOR
- IRON LOADING DOOR

WINDOWS

- ON ALL OR MOST FLOORS
- MORE THAN USUAL
- OVERLOOKING — UNPROTECTED
- NEARLY ALL GLASS
- OPENINGS THRO' & WINDOWS OVER
- ON SOME FLOORS ONLY
- PROTECTED BY WIRED GLASS
- PROTECTED BY SINGLE IRON SHUTTERS
- PROTECTED BY DOUBLE IRON SHUTTERS.
- WINDOWS IN FRONT & REAR OF BUILDINGS UNDERSTOOD UNLESS OTHERWISE SHOWN

FLOORS

1.2.3.3½ &c ON BUILDINGS ARE NUMBER OF STORIES ABOVE GROUND (3½=3 FLOORS & ATTIC)

2&2B MEANS 2 STORIES & 2 BASEMENTS BASE & SUB-BASEMENT.

SKYLIGHTS

- ^ LESS THAN 50 SQUARE FEET (SAY 10'x5', OR 7'x7')
- ^ ^ OPENINGS THROUGH 2 FLOORS UNDER (EACH STROKE DENOTES AN OPENING.)
- WITH WELL HOLE THROUGH 3 FLOORS
- LANT. LANTERN LIGHT, SIDES ONLY GLASS. OR VENT. OR RAISED VENTILATOR — OVER 50 SQ: FT. TO SCALE

HOISTS & LIFTS

- H OPEN
- H OPEN (WOOD FLAPS TO FLOORS)
- H ENCLOSED WOOD OR PLASTER
- W H OPEN TO STREET
- H ENCLOSED BRICK OR FIRE RESISTING WIRED GLASS DOORS

IRON DOORS SHOWN AS EXPLAINED UNDER "OPENINGS"

ROOFS

ASB	ASBESTOS
C	CONCRETE
CORR:	CORRUGATED IRON
¬	METAL
P	PATENT (FELT &c)
O	SLATE
T	TILE

PROFILES

WITH NORTH LIGHTS

SUNDRIES

- STEAM BOILERS
- —"— BOILER SET IN BRICK
- FACTORY CHIMNEYS
- (ENG.) STEAM ENGINE
- OVERHANGING WOOD CORNICE
- FIRE ALARM BOX
- —— Dº —— ON KEY PLAN
- HYDRANT
- H HYDRAULIC HYDRANT
- PRIVATE HYDRANT OR STAND PIPE
- D DOUBLE HYDRANT
- S SALT WATER HYDRANT
- SPRINKLER OR AUTO ALARM BELL

REFERENCE NUMBERS

NUMBERS PARALLEL WITH STREET ARE EXISTING STREET Nºs

WHERE TWO SETS OF STREET Nºs IN SAME BLOCK COINCIDE, ADDITIONAL ARBITRARY Nºs ARE GIVEN TO ONE SET (500 & UPWARDS)

WHERE BUILDINGS TO WHICH THEY APPLIED ARE DEMOLISHED, STREET & ARBITRARY Nºs ARE SHOWN & CROSSED THROUGH ON REVISION

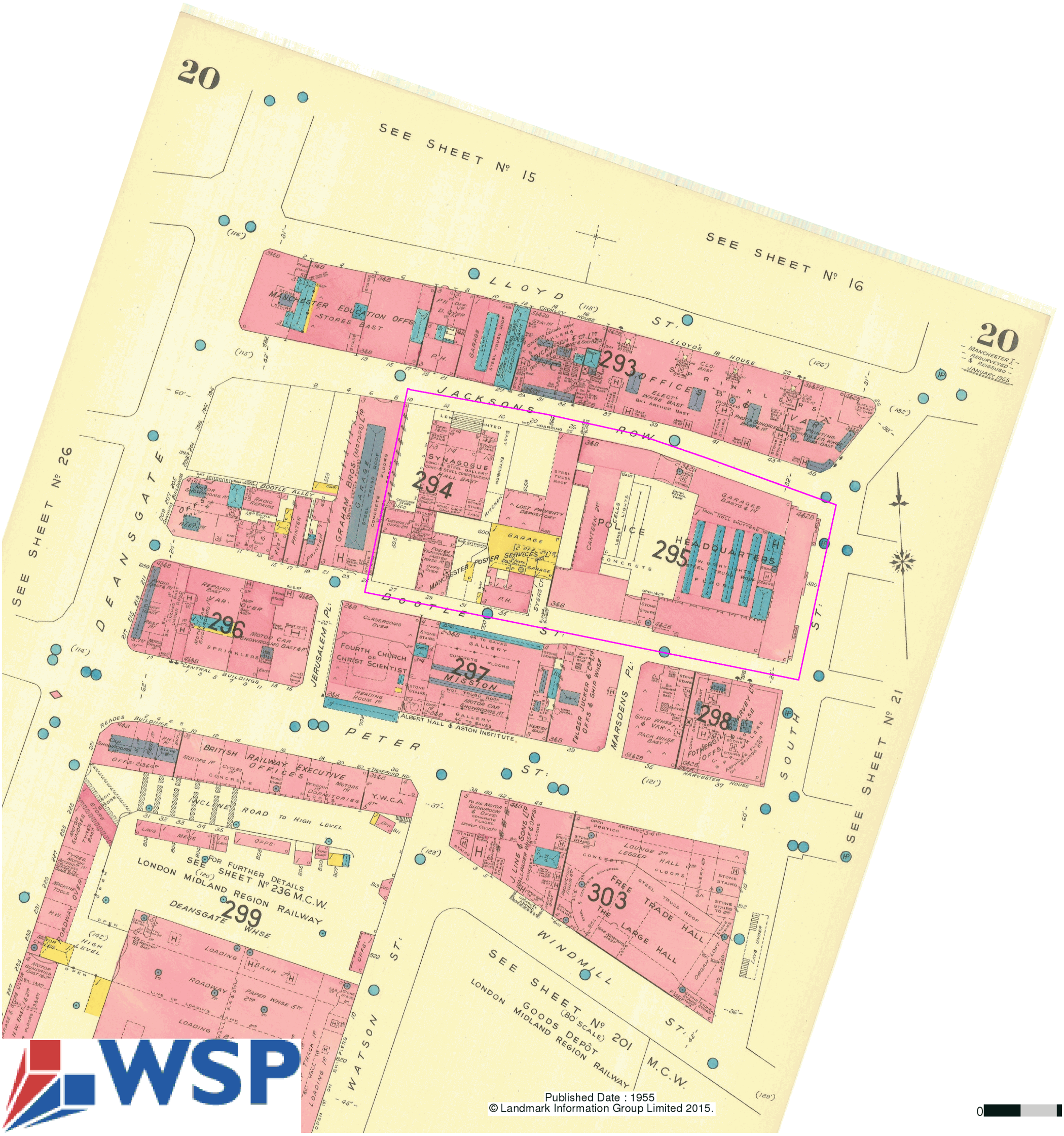
—48'— ARE STREET WIDTHS.

(37') ARE HEIGHTS OF GROUND ABOVE ORDNANCE DATUM

HEIGHT IN FEET OF ADJOINING BUILDINGS WHERE STORIES DIFFER IN HEIGHT

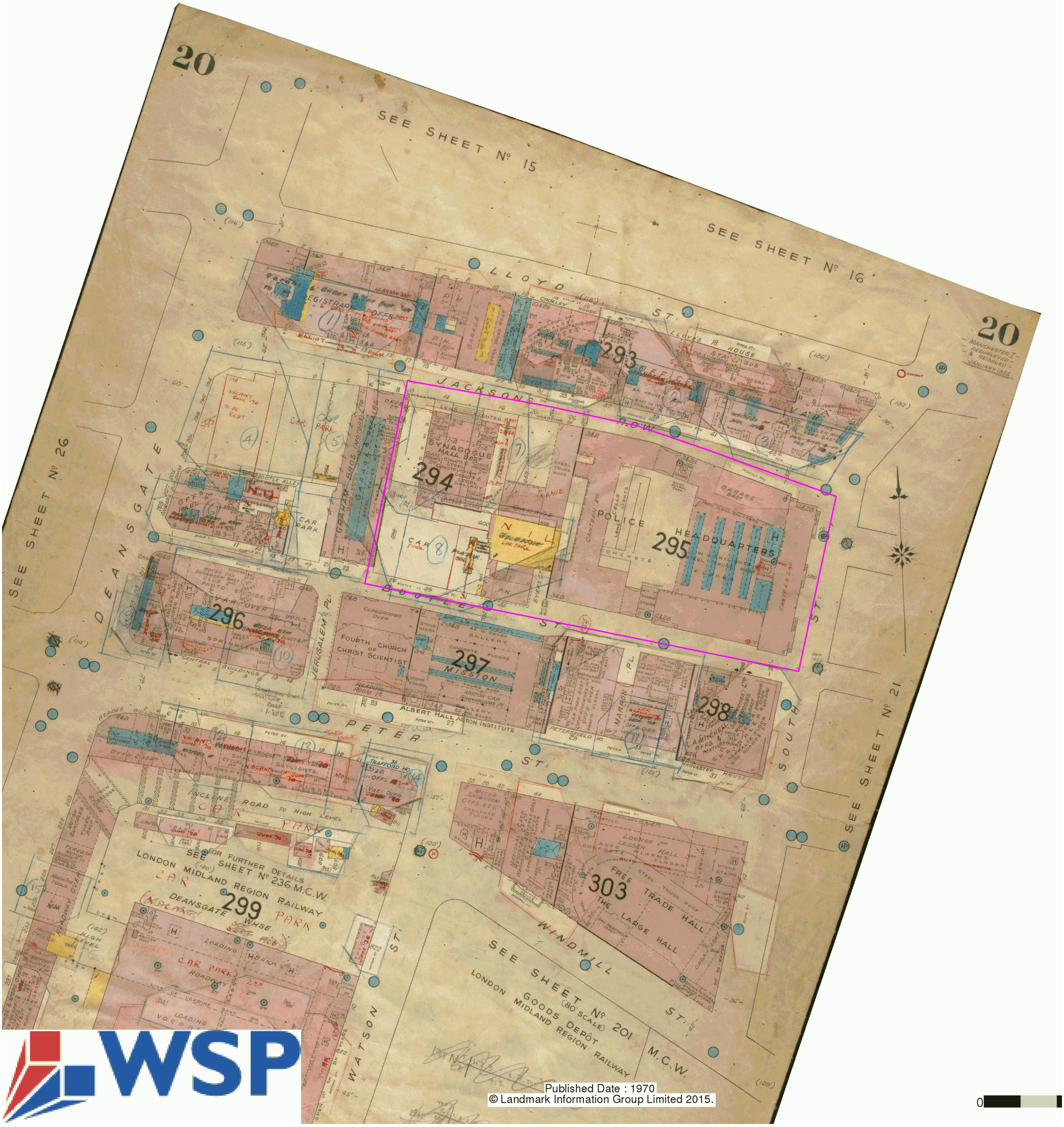
SIZES OF WATER MAINS SUPPLYING HYDRANTS

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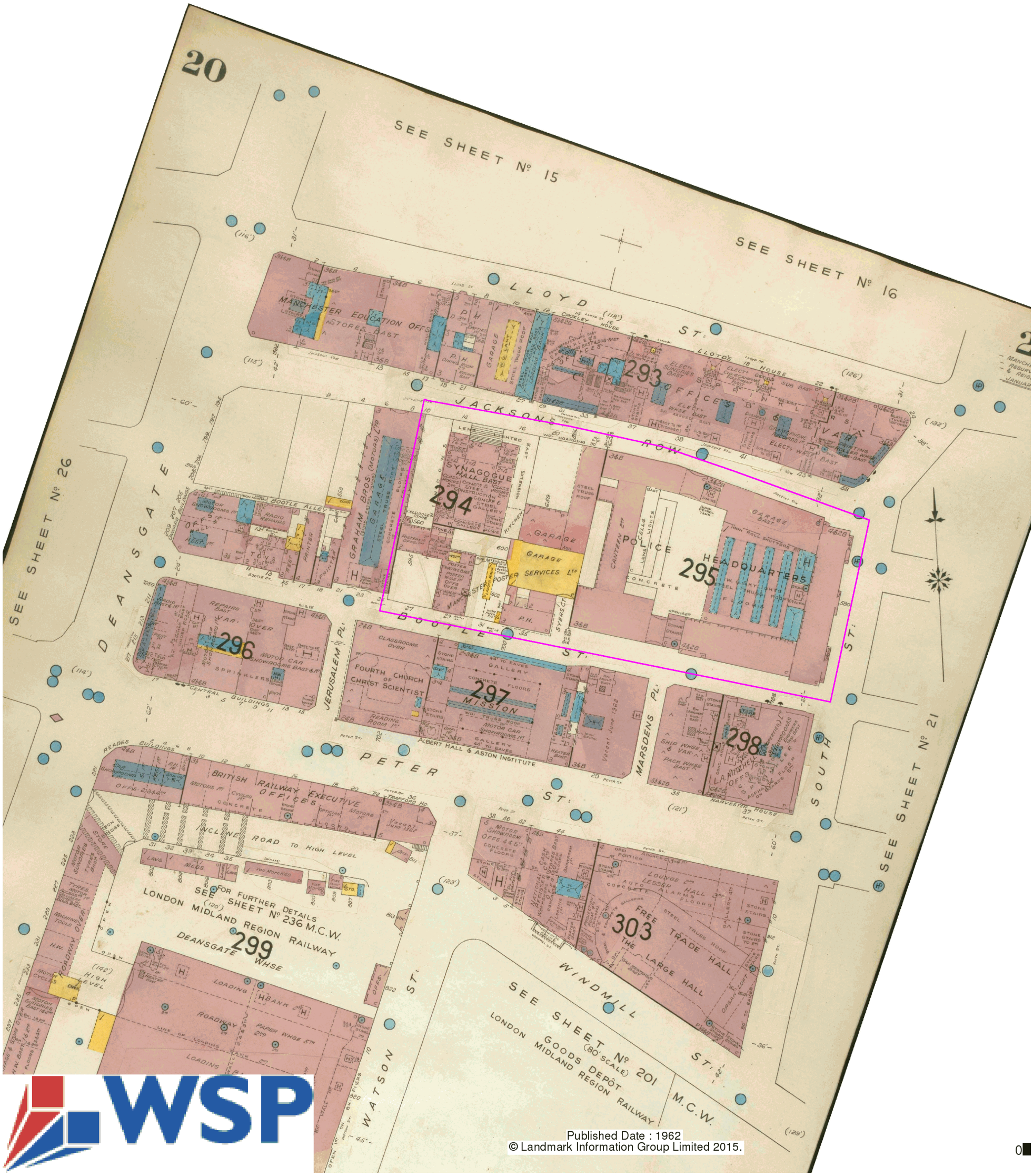
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Published Date : 1970
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Published Date : 1962

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INDEX

TO THE

FIVE FEET ENGRAVED SHEETS

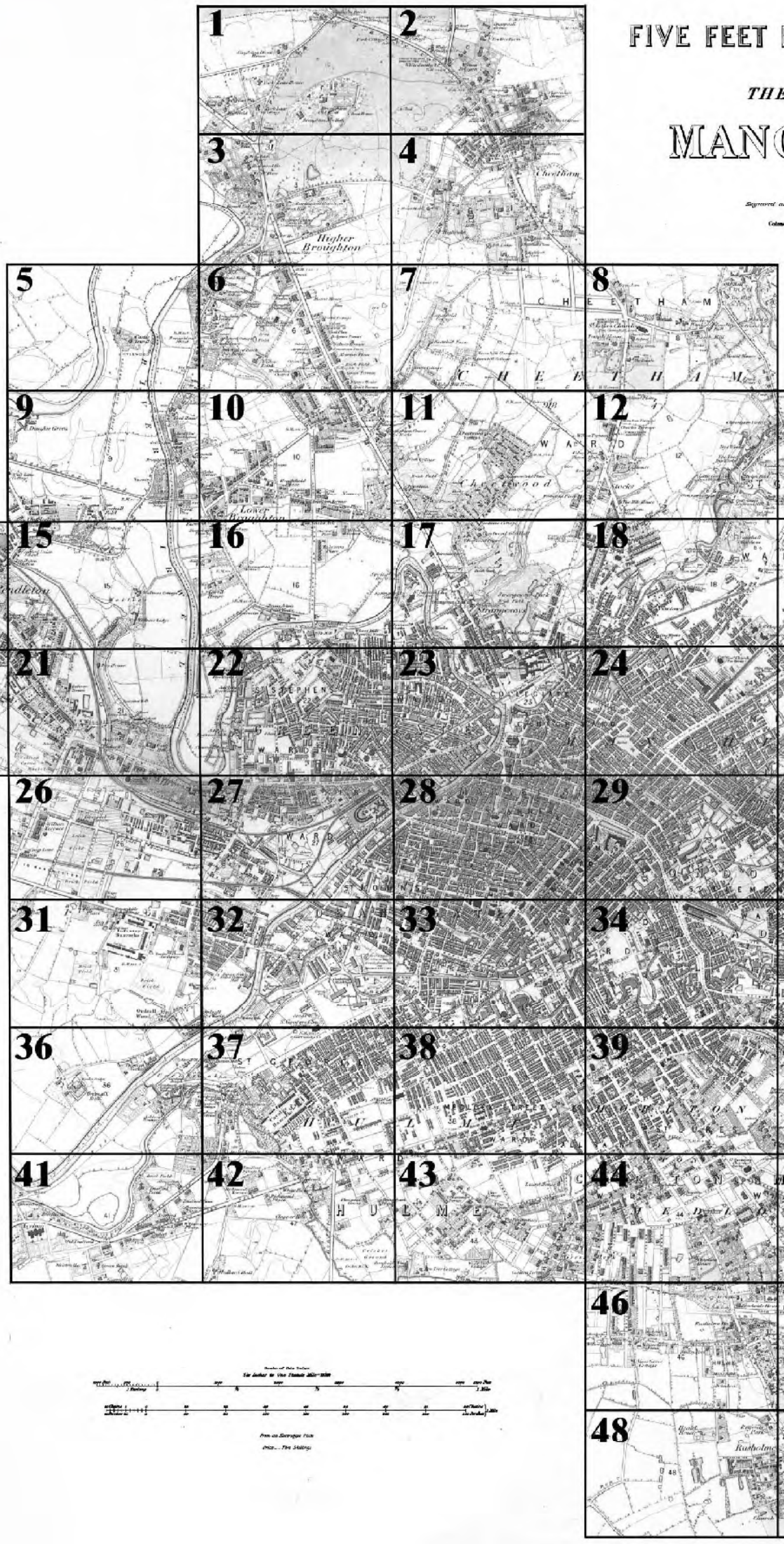
OF

THE CITY OF

MANCHESTER

Engraved at the Ordnance Survey Office, Southampton.

Colonel H.James, R.E. F.R.S. M.R.I.A. &c. Superintendent.



BLACKFRIARS WARD

MANCHESTER

EXCHANGE WARD

COLLEGIATE CHURCH WARD

ST JAMES'S WARD

OXFORD WARD

ST JOHN'S WARD

SALFORD

MANCHESTER

RIVER IRWELL

The Site

OS OFFICE SOUTHAMPTON

Appendix F

DYNASAFE BACTEC EXPLOSIVE ORDNANCE THREAT ASSESSMENT

Explosive Ordnance Desktop Threat Assessment

Site: **Jacksons Row, Manchester**

Client: **WSP UK Limited**

Ref: **6239TA**

Date: **26th October 2015**

Dynasafe BACTEC Limited
9, Waterside Court, Galleon Boulevard, Crossways Business Park, Dartford, Kent, DA2 6NX, UK
Office: +44 (0) 1322 284 550 **www.bactec.com**

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Date of Issue: 26th October 2015 Copy no. 1

Originator: KB

This Report has been produced in compliance with the Construction Industry Research and Information Association guidelines for the preparation of Detailed Risk Assessments in the management of UXO risks in the construction industry.

Glossary of Terms

AAA	Anti-Aircraft Artillery
ARP	Air-raid Precautions
BDO	Bomb Disposal Officer
EOD	Explosive Ordnance Disposal (current term for "bomb" disposal)
HE	High Explosive
HG	Home Guard
IB	Incendiary Bomb
kg	Kilogram
LCC	London County Council
LM	Land Mine
LSA	Land Service Ammunition (includes grenades, mortars, etc.)
Luftwaffe	German Air Force
m bgl	Metres Below Ground Level
MoD	Ministry of Defence
OB	Oil Bomb
PM	Parachute Mine
RAF	Royal Air Force
SI	Site Investigation
SAA	Small Arms Ammunition (small calibre cartridges used in rifles & machine guns)
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	"Doodlebug" the first cruise type missile, used against London from June 1944. Also known as 'Flying Bomb'.
V-2	The first ballistic missile, used against London from September 1944
WWI	First World War (1914 -1918)
WWII	Second World War (1939 – 1945)

Executive Summary

The Site: The site, centred on the approximate OS National Grid Reference: 383682, 398018, is located in Manchester, approximately 520m north-east of Deansgate Railway Station. It is bound to the north by Jackson's Row (road), to the east by Southmill Street, to the south by Bootle Street and to the west by neighbouring properties.

Situated within the eastern half of the site is the City Police Headquarters, a five-storey building of pre-WWII construction. At the centre of this development is a large hard-surfaced courtyard accessed via gates to the north and south. The south-western section is occupied by the Sir Ralph Abercromby Public House, which includes a car-park to the rear and garden to the west. Located within the north-western corner is the Manchester Reform Synagogue, a large brick built structure of post-war construction. The remainder of the site is laid to hard-standing and is used for car parking.

Proposed Works: It is understood that a tower is to be constructed on site. The proposed intrusive works will include excavations to 13.5m bgl and raft foundations.

Risk Assessment Methodology: In accordance with CIRIA guidelines this assessment has carried out research, analysed the evidence and considered the risks that the site has been contaminated with unexploded ordnance; that such items remained on site; that they could be encountered during any intrusive works and the consequences that could result. Appropriate risk mitigation measures have been proposed.

Explosive Ordnance Risk Assessment: Dynasafe BACTEC considers the risk on the site to be heterogeneous and can therefore be divided into ***Low*** and ***Medium*** Risk Zones. This is based on the following:

- Manchester was the eleventh most heavily bombed city / town in Britain during WWII. The site is located within the city centre which experienced a high bombing density, as confirmed by official statistics.
- Original bombing records, sought from two separate sources, plot one HE bomb strike to the Police Station. This resulted in damage to the upper two floors of the building, leaving the lower two floors intact.
- A 1kg incendiary bomb shower is known to have gutted some buildings at the north-western corner of the site as well as causing minor / moderate damage to a small building at the southern site boundary.
- Therefore it can be assumed that at these localities, heaps of rubble would have persisted, and debris would have been strewn across the site. Consequently, had a subsequent HE UXB fallen in these areas, it may have become obscured from view within the ruins. This is especially pertinent as nearly all German air raids on Manchester occurred at night, increasing the likelihood of a UXB falling unobserved and going unreported.
- Furthermore, such an incident could conceivably have resulted in the UXB coming to rest beneath neighbouring undamaged buildings / hard-staining, due to the 'J' Curve Effect.
- However note that as the lower two floors of the Police Station remained intact, it is highly unlikely that a subsequent UXB could have fallen within this ruin and passed through the ground floor without leaving any obvious evidence of its presence. Furthermore the station remained in use throughout the remainder of the war, further decreasing the likelihood of such a scenario taking place.
- Those structures which survived the Blitz undamaged will likely have remained inhabited / in use, thereby increasing the likelihood of any air-delivered UXO being observed here. Furthermore a UXB strike to these buildings will have caused significant damage, even without detonating. Following any such incident, the damage would have been observed and the UXB exhumed / removed.
- No evidence has been located to suggest that the site formerly had any British / Allied military occupation or usage that could have led to contamination with items of UXO.

Following WWII, a large proportion of the site has been redeveloped. Within the footprints of the post-war buildings and hard-standing, the risk from shallow-buried UXO (AA projectiles and 1kg incendiary bombs) will have been largely mitigated, as any such items will likely have been exhumed and removed during excavations for foundations, as well as levelling and re-surfacing works.

The risk from deep-buried German HE UXBs will have only been mitigated within the volume of any post-war bulk excavations (for basement levels) and at the precise locations of any pile foundations. This risk will therefore remain within virgin geology, beneath the post-war construction works and amongst any pile layouts, down to the maximum bomb penetration depth.

Bomb Penetration Assessment: It has been assessed that a 500kg bomb would have had an approximate maximum bomb penetration depth of **6-8m** below WWII ground level. Penetration depth could potentially have been greater if the UXB was larger (though only 4% of German bombs used in WWII over Britain were of that size). Note that UXBs may be found at any depth between just below the WWII ground level and the maximum penetration depth. This assessment has been made using generic geological information.

Risk Mitigation Measures: Dynasafe BACTEC believes the following risk mitigation measures should be deployed to support the proposed works at the Jacksons Row site.

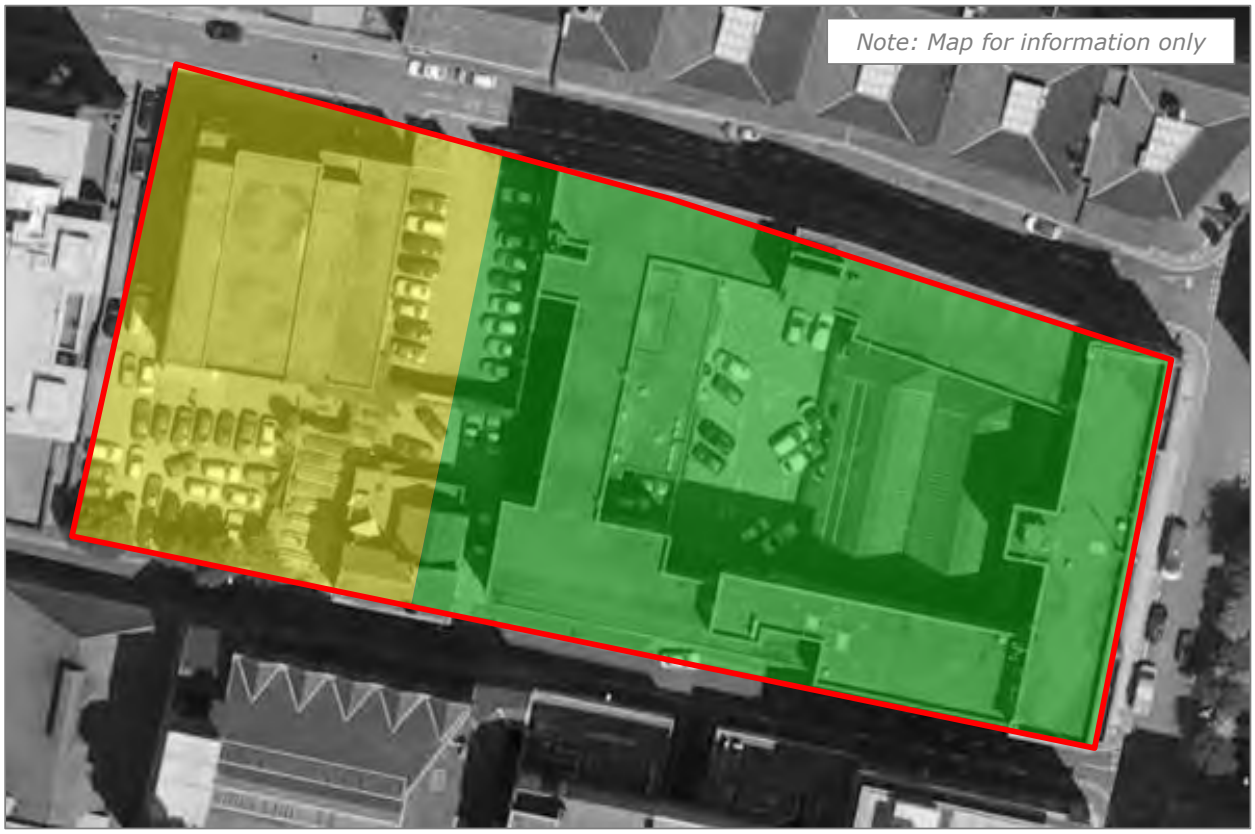
Both Risk Zones

- Explosive Ordnance Safety and Awareness Briefings to all personnel conducting intrusive works.
- The Provision of Unexploded Ordnance Site Safety Instructions.

Medium Risk Zones Only

- Explosive Ordnance Disposal (EOD) Engineer presence on site to supervise open excavations
- Intrusive Magnetometer Survey of any pile / boreholes locations down to the maximum bomb penetration depth.

Risk Map



Low Risk Zone

Relatively undamaged buildings and hard-standing during WWII.

Medium Risk Zone

a) Buildings which sustained serious bomb damage during WWII

b) Buffer area to account for the J-Curve Effect

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Explosive Ordnance Threat Assessment

In Respect of

Jacksons Row, Manchester

1. Introduction

1.1. Background

WSP UK Limited has commissioned Dynasafe BACTEC Limited to conduct an Explosive Ordnance Threat Assessment for the Jacksons Row site, Manchester.

Unexploded Ordnance (UXO) presents a significant threat to construction projects in parts of the UK as a result of enemy actions during the two 20th Century World Wars and historic British and Allied military activity.

The most intensive period of bombing over Manchester was the nine months between October 1940 and May 1941 which became known as "The Blitz". During this period the Luftwaffe attempted to overwhelm Britain's air defences, destroy key industries and infrastructure and break the country's morale ahead of invasion.

One of the legacies of this conflict is buried unexploded air-dropped bombs or anti-aircraft projectiles resulting from the failure of a proportion of the weapons to function as designed. It is commonly accepted that the failure rate of these munitions was approximately 10% and, depending on their shape, weight, velocity and ground conditions, many penetrated the ground and came to rest at depth.

Intensive efforts were made during and after the war to locate and render safe all UXO but, unsurprisingly, not all were found and dealt with. This is evidenced by the regular, on-going discoveries of UXO during construction-related intrusive ground works.

As a result of a generally increased risk awareness amongst professionals involved in ground engineering works and proactive health and safety measures, the threat to life and limb from UXO has been minimised. However even the simple discovery of a suspected device during on-going works can cause considerable disruption to production and cause unwanted delays and expense.

Such risks can be more fully addressed by a better understanding of the site-specific threat and the implementation of appropriate risk mitigation measures.

2. Construction Industry Duties and Responsibilities

2.1. The UK Regulatory Environment

There is no specific legislation covering the management and control of the UXO risk in the UK construction industry but issues regarding health and safety are addressed under a number of regulatory instruments, as outlined below.

In practice the regulations impose a responsibility on the construction industry to ensure that they discharge their obligations to protect those engaged in ground-intrusive operations (such as archaeology, site investigation, drilling, piling or excavations) from any reasonably foreseeable UXO risk.

2.2. The Health and Safety at Work Act, 1974

The Act places a duty of care on an employer to put in place safe systems of work to address, as far as is reasonably practicable, all risks (to employees and the general public) that are reasonably foreseeable.

2.3. Construction (Design and Management) Regulations 2015

This legislation defines the responsibilities of all parties (primarily the client, the CDM Co-ordinator, the Designer and the Principal Contractor) involved with works.

Although UXO issues are not specifically addressed the regulations effectively place obligations on all these parties to:

- Ensure that any potential UXO risk is properly assessed
- Put in place appropriate risk mitigation measures if necessary
- Keep all parties affected by the risk fully informed
- Prepare a suitably robust emergency response plan

2.4. Other Legislation

Other relevant legislation includes the "Management of Health and Safety at Work Regulations 1999" and "The Corporate Manslaughter and Corporate Homicide Act 2007".

3. The Role of the Authorities and Commercial Contractors

3.1. The Authorities

The Police have the responsibilities for co-ordinating the emergency services in the case of an ordnance-related incident on a construction site. They will make an initial assessment (i.e. is there a risk that the find is ordnance or not?) and if they judge necessary impose a safety cordon and/or evacuation and call the military authorities (JSEODOC - Joint Services Explosive Ordnance Disposal Operations Centre) to arrange for investigation and/or disposal. In the absence of an EOD specialist on site many Police Officers will use the precautionary principle, impose cordon(s)/evacuation and await advice from the JSEODOC.

The priority given to the request by JSEODOC will depend on their judgement of the nature of the threat (ordnance, location, people and assets at risk) and the availability of resources. They will respond immediately or as resources are freed up. Depending on the on-site risk assessment the item of ordnance may be removed or demolished (by controlled explosion) in situ. In the latter case additional cordons and/or evacuations may be necessary.

Note that the military authorities will only carry out further investigations or clearances in very high profile or high risk situations. If there are regular ordnance finds on a site the JSEODOC may not treat each occurrence as an emergency and will encourage the construction company to put in place alternative procedures (i.e. the appointment of a commercial contractor) to manage the situation and relieve pressure from the JSEOD disposal teams.

3.2. Commercial Contractors

In addition to pre-construction site surveys and follow-on clearance work, a commercial contractor is able to provide a reactive service on construction sites. The presence of a qualified EOD Engineer with ordnance recognition skills will avoid unnecessary call-outs to the authorities and the Contractor will be able to arrange for the removal and disposal of low risk ordnance. If high risk ordnance is discovered actions will be co-ordinated with the authorities with the objective of causing the minimum possible disruption to site operations whilst putting immediate, safe and appropriate measures in place.

4. This Report

4.1. Aims and Objectives

The aim of this report is to examine the possibility of encountering any explosive ordnance during any intrusive works at the Jacksons Row site. Risk mitigation measures will be recommended, if deemed necessary, to eliminate or reduce the threat from explosive ordnance during the envisaged works. The report follows the CIRIA Guidelines.

4.2. Risk Assessment Methodology

The following issues will be addressed in the report:

- The risk that the site was contaminated with unexploded ordnance.
- The risk that UXO remains on site.
- The risk that ordnance may be encountered during any intrusive works.
- The risk that ordnance may be initiated.
- The consequences of initiating or encountering ordnance.

Risk mitigation measures, appropriate to the assessed level of risk and site conditions, will be recommended if required.

4.3. Approach

In preparing this Explosive Ordnance Threat Assessment Report, BACTEC has considered general and, as far as possible, site specific factors including:

- Evidence of German bombing and delivery of UXBs.
- Site history, occupancy and conditions during WWII.
- The legacy of Allied military activity.
- Details of any known EOD clearance activity.
- The extent of any post war redevelopment.
- Scope of the current proposed works.

4.4. Sources of Information

Dynasafe BACTEC has carried out detailed historical research for this Explosive Ordnance Threat Assessment including accessing military records and archived material held in the public domain and in the MoD.

Material from the following sources has been consulted:

- The National Archives.
- Historic England.
- Britain From Above.
- Greater Manchester County Record Office.
- University of Manchester Library.
- Relevant information supplied by WSP UK Limited.
- Available material from 33 Engineer Regiment (EOD) Archive.
- Dynasafe BACTEC's extensive archives built up over many years of research and hands-on Explosive Ordnance Disposal activities in the UK.
- Open sources such as published books, local historical records and the internet.

4.5. Reliability of Historical Records

4.5.1. General Considerations

This report is based upon research of historical evidence. Whilst every effort has been made to locate all relevant material BACTEC cannot be held responsible for any changes to the assessed level of risk or risk mitigation measures based on documentation or other information that may come to light at a later date.

The accuracy and comprehensiveness of wartime records is frequently difficult or impossible to verify. As a result conclusions as to the exact location, quantity and nature of the ordnance threat can never be definitive but must be based on the accumulation and careful analysis of

all accessible evidence. BACTEC cannot be held responsible for inaccuracies or gaps in the available historical information.

4.5.2. Bombing Records

During WWII considerable efforts were expended in recording enemy air raids. Air Raid Precautions (ARP) wardens were responsible for making records of bomb strikes either through direct observation or by post-raid surveys. However their immediate priority was to deal with casualties and limit damage, so it is to be expected that records are often incomplete and sometimes contradictory. Record keeping in the early days of bombing was not comprehensive and details of bombing in the early part of the war were sometimes destroyed in subsequent attacks. Some reports may cover a single attack, others a period of months or the entire war.

Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are not always reliable; records of attacks on military or strategic targets were often maintained separately from the general records and have not always survived.

5. The Site

5.1. Site Location

The site is located in Manchester, approximately 520m north-east of Deansgate Railway Station. It is bound to the north by Jackson's Row (road), to the east by Southmill Street, to the south by Bootle Street and to the west by neighbouring properties.

The site is centred on the approximate OS National Grid Reference: 383682, 398018.

Site Location Maps are presented in ***Annex A***.

5.2. Site Description

Situated within the eastern half of the site is the City Police Headquarters, a five-storey building of pre-WWII construction. At the centre of this development is a large hard-surfaced courtyard accessed via gates to the north and south.

The south-western section is occupied by the Sir Ralph Abercromby Public House, which includes a car-park to the rear and garden to the west. Located within the north-western corner is the Manchester Reform Synagogue, a large brick built structure of post-war construction. The remainder of the site is laid to hard-standing and is used for car parking.

A Recent Aerial Photograph of the site is presented in ***Annex B***.

6. Scope of the Proposed Works

It is understood that a tower is to be constructed on site. The proposed intrusive works will include excavations to 13.5m bgl and raft foundations.

A Current Site Plan is presented in ***Annex C***.

7. Ground Conditions

Published BGS data for a borehole sunk approximately 60m to the west of the site records the following shallow geological sequence in the vicinity:

- 3.66m of BALLAST (loose ground).
- 9.14m of SANDSTONE.

8. Site History

8.1. Historical OS Mapping

Latest available pre and earliest available post-WWII OS maps were provided by *WSP UK Limited*. These are presented in ***Annex D*** and described below.

8.1.1. Pre-WWII

The 1922-33 (1:1,250 scale) map shows the site to be occupied by a number of densely packed buildings with associated courtyards and access, including a *Public House* adjacent with the southern boundary. Running north-east to south-west, across the eastern half of the site, is *Southsea* (road).

The immediate surrounding area is commercial in nature.

8.1.2. Post-WWII

The 1948 (1:1,250 scale) map records significant changes across the entirety of the site. Within the eastern half the pre-WWII structures and roadway have been cleared and a *Police Station* constructed in their place. Further research indicates this station opened immediately prior to WWII, in 1937.[1]

However situated in the north-western corner is a large *Ruin.* Such an observation is usually indicative of serious bomb damage on early post-WWII Manchester OS maps.

In the immediate surrounding area, further evidence of possible bomb damage, including *Ruins* and redevelopment, has been highlighted.

9. The Threat from Aerial Bombing

9.1. General Bombing History of the North-West

9.1.1. First World War

A series of bombing raids took place in the UK during WWI. Zeppelin airships, "Gotha" and "Giant" bombers conducted a succession of attacks in which high explosive bombs and incendiary devices were dropped. Although Zeppelin airship raids were recorded in the north-west region, no raids were recorded across the Manchester region specifically.

Consequently the threat from WWI German UXBs is considered negligible and will not be further addressed in this report.

9.1.2. Second World War

At the start of WWII, the Luftwaffe planned to destroy key military installations, including RAF airfields and Royal Navy bases, during a series of daylight bombing raids in 1940. After the Battle of Britain in the south-east, these tactics were modified to include both economic and industrial sites throughout the UK.

In the north-west the Merseyside and Greater Manchester areas were heavily bombed during late 1940 / early 1941 with targets including dock facilities, railway infrastructure, power stations, weapon manufacturing plants and gas works. As a result of aircraft losses, daylight raids were reduced in favour of attacking targets under the cover of darkness.

After June 1941 when the bulk of the Luftwaffe (based in France) had been redeployed to the Russian Front, attacks were only sporadic and much smaller in scale.

From mid-1944 the "V-weapon" (for Vengeance) campaign, using unmanned rockets and missiles, represented Hitler's final attempt to reverse Germany's imminent defeat. The V1 (Flying Bomb or Doodlebug) and the V2 (Long Range Rocket) were launched from bases in

[1] *http://manchesterhistory.net/manchester/tours/tour6/centralpolice.html*

occupied France, Belgium and Holland as well as from Germany itself. Although these weapons caused considerable destruction their relatively low numbers allowed accurate records of strikes to be maintained and these records have mostly survived.

In December 1944, after a two-year lull in bombing, several aircraft-delivered V1 flying bombs fell in Greater Manchester. One landed in Oldham killing 27 people, the region's last bombing casualties of the war.

There is a negligible risk from unexploded V-weapons today since even if an unexploded 1,000kg warhead had survived impact the remains of the munition's body would have left incontrovertible evidence of the strike, and it would have been dealt with at the time.

9.2. Aerial Delivered Ordnance in the Second World War

9.2.1. Generic Types of WWII German Air-delivered Ordnance

The nature and characteristics of the ordnance used by the Luftwaffe allows an informed assessment of the hazards posed by any unexploded items that may remain today. Detailed illustrations of German air delivered ordnance are presented at ***Annex E***.

- HE Bombs: In terms of weight of ordnance dropped, HE bombs were the most frequent weapon deployed. Most bombs were 50kg, 250kg or 500kg (overall weight, about half of which was the high explosive) though large bombs of up to 2,000kg were also used. HE bombs had the weight, velocity and shape to easily penetrate the ground intact if they failed to explode. Post-raid surveys would not always have spotted the entry hole or other indications that a bomb penetrated the ground and failed to explode and contemporary ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded 50kg bomb. Unexploded HE bombs therefore present the greatest risk to present–day intrusive works.
- Blast Bombs/Parachute Mines: Blast bombs generally had a slow rate of descent and were extremely unlikely to have penetrated the ground. Non-retarded mines would have shattered on most ground types, if they had failed to explode. There have been extreme cases when these items have been found unexploded, but this was where the ground was either very soft or where standing water had reduced the impact. BACTEC does not consider there to be a significant threat from this type of munition on land.
- Large incendiary bombs: This type of bomb ranged in size from 36kg to 255kg and had a number of inflammable fill materials (including oil and white phosphorus), and a small explosive charge. They were designed to explode and burn close to the surface but their shape and weight meant that they did have penetration capability. If they penetrated the ground complete combustion did not always occur and in such cases they remain a risk to intrusive works.
- 1kg Incendiary Bombs (IB): These bombs, which were jettisoned from air-dropped containers, were unlikely to penetrate the ground and in urban areas would usually have been located in post-raid surveys. However, if bombs did not initiate and fell in water or dense vegetation, or became mixed with rubble in bomb damaged areas they could have been overlooked. Some variants had explosive heads and these present a risk of detonation during intrusive works.
- Anti-personnel (AP) Bomblets: AP bombs had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.
- Specialist Bombs (smoke, flare, etc): These types do not contain high explosive and therefore a detonation consequence is unlikely. They were not designed to penetrate the ground.

9.2.2. German Air-delivered Ordnance Failure Rate

Based on empirical evidence, it is generally accepted that 10% of the German HE bombs dropped during WWII failed to explode as designed. This estimate is probably based on the statistics of wartime recovered UXBs and therefore will not have taken account of the unknown numbers of UXBs that were not recorded at the time, and is probably an underestimate.

The reasons for failures include:

- Fuze or gaine malfunction due to manufacturing fault, sabotage (by forced labour) or faulty installation.
- Clockwork mechanism failure in delayed action bombs.
- Failure of the bomber aircraft to arm the bombs (charge the electrical condensers which supplied the energy to initiate the detonation sequence) due to human error or equipment defect.
- Jettison of the bomb before it was armed or from a very low altitude. Most likely if the bomber was under attack or crashing.

War Office Statistics document that a daily average of 84 bombs which failed to function were dropped on civilian targets in Great Britain between 21st September 1940 and 5th July 1941. 1 in 12 of these (probably mostly fitted with time delay fuzes) exploded sometime after they fell - the remainder were unintentional failures.

From 1940 to 1945 bomb disposal teams dealt with a total of 50,000 explosive items of 50kg and over (i.e. German bombs), 7,000 AAA shells and 300,000 beach mines. These operations resulted in the deaths of 394 officers and men. However, UXO is still regularly encountered across the UK (see recent press articles, ***Annex F-1***).

9.2.3. UXB Ground Penetration

9.2.3.1. General Considerations

The actual penetration depth of aerial delivered bombs into the ground will have been determined by the mass and shape of the bomb, the velocity and angle of the bomb on impact (dependent on the height of release) and the nature of the ground and ground cover; the softer the ground, the greater the potential penetration. Peat, alluvium and soft clays are easier to penetrate than gravel and sand. Bombs are brought to rest or are commonly deflected by bedrock or large boulders.

9.2.3.2. The "j" Curve Effect

An air-dropped bomb falling from normal bombing altitude (say 5,000m) into homogeneous ground will continue its line of flight but turn in an upwards curve towards the surface as it comes to rest. This offset from vertical is generally thought to be about one third of the penetration depth, but can be up to 15m depending on ground conditions or the bomb's angle of impact.

9.2.3.3. Second World War Bomb Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by Bomb Disposal, mostly in the London area. They then came to conclusions as to the likely average and maximum depths of penetration of different sized bombs in different geological strata.

The median penetration of 430 x 50kg German bombs in London Clay was 4.6m and the maximum penetration observed for the SC50 bomb was 9m.

They concluded that the largest common German bomb, 500kg, had a likely penetration depth of 6m in sand or gravel but 8.7m in clay. The maximum observed depth for a 500kg bomb was 10.2m and for a 1,000kg bomb 12.7m. Theoretical calculations suggested that significantly greater penetration depths were probable.

9.2.4. Initiation of Unexploded Bombs

Unexploded bombs do not spontaneously explode. All high explosive requires significant energy to create the conditions for detonation to occur. In the case of unexploded German bombs discovered within the construction site environment, there are a number of potential initiation mechanisms:

- Direct impact onto the main body of the bomb: Unless the fuze or fuze pocket is struck, there needs to be a significant impact (e.g. from piling or large and violent mechanical excavation) to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
- Re-starting the clock timer in the fuze: Only a small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion has taken place within the fuze mechanism over the last 60 years that would prevent clockwork mechanisms from functioning, nevertheless it was reported that the fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-commence.
- Induction of a static charge, causing a current in an electric fuze: The majority of German WWII bombs employed electric fuzes. It is probable that significant corrosion has taken place within the fuze mechanism over the last 60 years such that the fuze circuit could not be activated.
- Friction impact initiating the (shock-sensitive) fuze explosive: This is the most likely scenario resulting in the bomb detonating.

Annex F-2 details UXB incidents where intrusive works have caused UXBs to detonate, resulting in death or injury and damage to plant.

9.3. Bombing History of Manchester

9.3.1. Second World War Overview

During WWII Manchester was heavily bombed by the Luftwaffe due primarily to the industry located within the city. The importance of the Manchester Ship Canal and Manchester Docks to the Allied war effort was also not overlooked and this infrastructure was heavily targeted along with railway stations. Many Manchester companies were involved in vital war production work; putting the city's docks and industry out of action would have had serious consequences for the Allied war effort.

The Luftwaffe target map, presented in ***Annex G***, shows the areas of Manchester highlighted for attack. It earmarks the railway infrastructure, approximately 80m to the south of the site, for destruction.

Between July 1940 and July 1942, Manchester suffered repeated and widespread bombing. The Luftwaffe mounted consecutive heavy attacks on the nights of the 22/23rd and 23/24th December 1940 leaving large areas of Manchester, Salford and Stretford devastated.

In total these two successive nights involved a total of 441 German bombers and became known as the 'Manchester Blitz'. During these attacks seven conflagrations and numerous smaller fires were reported. This, coupled with concentrated HE bombing, resulted in the total destruction of over 4,000 houses as well as serious damage to a further 12,000.

During 1941 two more large scale raids occurred on the 9th January and 1st June. Although each involved half as many aircraft as the 22nd December 1940 raid, these two attacks still delivered a further 208 tonnes of HE bombs onto Manchester, in total.

After June 1941, the raids became much more infrequent, but by this time serious damage had been caused to the docks, industrial premises and railway infrastructure of the city centre, within which the site was located.

For security reasons, the media was instructed to downplay the Manchester raids in public reports; for example, all damage sustained to Trafford Park went unreported. Records of bombing incidents in the civilian areas of Manchester were collected by the Air Raid Precautions wardens and collated by the Civil Defence Office. Some other organisations, such as RAF stations, hospitals and railways, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics.

These various types of records of bombing incidents for the region of the site are presented in the following sections.

9.4. Second World War Bombing Statistics

The following table summarises the quantity of German bombs (excluding 1kg incendiaries and anti-personnel bombs) falling on the County Borough of Manchester between 1940 and 1945:

Record of German Ordnance Dropped on the County Borough of Manchester	
Area Acreage	27,255
High Explosive Bombs (all types)	712
Parachute Mines	18
Oil Bombs	7
Phosphorus Bombs	0
Pilotless Aircraft (V1)	1
Fire Pot	0
Long Range Rocket (V2)	0
Total	738
Items Per 1,000 Acres	**27.1**

Source: Home Office Statistics

Note this table does not include UXO found during or after WWII.

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. It is known however that by the end of WWII over 128,000 1kg IBs had been dropped on Manchester.

Although the incendiaries are not particularly significant in the threat they pose, they nevertheless are items of ordnance that were designed to cause damage and inflict injury and should not be overlooked in assessing the general risk to personnel and equipment. The anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. This table does not include UXO found during or after WWII.

The following table summarises the quantity of German HE Parachute Mines and HE bombs falling on the County Borough of Manchester during the two heaviest air raids:

Record of German Ordnance Dropped on the County Borough of Manchester: 22nd – 24th December 1940				
District	High Explosive Parachute Mines		High Explosive Bombs	
	Exploded	Unexploded	Exploded	Unexploded
Manchester	27	5	296	341
Salford	23	3	235	299
Stretford	21	6	124	148
Manchester Docks	0	1	16	17
Total	**71**	**15**	**671**	**805**

9.5. Site Specific WWII Bombing Records

9.5.1. Manchester Bomb Plot / Damage Map

WWII bomb damage maps of Manchester, compiled by Manchester City Council, showing HE strikes and the extent of damage caused to properties, were obtained from the University of Manchester Library. A section of the covering the site is presented in ***Annex H***.

Note that as this map is undated it is not known whether it represents a complete record of all bombing over Manchester during WWII.

The map records a HE bomb strike to the south-eastern corner of the site, resulting in minor to moderate damage to the Police Headquarters situated within the study area.

Several neighbouring buildings occupying the north-western corner sustained serious damage while a small area of lesser damage is highlighted along the southern boundary. Note the lack of potted HE bomb strikes indicates this may be the result of 1kg incendiary bomb showers causing fires.

9.5.2. WWII-era RAF Aerial Photography

RAF aerial photographs of the site and surrounding area were obtained from the Britain From Above Project and Historic England. These images are presented in ***Annex I*** and described below.

9.5.2.1. May 1946

This photograph, taken approximately two years after the cessation of bombing in Manchester, confirms that the Police Headquarters, situated in the eastern half of the site, survived largely intact. However significant bomb damage is apparent in the north-western section of the study area, with only the outer walls of the structures left standing. Bordering the Police Station to the west is a smaller two storey building which appears to be in ruin.

Note a hard-surfaced courtyard within the Police Station.

9.5.2.2. May 1948

While this is image is of small scale and low resolution it confirms that the damage to the Police Headquarters was relatively minor, as it appears to have been already repaired.

9.5.3. Secondary Source Evidence

Anecdotal accounts of local bombing incidents were sought from web resources and publications. A review of a local history publication[2] resulted in the following:

- 23/12/1940 - Eastern side of Deansgate, **Jackson's Row** and St Anne's Square were hit by a shower of [1kg] incendiaries, causing extensive damage to shops and businesses.
- 01/06/1941 - **Bootle Street Police HQ** had its upper floors wrecked and two civil defence messengers were killed, but police work nevertheless continued.

9.5.4. Abandoned Bombs

A post-air raid survey of buildings, facilities and installations would have included a search for evidence of bomb entry holes. If evidence were encountered, Bomb Disposal Officer teams would normally have been requested to attempt to locate, render safe and dispose of the bomb. Occasionally evidence of UXBs was discovered but due to a relatively benign position, access problems or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an Abandoned Bomb.

Given the inaccuracy of WWII records and the fact that these bombs were 'abandoned', their locations cannot be considered definitive, nor the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded. Dynasafe BACTEC holds no records of officially registered abandoned bombs at or near the site.

9.6. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the Jacksons Row site the following parameters would be used:

- Geology – 3.66m of BALLAST, 9.14m of SANDSTONE.

[2] *G. Phythian, Blitz Britain: Manchester and Salford, 2015*

- Impact Angle and Velocity – 80-90° from horizontal and 267 metres per second.
- Bomb Mass and Configuration – The 500kg SC (General Purpose) HE bomb, without retarder units or armour piercing nose. This was the largest of the common bombs used against Britain.

Taking into account the above-mentioned factors, it has been assessed that a 500kg bomb would have had an approximate maximum bomb penetration depth of **6-8m** below WWII ground level. Penetration depth could potentially have been greater if the UXB was larger (though only 4% of German bombs used in WWII over Britain were of that size). Note that UXBs may be found at any depth between just below the WWII ground level and the maximum penetration depth.

9.7. Likelihood of Post-raid UXO Detection

Utilising the available historical bombing records as reviewed in *Sections 9.1 to 9.5*, it is possible to make an assessment of the likelihood that evidence of UXO would have been noted on a site during the war and the incident dealt with or recorded at the time. Factors such as bombing density, frequency of access, ground cover, damage and failure rate have been taken into consideration.

9.7.1. Density of Bombing

Bombing density is an important consideration for assessing the possibility that UXBs remain in an area. A very high density of bombs can for example result in increased levels of damage sustained to structures, greater likelihood of errors in record keeping and a higher risk that UXBs fell over the area.

Bombing statistics record a high bombing density over central Manchester during WWII. Available bomb plot maps record one HE bomb strike to the south-eastern corner of the study area and a 1kg incendiary bomb shower is known to have gutted some adjacent buildings at the north-western corner of the site.

9.7.2. Damage

If structures on a site have been subject to significant bomb or fire damage, rubble and debris are likely to have been present; similarly a HE bomb strike on open ground is likely to have resulted in a degree of soil disturbance. Under such conditions there is a greater risk of the entry holes of UXBs dropped during subsequent raids being obscured and going unnoticed.

The structures located within the north-western section of the site suffered damage so severe that either the affected buildings were instantly destroyed or they were subsequently demolished by the authorities, on account of being damaged beyond repair. At these locations it can be assumed that large quantities of rubble persisted for a time and debris will likely have been strewn across neighbouring, undamaged areas.

Had a subsequent UXB then fallen within such ground cover, it is likely to have become immediately obscured from view within the ruins and wreckage. This scenario is illustrated by a photograph of local bomb damage, see ***Annex J***.

However anecdotal accounts and WWII-era aerial photographs confirm that the damage to the police headquarters, located in the eastern half the site, was confined largely to the two upper floors. As the lower two floors of the building remained intact, the degree of damage caused will not have been sufficient enough to obscure the passage of a subsequent HE UXB through the entire building and into the ground.

9.7.3. Frequency of Access

UXO at sites where human access was infrequent would have a higher chance of being overlooked than at those sites which were subject to greater occupancy. The importance of a site or facility to the war effort is also an important consideration as such sites are likely to have been both frequently accessed and are also likely to have been subject to post-raid checks for evidence of UXO.

As a developed site within a densely populated urban environment, the study area in general would have been frequently accessed. Some of the buildings survived the Blitz largely intact and therefore will likely have remained inhabited / in use, thereby increasing the likelihood of any air-delivered UXO being observed here.

However, following the serious bomb damage, the affected buildings would have been abandoned until repairs were made or the ruins cleared, increasing the possibility of subsequent UXO falling on site unnoticed. This is especially pertinent as many German air raids on Manchester occurred at night.

9.7.4. Ground Cover

The degree and type of groundcover present during WWII would have a significant effect on the visual evidence at ground level which may have indicated the presence of buried UXO.

Evidence of UXO will have been obvious within undamaged parts of the study area, as a UXB strike to the unaffected buildings and hard-standing will still have caused significant damage, even without detonating. Following any such incident, the damage would have been observed and the UXB exhumed / removed.

9.7.5. Bomb Failure Rate

There is no evidence to suggest that the bomb failure rate in the vicinity of the site would have been different from the "approximately 10%" figure normally used.

10. The Threat from Allied Military Ordnance

10.1. General

BACTEC has identified evidence of domestic military related activity in the local area, which could have led to UXO contamination.

The following historical and modern facilities / activities / incidents have been considered:

- Army, Navy and RAF Bases / Installations
- Military Training Areas / Weapons Ranges
- Ordnance / Explosives Factories and Storage Depots
- Sites requisitioned for military use
- Military Fortifications and Coastal Defences
- Locations of Army Explosive Ordnance Clearance Tasks
- WWII Anti-Aircraft Batteries
- WWII Pipe Mined Locations and Beach Minefields

The most likely source of British / Allied ordnance is anti-aircraft fire, as discussed in the following section.

10.1.1. Anti-Aircraft Artillery and Projectiles

At the start of the war two types of AAA guns were deployed: Heavy Anti-Aircraft Artillery (HAA), using large calibre weapons such as the 3.7" QF (Quick Firing) gun and Light Anti-Aircraft Artillery (LAA) using smaller calibre weapons such as 40mm Bofors gun.

During the early war period there was a severe shortage of AAA available and older WWI 3" and modified naval 4.5" guns were deployed alongside those available 3.7" weapons. The maximum ceiling height of fire at that time was around 11,000m (for the 3.7" gun and less for other weapons). As the war progressed improved variants of the 3.7" gun were introduced and, from 1942, large 5.25 inch weapons began to be brought into service. These had significantly improved ceiling heights of fire reaching over 18,000m.

The LAA batteries were intended to engage fast low flying aircraft and were typically deployed around airfields or strategic installations. These batteries were mobile and could be moved to new positions with relative ease when required. The most numerous of these was the 40mm Bofors gun which could fire up to 120 x 40mm HE shells per minute to over 1800m.

The HAA projectiles were high explosive shells, usually fitted with a time delay or barometric pressure fuze to make them explode at a pre-determined height. Before the war all the clockwork fuses used by the Royal Artillery had come from Switzerland. When that source of supply was cut off, Britain had been forced to make its own. After four years of war, the country still lacked the engineering skills to produce a reliable fuse.

This resulted in a considerable number of AA projectiles either exploding prematurely, killing the gunners or failing to explode at all; falling to the ground as UXBs. In January 1944 more people in London were killed by HAA shells than by German bombs. Details of the most commonly deployed WWII AAA projectiles are shown below:

Gun type	Calibre	Shell Dimensions	Shell Weight	HE Fill Weight
3.7 Inch	94mm	94mm x 438mm	12.7kg	1.1kg
4.5 Inch	114mm	114mm x 578mm	24.7kg	1.7kg
40mm	40mm	40mm x 311mm	0.84kg	70g

Although the larger unexploded projectiles could enter the ground they did not have great penetration ability and are therefore likely to be found close to WWII ground level. These shells are frequently mistakenly identified as small German air-delivered bombs, but are differentiated by the copper driving band found in front of the base. With a high explosive fill and fragmentation hazard these items of UXO present a significant risk if encountered. The smaller 40mm projectiles are similar in appearance and effect to small arms ammunition and, although still dangerous, present a lower risk.

Five HAA batteries were located within a 5km radius of the site during WWII. Numerous unexploded AAA shells were recovered during and following WWII and are still occasionally encountered on sites today. Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at ***Annex K***.

11. Ordnance Clearance and Post-WWII Ground Works

11.1. General

The extent to which any ordnance clearance activities have taken place on site or extensive ground works have occurred is relevant since on the one hand they may indicate previous ordnance contamination but also may have reduced the risk that ordnance remains undiscovered.

11.2. EOD Bomb Disposal and Clearance Tasks

BACTEC holds a number of official records of explosive ordnance disposal operations during and following WWII, obtained from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD). No records could be found to indicate that any EOD tasks have taken place on or within very close proximity to the site.

11.3. Post War Redevelopment

Between 1951 and 1964 the present day Synagogue was constructed in the north-western corner of the site while minor redevelopment immediate to the east also took place. Additional phases of redevelopment have taken place in subsequent years across the western half of the site.

Note however no significant intrusive works are believed to have taken place across the eastern half of the site in the post-war period.

12. The Overall Explosive Ordnance Threat Assessment

12.1. General Considerations

Taking into account the quality of the historical evidence, the assessment of the overall threat to any intrusive works from UXO must evaluate the following risks:

- That the site was contaminated with unexploded ordnance
- That UXO remains on site
- That such items could be encountered during any intrusive works
- That ordnance may be activated by the works operations
- The consequences of encountering or initiating ordnance

12.2. The Risk that the Site was Contaminated with Unexploded Ordnance

For the reasons discussed in *Section 9* BACTEC believes that there is a risk that UXO contaminated the study area. This is based on the following:

- Manchester was the eleventh most heavily bombed city / town in Britain during WWII. The site is located within the city centre which experienced a high bombing density, as confirmed by official statistics.
- Original bombing records, sought from two separate sources, plot one HE bomb strike to the Police Station. This resulted in damage to the upper two floors of the building, leaving the lower two floors intact.
- A 1kg incendiary bomb shower is known to have gutted some buildings at the north-western corner of the site as well as causing minor / moderate damage to a small building at the southern site boundary.
- Therefore it can be assumed that at these localities, heaps of rubble would have persisted, and debris would have been strewn across the site. Consequently, had a subsequent HE UXB fallen in these areas, it may have become obscured from view within the ruins. This is especially pertinent as nearly all German air raids on Manchester occurred at night, increasing the likelihood of a UXB falling unobserved and going unreported.
- Furthermore, such an incident could conceivably have resulted in the UXB coming to rest beneath neighbouring undamaged buildings / hard-staining, due to the 'J' Curve Effect.
- However note that as the lower two floors of the Police Station remained intact, it is highly unlikely that a subsequent UXB could have fallen within this ruin and passed through the ground floor without leaving any obvious evidence of its incidence. Furthermore the station remained in use throughout the remainder of the war, further decreasing the likelihood of such a scenario taking place.
- Those structures which survived the Blitz undamaged will likely have remained inhabited / in use, thereby increasing the likelihood of any air-delivered UXO being observed here. Furthermore a UXB strike to these buildings will have caused significant damage, even without detonating. Following any such incident, the damage would have been observed and the UXB exhumed / removed.

No evidence has been located to suggest that the site formerly had any British / Allied military occupation or usage that could have led to contamination with items of UXO.

12.3. The Risk that Unexploded Ordnance Remains on Site

Following WWII a large proportion of the site has been redeveloped. Within the footprints of the post-war buildings and hard-standing, the risk from shallow-buried UXO (AA projectiles and 1kg incendiary bombs) will have been largely mitigated, as any such items will likely have been exhumed and removed during excavations for foundations, as well as levelling and re-surfacing works.

The risk from deep-buried German HE UXBs will have only been mitigated within the volume of any post-war bulk excavations (for basement levels) and at the precise locations of any pile

foundations. This risk will therefore remain within virgin geology, beneath the post-war construction works and amongst any pile layouts, down to the maximum bomb penetration depth.

12.4. The Risk that Ordnance may be Encountered during the Works

The most likely scenarios under which UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Since an air-dropped bomb may come to rest at any depth between just below ground level and its maximum penetration depth there is also a chance that such an item could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level. A risk of encountering UXO will only present itself if intrusive work is carried out into virgin geology (or WWII-era made ground), outside the volume of post-war foundations.

12.5. The Risk that Ordnance may be Initiated

The risk that UXO could be initiated if encountered will depend on its condition, how it is found and the energy with which it is struck. The most violent activity on most construction sites is percussive piling. As a result items that are shallow buried present a slightly lower risk than those that are deep buried, since the force of impact is usually lower and they are more likely to be observed – when immediate mitigating actions can be taken.

12.6. The Consequences of Encountering or Initiating Ordnance

Clearly the consequences of an inadvertent detonation of UXO during construction operations would be catastrophic with a serious risk to life, damage to plant and a total site shutdown during follow-up investigations.

Since the risk of initiating ordnance is significantly reduced if appropriate mitigation measures are undertaken, the most important consequence of the discovery of ordnance will be economic. This would be particularly so in the case of high profile locations and could involve the evacuation of the public.

The unexpected discovery of ordnance may require the closing of the site for any time between a few hours and a week with a potentially significant cost in lost time. Note also that the suspected find of ordnance, if handled solely through the authorities, may also involve loss of production since the first action of the Police in most cases will be to isolate the locale whilst awaiting military assistance, even if this turns out to have been unnecessary.

12.7. Dynasafe BACTEC's Assessment

Taking into consideration the findings of this study, Dynasafe BACTEC considers the risk on the site to be heterogeneous and can therefore be divided into ***Low*** and ***Medium*** Risk Zones. These are described below and illustrated on a Risk Map, presented in ***Annex L***.

Low Risk Zone: Relatively undamaged buildings and hard-standing during WWII.

	Level of Risk			
Type of Ordnance	**Negligible**	**Low**	**Medium**	**High**
German High Explosive Bombs		✓		
German 1kg Incendiary Bombs		✓		
British AA Shells		✓		
British / Allied SAA and LSA	✓			

Medium Risk Zone:

a) Buildings which sustained serious bomb damage during WWII.

b) Buffer area to account for the 'J-Curve Effect'

	Level of Risk			
Type of Ordnance	**Negligible**	**Low**	**Medium**	**High**
German High Explosive Bombs			✓	
German 1kg Incendiary Bombs		✓		
British AA Shells		✓		
British / Allied SAA and LSA	✓			

13. Proposed Risk Mitigation Methodology

13.1. General

Dynasafe BACTEC believes the following risk mitigation measures should be deployed to support the proposed works at the Jacksons Row site.

13.2. Recommended Risk Mitigation Measures

Both Risk Zones

- ***Site Specific Explosive Ordnance Safety and Awareness Briefings to all personnel conducting intrusive works:*** A specialised briefing is always advisable when there is a possibility of explosive ordnance contamination. It is an essential component of the Health & Safety Plan for the site and conforms to requirements of CDM Regulations 2007. All personnel working on the site should be instructed on the identification of UXB, actions to be taken to alert site management and to keep people and equipment away from the hazard. Posters and information of a general nature on the UXB threat should be held in the site office for reference and as a reminder.
- ***The Provision of Unexploded Ordnance Site Safety Instructions:*** These written instructions contain information detailing actions to be taken in the event that unexploded ordnance is discovered. They are to be retained on site and will both assist in making a preliminary assessment of a suspect object and provide guidance on the immediate steps to be taken in the event that ordnance is believed to have been found.

Medium Risk Zone Only

- ***Explosive Ordnance Disposal (EOD) Engineer presence on site to supervise open excavations:*** When on site the role of the EOD Engineer would include; monitoring works using visual recognition and instrumentation and immediate response to reports of suspicious objects or suspected items of ordnance that have been recovered by the ground workers on site; providing Explosive Ordnance Safety and Awareness briefings to any staff that have not received them earlier and advise staff of the need to modify working practices to take account of the ordnance threat, and finally to aid Incident Management which would involve liaison with the local authorities and Police should ordnance be identified and present an explosive hazard.
- ***Intrusive Magnetometer Survey of any pile / boreholes locations down to the maximum bomb penetration depth:*** BACTEC can deploy a range of intrusive magnetometry techniques to clear ahead of all the pile locations. The appropriate technique is governed by a number of factors, but most importantly the site's ground conditions. The appropriate survey methodology would be confirmed once the enabling works have been completed. A site meeting would be required between BACTEC and the client to determine the methodology suitable for this site. Target investigation or avoidance will be recommended as appropriate.

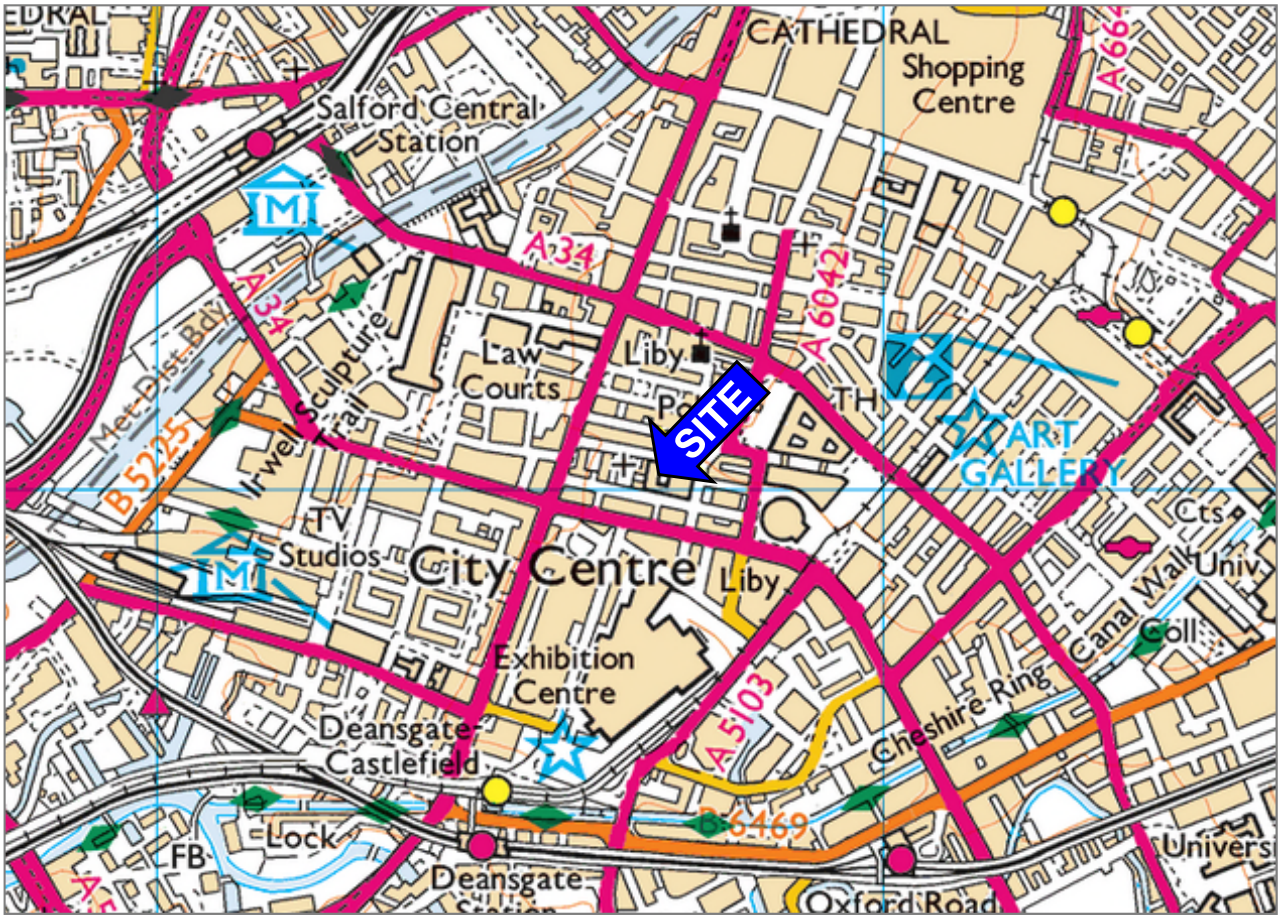
Dynasafe BACTEC Limited 26th October 2015

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North





Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

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North

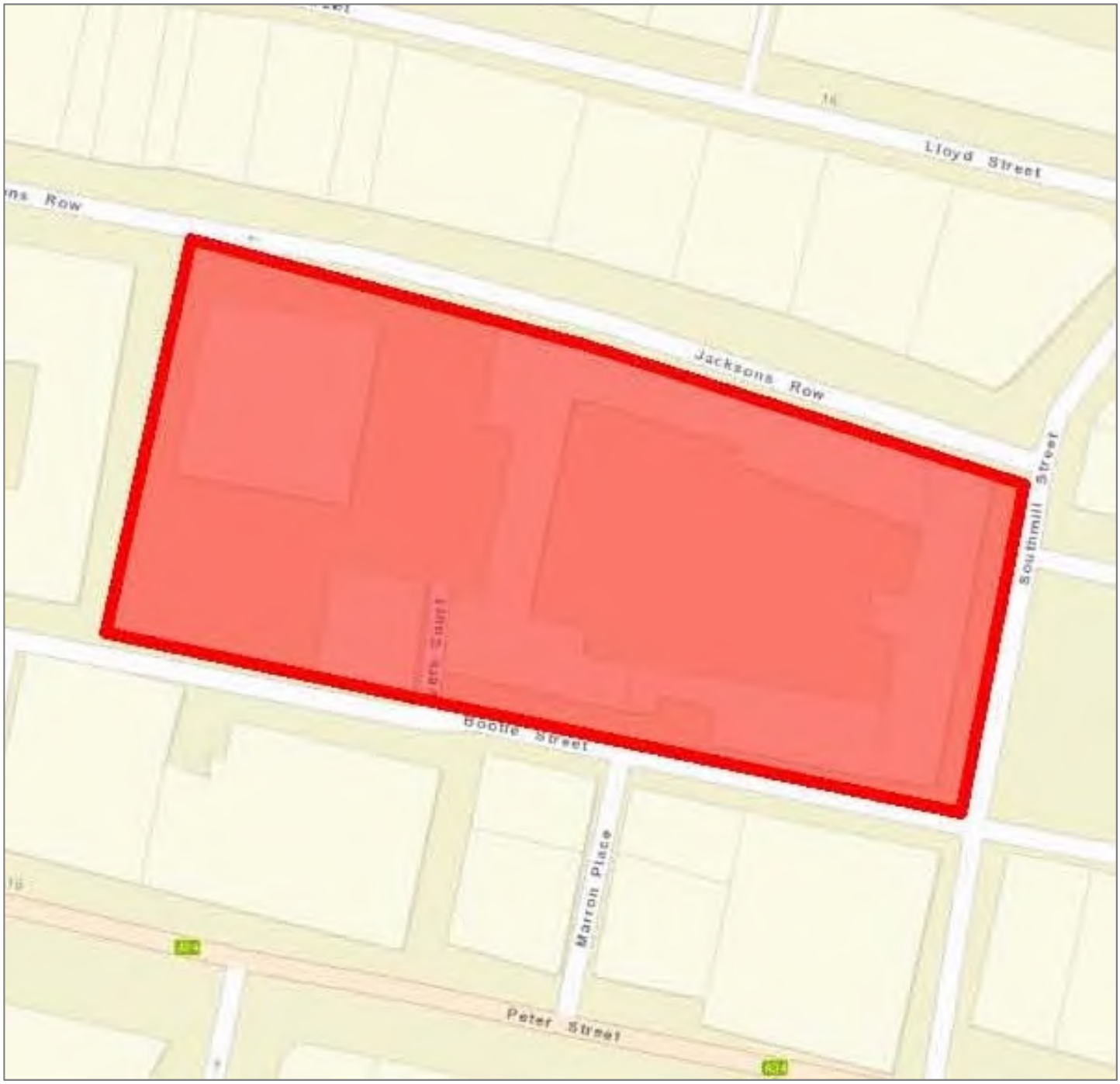


Approximate site boundary

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Google Earth ™ Mapping Services

North

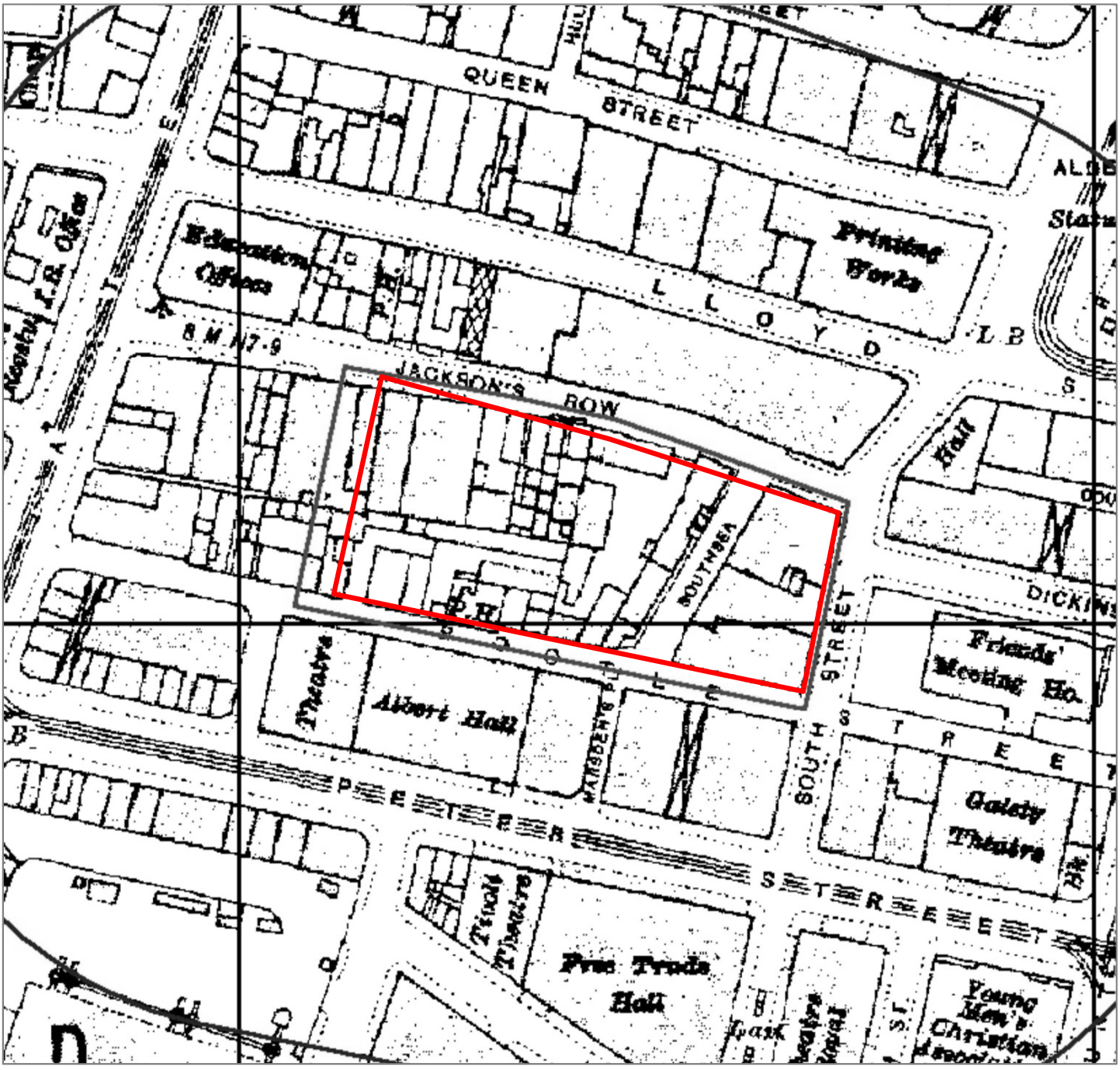


Site boundary

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: WSP UK Limited

North



Approximate site boundary

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: WSP UK Limited



- Approximate site boundary
- Ruin
- Redevelopment

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: WSP UK Limited

SC 50

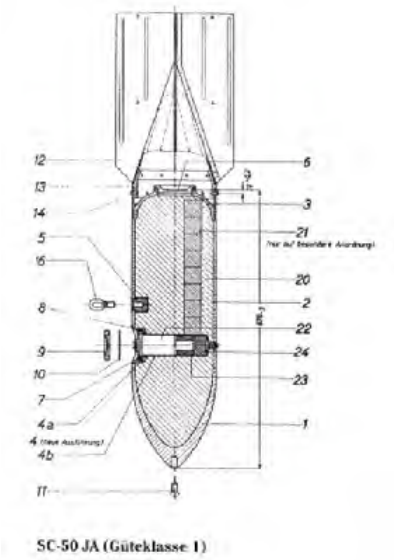
Bomb Weight:	40-54kg (110-119lb)
Explosive Weight:	c25kg (55lb)
Fuze Type:	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions:	1,090 x 280mm (42.9 x 11.0in)
Body Diameter:	200mm (7.87in)
Use:	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks:	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.



50kg bomb, London Docklands



Minus tail section

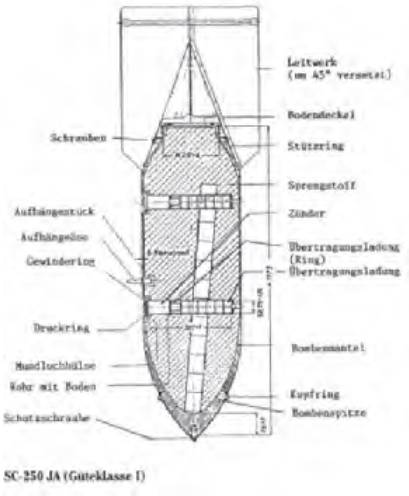


SC 250

Bomb weight:	245-256kg (540-564lb)
Explosive weight:	125-130kg (276-287lb)
Fuze type:	Electrical impact/mechanical time delay fuze.
Bomb dimensions:	1640 x 512mm (64.57 x 20.16in)
Body diameter:	368mm (14.5in)
Use:	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.



250kg bomb, Hawkinge



SC-250 JA (Güteklasse I)

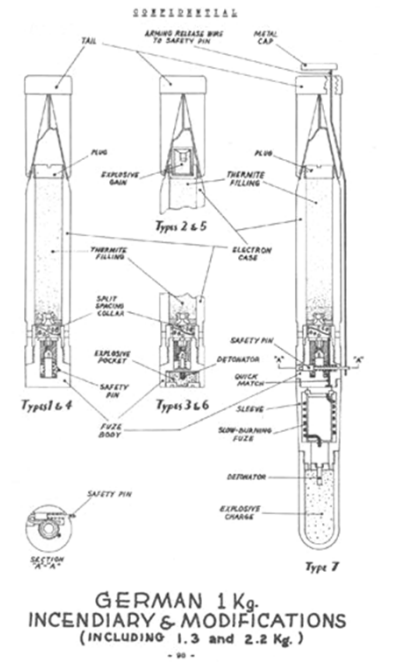
1kg Incendiary Bomb

Bomb weight:	1.0 and 1.3kg (2.2 and 2.87lb)
Filling:	680gm (1.3lb) Thermite
Fuze type:	Impact fuze
Bomb dimensions:	350 x 50mm (13.8 x 1.97in)
Body diameter:	50mm (1.97in)
Use:	As incendiary – dropped in clusters against towns and industrial complexes
Remarks:	Jettisoned from air-dropped containers. Magnesium alloy case. Sometimes fitted with high explosive charge





1. Scaffold pipe
2. Incendiary 1kg bomb
3. Incendiary bomb recently found on site in UK



GERMAN 1 Kg. INCENDIARY & MODIFICATIONS (INCLUDING 1.3 and 2.2 Kg.)

Report Reference: 6239TA	Client: WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Dynasafe BACTEC Limited and various historical sources

The Telegraph

11:50AM GMT 24 Mar 2015

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Giant WWII bomb dug up by builders in London

A massive evacuation procedure is carried out in Bermondsey, south London, after the 1,000lb explosive measuring 5ft long was uncovered



Express & Echo

6.1 °C
Light Rain Shower

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Road closed after German bomb found in Axminster garden

By Exeter Express and Echo | Posted: June 03, 2014



Mother-of-two digs up unexploded WWII bomb in garden and casually flings it on the rubbish thinking it was an old exhaust pipe

- Carole Fisher-White, 56, unearthed a mortar shell in her back garden
- It was only when sons said it looked like a bomb that the penny dropped
- Royal Navy bomb disposal team called to defuse the device
- The 29mm Spigot Mortar was was an infantry anti-tank weapon
- Also known as the Blacker Bombard it was used by the Home Guard



Page last updated at 14:45 GMT, Friday, 22 May 2009 15:45 UK

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Building site WWII bomb exploded



Building site WWII bomb exploded

A controlled explosion has been carried out on a World War II bomb found on a building site in East Sussex.

The 110lb (50kg) SC50 bomb, thought to have been dropped from a German aircraft in 1940 or 1941, was found at the Hollendon House

Unexploded Second World War grenade discovered by a curious dog

By Charlotte Cox

Police and Army bomb disposal experts were called to the address in Peakdale Avenue, Heald Green.

A dog called Snoop has sniffed out a suspected Second World War grenade in a Stockport garden.

Police and Army bomb disposal experts were called to the address in Peakdale Avenue, Heald Green.

The took the grenade to nearby parkland and destroyed in a controlled explosion.



Page last updated at 14:23 GMT, Thursday, 5 June 2008 15:23 UK

BBC

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Unexploded bomb 'started to tick'

An unexploded World War II bomb started to tick and ooze liquid as experts tried to defuse it, police have said.

The large bomb was found in a river at Sugar House Lane, near Bromley-by-Bow Tube station in east London, on Monday.

Rush-hour travel was disrupted as overnight work to make the bomb safe continued into Thursday morning.



"It measures approximately the size and length of a man, and weighs around 1,000kg (2,200lb).

Royal Navy clearance divers dispose of 70-year old German bomb



The team of four from the Southern Diving Unit 1 at HM Naval Base Devonport, Plymouth, blew up the air-dropped bomb in-situ in a controlled explosion where it was found by contractors for SW Water laying a mains in a field at St Enoder Kart Circuit near Wadebridge, north Cornwall yesterday.

1994



Blown up by history

RESCUE workers search for survivors after a Second World War bomb exploded at a building site in Berlin, killing three people and injuring at least eight others.

A fire brigade spokesman said he feared the final death toll could be higher. One worker was still missing, believed to be trapped under a machine. "We've found human remains 100 metres away but we can't tell if they belong to the dead already found," the spokesman said.

The blast, set off by drilling work on Frankfurter Allee, one of east Berlin's busiest avenues, trapped workers under building machinery and sent huge chunks of concrete tumbling through the air.

A large office block was being built on the site of the explosion which sent shoppers scrambling for shelter and paralysed dense afternoon traffic. One eyewitness said: "There was a bang, then silence, and then it started raining stones and dirt."

Dozens of cars within a 250-metre radius were wrecked and the top two floors of a nearby apartment block caved in.

Radio reports claimed that the total number of injured stood at 14.

2008



2006



World War II bomb kills three in Germany

Three people have been killed and six injured trying to defuse a World War II bomb in central Germany.

Workers building a sports stadium had earlier unearthed the bomb in the town of Goettingen.

It was not immediately clear why the bomb, reportedly weighing 500kg (1,100lb), had detonated.



Unexploded WWII bombs dropped by Allied planes are frequently found in Germany, though it is unusual for them to explode unexpectedly.

2010

2006





The bomb went off as the machine lifted up earth and debris

A World War Two bomb has exploded at a construction site near a west German town, killing a man and injuring eight others, police say.

The explosion occurred after a digger accidentally struck the device during excavation work in Euskirchen in the state of North Rhine-Westphalia.

The machine's operator died on the spot. Two of those hurt were critically wounded, the dpa news agency reports.

Related

2014

Top Left: WWII bomb killed 3 and injured 8 in Berlin – 1994.
Middle Left: WWII bomb killed 3 in Goettingen, Germany – 2010.
Bottom Left: Excavator operator killed by WWII bomb in Euskirchen, Germany – 2014.
Top Right: WWII bomb injures 17 at construction site in Hattingen, Germany - 2008.
Middle Right: A highway construction worker in Germany accidentally struck a WWII bomb, killing himself and wrecking several passing cars - 2006.
Bottom Right: Destroyed piling rig and dump truck after detonation of WWII UXB in Austria - 2006.

North



Approximate site boundary

Luftwaffe bombing targets

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Greater Manchester County Record Office

North

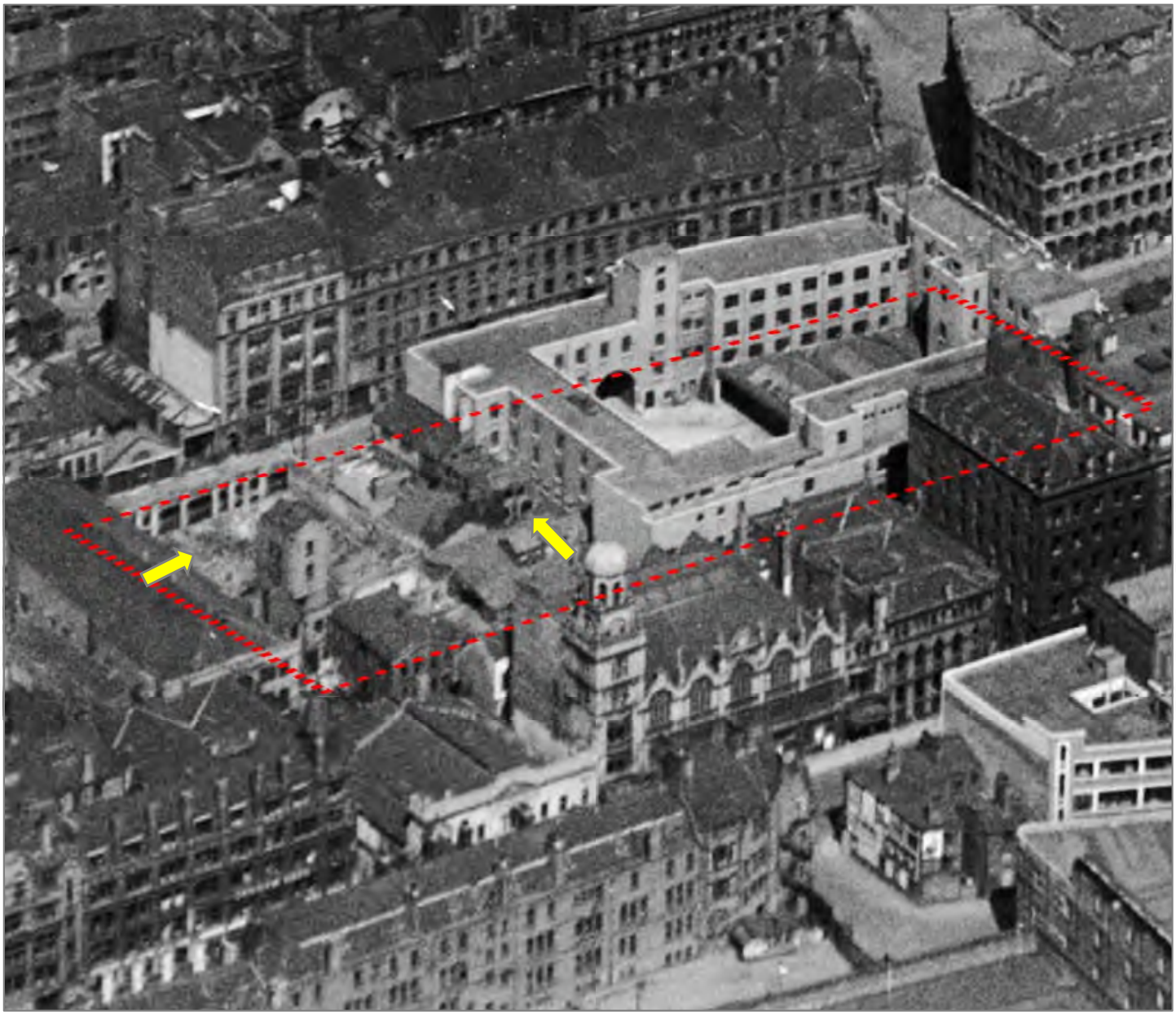


- Approximate site boundary
- Serious damage / clearance
- Minor to moderate damage
- Incendiary bomb strike
- HE bomb strike

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: University of Manchester Library

North



Approximate site boundary

Bomb damage

Report Reference:	Client:	
6239TA	WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Britain From Above

North



Approximate site boundary

Report Reference: 6239TA	Client: WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Historic England



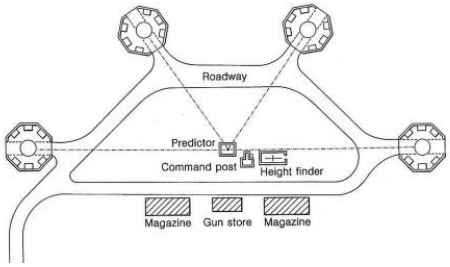
December 1940 – Free Trade Hall, Peter Street approximately 50m to the south of the site

3.7 inch Anti-Aircraft Projectile

Weight:	12.7kg (28lb)
Dimensions:	94 x 360mm (3.7 x 14.7in)
Carriage:	Mobile and Static Versions
Rate of Fire:	10-20 rounds per minute
Ceiling:	9-18,000m (29-59,000ft)
Muzzle Velocity:	792m/s (2,598ft/s)
Remarks:	4.5 inch projectiles were also commonly utilised



This AA shell was uncovered on a construction site in North London in February 2009.



Layout plan for a typical HAA battery site.



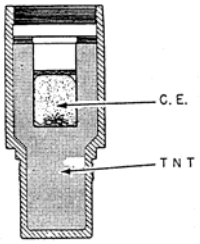
Hyde Park 1939 3.7 Inch QF gun on mobile mounting



3.7 inch AA Projectile Minus Fuze

Rockets / Unrotated Projectiles

Weight:	Overall: 24.5kg (54lb) Warhead: 1.94kg (4.28lb)
Dimensions:	1930mm x 82.6mm (76 x 3.25in)
Carriage:	Mobile – transported on trailers
Ceiling:	6770m (22,200ft)
Maximum Velocity:	457mps (1,500 fps)



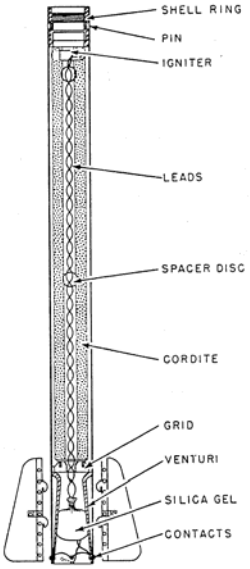
MK II HE Shell (3.5kg)



Rocket Battery in action



Home Guard soldiers load an anti-aircraft rocket at a 'Z' Battery



2" U.P AA Rocket

40mm Bofors Gun Projectile

Weight:	0.86kg (1.96lb)
Dimensions:	40mm x 310mm (1.6in x 12.2in)
Rate of Fire:	120 rounds per minute
Ceiling:	23,000ft (7000m)
Muzzle Velocity:	2,890 ft/s (881m/s)
Remarks:	Mobile batteries – normally few records of where these guns were located



Unexploded 40mm Bofors projectile recovered from a marine environment



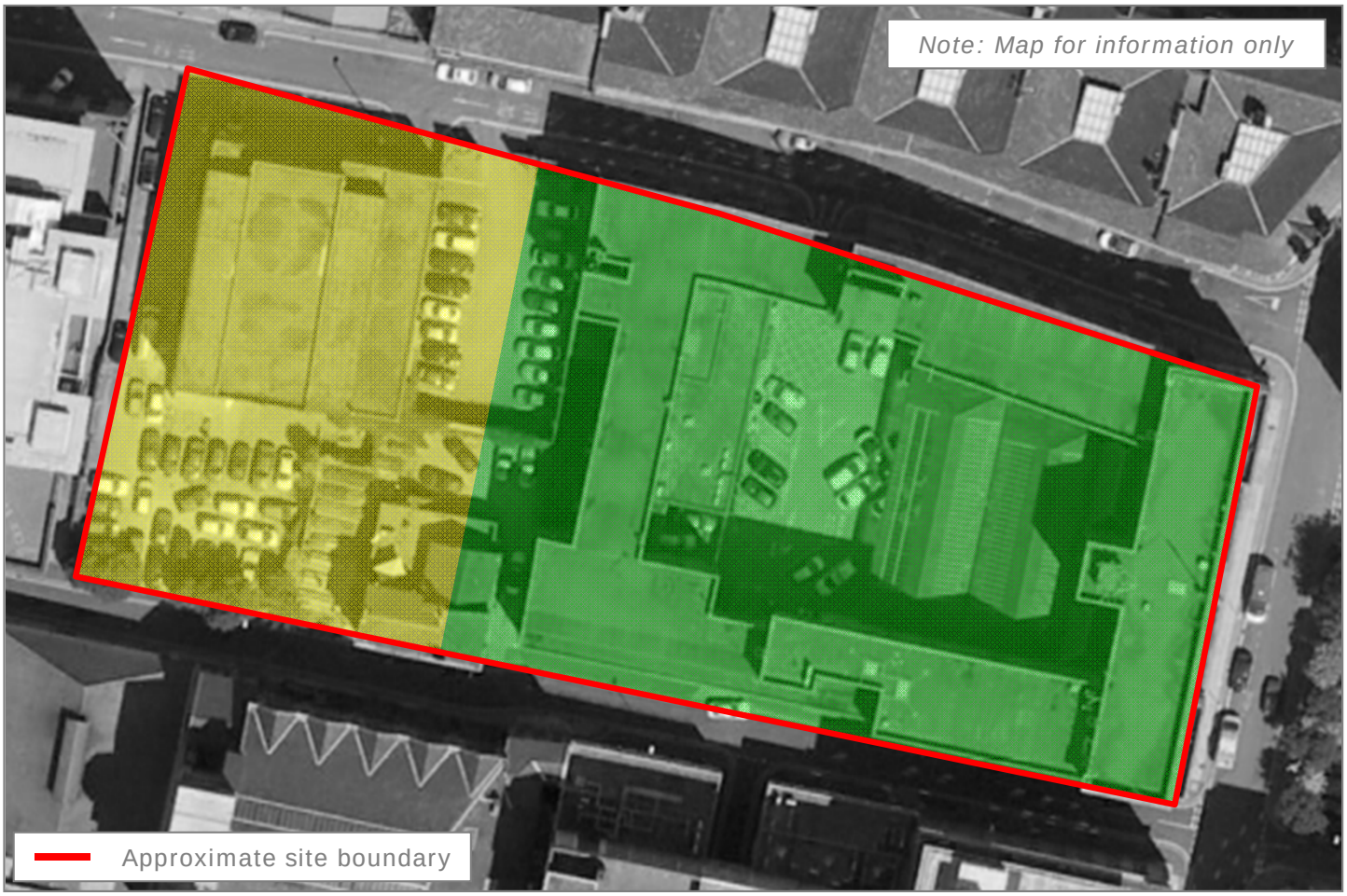
40mm Bofors gun and crew at Stanmore in Middlesex, 28 June 1940.



Report Reference: 6239TA	Client: WSP UK Limited	DYNASAFE
	Project: Jacksons Row, Manchester	

Source: Dynasafe BACTEC International Limited and various historical sources

North



Low Risk Zone

Relatively undamaged buildings and hard-standing during WWII.

Medium Risk Zone

a) Buildings which sustained serious bomb damage during WWII

b) Buffer area to account for the J-Curve Effect

Recommended Mitigation Measures

Both Risk Zones

- Explosive Ordnance Safety and Awareness Briefings to all personnel conducting intrusive works
- The Provision of Unexploded Ordnance Site Safety Instructions

Medium Risk Zone only

- Explosive Ordnance Disposal (EOD) Engineer presence on site to support any open excavations
- Intrusive Magnetometer Survey of any pile / boreholes locations down to the maximum bomb penetration depth

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 2.2

BIODIVERSITY ASSESSMENT

NOTE

The following technical reports were prepared and appended to the Environmental Statement registered in January, 2017, for an earlier iteration of the Proposed Scheme:

- **Appendix 2.1** Phase 1 Preliminary Geo-environmental Risk Assessment;
- **Appendix 2.2** Biodiversity Assessment;
- **Appendix 2.3** Preliminary Geotechnical and Environmental Assessment;
- **Appendix 5.1** EIA Scoping Report;
- **Appendix 6.1-6.4** Noise appendices;
- **Appendix 7.1** Socio-economic glossary;
- **Appendix 10.1-10.4** Wind;
- **Appendix 12.1** Archaeological DBA; and
- **Appendix 12.2** WSI.

The subsequent design changes made, giving rise to the current iteration of the Proposed Scheme which is set out in **Chapter 3 Scheme Description** of this ES, are such that the information and assumptions on which these technical reports are based remain valid and appropriate. For this reason, it has been concluded that the technical reports can be provided in their current form, without update.

It should be noted that where reference is made in the following technical report to the Proposed Scheme, this should be disregarded and reference made only to **Chapter 3 Scheme Description** in this ES.

This Appendix has been replaced in full
Please refer to the Environmental
Statement Addedum (2019)

REPORT N^{O} 001

ST MICHAEL'S, JACKSON'S ROW

BIODIVERSITY ASSESSMENT

This Appendix has been replaced in full. Please refer to the Environmental Statement Addedum (2019)

PUBLIC NOVEMBER 2016

WSP | PARSONS BRINCKERHOFF

ST MICHAEL'S, JACKSON'S ROW

BIODIVERSITY ASSESSMENT

Jackson's Row Developments Ltd

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Statement Addendum (2019)

Public

Project no: 70010278
Date: November 2016

WSP | Parsons Brinckerhoff
The Victoria
150-182 The Quays
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M50 1SP

Tel: +0 (0) 161 8862400
www.wsp-pb.com

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2
Remarks	Final	Update after bat survey	
Date	20.10.15	November 2016	
Prepared by	Charis Russell-Smith	Dawn Phythian	
Signature			
Checked by	Dawn Phythian	Charis Russell-Smith	
Signature			
Authorised by	Dr Mark Webb	Emma Hatchett	
Signature			
Project number	70010278	70010278	
Report number	Re01	01	
File reference	Manchester >> Environmental Planning – E26 >> PROJECTS >> Jackson's Row >> Deliverables	Manchester\E26 - Environmental Planning\PROJECTS\70010278 Jackson Row\05 Deliverables\03 Ecology\Update with Bat Surveys	

This Appendix has been replaced in full. Please refer to the Environmental Statement Addendum (2019)

PRODUCTION TEAM

CLIENT

Jackson's Row Developments Ltd

WSP | PARSONS BRINCKERHOFF

The Victoria
150-182 The Quays
Salford
M50 1SP

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Statement Addedum (2019)

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This Appendix has been replaced in full. Please refer to the Environmental Statement Addendum (2019)

1 INTRODUCTION

1.1.1 WSP | Parsons Brinkerhoff (WSP | PB) was instructed to conduct an Ecological Constraints Appraisal (referred to as a Biodiversity Assessment) on a parcel of land located on Jackson's Row. The Site is located in central Manchester, north of the A57 (M) (National Grid Reference SJ83663 98054) (herein referred to as the 'Site') prior to the proposed construction of a mixed use development (hereafter referred to as the 'Proposed Scheme). The Site boundary is shown in **Figure 1** - Site Location Plan.

1.1.2 During the initial survey potential features for roosting bats were noted on the outside of one of the buildings. Therefore an internal inspection plus roost surveys have been undertaken in 2016.

1.2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

1.2.1 The Site comprises of a number of buildings between Jackson's Row and Bootle Street, Greater Manchester. It is within an area of predominantly commercial properties. Rochdale Canal and the River Irwell are located approximately 0.5km from the Site boundary.

1.2.2 Within the Site boundary habitats include hardstanding, buildings, ornamental scrub and scattered trees.

1.2.3 The Proposed Scheme is for two buildings comprising residential dwellings, a hotel, a synagogue, a number of restaurants and bars and office spaces. In addition, it also includes public realm areas, revised access, car parking, landscaping and pedestrian routes through the Site. The Site area comprises 0.56 ha.

1.3 SCOPE OF WORKS

1.3.1 The objectives of the initial biodiversity assessment are to set out the following:

- Obtain detailed baseline information on the current habitats and ecological features in and around the Site;
- Identify the potential of the Site to support protected or notable habitats or species;
- Identify the presence or potential presence of any protected or notable species whose disturbance may require consent under the Wildlife and Countryside Act, 1981 (as amended) (hereafter 'the WCA') or the Conservation of Habitats and Species Regulations, 2010 (as amended); and
- Identify any requirements for further survey or control measures to be put in place during the construction phase.

1.3.2 The updated assessment follows the further bat surveys.

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addendum (2019)

2 METHODOLOGY

2.1 DESKTOP ASSESSMENT

2.1.1 A desktop assessment was carried out in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidelines for Preliminary Ecological Appraisal' (2013). Records of any protected or notable species, habitats and designated nature conservation sites within a 2 km radius of the Site were obtained and reviewed. This radius was extended to 5 km for bats, as recommended by best practice guidelines (Hundt, 2012) and 10 km for International and European level conservation sites including Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Wetlands of International Importance (Ramsar).

2.1.2 The following organisations were contacted regarding records held for protected and/or notable species:

- Greater Manchester Ecology Unit (GMEU).

2.1.3 Additional information on sites of nature conservation interest was obtained from:

- Natural England – Nature on the map website / Multi Agency Geographical Information for the Countryside (MAGIC) (http://www.natureonthemap.naturalengland.org.uk/); and
- The National Biodiversity Network (NBN) (http://www.nbn.org.uk/).

This Appendix has been replaced in full. Please refer to the Environmental Statement Addedum (2016)

2.2 WALKOVER SURVEY

2.2.1 An Ecological Constraints Appraisal is a broad inspection which identifies habitat types present at the Site and evaluates their potential to support protected or notable species. A Site walkover was undertaken on 15th October 2015 by Principal Ecologist Dawn Phythian MCIEEM CEnv, from the publically accessible areas of Site. The habitats within the Site boundary were identified in accordance with the Joint Nature Conservation Committee (JNCC) Phase 1 survey methodology (JNCC, 2010) and notes were taken on any features of interest. The habitats recorded at the Site were also assessed for their potential to support protected or notable species following Chartered Institute of Ecology and Environmental Management guidance (CIEEM, 2013).

2.2.2 Any field signs of legally protected or priority species were noted and where no field signs were present an assessment was made of whether any protected or priority species were likely to be present. Features of ecological interest or evidence of protected species were recorded as Target Notes (see **Appendix A**).

2.2.3 The buildings and trees on Site were examined to determine if they offered suitable roosting potential for bats. These were then categorised and further surveys were recommended on the bat potential rating of the feature as described within **Appendix B** (as modified from Hundt, 2012).

2.2.4 The surveys also looked for the presence of common invasive species such as Japanese knotweed *Fallopia japonica*, giant hogweed *Heracleum mantegazzianum* and Himalayan balsam *Impatiens glandulifera*.

2.3 BAT SURVEYS

2.3.1 Following the initial assessment, bat surveys were undertaken of the buildings on Site to investigate the potential of the buildings to support roosting bats. This included internal and external inspections of the buildings and emergence survey on the public house.

ROOST SURVEYS

2.3.2 The features present on the outside of the public house were identified as having moderate potential to support roosting bats and as such two bat roost surveys were undertaken, in accordance with current professional guidelines (Collins, 2016). These emergence surveys were undertaken from 15 minutes before until 2 hours after dusk.

Table 2-1 - Dates and weather conditions for the bat emergence surveys

Date	Sunset	Weather Conditions
15/09/16	19:24	Clear sky, temperature from 22.6^{0}C to 18.7^{0}C at the end of surveys. No breeze at the start of survey picking up to beaufort wind speed of 1 by the end.
22/09/16	19:06	Cloud covers 6 Oktas, wind 1 on beaufort wind speed scale. Temperature 15.6^{0}C at start to 13.7^{0}C at finish.

BUILDING SURVEYS

2.3.3 The buildings were accessed where safe to do so and externally surveyed from the ground. Surveys focused on roof space (from visual assessment only) and features on the inside and outside of windows. An endoscope was used to investigate any cavities. Signs of bat use searched for include:

- scratches;
- droppings;
- staining at potential entrances; and
- live and dead bats

2.4 LIMITATIONS TO THE ASSESSMENT

2.4.1 An Ecological Constraints Appraisal does not comprise a full botanical assessment of all species present within a Site; therefore species lists are indicative only. Similarly, plant species are not as easily identifiable within areas of short/low mown grassland habitats. The list of species identified at the Site is therefore unlikely to be comprehensive; however it provides a broad overview of the habitat types and their ecological value.

2.4.2 The Site was assessed from accessible areas only and the internal courtyard, and sample areas of the roof were viewed on the police training centre (including views of the roofs of the other buildings). However, due to the fact that no information on asbestos was available, the small roof space in the public house was viewed from the loft hatch only and the cellar was not entered.

2.4.3 Only emergence surveys were undertaken, not dawn surveys on the public house, due to safety reasons. Surveys were not commissioned until late in the bat activity season 2016 and as such surveys were spaced out as far as possible for that section of the season only. Given the features identified are likely only to support small roosts with no access available to large cavities, this is not deemed to be a significant constraint.

2.4.4 The baseline conditions described in this report are accurate at the time at which the survey was undertaken. Should considerable time pass (e.g. 2+ years) and/or conditions/land-use on the Site change prior to the commencement of works, it is recommended that an update survey is undertaken.

This Appendix has been replaced in full. Please refer to the Environmental Statement Addedum (2019)

3 RESULTS

3.1 DESKTOP ASSESSMENT

3.1.1 Data older than 10 years has been excluded from the protected species summary as this data is unlikely to provide accurate representation of the species within the study area.

NATURE CONSERVATION SITES

STATUTORY SITES

3.1.2 Rochdale Canal Special Area of Conservation (SAC) and Site of Special Scientific Interest is located approximately 6.06 km north east from the Site boundary. The JNCC qualifies this site for protection due to the presence of a significant population of the European Protected Species (EPS) floating water-plantain *Luronium natans* in a botanically diverse waterplant community which also supports a wide range of pondweeds *Potamogeton* spp. This population of *Luronium* is representative of the formerly more widespread canal populations of north-west England.

3.1.3 There are no other statutory designated sites located within 2 km of the Site.

NON STATUTORY SITES

3.1.4 There are three Sites of Biological Interest (SBIs) located within 2 km of the Site boundary. SBIs are areas designated for protection due to their significant wildlife value and are of county-wide importance.

3.1.5 The Rochdale Canal (Stott's Lane Ducie Street Basin) and the Ashton Canal are both designated as SBI's and are located approximately 1.44 km north-east and 1.20 km east from the Site boundary, respectively. The Rochdale Canal is designated for protection for its floating water plantain population. It is also of note that certain stretches support white-clawed crayfish *Austropotamobius pallipes*, which has full legal protection and American pondweed *Potamogeton epihydrus*, a Red Data Book species. In addition, certain stretches of the Ashton Canal also support floating water plantain and the nationally scarce grasswrack pondweed *Potamogeton compressus*; both are UK Biodiversity Priority Species and are designated as Species of Principal Importance under Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006. The River Irwell SBI is located 1.28 km north-west from the Site boundary is recognised for its distinctive aquatic species composition.

3.1.6 There are no connecting features between the described non statutory sites and the Site.

SPECIES

3.1.7 GMEU provided the following records of protected and notable species.

This Present has been replaced in full. Please refer to the Environmental Statement Addendum (2019)

Table 3-1 - Species records located within 2 km of the Site boundary

Species	Closest Record to Site	Date	Distance from Site Boundary	Suitable Habitat Present on Site
Birds				
Lapwing *Vanellus vanellus*	SJ827981	01/06/2012	0.85 km west	✗
Lesser redpoll *Carduelis cabaret*	SJ823989	27/01/2011	1.57 km north west	✗
Skylark *Alauda arvensis*	SJ82809803	25/05/2012	0.82 km west	✗
House sparrow *Passer domesticus*	SJ82499901	16/03/2014	1.48 km north west	✓
Dunnock *Prunella modularis*	SJ83309839	20/02/2014	0.46 km north west	✓
Peregrine falcon *Falco peregrinus*	SJ823989	11/09/2010	1.57 km north west	✗
Song thrush *Turdus philomelos*	SJ82899803	01/04/2014	0.72 km west	✓
Little ringed plover *Charadrius dubius*	SJ82779811	17/05/2011	0.85 km west	✗
Kingfisher *Alcedo atthis*	SJ838976	01/02/2013	0.39 km south east	✗
Bullfinch *Pyrrhula pyrrhula*	SJ82859800	22/04/2014	0.76 km west	✓
Starling *Sturnus vulgaris*	SJ837961	04/12/2012	0.74 km west	✓
Black redstart *Phoenicurus ochruros*	SJ838974	20/06/2011	0.56 km south east	✓
Mammals				
West European Hedgehog *Erinaceus europaeus*	SJ845972	16/01/2013	1.1 km south east	✗
Badger *Meles meles*	Confidential	20/09/2011	0.52 km south east	✗
Amphibians/Reptiles				
Common toad *Bufo bufo*	SJ823987	19/04/2014	1.47 km north west	✗

This Appendix has been replaced in full. Please refer to the Environmental Statement Addendum (2019)

3.1.8 GMEU provided recent records of the following bat species within 5km of the Site boundary:

Table 3-2 - Bat roost records returned within 5 km of the Site boundary

Species	Closest Record To Site	Date	Distance From Site Boundary
Common pipistrelle *Pipistrellus pipistrellus*	SJ83239773	15/08/2012	0.47 km south west
Soprano pipistrelle *Pipistrellus pygmaeus*	SJ82849793	26/06/2013	0.78 km south west
Pipistrellus sp.	SJ83729744	05/06/2008	0.54 km south
Daubenton's bat *Myotis daubentonii*	SD798008	13/07/2006	4.70 km north west
Brown long-eared bat *Plecotus auritus*	SJ87059697	04/07/2011	3.47 km south east
Vespertilionidae sp.	SJ82849793	20/06/2013	0.79 km west

This Appendix has been replaced in full. Please refer to the Environmental Statement Addedum (2019)

3.1.9 One record of unknown Noctule *Nyctalus noctula* species was also recorded, but location data provided was not full.

3.1.10 Habitats and species listed under the Greater Manchester Biodiversity Action Plan (BAP) which may be relevant to the Site include:

- Black redstart *Phoenicurus ochruros*;
- Bats; and
- Urban-managed greenspace.

3.2 ECOLOGICAL CONSTRAINTS APPRAISAL

3.2.1 The habitats present on Site consist of buildings, hardstanding, ornamental shrubs and immature trees. Overall the habitats on Site are considered to be of minimal ecological value.

PROTECTED SPECIES

BREEDING BIRDS

3.2.2 The Site contained a small number of ornamental hawthorn *Crataegus orientalis* trees; however these were identified to have limited potential to support breeding birds and are therefore not considered to pose a constraint to the Proposed Development.

3.2.3 It should be noted that the nationally protected black redstart has been known to breed in central Manchester over recent years, and species records returned from the data search show that this species has been recorded less than 1 km from the Site boundary. The walk over survey was undertaken in autumn, these birds are summer migrants, and as such would not be expected to be present on Site at this time. The Site contained a number of flat roofs but with little vegetation and foraging habitat and therefore the Site is of low potential for these birds. The Greater Manchester Biodiversity Action Plan (BAP) has a Species Action Plan for this species and it is recommended that design plans include for green roofs and buildings to take this species into account.

BATS

3.2.4 Three buildings on Site were assessed for their potential to support roosting bats, and a summary

of features identified during building inspections can be found within **Table 3-3** below and exact locations detailed in **Figure 2**. Full descriptions of features identified during the building inspections are included below.

Table 3-3 - Bat roost potential categories for the buildings found within the Site boundary

Building Name	Building Description	Features With Bat Roost Potential	Bat Roost Potential Category
Building A	This building is a synagogue. It has three levels with a flat roof and an overlapping felt edge. The building also has metal windows and metal roof single storey small rear extension.	Small gaps were noted on the felt roof overlap at both the front and back of the building. These gaps are small and are against a flat concrete slab with no access to a cavity. The roof was viewed. Anecdotal evidence provided by the Site caretaker indicated that bats have been seen in vicinity of this area in previous years.	Negligible
Building B	The Sir Ralph Abercromby public house is of a Victorian build, predominately constructed of brick with a multi-levelled pitched and tilled roof, wooden sash windows and a single storey flat roof extension to rear. One area within the roof was flat.	Features are: • Gaps in and adjacent to wooden sash windows balcony on three windows. (moderate potential); • wooden soffit boxes with small gaps noted on upper balcony (low potential); • brickwork on the chimney had some damage and missing mortar (low potential); • lifted flashing on roof (low potential); and • Lifted tiles and ridge tile gaps on roof (low- moderate potential).	Moderate
Building C	This building was once used as a police station and is constructed of brick with stone frontage. It is multiple stories with a flat roof and visible concrete lip. The brick and mortar were generally considered to be in good condition and no gaps were identified around the PVC windows.	No features on the building could be seen from the external inspection. Possible features could have been present on the roof and within the courtyard however due to visual restrictions; this structure could not be thoroughly assessed.	Negligible

This Appendix has been replaced in full. Please refer to the Environmental Statement Addendum (2019)

Building A

3.2.5 This building was found to have no roof space and a flat roof. The potential gaps on the outside of the building did not have access to potential cavities and as such was deemed to have negligible features.

Building B

3.2.6 Building B has features of moderate potential on the outside of the building, two surveys in line with current guidance were undertaken, dusk surveys were undertaken due to the location of the Site in the city centre and the worry of security. No emergence was observed. However, activity

from a small number of bats was observed, generally feeding over the vegetation on Site.

3.2.7 The building is a brick two and three storey structure. The third storey rooms are built into the room space leaving approximate 1 foot of space above the ceilings. A single roof light was seen at this level. The second storey had a small loft space, views into this were achieved and it was noted that the roof had modern breathable membrane under the tiles and had been relined relatively recently. There was no light visible in the roof and therefore it was considered that no gaps are present in the membrane which could allow access into the cavity by roosting bats. As such with no loft space on the third floor and no access to any internal loft space in second floor section, the potential for roosting bats within the buildings roofs is limited to under the external roofing tiles. The breathable roof membrane reduces the value of the roof for bats as its fibrous nature traps bats within it. This makes the internal space in the roof unsuitable for roosting bats.

3.2.8 The windows are, on the whole, original sash windows, some had internal secondary glazing, and there were a few newer wooden frames. All the frames were in good order on the inside and had been painted with no visible entrances on any of the windows on the inside or visible on the outside apart from one. One window at the back of the property had a hole where the sill was damaged. This gave internal access to the room, however on inspection using an endoscope no access to the outside of the building could be found.

3.2.9 The small window facing out to the roof terrace has a hole at the top of the window within the mortar between the frame and the wall. This gives access to the wall cavity and during an endoscope inspection it was concluded that the feature extended approximately 30cm up and 50cm to the left of the opening. However, fill was present in terms of mortar and material and no signs of bat use were noted. The window is covered in a metal grate of vertical bars approximately 10cm apart and as such would impede bats finding the feature and reduce the likelihood of use.

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Building C

3.2.10 The building is stone fronted with metal windows and the facade was, on the whole, very neat with no visible gaps around the windows or roofline. The brickwork within the courtyard contains holes as a result of the recent removal of a lean-to structure, these did not appear to open to the wall cavity and as the holes were under 5 months old, they are considered unlikely to be used by roosting bats. The building internally has been salvaged for internal fixtures and there are no usable features. The roof is flat with an external pillar, it is in a good order and no features for bats were noted. As such this building is of negligible value for roosting bats

INVASIVE SPECIES

3.2.11 An established stand of small leaved cotoneaster *Cotoneaster microphyllus* was identified in the centre of the Site (see **Appendix A** – TN2).

OTHER SPECIES

3.2.12 No other habitats with potential for protected species were identified on Site and therefore it was considered unlikely that other protected species pose a constraint to the Proposed Scheme.

4 DISCUSSION AND RECOMMENDATIONS

4.1 NATURE CONSERVATION SITES

4.1.1 The Site does not share any contiguous or complimentary habitat with the SAC which has been identified within 10km of it. The SAC's primary classification is for its aquatic vegetation community. Given there are no waterbodies on Site, the distance from the Site boundary and the lack of direct connectivity, it is not expected that the proposed work on Site will impact on the SAC. Therefore it is possible to exclude the risk of likely significant effects upon it and no further assessment is required. No other statutory or non-statutory sites are likely to be directly or indirectly impacted upon from the Proposed Scheme due to the spatial separation and lack of connectivity between them and the Site.

4.2 HABITATS

4.2.1 The Site is dominated by man-made habitats such as buildings and hardstanding. There are limited areas of semi-natural habitat present including ornamental shrubs and scattered trees. Such habitats are considered to be common within the local context and unlikely to be of significant value for any protected or notable species.

4.3 PROTECTED SPECIES

4.3.1 No evidence of protected or notable species was recorded during the survey. However the trees and hedgerow on Site have potential to support nesting birds during the breeding bird season, albeit limited and the Proposed Scheme is therefore unlikely to have a significant effect on breeding birds.

4.3.2 Buildings and trees on Site were assessed for their potential to support roosting bats. Some features were identified on building B as having moderate potential for bats. Following a building inspection there are still some features suitable for roosting bats but no signs of potential bat presence were identified during the internal inspection, nor was a large potential cavity found in which maternity or other important roost could be supported.

4.3.3 As a result of the assessment of moderate potential for building B, two emergence surveys were undertaken in accordance with guidelines (Collins, 2016), during which no bat emergences was seen. Therefore a conclusion of likely absence of roosting bats within building B was concluded.

4.3.4 Buildings A and C were not found to have any features of suitability to support roosting bats.

4.4 RECOMMENDATIONS

BATS

4.4.1 The initial assessment undertaken in 2015 highlighted the need for further bat surveys, these have now been completed. No further surveys for bats are recommended at this time. Should building B be demolished or subject to significant refurbishment, then a pre-start demolition check would be recommended as a precaution to ensure that the features identified on the building had not begun to be used by bats in the intervening time period.

BIRDS

4.4.2 Given the Site has limited food sources for black redstart; it is not recommended that surveys for this species are undertaken at this time. No other ecological surveys for birds are required given the current ecological records received for the Site.

4.4.3 All wild birds are afforded partial protection under Section 1 of the WCA 1981 (as amended),

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making it an offence, amongst other things, to intentionally or recklessly kill, injure or take a wild bird; take or destroy its eggs; and/or to take, damage, destroy, interfere with or obstruct access to its nest whilst it is in use or being built.

4.4.4 The clearance of the buildings together with any trees and scrub should ideally be carried out outside the bird breeding season i.e. between October and February. If these are to be removed during the bird breeding season (generally considered to be from March-September) then they should be checked to confirm the absence of nesting birds by a suitably qualified ecologist prior to removal. Where nesting birds are encountered, the ecologist should advise on an appropriate buffer to be established within which no works would be conducted until the young have fledged the nest.

INVASIVE SPECIES

4.4.5 An established stand of small-leaved cotoneaster was identified in the centre of the Site (See **Appendix A** – TN1). Works should be timed so as to minimise the spread of these species, by working outside of the flowering / seeding periods. Should any of the works directly impact the invasive species, these plants will need to be managed appropriately. Cotoneaster should be removed out of flower when displaying no berries, before being chipped and removed from the Site. Cotoneaster plants spread via the berries, which are on the plant during the autumn and winter months. Therefore if this plant is removed or disturbed during the time when the berries are present this could cause the plant to spread. If necessary, removal of this plant should occur during the spring (April – May).

ECOLOGICAL ENHANCEMENT

4.4.6 The National Planning Policy Framework (NPPF) and Natural Environment and Rural Communities (NERC) Act 2006 place a duty upon public bodies, including planning authorities in England and Wales to promote and enhance biodiversity in all of their functions. Habitats and species of value will therefore need to be considered within the development and landscaping design process.

4.4.7 The results of this initial biodiversity assessment suggest that the following should be considered during the early scheme design to minimise potentially adverse ecological effects and realise opportunities to enhance biodiversity:

- Any soft landscaping should take into account local wildlife listed in the Greater Manchester Biodiversity Action Plan and efforts should be made to promote these species;
- Should any artificial lighting be installed or utilised at night during the Proposed Works then it is recommended that low pressure sodium lamps or high pressure sodium instead of mercury or metal halide lamps is used due to its UV filtration characteristics. This will avoid disturbance to commuting, foraging or roosting bats. Lighting should also be directional to avoid light spill (Bat Conservation Trust & Institute of Lighting Engineers 2008); and
- Given the design includes roof gardens and tall buildings there is opportunity within the design to support the Manchester BAP for black redstart. Therefore it is recommended the design of these features should incorporate favourable habitat such as achievable ledges and foraging opportunity in the planting. This would also have benefits for other birds and provide foraging opportunities for insects and bats.

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5 CONCLUSION

5.1.1 The Ecological Assessment updated in October 2015 noted that the buildings on Site have some potential for roosting bats and breeding birds. In addition an invasive plant species was identified on the Site.

5.1.2 Further surveys were undertaken to investigate the potential use of the buildings for bats. Buildings A and C were not found to contain any visible features for bats. Building B has visible features, however likely absence is concluded for these features following emergence surveys and an internal inspection.

5.1.3 The buildings roofs and the vegetation on Site have some potential to support nesting birds and therefore should be removed outside the nesting season (commonly taken to be March to September inclusive). It is considered unlikely that the Proposed Scheme will impact on protected/notable species or local conservation sites as identified in the study.

5.1.4 There is opportunity within the building design plans to provide valuable wildlife habitats within the proposed green spaces as included within the proposed design, including suitable provisions for the locally highlighted black redstart.

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

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- The Natural Environment and Rural Communities (NERC) Act (2006).

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FIGURE 1 - SITE LOCATION PLAN

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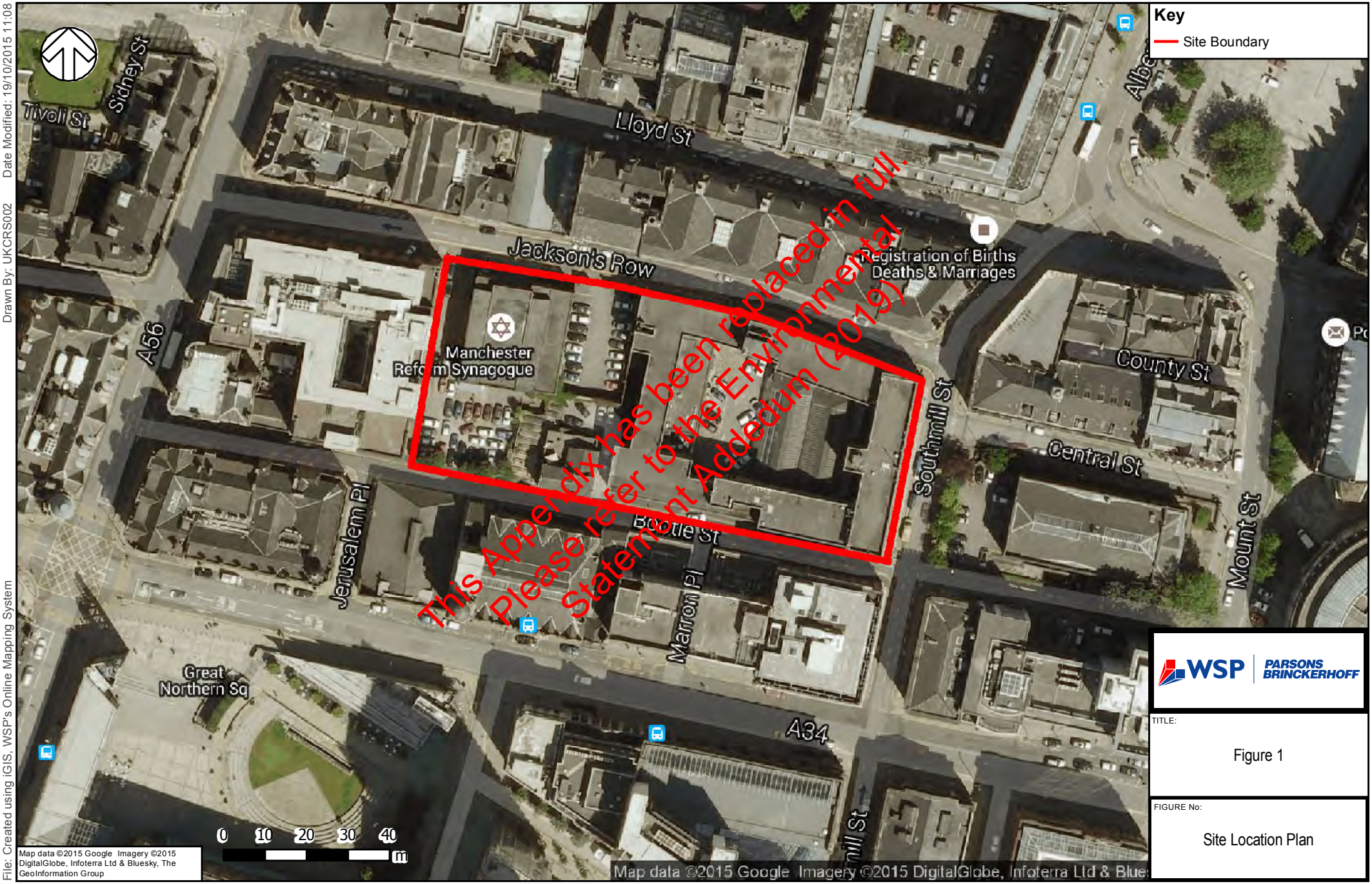
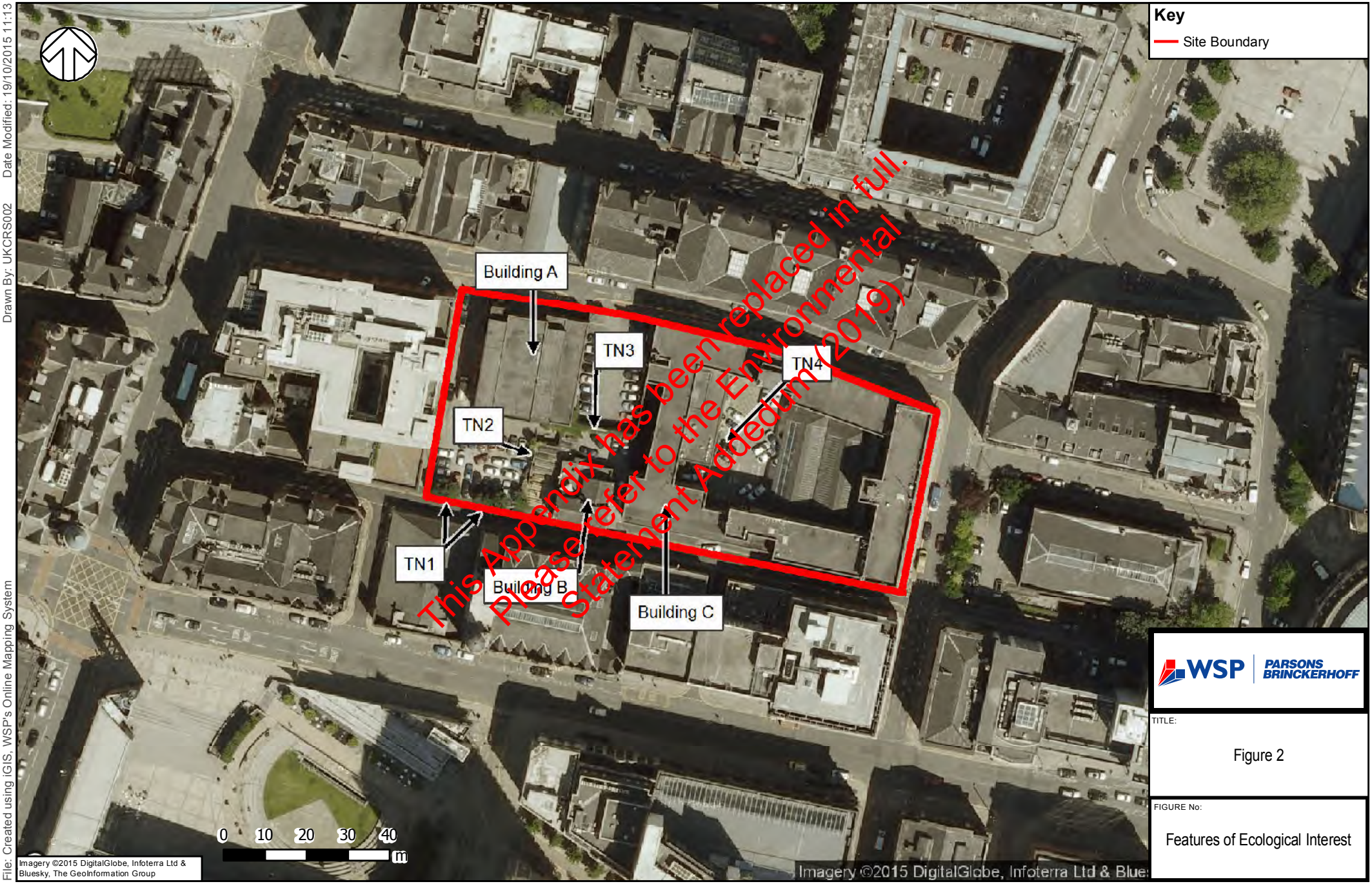

Key
Site Boundary
Tivoli St
Sidney St
Lloyd St
Jackson's Row
Registration of Births Deaths & Marriages
A56
Manchester Reform Synagogue
County St
Southmill St
Central St
Mount St
Jerusalem Pl
Bootle St
Marron Pl
Great Northern Sq
A34
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Map data ©2015 Google Imagery ©2015 DigitalGlobe, Infoterra Ltd & Bluesky, The GeoInformation Group
Map data ©2015 Google Imagery ©2015 DigitalGlobe, Infoterra Ltd & Blue
WSP PARSONS BRINCKERHOFF
TITLE:
Figure 1
FIGURE No:
Site Location Plan
File: Created using iGIS, WSP's Online Mapping System
Drawn By: UKCRS002
Date Modified: 19/10/2015 11:08

FIGURE 2 - FEATURES OF ECOLOGICAL INTEREST

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Key
Site Boundary
Building A
TN1
TN2
TN3
TN4
Building B
Building C
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0 10 20 30 40
m
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Imagery ©2015 DigitalGlobe, Infoterra Ltd & Blue
WSP
PARSONS BRINCKERHOFF
TITLE:
Figure 2
FIGURE No:
Features of Ecological Interest
Drawn By: UKCRS002
Date Modified: 19/10/2015 11:13
File: Created using iGIS, WSP's Online Mapping System

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Appendix A

TARGET NOTES

Target Note	Grid Reference	Description
1	SJ83619 98007 & SJ83631 98004	Vegetation identified in this area: ■ 5 immature oriental rowan (one densely covered in ivy) ■ The understorey vegetation in is patch bare ground with some perennial rye grass *Lolium perenne*, chickweed *Stellaria media* and white clover *Trifolium repens*. Dumped material was also present in this area.
2	SJ83640 98017	Small leaved cotoneaster was present within this planter. A vegetation planter was also present in this area and contained laurel *Laurus*, sycamore *Acer pseudoplatanus*, ornamental rowan *Sorbus sp.* and ornamental rose *Rosa sp.*
3	SJ83657 98021	Russian vine *Fallopia baldschuanica* was seen on the wall located at the back of Building B (the Sir Ralph Abercromby).
4	SJ83688 98020	Buddleia *Buddleja sp*.was present in cracks present in the courtyard of the Site.

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Appendix B

BAT ROOST POTENTIAL ASSESSMENT GUIDANCE

Criteria for bat roost potential assessment of a structure (modified from Collins 2016)

Bat Roost Potential	Description
Confirmed	Building with features confirmed to be used by roosting bats either by historic records (verified appropriately), or evidence recorded during survey.
High	Building exhibits a number of features suitable for use by roosting bats e.g. numerous roosting opportunities such as dark, enclosed roof voids; has a high degree of connectivity with likely navigation routes; and is located within suitable foraging habitat.
Moderate	Building exhibits features suitable for use by roosting bats, such as internal and external cavities well insulated from external weather conditions, but is less than ideal in some way. It may be situated in less than ideal habitat, lacking suitable commuting corridors.
Low	Building may have some interest to roosting bats, e.g. external roosting features such as fascia or soffit boards, but is considered to be sub-optimal to the extent that bats would be considered unlikely to use it; or has more suitable features but is in an unsuitable location e.g. isolated from foraging or commuting habitats.
Negligible	Building with little-to-no potential to support bats in an unsuitable location e.g. isolated from foraging or commuting habitats.

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Appendix C

LEGISLATION AND POLICY GUIDANCE

THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010 (AS AMENDED)

The Conservation of Habitats and Species Regulations 2010 (as amended) consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.

THE WILDLIFE AND COUNTRYSIDE ACT (WCA) 1981 (AS AMENDED)

The WCA, as amended, consolidates and amends pre-existing national wildlife legislation in order to implement the Bern Convention and the Birds Directive.

It complements the Conservation of Habitats and Species (Amendment) Regulations 2011 offering protection to a wider range of species. The Act also provides for the designation and protection of national conservation sites of value for their floral, faunal or geological features, termed Sites of Special Scientific Interest (SSSIs). Schedules of the act provide lists of protected species, both flora and fauna, and detail the possible offences that apply to these species. All relevant species specific legislation is detailed later in this Appendix.

THE COUNTRYSIDE AND RIGHTS OF WAY (CROW) ACT 2000

The CROW Act, introduced in England and Wales in 2000, amends and strengthens existing wildlife legislation detailed in the WCA. It places a duty on government departments and the National Assembly for Wales to have regard for biodiversity, and provides increased powers for the protection and maintenance of SSSIs.

The Act also contains lists of habitats and species (Section 74) for which conservation measures should be promoted, in accordance with the recommendations of the Convention on Biological Diversity (Rio Earth Summit) 1992.

THE NATURAL ENVIRONMENT AND RURAL COMMUNITIES (NERC) ACT 2006

Section 40 of the NERC Act 2006 places a duty upon all local authorities and public bodies in England and Wales to have regard to the conservation of biodiversity in their function. Section 41 (England) lists the habitats and species of principal importance to the conservation of biodiversity in England. These species and habitats are a material consideration in the planning process.

NATIONAL PLANNING POLICY FRAMEWORK (NPPF) MARCH 2012

The planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying a number of principles, including (but not limited to) the following:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- Proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the

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features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;

- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

NATIONAL PLANNING PRACTICE GUIDANCE 2014

The National Planning Practice Guidance (NPPG) was published on 6th March 2014 and introduced revised and updated planning practice guidance.
Advice is provided within the 'Natural Environment' section, which refers the reader to specific guidance; in particular paragraph 016, which states:

"*Information on biodiversity impacts and opportunities should inform all stages of development (including, for instance, site selection and design including any pre-application consultation as well as the application itself.*
"An ecological survey will be necessary in advance of a planning application if the type and location of development are such that the impact on biodiversity may be significant and existing information is lacking or inadequate. Pre-application discussion can help scope whether this is the case and, if so, the survey work required.
"Where an Environmental Impact Assessment is not needed it might still be appropriate to undertake an ecological survey, for example, where protected species may be present. Separate guidance is to be published by Defra on statutory obligations in regard to protected species which will replace the advice set out in Circular 06/05: Biodiversity and Geological Conservation.
"Local planning authorities should only require ecological surveys where clearly justified, for example if they consider there is a reasonable likelihood of a protected species being present and affected by development. Assessments should be proportionate to the nature and scale of development proposed and the likely impact on biodiversity. Further guidance on information requirements is set out in making an application.
"Planning conditions, legal agreements or undertakings may be appropriate in order to provide for monitoring and/or biodiversity management plans where these are needed."

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ODPM CIRCULAR 06/2005: BIODIVERSITY AND GEOLOGICAL CONSERVATION - STATUTORY OBLIGATIONS AND THEIR IMPACT WITHIN THE PLANNING SYSTEM (CIRCULAR 06/05).

This Circular was prepared to support the now obsolete guidance within Planning Policy Statement 9 (PPS9) and provides administrative guidance on the application of the law relating to planning and nature conservation as it applies in England. This document will shortly be replaced by guidance set out within NPPG. Of particular note, this document states:

"The potential effects of a development, on habitats or species listed as priorities in the UK Biodiversity Action Plan (BAP), and by Local Biodiversity Partnerships, together with policies in the England Biodiversity Strategy, are capable of being a material consideration in the preparation of regional spatial strategies and local development documents and the making of planning decisions.'
'The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat".

BATS

All native UK bats are afforded full protection under Section 9 of the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5 of the Act. Under the Act it is an offense to:

- intentionally or recklessly kill, injure or take a wild animal included in Schedule 5 (Section 9.1); and to
- possess or control any live or dead wild animal included in Schedule 5 or any part of, or anything derived from, such an animal (Section 9.2)

It is an offence intentionally or recklessly to:

- damage or destroy any structure or place which any wild animal specified in Schedule 5 uses for shelter or protection (Section 9.4a);
- disturb any such animal while it is occupying a structure or place which it uses for shelter or protection (Section 9.4b); or
- obstruct access to any structure or place which any such animal uses for shelter or protection (Section 9.4c)

It is also an offence to:

- sell, offer or expose for sale, or possess or transport for the purpose of sale, any live or dead wild animal included in Schedule 5, or any part of, or anything derived from, such an animal (Section 9.5a); or
- publish or cause to be published any advertisement likely to be understood as conveying that one buys or sells, or intends to buy or sell, any of those things (Section 9.5b)

Knowingly causing or permitting any of the above acts to be carried out is also an offence.
Bats also receive full protection as European Protected Species under Section 41 of The Conservation of Habitats and Species Regulations 2010 through their inclusion on Schedule 2. Under the Regulations it is an offense to deliberately:

- capture, injure or kill a wild animal of these species;
- disturb such animals; and to
- damage or destroy a breeding site or resting place of such an animal

It is also an offence to:

- possess or control, transport, sell or exchange or offer for sale or exchange any of these species or any part or derivative of one (if obtained after May 1994)

INVASIVE WEEDS

Schedule 9 of the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) makes it an offence to plant or otherwise cause species such as Japanese knotweed *Fallopia japonica* to grow in the wild.

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Appendix 2.3

PRELIMINARY GEOTECHNICAL AND ENVIRONMENTAL ASSESSMENT

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

REPORT N^{O} 70010925/002/10482

JACKSON'S ROW

PRELIMINARY GEOTECHNICAL & ENVIRONMENTAL ASSESSMENT

CONFIDENTIAL

NOVEMBER 2016

WSP | PARSONS BRINCKERHOFF

JACKSON'S ROW

PRELIMINARY GEOTECHNICAL & ENVIRONMENTAL ASSESSMENT

Jackson's Row Developments Limited

Preliminary Geotechnical & Environmental Assessment
Confidential

Project no: 70010925
Date: November 2016

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QUALITY MANAGEMENT

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Report number	70010925/002/10482	70010925/002/10482
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1 INTRODUCTION

1.1 AUTHORISATION

On the instruction of Jackson's Row Developments Limited, WSP | Parsons Brinckerhoff has been commissioned to undertake limited ground investigations in support of a proposed development at Jackson's Row, Manchester.

1.2 PROPOSED DEVELOPMENT

The propose development involves the demolition of existing structures and construction of two towers of 21 and 31 storeys in height, with a one level basement, which will occupy the full footprint of the site. The towers will be of mixed use including residential, retail, office space, and gardens.

1.3 PREVIOUS REPORTING & OBJECTIVES

WSP | Parsons Brinckerhoff has previously produced a Phase I preliminary Geo-environmental risk assessment (Ref. 70010925/001/10465), dated November 2015, which should be read in conjunction with this report.

The objectives of the current works were to provide an initial assessment of the ground conditions and provide preliminary advice on;

- Basement excavation;
- Contamination risk;
- Ground gas risk; and,
- Site waste classification.

This report is not intended to fulfil the requirements of either a regulatory compliant generic qualitative risk assessment or a Eurocode 7 complaint Ground Investigation or Geotechnical Design Report. Additional investigations are required in order to discharge the relevant planning conditions and ensure the economic design of the substructure.

1.4 CONFIDENTIALITY STATEMENT

The report is addressed to and may be relied upon by the following:

Jackson's Row Developments Limited
4 Jordan Street
Manchester
M15 4PY

This report has been prepared for the sole use of the above named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP | Parsons Brinckerhoff. No responsibility will be accepted where this report is used in its entirety, or in part, by any other party.

Information provided by others is taken in good faith as being accurate. WSP | Parsons Brinckerhoff cannot and will not accept liability for any deficiencies in third party information.

General limitations are presented in **Appendix A**.

2 SCOPE OF WORKS

2.1 FIELDWORK

Fieldworks were undertaken by Geo Site Surveys under the supervision of WSP | Parsons Brinckerhoff on 2 and 7 November 2015. The procedures followed in the investigation were in general accordance with guidance presented in BS5930:2015 and BS10175:2011.

Table 2.1 summarises the fieldworks undertaken.

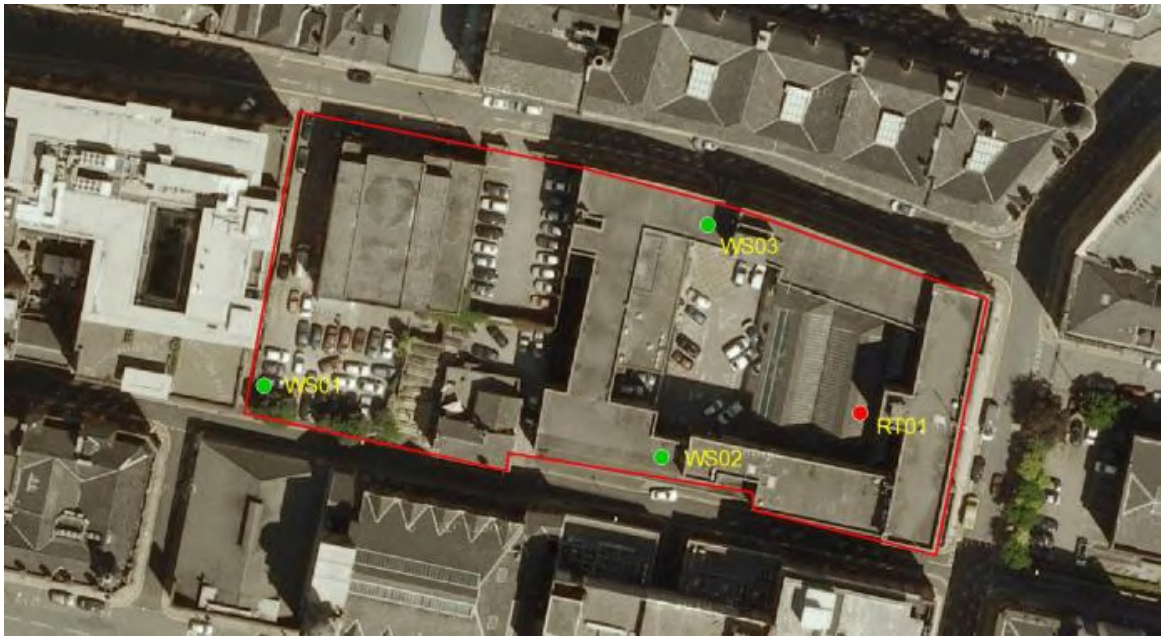
Table 2.1 – Summary of fieldwork

INVESTIGATION METHOD	NO. OF POSITIONS	DEPTH (m BGL*)	COMMENTS
Rotary borehole	1 (RT01)	15	Air / mist flush
Window sample borehole	3 (WS01 – WS03	3 – 4	Terminated at refusal
Dynamic probe	1 (follow on in WS01)	4.5	Terminated at 4.5mbgl due to exceeding range of the downhole magnetometer

* below ground level

Borehole locations are shown on **Figure 2.1** below.

Figure 2.1 – Exploratory Hole Locations



WS02 and WS03 were located underneath the arches leading to the central courtyard of the former Bootle Street Police Station.

Borehole positions with scanned for buried services by a specialist contractor using a GPR and cable avoidance tool.

An Unexploded Ordnance (UXO) surveyor equipped with a magnetometer was used to supervise the formation of WS01, which falls within a perceived Medium Risk Zone (see Phase I and Section 6.4).

Exploratory hole records are presented in **Appendix B**.

MONITORING INSTALLATIONS

Monitoring installation details are summarised in **Table 2.2** and are detailed on the exploratory hole records.

Table 2.2 – Summary of monitoring installations

EXPLORATORY HOLE REF.	STANDPIPE DIAMETER (MM)	SCREEN TOP AND BASE DEPTH (m BGL)
RT01	50	2.00 – 15.00
WS01	50	1.00 – 3.00
WS02	50	1.00 – 3.00
WS03	50	1.00 – 3.00

2.2 IN-SITU TESTING

STANDARD PENETRATION TESTS

Standard Penetration Tests (SPTs) were performed in the window sample boreholes. The test results are presented on the exploratory hole records.

2.3 LABORATORY TESTING

A programme of geotechnical and chemical laboratory testing was scheduled by WSP | Parsons Brinckerhoff and comprised:

GEOTECHNICAL TESTING

- Unconfined Compressive Strength (UCS)
- Point Load Index

CHEMICAL TESTING

SOILS (4NO. SAMPLES)

- pH and water soluble sulphate
- Toxic metals
- Asbestos ID
- PAH
- TPH-CWG
- Soil Organic Matter (SOM)

GROUNDWATER (1NO. SAMPLE)

- pH and sulphate
- Ammoniacal Nitrogen as NH_4

- Chloride
- Dissolved toxic metals
- Hexavalent Chromium
- VOCs
- TPH-CWG

Test results are presented in **Appendix B**.

2.4 GROUNDWATER & GROUND GAS MONITORING

Six monitoring visits were undertaken between 10 November and 15 December 2015. The following parameters were measured and recorded in each standpipe:

- Groundwater level
- Concentrations (% vol.) of CH_4, O_2, CO_2.
- Concentrations (ppm) of H_2S and CO
- Flow Rate
- Barometric pressure

A water sample was taken from RT01 on the second monitoring visit.

Monitoring results are presented in are presented in **Appendix B**.

3 GROUND SUMMARY

Published geological mapping indicates the eastern half of the site to be underlain by Glacial Till and Sherwood Sandstone. The western half of the site is indicated to be directly underlain by Sherwood Sandstone. Previous phases of historical development and demolition on the site suggests that Made Ground is likely to be present.

The current ground investigation has confirmed the presence of Made Ground and Sherwood Sandstone. Glacial Till was encountered in RT01 located in the eastern half of the site.

On the basis of the information obtained, the following ground summary has been derived for the site.

Table 3.1 – Ground Summary

STRATUM	TYPICAL DESCRIPTION	DEPTH TO BASE (m)	THICKNESS (m)	NOTES
Concrete / Asphalt/subbase		0.08 – 0.4	0.08 – 0.4	Encountered in all boreholes
Made Ground	Red brown slightly gravelly medium sand & cobbly gravel.	2.50 – 4.0	2.3 – 3.38	Encountered in all window sampler holes. Likely represents reworked natural ground and demolition derived materials.
Glacial Till	Soft red-brown slightly gravelly clay.	2.0	1.60	Only encountered in RT01
Completely Weathered Sherwood Sandstone	Brown-red slightly gravelly slightly clayey fine and medium sand.	3.90	1.90	Encountered in WS01, WS02, and RT01.
Intact Sherwood Sandstone	Very weak, becoming weak red-brown medium grained sandstone.	>15m	>11.10	Encountered at approx.34.5mAOD in RT01.

Groundwater was encountered in BH1 during drilling and observations made by Geotechnics are summarised in **Table 3.2**, along with groundwater monitoring results.

Table 3.2 – Water Strike and Monitoring Summary

EXPLORATORY HOLE	WATER STRIKE (m BGL)	FINAL DEPTH AFTER 20 MINUTES (m BGL)	WATER LEVEL DURING MONITORING (m BGL)		WATER LEVEL DURING MONITORING (m AOD – APPROX.)	
			Min.	Max.	Min.	Max.
RT01	13.5	-	12.42	12.01	25.49	25.08

4 ROCK STRENGTH

As outlined in **Table 3.1**, the upper level of the Sherwood Sandstone is weathered to gravelly sand. Intact rock was encountered at approximately 3mbgl in RT01 (approximately 34.5mAOD) although core recovery was poor to around 4mbgl (approximately 33.5mAOD). The following section provides an initial assessment of rock strength based on testing of rock core from RT01.

UNCONFINED COMPRESSIVE STRENGTH

Four unconfined compressive strength (UCS) tests were scheduled on the Sherwood Sandstone. The results are detailed in **Table 4.1** below.

Table 4.1 – UCS test results

BOREHOLE	DEPTH (m BGL)		ELEVATION (m AOD – APPROX.)		UCS (MPa)
	FROM	To	Top	Base	
RT01	7.77	8.00	29.23	29	11.5
	9.38	9.58	27.62	27.42	14.4
	11.10	11.34	25.9	25.66	17.9
	13.39	13.69	23.61	23.31	10.3

POINT LOAD TESTS

To further evaluate UCS and to determine values for sections of core not suitable for direct UCS testing, a series of point load tests were undertaken. Conversion of the point load index *IS50* results to an equivalent UCS is achieved through application of a correction factor (*K*). This was derived by correlating with direct UCS tests at equivalent depths, and a figure of 30 was adopted.

The results are detailed in **Table 4.2**.

Table 4.2 – Point Load Test results

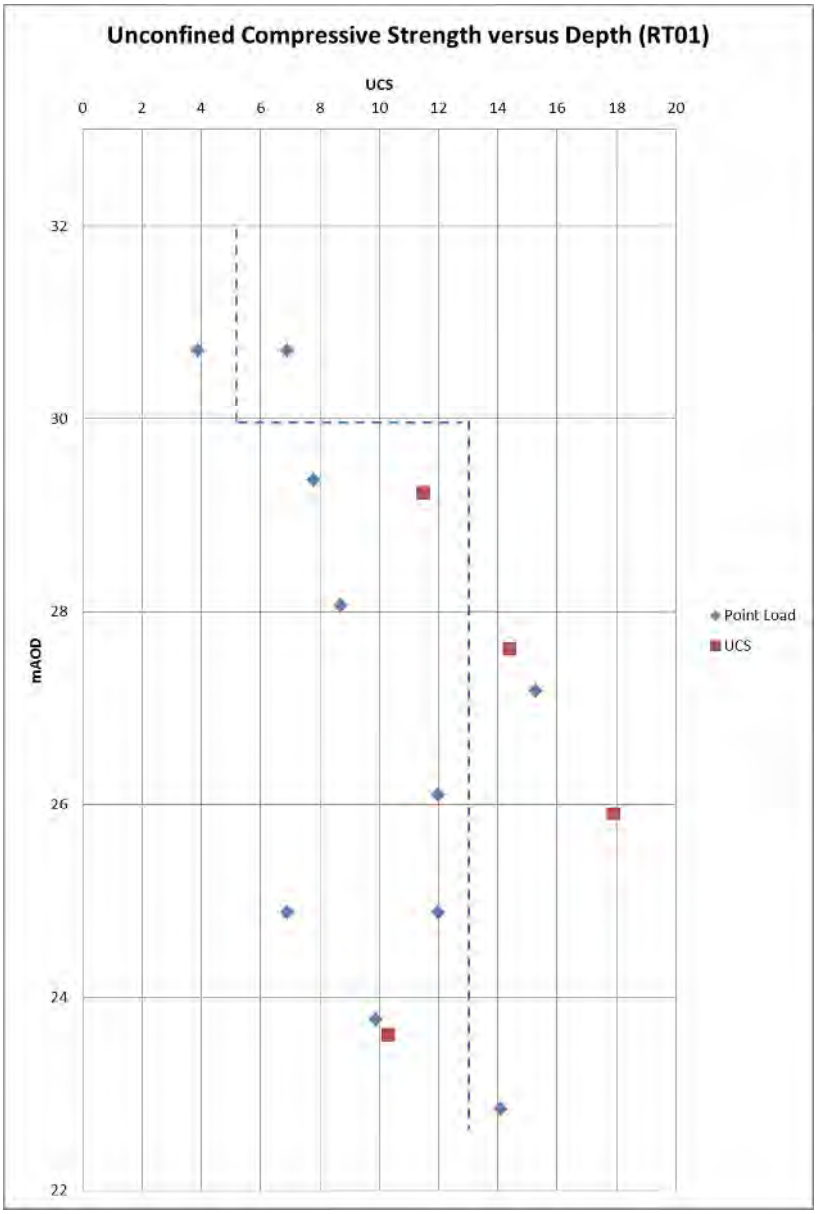
BOREHOLE	DEPTH (m BGL)	ELEVATION (m AOD – APPROX.)	I_{s50} (MPa)	UCS (MPa)
RT01	6.29	30.71	0.13	3.9
	6.29	30.71	0.23	6.9
	7.64	29.36	0.26	7.8
	8.94	28.06	0.29	8.7
	9.82	27.18	0.51	15.3
	10.90	26.10	0.40	12
	12.12	24.88	0.23	6.9
	12.12	24.88	0.40	12
	13.23	23.77	0.33	9.9
	14.16	22.84	0.47	14.1

.

Values of UCS derived from the above relationships are presented on **Figure 4.1** below and suggest the following strength profile**;**

UCS = 5MPa to 30mAOD, then increasing to 13MPa.

Figure 4.1 – UCS versus Elevation



5 PRELIMINARY ENVIRONMENTAL ASSESSMENT

5.1 SOILS

In terms of soil borne contamination at shallow depth at the site, four samples of Made Ground ranging from 0.8-2.75mbgl were taken and submitted to a UKAS accredited laboratory for a general screening suite comprising a range of inorganic and organic analytes. The results of the samples were screened against the Residential Land Use (Without Plant Uptake) Human Health GAC values.

All of the samples returned contaminant concentrations below the relevant GACs, with the exception of four results from WS01, taken at 2.0mbgl. These GAC exceedances are shown in **Table 5.1** below.

Table 5.1 – GAC Exceedances

ANALYTE	RESULT (mg/kg)	GAC (mg/kg)
Arsenic	40.2	35
Lead	3310	310
Benzo(a)anthracene	4.28	3.7
Benzo(a)pyrene	3.72	1.0

In all cases except lead, it is considered that the exceedances are marginal and given that the basement will encompass the whole site, the risk to end users is insignificant.

Concentrations of lead are significantly elevated to classify material excavated from this area as Hazardous Waste. It is therefore considered that, in order to provide cost surety over waste disposal and additional information regarding the nature and extent of the contamination present at the site, further site investigation works are undertaken to include a more statistically valid quantity of sample locations and depths. This will allow for more accurate soil waste classification of the Made Ground and quantities to be derived, and potentially identify significant project cost savings.

It is noted that no asbestos was identified in the samples. Any further analysis undertaken should also include asbestos screens within the Made Ground to ensure statistical validity.

5.2 GROUNDWATER

No exceedances of the Controlled Waters screening criteria were recorded. Based on the current limited data, the risks to Controlled Waters are considered low.

5.3 GROUND GAS

Ground gas concentrations recorded to date are presented in **Appendix B** and summarised in **Table 5.2**. WS01 could not be monitored due to the presence of parked cars.

Table 5.2 – Summary of Ground Gas Results

HOLE REF.	METHANE (% VOL.)		CARBON DIOXIDE (% VOL.)		OXYGEN (% VOL.)		HYDROGEN SULPHIDE (ppm)		CARBON MONOXIDE (ppm)		FLOW RATE (l/hr)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
WS02	0.0	0.0	0.1	0.6	19.0	20.2	0.0	0.0	0.0	0.0	0.0	0.0
WS03	0.0	0.0	0.1	0.6	18.9	20.4	0.0	0.0	0.0	0.0	0.0	0.0
RT01	0.0	0.0	0.1	0.6	19.0	20.2	0.0	0.0	0.0	0.0	0.0	0.0

The ground gas monitoring indicates CS1 conditions for both methane and carbon dioxide, requiring no special gas protection measures. Further monitoring positions will be required to confirm this assessment.

6 PRELIMINARY ENGINEERING ASSESSMENT

6.1 FOUNDATIONS & BASEMENT EXCAVATION

Rock strength is significant at proposed formation level and at this stage, supporting the structure on a raft/pad foundation is considered feasible.

The possible presence of the West Manchester Fault on the south western corner of the site is noted in the Phase I report. It is possible that the rock mass in the immediate vicinity of the fault may have an increased weathering profile or have a weakened / broken state compared to the typical rock mass. Such zones may be very localised and difficult to locate through investigation, particularly as the position of the fault is conjectured.

If such weathered/weakened zones are encountered during foundation excavation an appropriately qualified engineer should inspect the formation to determine the appropriate remedial action. This may comprise grouting, or the deepening of the foundations locally.

The basement construction will likely require the use of an embedded bored pile wall. Propping of the basement wall is likely to be required to control deflections and ground movement at the site boundaries. Further details are required as to the nature of the foundations for the structure on the western boundary (210 Deansgate) to determine if any additional remedial works need to be undertaken in advance of basement excavation.

The top of the lowest basement slab is currently anticipated to be 29.8mAOD. Excavations to around 28.3mAOD will likely be required for foundations, with excavations locally to around 26.8mAOD for lift pits. Based on groundwater standing at approximately 25mAOD, suggests that the excavation may be above the groundwater table.

However, groundwater level may vary seasonally and additional monitoring is required. On the assumption that changes in the design may occur, determining the permeability of the bedrock should form part of any future ground investigation. If in the final design deeper construction is required then groundwater level and permeability may dictate the type of embedded wail required (e.g. secant or contiguous).

6.2 OBSTRUCTIONS & EXCAVATABILITY

As well as the existing foundations, below ground obstructions, associated with previous phases of development should be anticipated. Other features, such as underground fuel tanks may also be present.

The majority of the basement excavation will be undertaken through bedrock. Based on the currently observed rock strengths and generally closely spaced discontinuities, hard digging conditions (for a large tracked excavator) should be anticipated, possibly with the use of hydraulic breakers and ripping techniques.

6.3 MATERIAL REUSE

Following appropriate asbestos removal, the crushed and screened demolition arisings may have some value as a recycled aggregate.

Based on the current chemical testing, it is anticipated that excavated Made Ground soils will need to go to landfill. Detailed waste characterisation will be required to ensure that disposal costs are appropriately managed (see **Section 5.0**).

Sherwood Sandstone is frequently used in the local area as a general fill material and it is possible that a ready market could be found for the arisings from the basement excavation.

6.4 UXO

As discussed in the Phase I report, the site has been divided by Dynasafe BACTEC into a Low Risk Zone and a Medium Risk Zone (see extract below).



The following risk mitigation measures are recommended by Dynasafe BACTEC to support the proposed works:

BOTH RISK ZONES

- Site specific explosive ordnance safety and awareness briefings to all personnel conducting intrusive investigation and contraction works; and,
- The provision of unexploded ordnance site safety instructions to all personnel.

MEDIUM RISK ZONE ONLY

- The presence of an Explosive Ordnance Disposal (EOD) engineer to supervise open excavations; and,
- Intrusive Magnetometer Survey of any borehole locations down to the maximum bomb penetration depth.

It is the responsibility of the principal contractor to ensure that the UXO risk is appropriately addressed and mitigated during the groundworks. In planning mitigation measures, reference should be made to CIRIA 681.

Appendix A

LIMITATIONS

Revised: 24/05/2016

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective

effects of any future changes or amendments to these values. Specific assumptions associated with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be

accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix B

EXPLORATORY HOLE RECORDS, LABORATORY TESTING & MONITORING RESULTS

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The Victoria, 150-182 The Quays
Salford, M50 3SP
Telephone: 0161 886 2400
Fax: 0161 886 2401

ROTARY DRILLHOLE LOG

Hole No. **RT01**

Project: Jackson's Row

Sheet: 1 of 2

Job No: 70010278

Client: Jackson's Row Developments Limited

Date: 07-11-15
07-11-15

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geo Site Surveys	Rotary Core	RH		37.500

RUN DETAILS					STRATA								Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa) Water Depth	Elev. (mAOD)	Depth (Thick-ness)	Discontinuities Detail	Description Main	Legend	Geology		Dia. 50 mm
						37.30	0.20		Grey CONCRETE		MG		
						37.10	0.40		MADE GROUND: Grey limestone gravel and limestone cobbles. Subbase.		MG		
							(1.60)		Soft red-brown sandy slightly gravelly CLAY. Gravel is fine and medium subangular to subrounded of mixed lithologies. (Glacial Till).		GT		
						35.50	2.00						
3.00						34.50	(1.00) 3.00		Brown-red slightly gravelly slightly clayey fine and medium SAND. Gravel is fine and of sandstone lithology. (Completely weathered Sherwood Sandstone).		SSG		
						34.00	(0.50) 3.50		Assumed Zone of Core Loss		NR		
4.00	60	0	0	NI		33.60	3.90	3.50 - 3.90 m bgL. Recovered as sand.	Very weak red-brown medium grained SANDSTONE. (Completely weathered Sherwood Sandstone).		SSG		
5.50	100	71	20	13 NI			(3.00)	4.84 - 5.28 m bgl. Discontinuity Set 2: Subvertical, planar, rough joint with sandy clay infill and yellow staining to 10mm depth. 5.63 - 5.79 m bgl. Discontinuity Set 3: Subhorizontal (45°), planar, smooth, clean joints.	Very weak red-brown medium grained highly weathered SANDSTONE. Discontinuity Set 1: horizontal, closely spaced, planar, smooth, clean bedding fractures. Non-intact between 4.74m and 4.82m. Becoming weak and micaceous from 5.18m. Non-intact from 6.00m to 6.23m. Recovered as sand. Fine and medium grained from 6.23m. Non-intact from 6.67m to 6.75m. Recovered as sand and medium gravel.		SSG	
7.00	93	72	50	4 4 NI 5		30.60	6.90						
				NI		30.47	7.03		Assumed Zone of Core Loss		NR		
8.50	100	100	64	3 NI 6 3					Weak red-brown micaceous medium and coarse grained SANDSTONE. Discontinuity Set 1: horizontal to subhorizontal (15°), closely spaced, planar, smooth, clean bedding fractures. From 11.44m to 14.50m becoming fine to coarse grained and slightly gravelly. Gravel is fine to coarse subrounded quartz. Discontinuity Set 1 is medium spaced from 13m to 14m.		SSG		
10.00	100	95	81	15 2				9.19 - 9.36 m bgl. Discontinuity Set 3: Subhorizontal (30°-45°) planar, smooth, clean joints					

Boring Progress

Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike

Rotary Flush

From	To	Type	Return	Depth Casing	Casing Dia
0.00	15.00	Water	100		

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks

Groundwater encountered at 13.50m BGL during drilling period.
Ground Level estimated from Topographical Survey (Drawing No.13643-100_2DT)

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP DRILLHOLE/ROTARY LOG 70010278 - JACKSON'S ROW.GPJ WSPETEMPLATE1.03.GDT 4/1/17

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ROTARY DRILLHOLE LOG

Hole No. **RT01**

Project: Jackson's Row

Sheet: 2 of 2

Job No: 70010278

Client: Jackson's Row Developments Limited

Date: 07-11-15
07-11-15

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geo Site Surveys	Rotary Core	RH		37.500

RUN DETAILS					STRATA							Install / Backfill
Depth	TCR	SCR	RQD	(SPT 'N') Fracture Spacing	Rock Test Result (MPa) Water Depth	Elev. (mAOD)	Depth (Thick-ness)	Discontinuities Detail	Description Main	Legend	Geology	Dia. 50 mm
11.50	100	100	78				(7.97)		Weak red-brown micaceous medium and coarse grained SANDSTONE. Discontinuity Set 1: horizontal to subhorizontal (15°), closely spaced, planar, smooth, clean bedding fractures. From 11.44m to 14.50m becoming fine to coarse grained and slightly gravelly. Gravel is fine to coarse subrounded quartz. Discontinuity Set 1 is medium spaced from 13m to 14m. *(continued)*			
13.00	100	90	80	29				11.66 - 11.70 m bgl. Coarse gravel (25mm) inclusions. 11.79 - 11.79 m bgl. Discontinuity Set 3: Subhorizontal (30) planar, smooth, clean joint.			SSG	
14.50	100	90	80	8	1			12.81 - 12.88 m bgl. Discontinuity Set 3: Subhorizontal (30°), planar, smooth, clean at 12.81m, sandy clay infill at 12.88, closely spaced joints. 13.23 - 14.06 m bgl. Discontinuity Set 3: Subhorizontal (30°), planar, smooth, clay coating on surface, medium spaced joints.				
15.00	100	88	84	7		22.50	15.00	14.69 - 14.73 m bgl. Discontinuity Set 3: Subhorizontal (30°), planar, rough, clean, closely spaced joints.				

Boring Progress						Rotary Flush					
Date	Time	Depth	Casing Dpt	Core Dia. (mm)	Water Strike	From	To	Type	Return	Depth Casing	Casing Dia

Chiselling				Water Added	
From	To	Hours	Tool	From	To

General Remarks
Groundwater encountered at 13.50m BGL during drilling period.
Ground Level estimated from Topographical Survey (Drawing No.13643-100_2DT)

Scale 1:62.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP DRILLHOLE/ROTARY LOG 70010278 - JACKSON'S ROW.GPJ WSPETEMPLATE1.03.GDT 4/1/17

WSP | Parsons Brinckerhoff
The Victoria, 150-182 The Quays
Salford, M50 3SP
Telephone: 0161 886 2400
Fax: 0161 886 2401

WINDOW SAMPLE LOG

Hole No. **WS01**

Project	Jackson's Row
Sheet	1 of 1
Job No	70010278
Client	Jackson's Row Developments Limited
Date	02-11-15 02-11-15
Contractor / Driller	Geo Site Surveys
Method/Plant Used	Competitor 130
Logged By	RH
Co-Ordinates (NGR)	
Ground Level (m AOD)	

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
								0.08	MADE GROUND: Asphalt		MG	
								0.20	MADE GROUND: Grey limestone gravel and limestone cobbles. Subbase.		MG	
1.00	(S)	3,3,3 4,4,2 N=13.						(2.30)	MADE GROUND: Red-brown sandy cobbly gravel. Gravel is medium and coarse primarily of brick with minor concrete and glass.		MG	
1.80-2.00	ES	.										
2.00	(S)	4,8,6 4,4,6 N=20.						2.50				
2.60-2.75	ES	.						(0.50)	Light orange-brown silty gravelly becoming very gravelly fine and medium SAND with rootlets at top of unit. Gravel is medium and coarse red-brown sandstone. (Completely weathered Sherwood Sandstone).		SSG	
3.00	(S)	16,9,12 12,12,14 N=50/ 0.28.						3.00	Window sampling terminated at 3m BGL due to refusal. Dynamic Probing continued to 4.5m BGL. Dynamic probe results: 3.00m - 4.00m: -, -, 24, 20, 18, 14, 11, 12, 11, 11 4.00m - 5.00m: 14, 7, 9, 11, 23		END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing

General Remarks

Magnetomer survey undertaken in the borehole due to UXO risk.
Refusal at 3m BGL. Borehole continued with Dynamic Probe to 4.5m BGL. Probing stopped at 4.5m BGL due to 1.5m range of magnetometer.
No groundwater observed during investigation period.
50mm standpipe installed to 3m BGL (1m plain, 3m slotted).

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

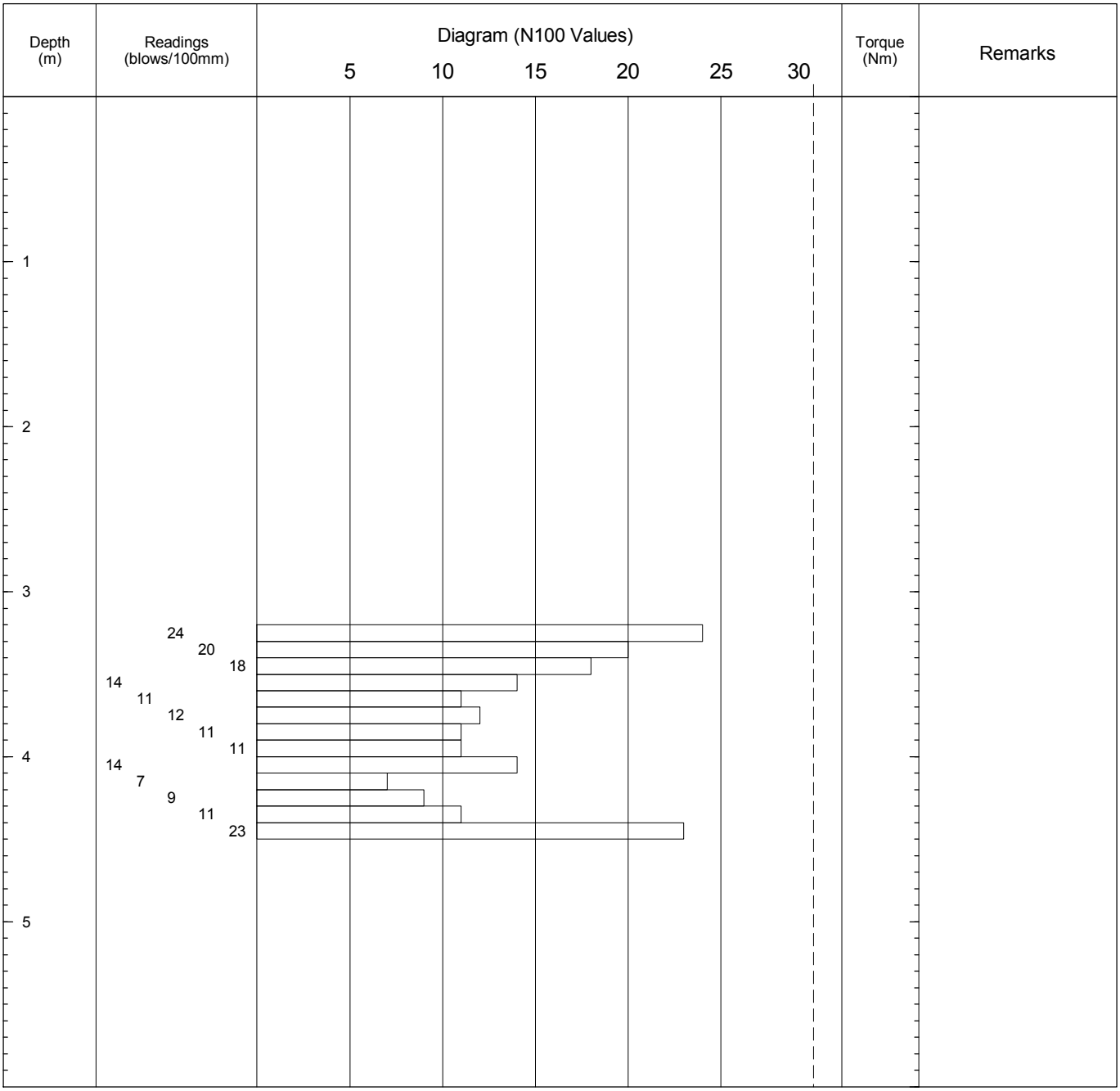
WSP | Parsons Brinckerhoff
The Victoria, 150-182 The Quays
Salford, M50 3SP
Telephone: 0161 886 2400
Fax: 0161 886 2401

DYNAMIC PROBE LOG

Hole No. **WS01**

	Project: Jackson's Row	Sheet: 1 of 1
Job No: 70010278	Client: Jackson's Row Developments Limited	Date: 02-11-15 02-11-15

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geo Site Surveys	Competitor 130	RH		1 of 1



Hammer Wt (kg)	
Hammer Drop (mm)	
Cone Dia (mm)	
Cone Type	
Damper	

General Remarks

Magnetomer survey undertaken in the borehole due to UXO risk.
Refusal at 3m BGL. Borehole continued with Dynamic Probe to 4.5m BGL. Probing stopped at 4.5m BGL due to 1.5m range of magnetometer.
No groundwater observed during investigation period.
50mm standpipe installed to 3m BGL (1m plain, 3m slotted).

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

WSP | Parsons Brinckerhoff
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WINDOW SAMPLE LOG

Hole No. **WS02**

Project: Jackson's Row

Sheet: 1 of 1

Job No: 70010278

Client: Jackson's Row Developments Limited

Date: 02-11-15
02-11-15

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geo Site Surveys	Competitor 130	RH		

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
								0.19	MADE GROUND: Grey concrete		MG	
									MADE GROUND: Loose red-brown slightly gravelly fine and medium sand. Gravel is medium and coarse sandstone, brick, and shells.			
0.60-0.80	ES	.							0.60 - 0.70 m bgl. Shell fragments.			
1.00	(S)	2,1,1 1,1,1 N=4.						(2.74)			MG	
									1.65 - 1.80 m bgl. Brick gravel.			
2.00	(S)	3,2,2 2,1,2 N=7.										
									2.70 - 2.75 m bgl. Coal fragments.			
								2.93	2.85 - 2.93 m bgl. Brick gravel.			
								3.00	Red-brown medium grained SANDSTONE.		SSG	
3.00	(S)	25,-,50 -,-,- N=50/ 0.05.							Borehole terminated due to refusal.		END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing

General Remarks
Refusal at 3.00m BGL.
No groundwater was observed during the investigation period.
50mm standpipe installed to 3m BGL. (1m plain, 2m slotted).

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP WINDOW SAMPLE LOG 70010278 - JACKSON'S ROW.GPJ WSPETEMPLATE1.03.GDT 4/1/17

WSP | Parsons Brinckerhoff
The Victoria, 150-182 The Quays
Salford, M50 3SP
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WINDOW SAMPLE LOG

Hole No. **WS03**

Project: Jackson's Row

Sheet: 1 of 1

Job No: 70010278

Client: Jackson's Row Developments Limited

Date: 02-11-15
02-11-15

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geo Site Surveys	Competitor 130	RH		

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
								0.22	MADE GROUND: Grey concrete.		MG	
								0.42	MADE GROUND: Red-brown slightly clayey slightly gravelly medium sand MADE GROUND. Gravel comprises brick.		MG	
								0.62	MADE GROUND: Light grey limestone gravel. subbase.		MG	
0.80-1.00	ES	.						(0.58)	MADE GROUND: Light orange-brown slightly clayey slightly gravelly sand. Gravel is fine and medium coal and brick.		MG	
1.00	(S)	1,0,0 0,1,0 N=1.						1.20				
								1.41	MADE GROUND: Light orange-brown slightly sandy clay.		MG	
2.00	(S)	2,2,2 2,1,2 N=7.						(1.09)	MADE GROUND: Red brown slightly gravelly medium sand. Gravel is coarse red brown sandstone.		MG	
								2.50				
3.00	(S)	2,3,4 2,2,3 N=11.						(1.50)	MADE GROUND: Red-orange sandy medium and coarse gravel. Gravel is primarily brick with occasional concrete.		MG	
								4.00				
4.00	(S)	2,1,4 16,20,10 N=50/ 0.27.							Borehole terminated due to refusal. Possible sandstone rockhead.		END	

Hole Diameter			Recovery			Water Strikes					
Depth	Diameter (mm)	Remarks	Core Top (m)	Core Base (m)	% Recovery	Date	Time	Strike	Minutes	Standing	Casing

General Remarks

Refusal at 4.25m BGL. Possible sandstone rockhead.
No groundwater was observed during the investigation period.
Standpipe installed to 3m BGL (1m plain, 2m slotted).

Scale 1:37.5

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP WINDOW SAMPLE LOG 70010278 - JACKSON'S ROW.GPJ WSPETEMPLATE1.03.GDT 4/1/17

TESTCONSULT LIMITED
Ruby House, 40A Hardwick Grange, Warrington WA1 4RF
Tel (01925) 286880 Fax (01925) 286881

LABORATORY TEST CERTIFICATE
UNIAXIAL COMPRESSIVE STRENGTH OF ROCK SPECIMEN

Site:	Jacksons Row	**Job No.:**	
Client:	WSP Group	**Lab Ref No.:**	SA 22538
		Date Received:	24/11/2015
		Date Tested:	30/11/2015
		Date Reported:	16/12/2015
Originator:	**Robert Home**		

Sample Reference	Moisture Content	Density (Mg/m^3)	Uniaxial Compressive Strength (mPa)
7.77-8.00	6.1	2030	11.5
9.38-9.58	7.2	2100	14.4
11.10-11.34	6.5	2090	17.9
13.39-13.69	8.5	2010	10.3

Tested in accordance with ISRM

Approved Signature
TESTCONSULT LIMITED
■ Liam Williams, Operations Manager

TESTCONSULT LIMITED
Ruby House, 40A Hardwick Grange, WARRINGTON, WA1 4RF
Tel (01925) 286880 Fax (01925) 286881

Laboratory Test Report
Point Load Strength Index

Project :	Jacksons Row	**Job Number**	-
Client :	WSP Group	**Lab Ref No**	SA 22538
		Date Received	24/11/2015
		Date Tested	
Originator :	**Robert Home**	**Date Reported**	16/12/2015

Point Load Strength Index

Sample No:-	Depth (m)	Description	Type	Orientation	W (mm)	D (mm)	P (kN)	De² (mm²)	De (mm)	I_s	F	$I_{s(50)}$MN/m²
WSP	6.29	1	d	II	63	75	0.60	5625.00	75.00	0.107	1.20	0.13
WSP	6.29	1	a	⊥	75	54	1.00	5156.62	71.81	0.194	1.18	0.23
WSP	7.64	1	a	⊥	75	110	2.00	10504.23	102.49	0.190	1.38	0.26
WSP	8.94	1	a	⊥	75	86	1.80	8212.40	90.62	0.219	1.31	0.29
WSP	9.82	1	a	⊥	75	50	2.10	4774.65	69.10	0.440	1.16	0.51
WSP	10.90	1	a	⊥	75	59	1.90	5634.08	75.06	0.337	1.20	0.40
WSP	12.12	1	d	II	72	75	1.10	5625.00	75.00	0.196	1.20	0.23
WSP	12.12	1	a	⊥	75	72	2.20	6875.49	82.92	0.320	1.26	0.40
WSP	13.23	1	a	⊥	75	52	1.40	4965.63	70.47	0.282	1.17	0.33
WSP	14.16	1	a	⊥	75	84	2.90	8021.41	89.56	0.362	1.3	0.47

Description 1: Weak reddish brown coarse grained SANDSTONE

$I_{s(50)}$MN/m² for Description 1

	Description 1
Min	0.13
Mean	0.32
Max	0.51

Test
A = axial
D = diametrical

Relationship to planes of weakness
IL = irregular lump
II = parallel
⊥ = perpendicular

	$I_{s(50)}$MN/m²	U.C.S. MN/m²
Extremely Weak	<0.05	0.6-1.0
Very Weak	0.05-0.20	1.0-5.0
Weak	0.20-0.50	5.0-25.0
Medium Strong	0.50-2.00	25-50
Strong	2.00-4.50	50-100
Very Strong	4.50-9.00	100-250
Extremely Strong	9.00 +	>250

Approved Signature
TESTCONSULT LIMITED
■ Liam Williams, Operations Manager

ALcontrol Laboratories

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WSP Environmental
The Victoria
150-182 The Quays
Salford
Manchester
Lancashire
M50 3SP

Attention: Robert Home

CERTIFICATE OF ANALYSIS

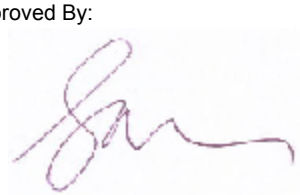
Date:	14 November 2015
Customer:	H_WSP_MAN
Sample Delivery Group (SDG):	151106-84
Your Reference:	70010278
Location:	Jackson's Row
Report No:	337982

We received 4 samples on Friday November 06, 2015 and 4 of these samples were scheduled for analysis which was completed on Friday November 13, 2015. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

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CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
12392681	WS01		2.00	02/11/2015
12392683	WS01		2.75	02/11/2015
12392684	WS02		0.80	02/11/2015
12392685	WS03		1.00	02/11/2015

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			1392681	WS01		2.00	1kg TUB
			1392683	WS01		2.75	1kg TUB
			1392684	WS02		0.80	1kg TUB
			1392685	WS03		1.00	1kg TUB
Anions by Kone (soil)	All	NDPs: 0 Tests: 4	X	X	X	X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4	X	X	X	X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 4	X	X	X	X	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 4	X	X	X	X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 4	X	X	X	X	
Metals in solid samples by OES	All	NDPs: 0 Tests: 4	X	X	X	X	
PAH by GCMS	All	NDPs: 0 Tests: 4	X	X	X	X	
pH	All	NDPs: 0 Tests: 4	X	X	X	X	
Sample description	All	NDPs: 0 Tests: 4	X	X	X	X	
Total Organic Carbon	All	NDPs: 0 Tests: 4	X	X	X	X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 4	X	X	X	X	

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
12392681	WS01	2.00	Dark Brown	Sand	0.1 - 2 mm	Brick	Concrete/Aggregate
12392683	WS01	2.75	Dark Brown	Sandy Silt Loam	0.1 - 2 mm	Stones	None
12392684	WS02	0.80	Dark Brown	Sand	0.1 - 2 mm	Stones	None
12392685	WS03	1.00	Dark Brown	Sandy Clay	0.1 - 2 mm	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	WS01	WS01	WS02	WS03		
			Depth (m)	2.00	2.75	0.80	1.00		
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
			Date Sampled	02/11/2015	02/11/2015	02/11/2015	02/11/2015		
			Sampled Time	.	.	.	.		
			Date Received	06/11/2015	06/11/2015	06/11/2015	06/11/2015		
			SDG Ref	151106-84	151106-84	151106-84	151106-84		
			Lab Sample No.(s)	12392681	12392683	12392684	12392685		
			AGS Reference						
Moisture Content Ratio (% of as received sample)	%	PM024		9.3	6.7	6.9	7.3		
Soil Organic Matter (SOM)	<0.35 %	TM132		37.8 #	0.722 #	0.733 #	0.695 #		
pH	1 pH Units	TM133		8.34 M	7.6 M	9.63 M	8.84 M		
Arsenic	<0.6 mg/kg	TM181		40.2 M	11.9 M	3.05 M	5.15 M		
Cadmium	<0.02 mg/kg	TM181		1.31 M	0.617 M	0.125 M	0.353 M		
Chromium	<0.9 mg/kg	TM181		15.4 M	25.2 M	6.65 M	11.1 M		
Copper	<1.4 mg/kg	TM181		859 M	30.2 M	6.25 M	11.6 M		
Lead	<0.7 mg/kg	TM181		3310 M	115 M	24.8 M	16.5 M		
Mercury	<0.14 mg/kg	TM181		0.707 M	<0.14 M	<0.14 M	<0.14 M		
Nickel	<0.2 mg/kg	TM181		26.1 M	30.5 M	7.18 M	16.7 M		
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #		
Zinc	<1.9 mg/kg	TM181		497 M	78.4 M	14.4 M	31.9 M		
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.419 M	0.489 M	0.0146 M	0.0498 M		

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	WS01	WS01	WS02	WS03		
			Depth (m)	2.00	2.75	0.80	1.00		
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
			Date Sampled	02/11/2015	02/11/2015	02/11/2015	02/11/2015		
			Sampled Time	.	.	.	.		
			Date Received	06/11/2015	06/11/2015	06/11/2015	06/11/2015		
			SDG Ref	151106-84	151106-84	151106-84	151106-84		
			Lab Sample No.(s)	12392681	12392683	12392684	12392685		
			AGS Reference						
Naphthalene-d8 % recovery**	%	TM218		90.8	91.5	92.5	93.3		
Acenaphthene-d10 % recovery**	%	TM218		90.3	90.9	91.7	93		
Phenanthrene-d10 % recovery**	%	TM218		92.2	92.6	93.4	93.2		
Chrysene-d12 % recovery**	%	TM218		88.5	85.1	86.1	87		
Perylene-d12 % recovery**	%	TM218		90.4	88.9	89.9	91.2		
Naphthalene	<0.009 mg/kg	TM218		0.422 M	<0.009 M	0.0118 M	<0.009 M		
Acenaphthylene	<0.012 mg/kg	TM218		0.0974 M	<0.012 M	<0.012 M	0.0167 M		
Acenaphthene	<0.008 mg/kg	TM218		0.752 M	<0.008 M	<0.008 M	<0.008 M		
Fluorene	<0.01 mg/kg	TM218		0.868 M	<0.01 M	<0.01 M	<0.01 M		
Phenanthrene	<0.015 mg/kg	TM218		6.62 M	<0.015 M	0.0588 M	0.117 M		
Anthracene	<0.016 mg/kg	TM218		2.22 M	<0.016 M	<0.016 M	0.0394 M		
Fluoranthene	<0.017 mg/kg	TM218		9.56 M	<0.017 M	0.0664 M	0.21 M		
Pyrene	<0.015 mg/kg	TM218		7.69 M	<0.015 M	0.0696 M	0.218 M		
Benz(a)anthracene	<0.014 mg/kg	TM218		4.28 M	<0.014 M	0.0569 M	0.134 M		
Chrysene	<0.01 mg/kg	TM218		3.3 M	<0.01 M	0.0349 M	0.108 M		
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		4.37 M	<0.015 M	0.0389 M	0.124 M		
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		1.66 M	<0.014 M	0.0242 M	0.0435 M		
Benzo(a)pyrene	<0.015 mg/kg	TM218		3.72 M	<0.015 M	0.0348 M	0.108 M		
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		1.87 M	<0.018 M	<0.018 M	0.0437 M		
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.568 M	<0.023 M	<0.023 M	<0.023 M		
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		1.96 M	<0.024 M	<0.024 M	0.052 M		
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		50	<0.118	0.396	1.21		

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	WS01	WS01	WS02	WS03		
			Depth (m)	2.00	2.75	0.80	1.00		
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid		
			Date Sampled	02/11/2015	02/11/2015	02/11/2015	02/11/2015		
			Sampled Time	.	.	.	.		
			Date Received	06/11/2015	06/11/2015	06/11/2015	06/11/2015		
			SDG Ref	151106-84	151106-84	151106-84	151106-84		
			Lab Sample No.(s)	12392681	12392683	12392684	12392685		
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		54 2	109 2	110 2	107 2		
GRO TOT (Moisture Corrected)	<0.044 mg/kg	TM089		<0.044 2 M	<0.044 2 M	<0.044 2 M	<0.044 2 M		
Methyl tertiary butyl ether (MTBE)	<0.005 mg/kg	TM089		<0.005 2 #	<0.005 2 #	<0.005 2 #	<0.005 2 #		
Benzene	<0.01 mg/kg	TM089		<0.01 2 M	<0.01 2 M	<0.01 2 M	<0.01 2 M		
Toluene	<0.002 mg/kg	TM089		0.0022 2 M	<0.002 2 M	<0.002 2 M	<0.002 2 M		
Ethylbenzene	<0.003 mg/kg	TM089		<0.003 2 M	<0.003 2 M	<0.003 2 M	<0.003 2 M		
m,p-Xylene	<0.006 mg/kg	TM089		<0.006 2 M	<0.006 2 M	<0.006 2 M	<0.006 2 M		
o-Xylene	<0.003 mg/kg	TM089		<0.003 2 M	<0.003 2 M	<0.003 2 M	<0.003 2 M		
sum of detected mpo xylene by GC	<0.009 mg/kg	TM089		<0.009 2	<0.009 2	<0.009 2	<0.009 2		
sum of detected BTEX by GC	<0.024 mg/kg	TM089		<0.024 2	<0.024 2	<0.024 2	<0.024 2		
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aliphatics >C10-C12	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aliphatics >C12-C16	<0.1 mg/kg	TM173		4.34	<0.1	<0.1	<0.1		
Aliphatics >C16-C21	<0.1 mg/kg	TM173		5.98	<0.1	<0.1	<0.1		
Aliphatics >C21-C35	<0.1 mg/kg	TM173		22.8	<0.1	<0.1	<0.1		
Aliphatics >C35-C44	<0.1 mg/kg	TM173		7.21	<0.1	<0.1	<0.1		
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173		40.3	<0.1	<0.1	<0.1		
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aromatics >EC10-EC12	<0.01 mg/kg	TM089		<0.01 2	<0.01 2	<0.01 2	<0.01 2		
Aromatics >EC12-EC16	<0.1 mg/kg	TM173		20.4	<0.1	<0.1	<0.1		
Aromatics >EC16-EC21	<0.1 mg/kg	TM173		86.6	<0.1	0.99	0.474		
Aromatics >EC21-EC35	<0.1 mg/kg	TM173		124	<0.1	4.43	4.04		
Aromatics >EC35-EC44	<0.1 mg/kg	TM173		31.1	<0.1	3.85	4.61		
Aromatics >EC40-EC44	<0.1 mg/kg	TM173		10.8	<0.1	2	2.42		
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173		262	<0.1	9.27	9.13		
Total Aliphatics & Aromatics >C5-C44	<0.1 mg/kg	TM173		303	<0.1	9.27	9.13		

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS01 2.00 SOLID 02/11/2015 00:00:00 09/11/2015 11:25:47 151106-84 12392681 TM048	11/11/2015	Rebecca Rawlings	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS01 2.75 SOLID 02/11/2015 00:00:00 09/11/2015 12:22:02 151106-84 12392683 TM048	11/11/2015	Rebecca Rawlings	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS02 0.80 SOLID 02/11/2015 00:00:00 09/11/2015 11:32:55 151106-84 12392684 TM048	11/11/2015	Rebecca Rawlings	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS03 1.00 SOLID 02/11/2015 00:00:00 09/11/2015 11:18:12 151106-84 12392685 TM048	11/11/2015	Rebecca Rawlings	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
ASB_PREP				
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546		
TM243		Mixed Anions In Soils By Kone		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	12392681	12392683	12392684	12392685
Customer Sample Ref.	WS01	WS01	WS02	WS03
AGS Ref.				
Depth	2.00	2.75	0.80	1.00
Type	SOLID	SOLID	SOLID	SOLID
Anions by Kone (soil)	13-Nov-2015	13-Nov-2015	13-Nov-2015	13-Nov-2015
Asbestos ID in Solid Samples	11-Nov-2015	11-Nov-2015	11-Nov-2015	11-Nov-2015
EPH CWG (Aliphatic) GC (S)	11-Nov-2015	11-Nov-2015	11-Nov-2015	11-Nov-2015
EPH CWG (Aromatic) GC (S)	11-Nov-2015	11-Nov-2015	11-Nov-2015	11-Nov-2015
GRO by GC-FID (S)	10-Nov-2015	10-Nov-2015	10-Nov-2015	10-Nov-2015
Metals in solid samples by OES	12-Nov-2015	12-Nov-2015	11-Nov-2015	11-Nov-2015
PAH by GCMS	11-Nov-2015	11-Nov-2015	11-Nov-2015	11-Nov-2015
pH	12-Nov-2015	12-Nov-2015	12-Nov-2015	12-Nov-2015
Sample description	09-Nov-2015	09-Nov-2015	09-Nov-2015	09-Nov-2015
Total Organic Carbon	13-Nov-2015	13-Nov-2015	12-Nov-2015	13-Nov-2015
TPH CWG GC (S)	11-Nov-2015	11-Nov-2015	11-Nov-2015	11-Nov-2015

CERTIFICATE OF ANALYSIS

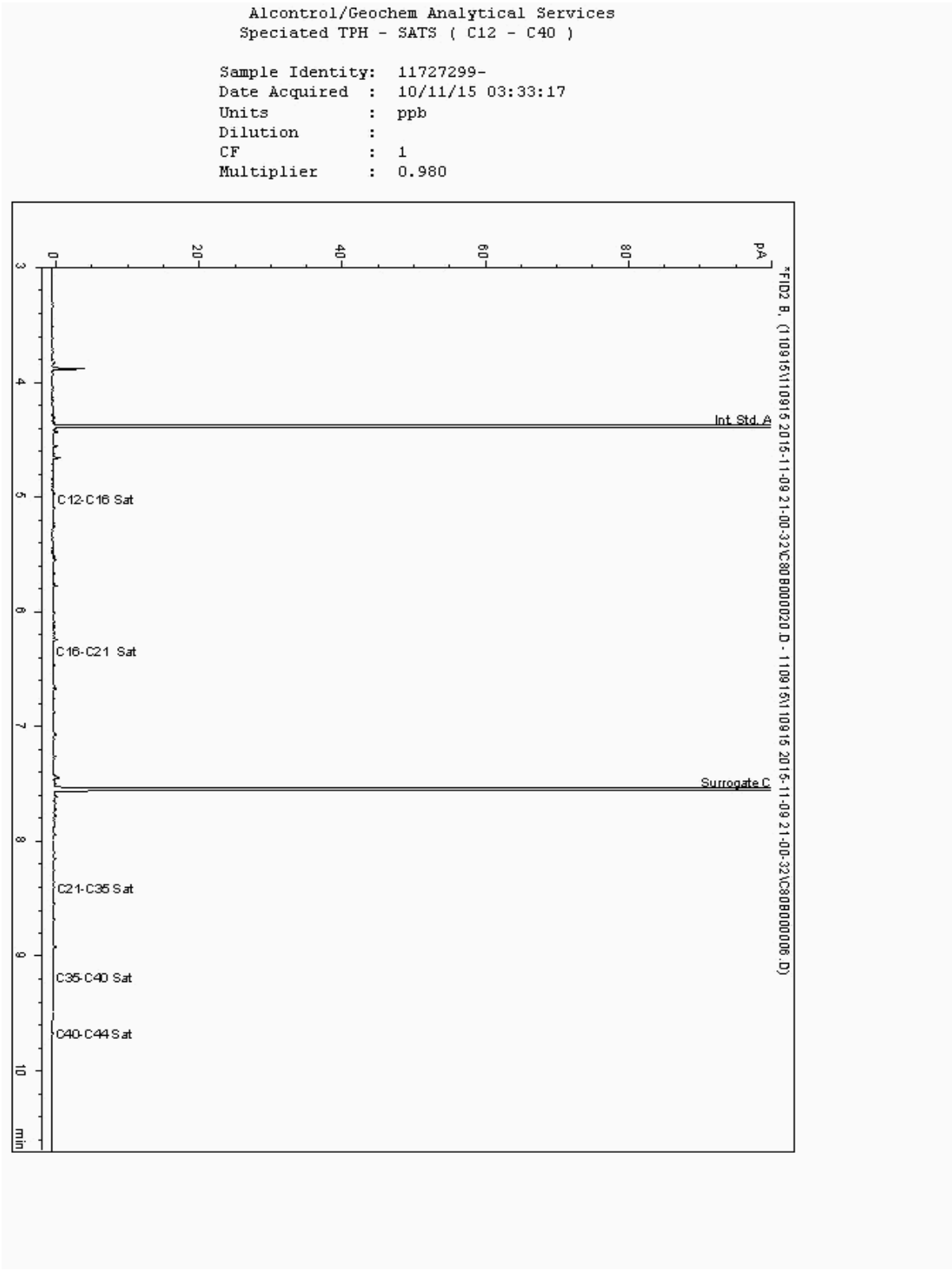
SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 12403681
Sample ID : WS03

Depth : 1.00



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

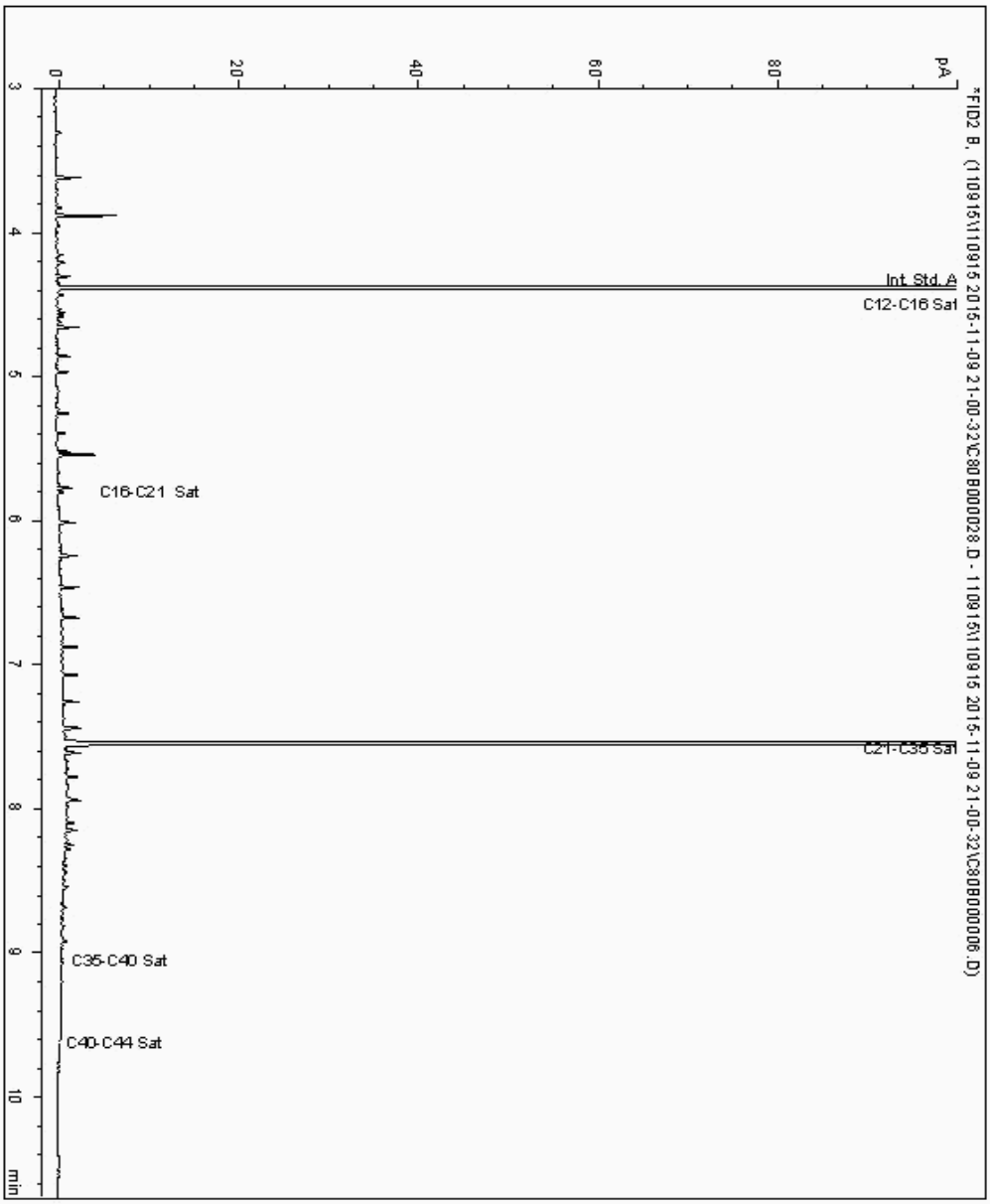
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 12403737
Sample ID : WS01

Depth : 2.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 11727228-
Date Acquired : 10/11/15 06:14:58
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010



CERTIFICATE OF ANALYSIS

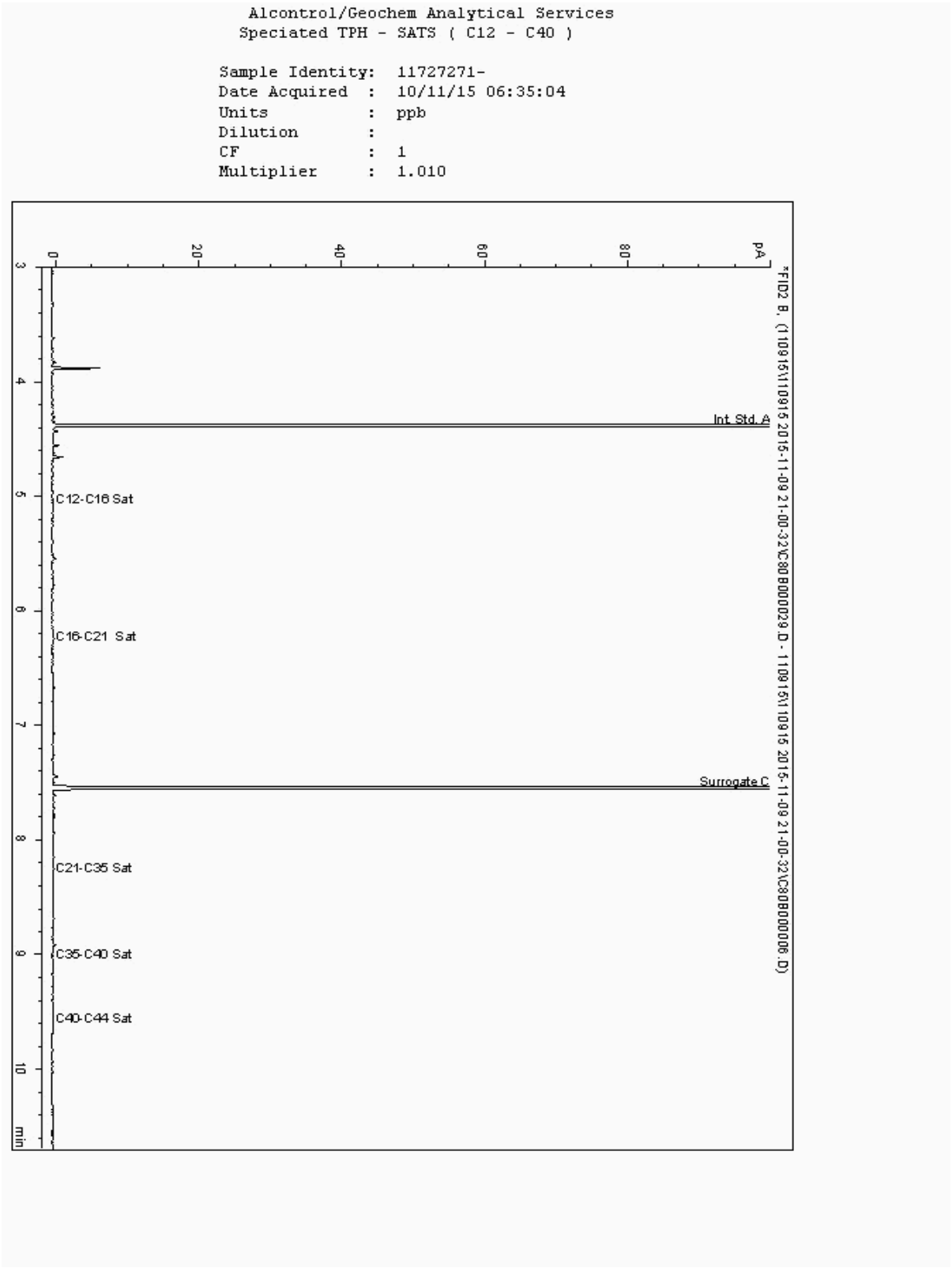
SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 12403808
Sample ID : WS02

Depth : 0.80



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

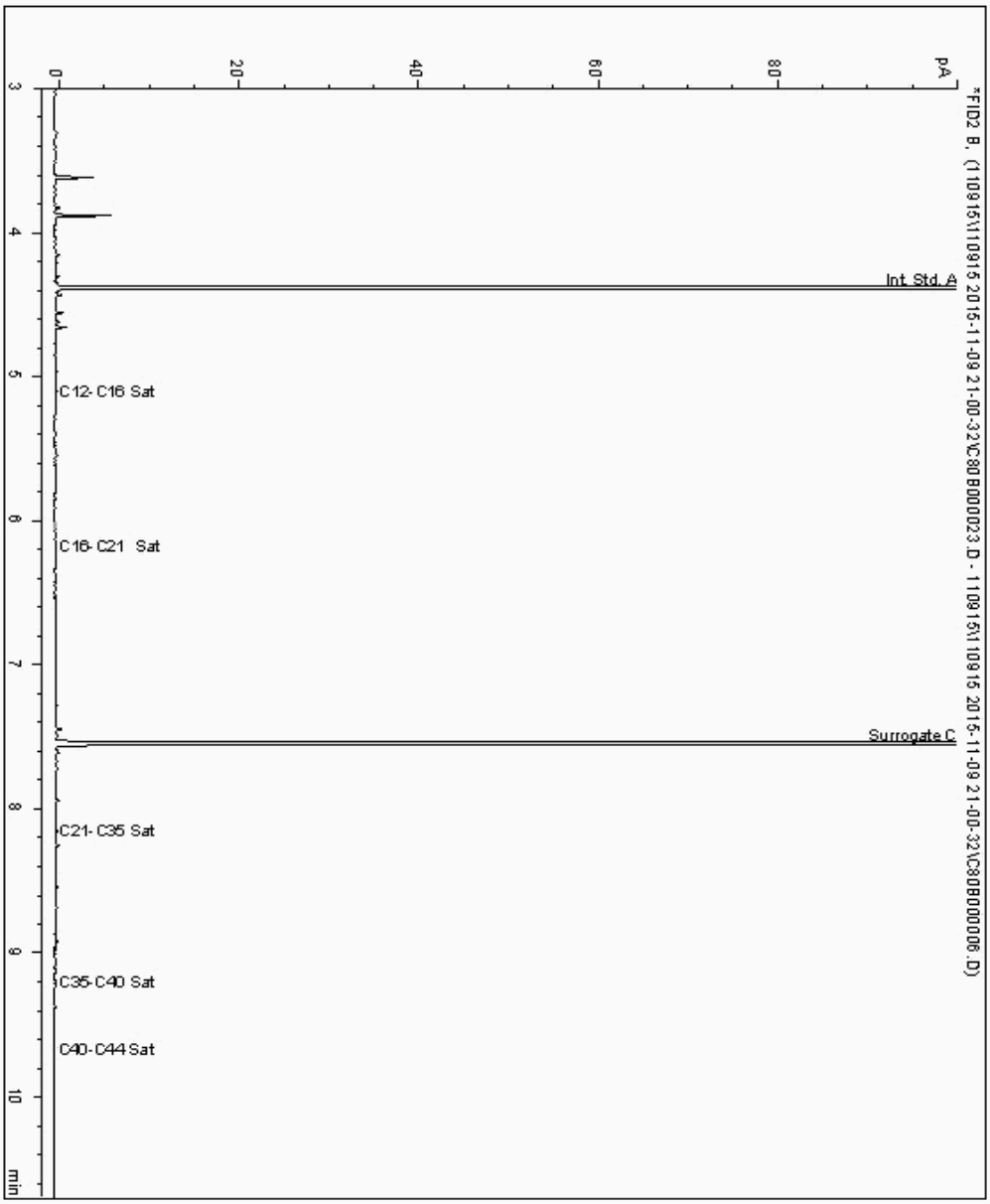
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 12404148
Sample ID : WS01

Depth : 2.75

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 11727252-
Date Acquired : 10/11/15 04:33:53
Units : ppb
Dilution :
CF : 1
Multiplier : 0.980



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

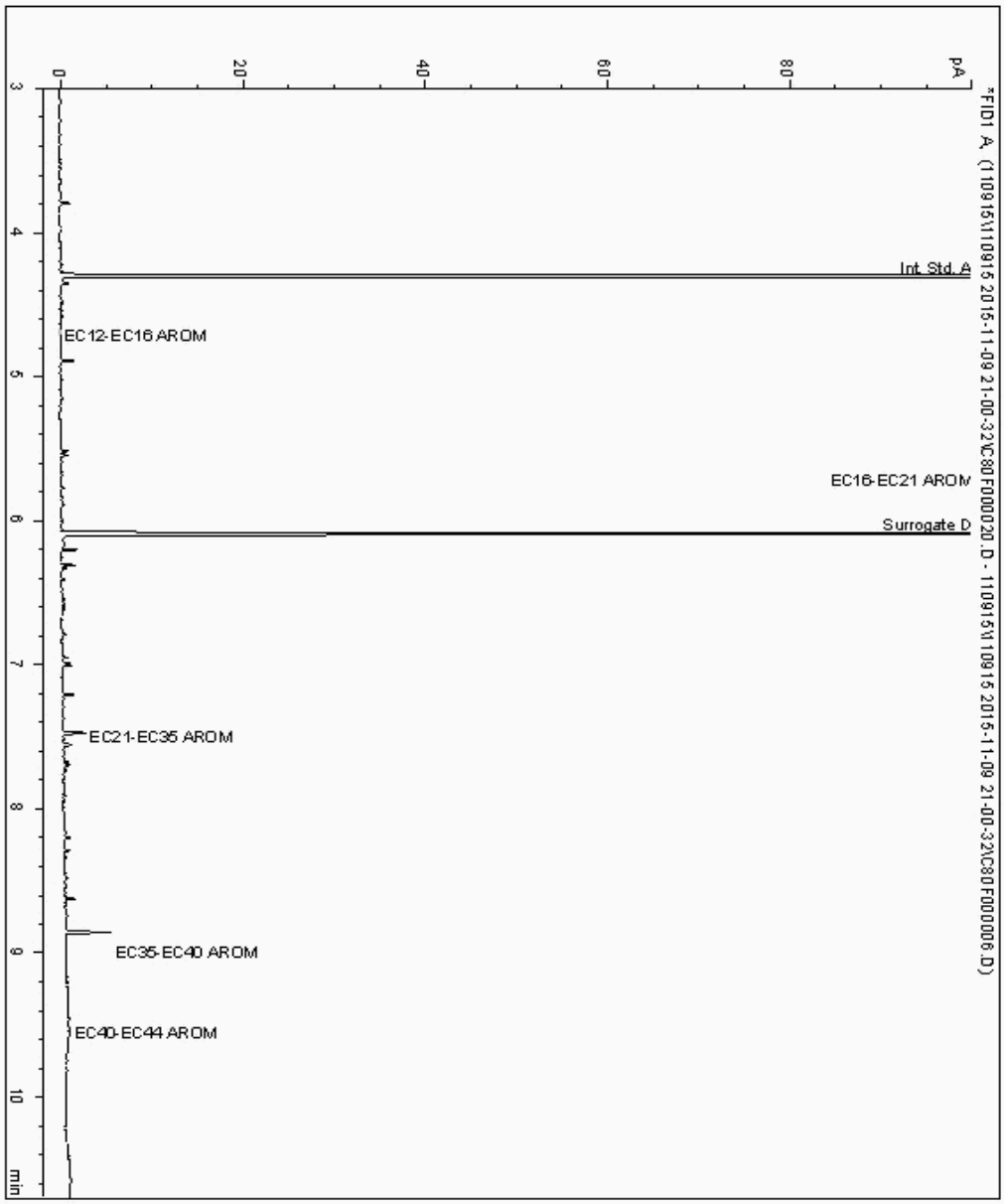
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 12403681
Sample ID : WS03

Depth : 1.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROMS (C12 - C44)

Sample Identity: 11727300-
Date Acquired : 10/11/15 03:33:17
Units : ppb
Dilution :
CF : 1
Multiplier : 0.980



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

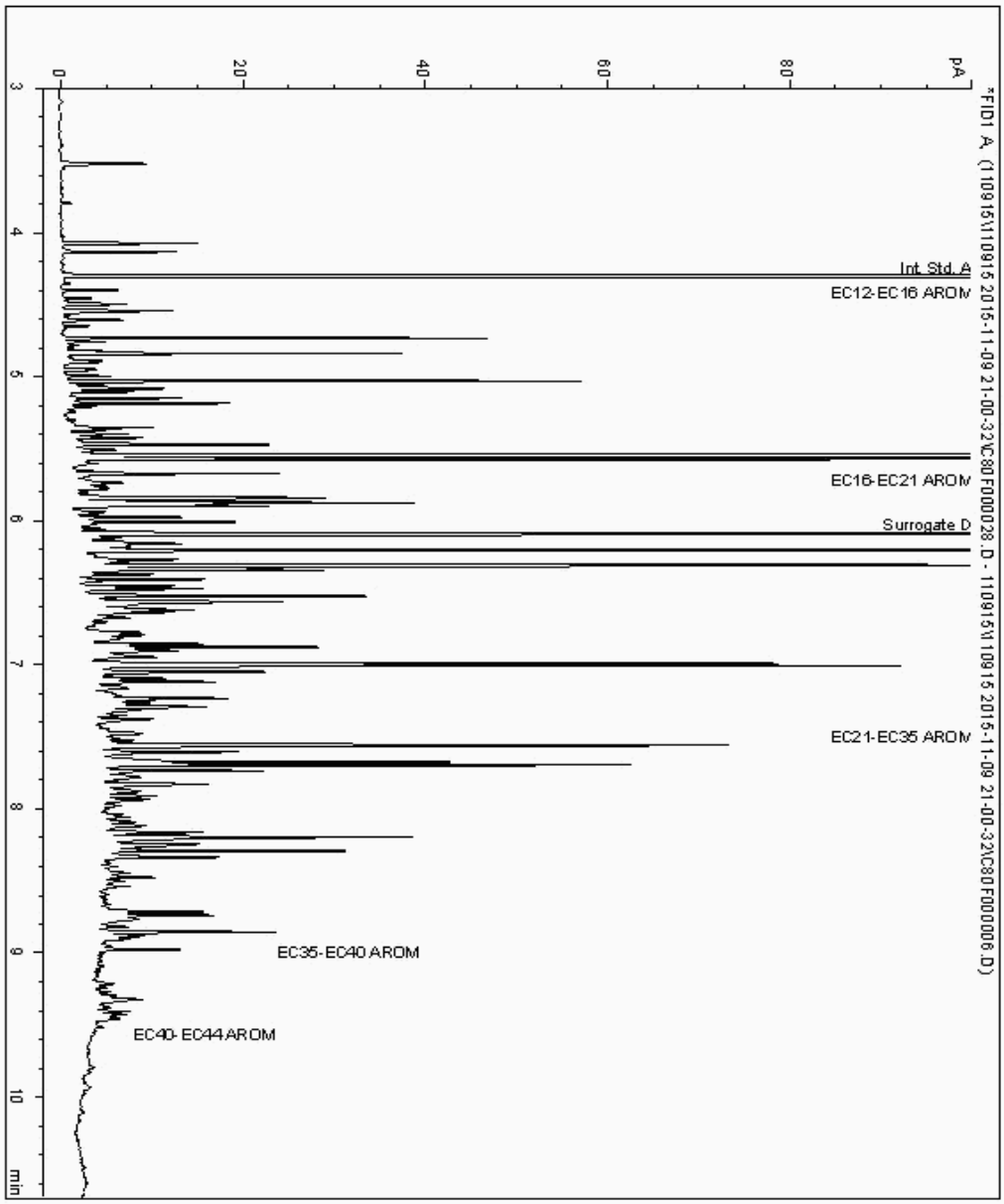
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 12403737
Sample ID : WS01

Depth : 2.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROMS (C12 - C44)

Sample Identity: 11727229-
Date Acquired : 10/11/15 06:14:58
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

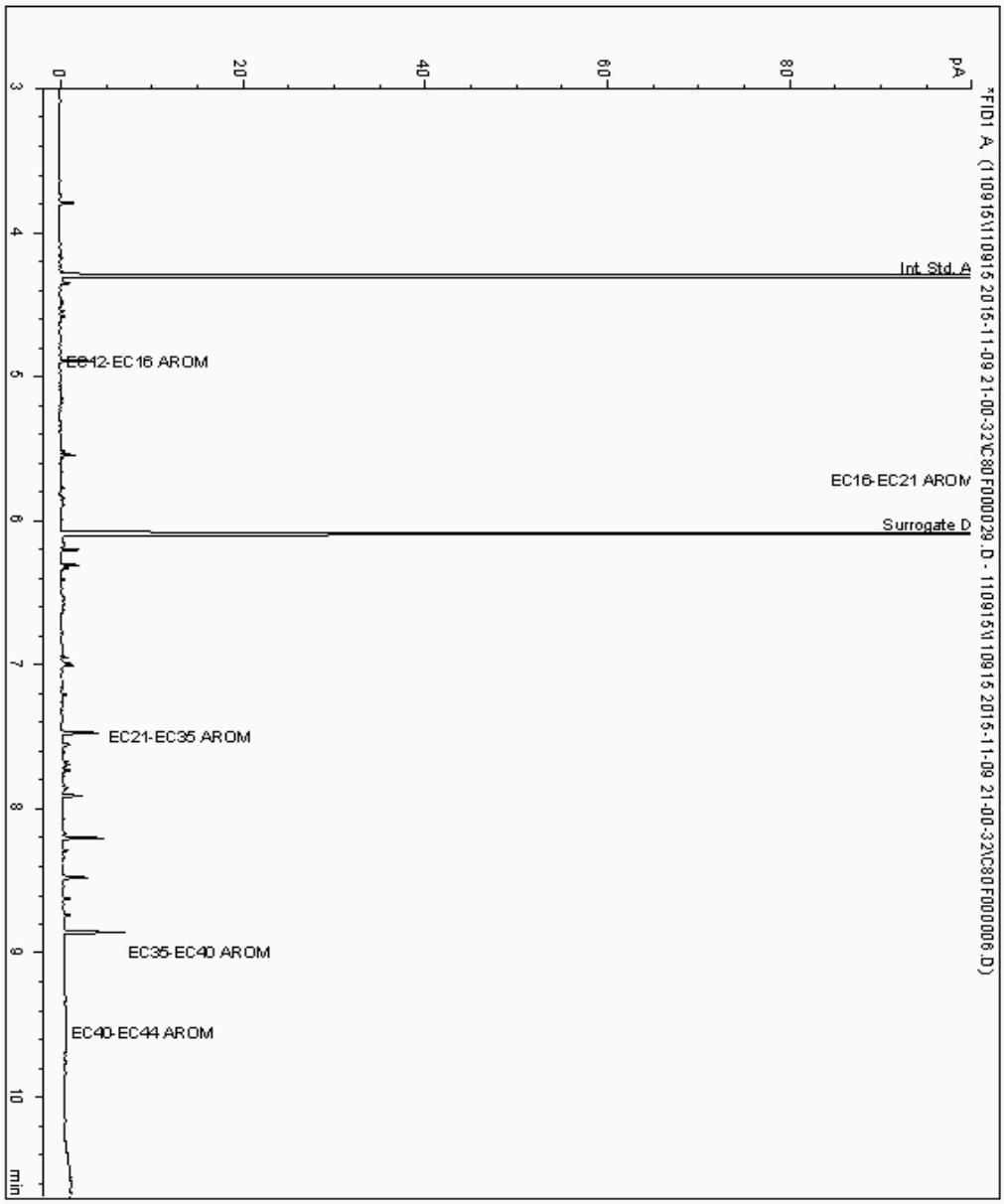
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 12403808
Sample ID : WS02

Depth : 0.80

Alcontrol/Geochem Analytical Services
Speciated TPH - AROMS (C12 - C44)

Sample Identity: 11727272-
Date Acquired : 10/11/15 06:35:04
Units : ppb
Dilution :
CF : 1
Multiplier : 1.010



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

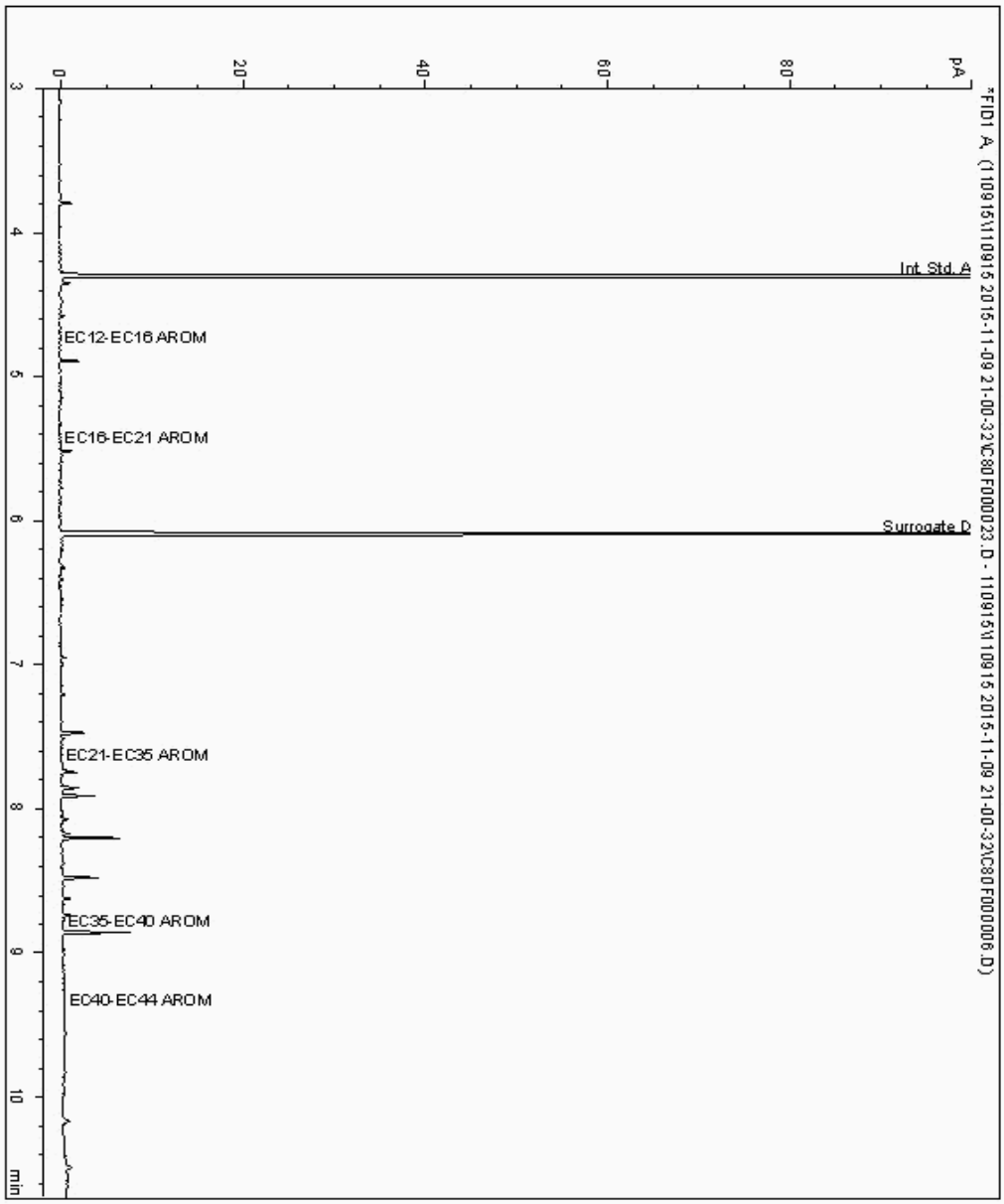
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 12404148
Sample ID : WS01

Depth : 2.75

Alcontrol/Geochem Analytical Services
Speciated TPH - AROMS (C12 - C44)

Sample Identity: 11727253-
Date Acquired : 10/11/15 04:33:53
Units : ppb
Dilution :
CF : 1
Multiplier : 0.980



CERTIFICATE OF ANALYSIS

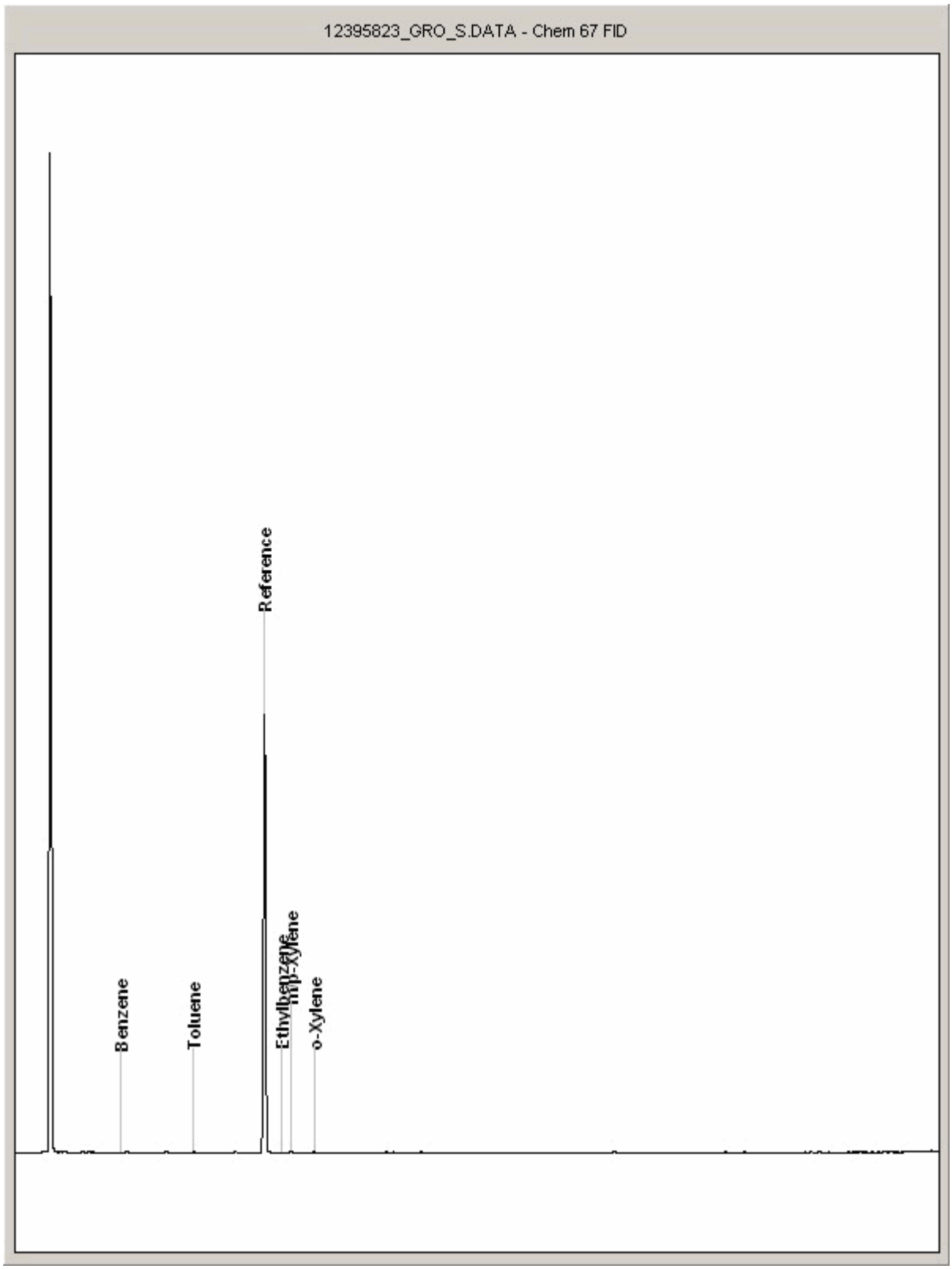
SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 12395823
Sample ID : WS01

Depth : 2.00



CERTIFICATE OF ANALYSIS

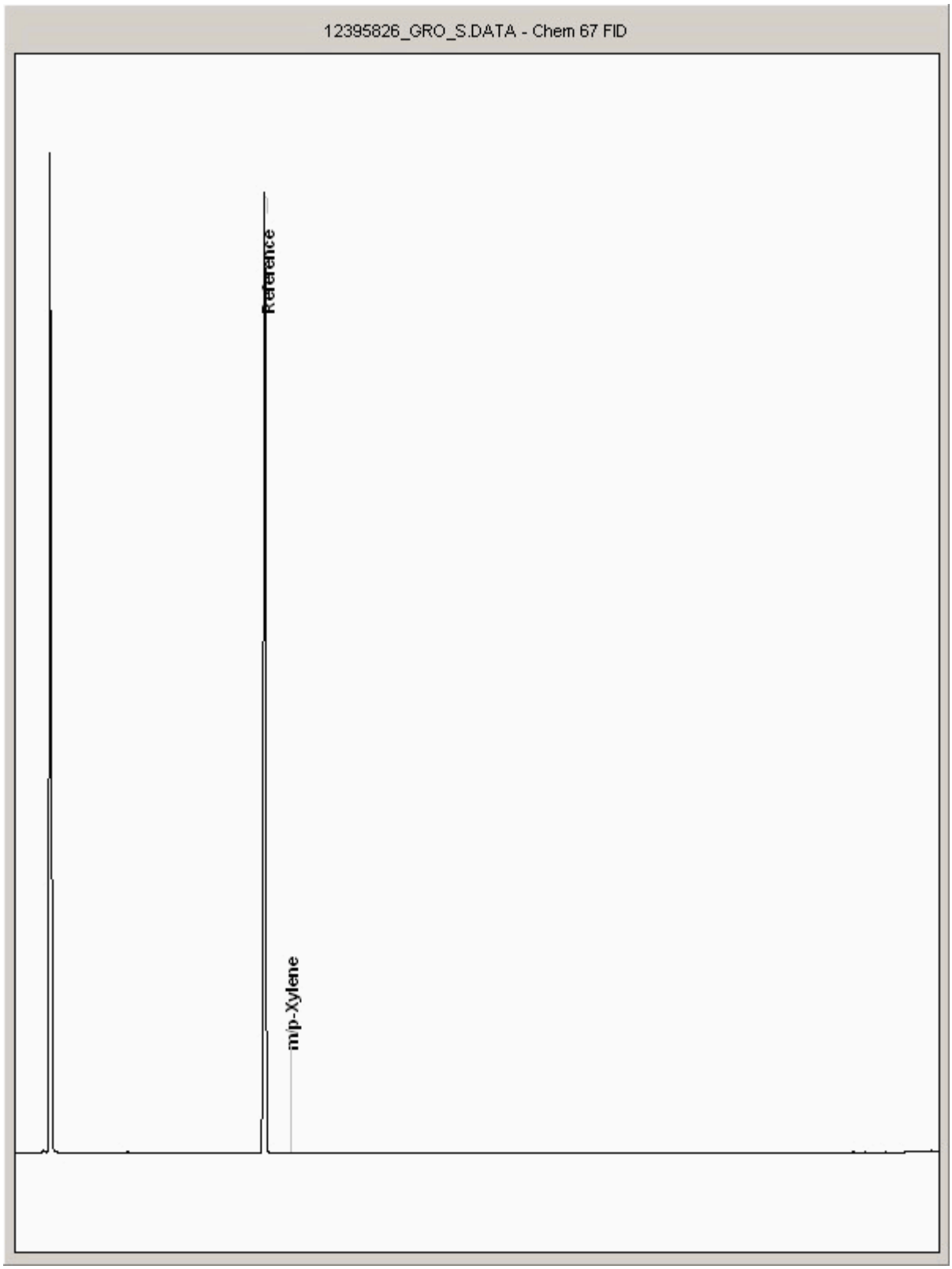
SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 12395826
Sample ID : WS03

Depth : 1.00



CERTIFICATE OF ANALYSIS

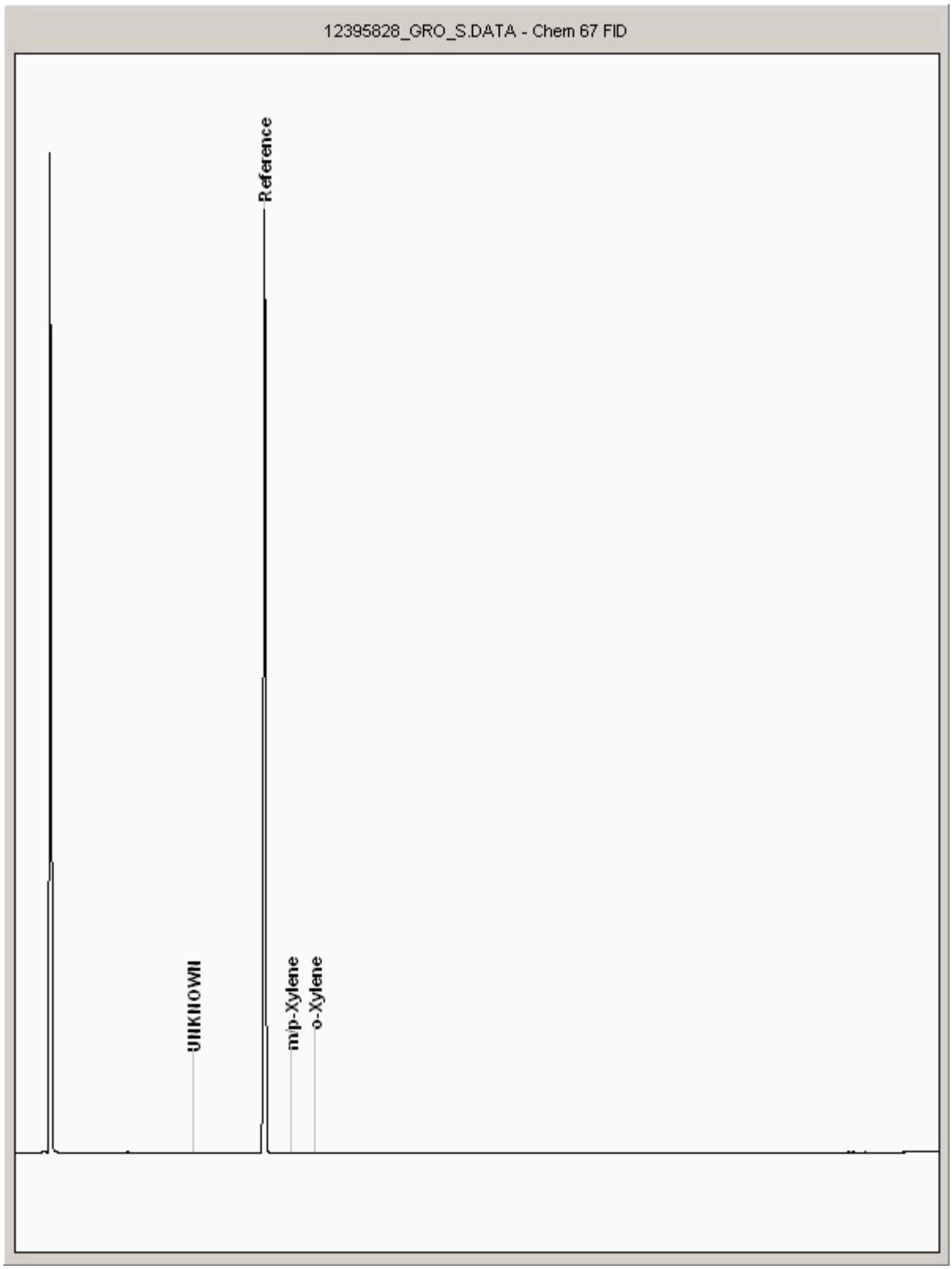
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Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 12395828
Sample ID : WS02

Depth : 0.80



CERTIFICATE OF ANALYSIS

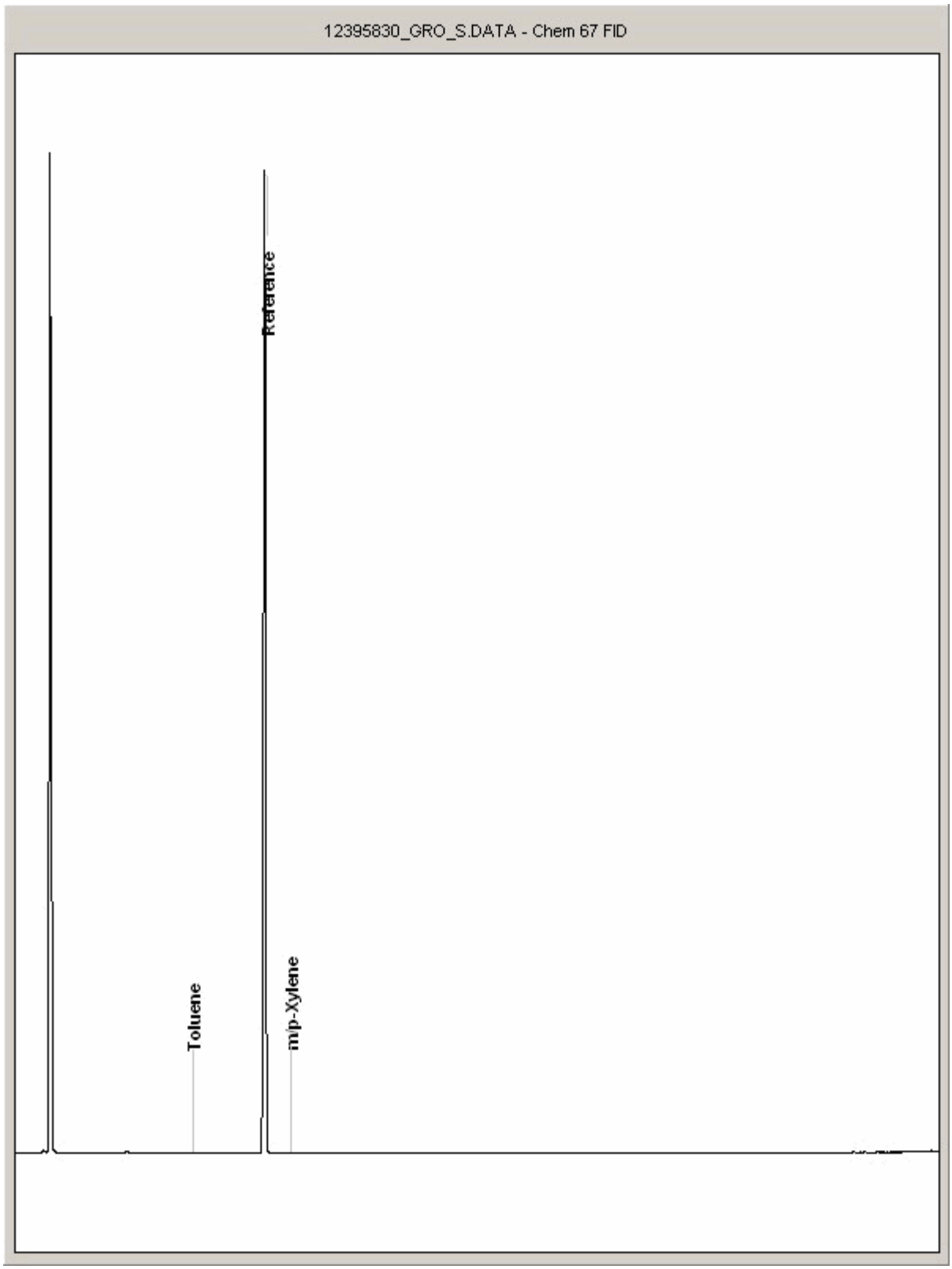
SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 12395830
Sample ID : WS01

Depth : 2.75



CERTIFICATE OF ANALYSIS

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA Leach tests, flash point, ammonium as NH4 by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.

7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample -similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

12. Results relate only to the items tested

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not
accredited.

19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

20. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

23. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials -whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute themajor part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

24. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 -C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
THIN LAYER CHROMATOGRAPHY	D&C	DCM	SOXTHERM	IATROSCAN
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE/ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE/ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE/ACETONE	END OVER END	GC-FID
EPH (MINOIL)	D&C	HEXANE/ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE/ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE/ACETONE	END OVER END	GC-FID
PCB TOT / PCB CON	D&C	HEXANE/ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE/ACETONE	MICROWAVE TM218.	GC-MS
C8-C40 (C8-C40) EZ FLASH	WET	HEXANE/ACETONE	SHAKER	GC-EZ
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE/ACETONE	SHAKER	GC-EZ
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM/ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	LIQUID/LIQUID SHAKE	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID SHAKE	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC MS

Identification of Asbestos in Bulk Materials

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.

The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Last Updated : 2010/09/08

SDG:	151106-84	**Location:**	Jackson's Row	**Order Number:**	70010278
Job:	H_WSP_MAN-277	**Customer:**	WSP Environmental	**Report Number:**	337982
Client Reference:	70010278	**Attention:**	Robert Home	**Superseded Report:**	

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt . However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment . Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect .

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill /made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5 -C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before presevation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than : - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

ALcontrol Laboratories

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WSP Environmental
The Victoria
150-182 The Quays
Salford
Manchester
Lancashire
M50 3SP
Attention : Robert Home

CERTIFICATE OF ANALYSIS

Date:	04/12/2015 16:28		
Customer:	H_WSP_MAN		
Sample Delivery Group (SDG):	151126-71	**Report No.:**	340779
Your Reference:	70010278		
Location:	Jackson's Row		

We received 1 sample on Thursday November 26, 2015 and 1 of these samples were scheduled for analysis which was then completed on Friday December 04, 2015. Accredited laboratory tests are defined in the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with data sections alone.

All chemical testing (unless subcontracting) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan
Operations Manager

Alcontrol Laboratories is a trading division of Alcontrol UK Limited
Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291

LIQUID

			Customer Sample Ref.	RT01-W					
			Depth (m)	12.5					
			Sample Type	LIQUID					
			Date Sampled	17/11/2015					
			Date Received	26/11/2015 07:00					
			SDG Ref	151126-71					
			Lab Sample No.(s)	12517729					
			AGS Reference						
Component	LOD	Units	Method						
MISC									
Ammoniacal Nitrogen as NH4	<300	µg/l *	TM099	<300					
Arsenic (diss.filt)	<0.12	µg/l *	TM152	0.234					
Cadmium (diss.filt)	<0.1	µg/l *	TM152	<0.1					
Chromium (diss.filt)	<0.22	µg/l *	TM152	1.72					
Copper (diss.filt)	<0.85	µg/l *	TM152	4.22					
Lead (diss.filt)	<0.02	µg/l *	TM152	0.085					
Nickel (diss.filt)	<0.15	µg/l *	TM152	1.84					
Selenium (diss.filt)	<0.39	µg/l *	TM152	0.504					
Zinc (diss.filt)	<0.41	µg/l *	TM152	5.15					
Mercury (diss.filt)	<0.01	µg/l *	TM183	<0.01					
Sulphate	<2000	µg/l *	TM184	20700					
Chloride	<2000	µg/l *	TM184	7000					
pH	<1	pH Units *	TM256	7.58					
Low Level Hexavalent Chromium	<3	µg/l	TM331	<3					
TPH CWG (W)									
GRO Surrogate % recovery**		%	TM245	76					
GRO >C5-C12	<50	µg/l *	TM245	<50					
Methyl tertiary butyl ether (MTBE)	<3	µg/l *	TM245	<3					
Benzene	<7	µg/l *	TM245	<7					
Toluene	<4	µg/l *	TM245	<4					
Ethylbenzene	<5	µg/l *	TM245	<5					
m,p-Xylene	<8	µg/l *	TM245	<8					
o-Xylene	<3	µg/l *	TM245	<3					
Sum of detected Xylenes	<11	µg/l	TM245	<11					
Sum of detected BTEX	<28	µg/l	TM245	<28					
Aliphatics >C5-C6	<10	µg/l	TM245	<10					
Aliphatics >C6-C8	<10	µg/l	TM245	<10					
Aliphatics >C8-C10	<10	µg/l	TM245	<10					
Aliphatics >C10-C12	<10	µg/l	TM245	<10					
Aliphatics >C12-C16 (aq)	<10	µg/l	TM174	19					
Aliphatics >C16-C21 (aq)	<10	µg/l	TM174	17					
Aliphatics >C21-C35 (aq)	<10	µg/l	TM174	74					
Total Aliphatics >C12-C35 (aq)	<10	µg/l	TM174	110					
Aromatics >EC5-EC7	<10	µg/l	TM245	<10					
Aromatics >EC7-EC8	<10	µg/l	TM245	<10					
Aromatics >EC8-EC10	<10	µg/l	TM245	<10					
Aromatics >EC10-EC12	<10	µg/l	TM245	<10					
Aromatics >EC12-EC16 (aq)	<10	µg/l	TM174	20					
Aromatics >EC16-EC21 (aq)	<10	µg/l	TM174	19					
Aromatics >EC21-EC35 (aq)	<10	µg/l	TM174	57					
Total Aromatics >EC12-EC35 (aq)	<10	µg/l	TM174	96					
Total Aliphatics & Aromatics >C5-35 (aq)	<10	µg/l	TM174	206					
VOC MS (W)									
Dibromofluoromethane**		%	TM208	112					
Toluene-d8**		%	TM208	100					
4-Bromofluorobenzene**		%	TM208	100					
Dichlorodifluoromethane	<1	µg/l	TM208	<1					
Chloromethane	<1	µg/l *	TM208	<1					
Vinyl chloride	<1	µg/l *	TM208	<1					
Bromomethane	<1	µg/l *	TM208	<1					
Chloroethane	<1	µg/l *	TM208	<1					
Trichlorofluoromethane	<1	µg/l *	TM208	<1					
1,1-Dichloroethene	<1	µg/l *	TM208	<1					
Carbon disulphide	<1	µg/l *	TM208	<1					
Dichloromethane	<3	µg/l *	TM208	<3					
Methyl tertiary butyl ether (MTBE)	<1	µg/l *	TM208	<1					
trans-1,2-Dichloroethene	<1	µg/l *	TM208	<1					

LIQUID

			Customer Sample Ref.	RT01-W					
			Depth (m)	12.5					
			Sample Type	LIQUID					
			Date Sampled	17/11/2015					
			Date Received	26/11/2015 07:00					
			SDG Ref	151126-71					
			Lab Sample No.(s)	12517729					
			AGS Reference						
Component	LOD	Units	Method						
1,1-Dichloroethane	<1	µg/l *	TM208	<1					
cis-1,2-Dichloroethene	<1	µg/l *	TM208	<1					
2,2-Dichloropropane	<1	µg/l	TM208	<1					
Bromochloromethane	<1	µg/l *	TM208	<1					
Chloroform	<1	µg/l *	TM208	<1					
1,1,1-Trichloroethane	<1	µg/l *	TM208	<1					
1,1-Dichloropropene	<1	µg/l *	TM208	<1					
Carbontetrachloride	<1	µg/l *	TM208	<1					
1,2-Dichloroethane	<1	µg/l	TM208	<1					
Benzene	<1	µg/l *	TM208	<1					
Trichloroethene	<1	µg/l *	TM208	<1					
1,2-Dichloropropane	<1	µg/l *	TM208	<1					
Dibromomethane	<1	µg/l *	TM208	<1					
Bromodichloromethane	<1	µg/l *	TM208	<1					
cis-1,3-Dichloropropene	<1	µg/l *	TM208	<1					
Toluene	<1	µg/l *	TM208	<1					
trans-1,3-Dichloropropene	<1	µg/l *	TM208	<1					
1,1,2-Trichloroethane	<1	µg/l *	TM208	<1					
1,3-Dichloropropane	<1	µg/l *	TM208	<1					
Tetrachloroethene	<1	µg/l *	TM208	<1					
Dibromochloromethane	<1	µg/l *	TM208	<1					
1,2-Dibromoethane	<1	µg/l *	TM208	<1					
Chlorobenzene	<1	µg/l *	TM208	<1					
1,1,1,2-Tetrachloroethane	<1	µg/l *	TM208	<1					
Ethylbenzene	<1	µg/l *	TM208	<1					
m,p-Xylene	<1	µg/l *	TM208	<1					
o-Xylene	<1	µg/l *	TM208	<1					
Styrene	<1	µg/l *	TM208	<1					
Bromoform	<1	µg/l *	TM208	<1					
Isopropylbenzene	<1	µg/l *	TM208	<1					
1,1,2,2-Tetrachloroethane	<1	µg/l	TM208	<1					
1,2,3-Trichloropropane	<1	µg/l *	TM208	<1					
Bromobenzene	<1	µg/l *	TM208	<1					
Propylbenzene	<1	µg/l *	TM208	<1					
2-Chlorotoluene	<1	µg/l *	TM208	<1					
1,3,5-Trimethylbenzene	<1	µg/l *	TM208	<1					
4-Chlorotoluene	<1	µg/l *	TM208	<1					
tert-Butylbenzene	<1	µg/l *	TM208	<1					
1,2,4-Trimethylbenzene	<1	µg/l *	TM208	<1					
sec-Butylbenzene	<1	µg/l *	TM208	<1					
4-iso-Propyltoluene	<1	µg/l *	TM208	<1					
1,3-Dichlorobenzene	<1	µg/l *	TM208	<1					
1,4-Dichlorobenzene	<1	µg/l *	TM208	<1					
n-Butylbenzene	<1	µg/l *	TM208	<1					
1,2-Dichlorobenzene	<1	µg/l	TM208	<1					
1,2-Dibromo-3-chloropropane	<1	µg/l	TM208	<1					
1,2,4-Trichlorobenzene	<1	µg/l *	TM208	<1					
Hexachlorobutadiene	<1	µg/l *	TM208	<1					
tert-Amyl methyl ether (TAME)	<1	µg/l *	TM208	<1					
Naphthalene	<1	µg/l *	TM208	<1					
1,2,3-Trichlorobenzene	<1	µg/l *	TM208	<1					
1,3,5-Trichlorobenzene	<1	µg/l	TM208	<1					

Groundwater and Ground Gas Monitoring Form

VISIT 1

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	10/11/2015
Start Time	10:00:00
End Time	11:00:00

Operator	RH
Pressure at Start mB	1015
Pressure at End mB	1015
Weather Conditions	Cloudy, windy, intermittent sunshine
Temperature oC	15

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	1007.00	0	0	0.5	0.6	19.5	19.7	0	0	0	Dry	3.00		
2	WS03	1.00	3.00	0.0	0.0	1008.00	0	0	0.1	0.2	20.4	20.3	0	0	0	Dry	2.90		
3	RT01	2.00	15.00	0.0	0.0	1007.00	0	0	0.5	0.2	19.7	20.0	0	0	0	12.3	14.70		No
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			

COMMENTS & GROUND CONDITIONS: WS01 inaccessible due to vehicle parked over borehole cover

Groundwater and Ground Gas Monitoring Form

VISIT 2

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	17/11/2015
Start Time	10:15:00
End Time	11:45:00

Operator	RH
Pressure at Start mB	998
Pressure at End mB	998
Weather Conditions	Cloudy with heavy showers
Temperature oC	10

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	991.00	0	0	0.1	0.1	19.4	20.2	0	0	0	Dry	3.00		
2	WS03	1.00	3.00	0.0	0.0	991.00	0	0	0.1	0.1	19.8	20.2	0	0	0	Dry	2.90		
3	RT01	2.00	15.00	0.0	0.0	991.00	0	0	0.1	0.1	19.9	20.2	0	0	0	12.16	14.70		Yes
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COMMENTS & GROUND CONDITIONS: WS01 Not accessible due to car parked over borehole cover.

Groundwater and Ground Gas Monitoring Form

VISIT 3

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	24/11/2015
Start Time	10:04:00
End Time	11:00:00

Operator	RH
Pressure at Start mB	1009
Pressure at End mB	1009
Weather Conditions	Rain
Temperature oC	8

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	1002.00	0	0	0.1	0.6	19.2	19.5	0	0	0	Dry	3.00		
2	WS03	1.00	3.00	0.0	0.0	1002.00	0	0	0.4	0.3	18.9	19.7	0	0	0	Dry	2.90		
3	RT01	2.00	15.00	0.0	0.0	1002.00	0	0	0.6	0.4	19.4	19.7	0	0	0	12.15	14.70		
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COMMENTS & GROUND CONDITIONS: WS01 Not accessible due to car parked over borehole cover.

Groundwater and Ground Gas Monitoring Form

VISIT 4

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	01/12/2015
Start Time	10:00:00
End Time	10:45:00

Operator	RH
Pressure at Start mB	1017
Pressure at End mB	1017
Weather Conditions	Cloudy
Temperature oC	11

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	1009.00	0	0	0.6	0.6	19.6	19.2	0	0	0	Dry	3.00		
2	WS03	1.00	3.00	0.0	0.0	1009.00	0	0	0.6	0.2	19.2	19.9	0	0	0	Dry	2.90		
3	RT01	2.00	15.00	0.0	0.0	1009.00	0	0	0.1	0.6	19.3	19.0	0	0	0	12.42	14.70		
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COMMENTS & GROUND CONDITIONS: WS01 Not accessible due to car parked over borehole cover.

Groundwater and Ground Gas Monitoring Form

VISIT 5

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	08/12/2015
Start Time	10:10:00
End Time	11:00:00

Operator	RH
Pressure at Start mB	1016
Pressure at End mB	1016
Weather Conditions	Cloudy, intermittent sunshine
Temperature oC	11

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	1009.00	0.0	0.0	0.4	0.6	19.4	19.0	0.0	0.0	0.0	Dry	2.98		
2	WS03	1.00	3.00	0.0	0.0	1009.00	0.0	0.0	0.2	0.6	19.0	19.9	0.0	0.0	0.0	Dry	2.62		
3	RT01	2.00	15.00	0.0	0.0	1009.00	0.0	0.0	0.5	0.3	19.6	19.9	0.0	0.0	0.0	12.08	14.70		
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COMMENTS & GROUND CONDITIONS: WS01 Not accessible due to car parked over borehole cover.

Groundwater and Ground Gas Monitoring Form

VISIT 6

Site Name	Jackson's Row
Client	Zerum Consult Limited
Job No.	70010925
Date	15/12/2015
Start Time	10:05:00
End Time	10:45:00

Operator	RH
Pressure at Start mB	1013
Pressure at End mB	1013
Weather Conditions	Cloudy
Temperature oC	9

Equipment	Serial No.	Calibrated
Gas Analyser		
Dipmeter		
Interface Probe		
PID		

	Borehole	Response Zone (m)		Gas Flow (l/hr)		Borehole Pressure	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Other Gasses (ppmV)			Depth to Water	Depth to Base	Thickness of product	Sampled?
		Top	Bottom	Initial	Steady	(mB)	Initial	Steady	Initial	Steady	Initial	Steady	PID	H2S	CO	(m)	(m)	(mm)	(Y/N)
1	WS02	1.00	3.00	0.0	0.0	1008.00	0.0	0.0	0.5	0.5	19.2	19.8	0.0	0.0	0.0	Dry	2.98		
2	WS03	1.00	3.00	0.0	0.0	1007.00	0.0	0.0	0.5	0.2	19.6	20.0	0.0	0.0	0.0	Dry	2.62		
3	RT01	2.00	15.00	0.0	0.0	1008.00	0.0	0.0	0.2	0.5	19.3	19.1	0.0	0.0	0.0	12.01	14.70		
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COMMENTS & GROUND CONDITIONS: WS01 Not accessible due to car parked over borehole cover.

Appendix 2.4

AIR QUALITY ASSESSMENT

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Jackson's Row Developments Ltd

ST MICHAEL'S, JACKSON'S ROW, MANCHESTER

Air Quality Assessment

70010278-411
NOVEMBER 2017

PUBLIC

Jackson's Row Developments Ltd

ST MICHAEL'S, JACKSON'S ROW, MANCHESTER

Air Quality Assessment

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70010278-411
OUR REF. NO. 70010278-411

DATE: NOVEMBER 2017

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft	PM review	First Issue	Second Issue
Date	06/10/2017	23/10/2017	08/11/2017	30/11/2017
Prepared by	John Harrington	Sally Newbold	John Harrington	John Harrington
Signature				
Checked by	Gabor Antony		Gabor Antony	Gabor Antony
Signature				
Authorised by	Gabor Antony		Gabor Antony	Gabor Antony
Signature				
Project number	70010278-411	70010278-411	70010278-411	70010278-411
Report number	001	002	003	004
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EXECUTIVE SUMMARY

WSP has been commissioned by Jackson's Row Development Ltd to carry out an assessment of the potential air quality impacts arising from the Proposed Scheme at Jackson's Row, Manchester. It is proposed to develop the Application Site to construct two buildings, including one tower. The proposals include provision for two hotels, leisure use, office space, residential use and a synagogue along with public realm space and associated infrastructure.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the Proposed Scheme. For both phases, the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these proposed.

The assessment of construction phase impacts associated with fugitive dust and fine particulate matter (PM_{10} and $PM_{2.5}$) emissions has been undertaken in line with the relevant Institute of Air Quality Management (IAQM) guidance. This identified that there is a Medium Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases would be significantly reduced. The residual effects of the construction phase on air quality are considered to be negligible.

The assessment of the potential air quality impacts associated with traffic generated by the operational phase of the Proposed Scheme has been completed in line with published methodologies and technical guidance. The pollutants considered in this part of the assessment were nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$.

An assessment of the potential for future residents of the Proposed Scheme to be exposed to poor air quality, given the site's location in an Air Quality Management Area, has also been undertaken.

The results show that the Proposed Scheme would cause a negligible increase in concentrations of NO_2, PM_{10} and $PM_{2.5}$. According to the assessment significance criteria, the residual effects of the Proposed Scheme are therefore negligible. Concentrations of all pollutants were below the relevant UK Air Quality Strategy (AQS) objectives at the Application Site, and therefore future residents will not be exposed to poor air quality.

Based on the assessment results, it is considered that the Proposed Scheme complies with national, regional and local policy for air quality, and air quality is considered to be a low priority within the planning process.

1 INTRODUCTION

1.1.1. WSP has been commissioned by Jackson's Row Developments Ltd to carry out an assessment of the potential air quality impacts arising from the Proposed Scheme at Jackson's Row, Manchester, hereafter referred to as the 'Proposed Scheme or 'Application Site'.

1.1.2. The Application Site lies within the administrative boundary of Manchester City Council (MCC) and is situated to the north of the A34 and the east of the A56. It is bordered to the north by Jackson's Row, to the east by Southmill Street and to the south by Bootle Street and covers the region of 0.56 Hectares (ha) of land. It is proposed to develop the Application Site to construct two buildings, including one tower. The proposals include provision for two hotels, leisure use, office space, residential use and a synagogue along with public realm space and associated infrastructure.

1.1.3. An energy centre is included in the proposals; however a final design for the plant was not available to assess the impact of any boilers or CHP units. There is also the potential for the Proposed Scheme to join an existing Manchester heat network. Like other combustion technologies, these elements would impact on air quality, though this would vary depending on the technology and fuel used, the size and design of the plant and other factors. This will be assessed at a later post planning design stage.

1.1.4. The report presents the findings of an assessment of the potential air quality impacts of the Proposed Scheme during both the construction and operational phases. For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these described.

1.1.5. This report also considers the potential exposure of future residents of the Proposed Scheme to local pollution concentrations given the Application Site is located in an urban setting surrounding by heavily, slow moving trafficked roads and in Air Quality Management Area.

1.1.6. A glossary of terms used in this report is provided in **Appendix A**.

2 LEGISLATION, POLICY AND GUIDANCE

2.1 AIR QUALITY LEGISLATION & POLICY

2.1.1. A summary of the relevant air quality legislation and policy is provided below.

UK AIR QUALITY STRATEGY

2.1.2. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[1]. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.

2.1.3. The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs). The standards and objectives for the pollutants considered in this assessment are given in **Appendix B**.

2.1.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.

2.1.5. The air quality objectives are medium-term policy based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

2.1.6. For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.

2.1.7. The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM_{10}. Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area. However, there is no statutory objective given in the AQS for $PM_{2.5}$ at this time.

AIR QUALITY REGULATIONS

2.1.8. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM).

2.1.9. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:

"…the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…"

2.1.10. The Air Quality Standards (Amendment) Regulations 2016[4] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM_{10}, $PM_{2.5}$ and NO_2. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3.

1 Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)
2 The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928
3 The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043
4 The Air Quality Standards (Amendment) Regulations 2016- Statutory Instrument 2016 No. 1184

ENVIRONMENTAL PROTECTION ACT 1990 – CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

2.1.11. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:

"Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance"; and

"Any accumulation or deposit which is prejudicial to health or a nuisance"

2.1.12. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.1.13. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

ENVIRONMENT ACT 1995

2.1.14. Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

2.2 PLANNING POLICY

2.2.1. A summary of the national and local planning policy relevant to the Proposed Scheme and air quality is provided below.

NATIONAL PLANNING POLICY

National Planning Policy Framework

2.2.2. The Government's overall planning policies for England are described in the National Planning Policy Framework[5]. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:

'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'

One of the 12 core planning principles in the NPPF is that planning should 'contribute to conserving and enhancing the natural environment and reducing pollution.'

2.2.3. In relation to air quality, the following paragraphs in the document are relevant:

- Paragraph 109, which states *'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..';*
- Paragraph 110, which states *'In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity values, where consistent with other policies in this Framework';*
- Paragraph 122, which states *'…local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities'';*

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

- Paragraph 124, which states *'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'; and*
- Paragraph 203, which states *'Local Planning authorities should consider where otherwise unacceptable development could be made acceptable though the use of conditions or planning obligations. Planning Obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.'*

LOCAL PLANNING POLICY

Manchester City Council Core Strategy

2.2.4. In this document[6], Policy EN 16 Air Quality 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 impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas'.

Greater Manchester Spatial Framework

2.2.5. The draft Greater Manchester Spatial Framework, published in 2016 and currently undergoing review and consultation, provides the spatial planning context that the associated Greater Manchester councils will use to address sites for homes and employment as well as the environmental capacity of the region. Within this document, there is one policy relevant to air quality:

Policy GM17: Major improvements will be secured in air quality across Greater Manchester, helping to minimise the detrimental impacts on human health. There will be a particular focus on tackling air pollution in the locations where most people live.

The emission of air pollutants will be minimised by:

1. *Locating and designing new development so as to minimise the need to travel and maximise the use of walking, cycling and public transport for any trips;*
2. *Influencing individual travel behaviour, including through personal travel planning, especially as part of major developments, improved travel information and implementing integrated and smart public transport fares and ticketing;*
3. *Identifying employment sites that enable the movement of a higher proportion of freight by rail and water;*
4. *Reducing the use of polluting vehicles, potential through the introduction of Clean Air Zones in the areas with lowest air quality and travel demand management measures;*
5. *Stimulating the uptake of low-emission vehicles, including through a significant increase in the provision of electric vehicle charging points in new developments, the expansion of the public charging network and bus franchising contracts;*
6. *Managing the highway network so as to minimise congestion and smooth traffic flow;*
7. *Supporting the development of urban distribution centres and urban consolidation centres served by ultra-low emission vehicles;*
8. *Delivering major investment in improvements to walking, cycling, public transport and sustainable freight infrastructure, including through the use of planning obligations and the community infrastructure levy; and*

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

9. *Carefully controlling developments that would generate significant point source pollution such as some types of industrial activity and energy generation;*
10. *The removal of pollutants from the air will be significantly increased by:*
11. *Enhancing the green infrastructure network across Greater Manchester, including through a major programme of tree planting and bog restoration; and*
12. *Encouraging the use of building materials that capture pollutants from the air.*

Planning applications will be determined in accordance with the most recent development and planning control guidance published jointly by the Institute of Air Quality Management and Environmental Protection UK and the most recent IAQM Guidance on the Assessment of Dust from Demolition and Construction subsequent updates.'

2.2.6. Reference has been made to these policies by assessing impacts as a result of the proposals.

2.3 GUIDANCE

2.3.1. A summary of the publications referred to in the undertaking of this assessment is provided below.

LOCAL AIR QUALITY MANAGEMENT REVIEW AND ASSESSMENT TECHNICAL GUIDANCE

2.3.2. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work[7]. This guidance, referred to in this document as LAQM.TG16, has been used where appropriate in the assessment presented herein.

LAND-USE PLANNING & DEVELOPMENT CONTROL: PLANNING FOR AIR QUALITY

2.3.3. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[8] that offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.

GUIDANCE ON THE ASSESSMENT OF DUST FROM DEMOLITION AND CONSTRUCTION

2.3.4. This document[9] published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

NATIONAL PLANNING PRACTICE GUIDANCE – AIR QUALITY

2.3.5. This guidance[10] provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality, and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality is taken into account by Local Authorities in both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision.

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7 Defra (2016) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG16

8 Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

9 Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

10 Department of Communities and Local Government (DCLG) (March 2014). National Planning Practice Guidance

EMISSIONS OF NITROGEN OXIDES FROM MODERN DIESEL VEHICLES AND CALCULATOR USING REALISTIC EMISSIONS FOR DIESELS (CURED)

2.3.6. This document[11], prepared by Air Quality Consultants (AQC), considers recent evidence of on-road emissions performance and reviews it within the context of Defra's Emission Factor Toolkit[12] which assumes a reduction in vehicle emissions year on year due to future improvements in vehicle technology. In recent years, there has been evidence (ambient measurements) to suggest that vehicle emissions for oxides of nitrogen (NO_x) are not reducing at the rates assumed within the EfT attributable to the on-road performance of some modern diesel vehicles. Following the publication of their report, AQC launched a corresponding tool[13] for use within air quality modelling. This tool, the Calculator Using Realistic Emissions for Diesels (CURED) provides more realistic NOx emission factors for use within air quality modelling based on the reasonable worst-case sensitivity for future year modelling described within the AQC report.

DERIVING BACKGROUND CONCENTRATIONS OF NO_X AND NO_2

2.3.7. This document[14] produced by AQC provides a methodology for calibrating Defra background concentrations of NO_x and NO_2 utilising factors to uplift concentrations. The document also provides a methodology for projecting future background concentrations of NO_x and NO_2 for use within air quality modelling, when using emission factors from CURED.

[11] Air Quality Consultants, 2016. Emissions of Nitrogen Oxides from Modern Diesel Vehicles.

[12] Defra, 2017. Emissions Factor Toolkit. [online] <Available at http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factor-toolkit.html> [Accessed 25.09.2017]

[13] Air Quality Consultants, 2016. Calculator Using Realistic Emissions for Diesels

[14] Air Quality Consultants, 2016. Deriving Background Concentrations of NO_x an NO_2 – August 2016 Update.

3 SCOPE AND METHODOLOGY

3.1 SCOPE

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

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

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

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

3.1.3. In addition, the potential exposure of future residents of the Proposed Scheme to poor air quality will also be considered.

3.1.4. It should be noted that within the proposals there is the provision for an energy centre. However a final design regarding any potential boilers or CHP unit have not been provided. There is also the potential for the Proposed Scheme to join an existing Manchester heat network. Like other combustion technologies, these elements would impact on air quality, though this would vary depending on the technology and fuel used, the size and design of the plant and other factors. This should be assessed at a later post planning design stage.

3.1.5. It should also be noted that the Proposed Scheme includes a 136-space underground car park. Through discussion with the scheme architect it has been determined that the extract will be more than 20m away from a relevant receptor. As such, emissions associated with the car park ventilation have not been considered further in this assessment in accordance with EPUK/IAQM guidance.

3.2 METHODOLOGY

3.2.1. The following methodology has been discussed and agreed with the Environmental Health Officer (EHO) at MCC on the 9th October 2017.

CONSTRUCTION PHASE

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

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

3.2.4. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using: the relevant assessment methodology

published by the IAQM; the available information for this phase of the Proposed Scheme provided by the Project Team; and, professional judgement.

3.2.5. The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in **Appendix C.**

3.2.6. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:

- The number of type of construction traffic and plant likely to be generated by this phase of the Proposed Scheme;
- The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
- The likely duration of the construction phase and the nature of the construction activities undertaken.

OPERATIONAL PHASE

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

3.2.8. For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Scheme, the dispersion model ADMS Roads (version 4.1.1.0) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.

3.2.9. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. 2015 meteorological data used in the model was obtained from the observation station at Manchester Airport (Ringway) meteorological station. This station is considered to provide representative data for the assessment.

3.2.10. A summary of traffic data and pollutant emission factors used in the assessment can be found in **Appendix D**. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (km/h) and the percentage of (Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG16, and using professional judgement.

3.2.11. For the assessment, three scenarios were modelled, as follows:

- 2015 – Model Verification and Baseline;
- 2022 – Opening Year without Development;
- 2022 – Opening Year with Development.

3.2.12. 2015 is the most recent year for which monitoring data and meteorological data are available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2022 is the anticipated opening year of the Proposed Development.

3.2.13. The traffic flows for the 'without development' scenarios include flows for committed developments in the locality of the Application Site but do not include any contribution to road traffic from the Proposed Scheme itself. The traffic flows for the 'with development' scenarios contributions to road traffic from the Proposed Scheme and the nearby committed developments.

VEHICLE EMISSION FACTORS

3.2.14. Vehicle emission factors for use in the assessment have been obtained using Emission Factor Toolkit (EFT) version 7.0[15] (published in July 2016) available on the Defra website. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2013 and 2030. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time.

3.2.15. Currently there is some uncertainty over how representative the future EFT emission factor predictions are, particularly for nitrogen oxides (NO_x). To address this, Air Quality Consultants (AQC) Ltd's 'Calculator Using Realistic Emissions for Diesels' (CURED) V2A[16] has been used. The CURED tool has been developed to address the uncertainties associated with future emission estimates for diesel vehicles and is considered to provide more realistic NO_x emission factors than the EFT.

3.2.16. The results presented in this report have been calculated using the CURED V2A NO_x emission factors and EFT version 7 PM_{10} and $PM_{2.5}$ emission factors.

SELECTION OF BACKGROUND CONCENTRATIONS

3.2.17. Background air pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website[17], where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2013 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources.

3.2.18. AQC Ltd has also published a methodology for deriving more realistic future background concentrations of NO_x and NO_2 for used with the CURED emission factors. AQC produced this methodology as they had found that the Defra background maps tend to under predict concentrations of NO_x and NO_2, again as a result of disparity relating to the on-road emissions performance of modern diesel vehicles. The methodology calibrates the background concentrations against more recent monitoring data from Automatic Urban and Rural Network sites, to provide more realistic indications of background concentrations, as opposed to the overly optimistic Defra mapped backgrounds.

3.2.19. For the purposes of the assessment, the 2015 and 2022 background NO_x concentrations have been calibrated as per AQC's methodology[18].

3.2.20. Background concentrations for 2015 and 2022 have been utilised within the assessment for particulate matter (PM_{10} and $PM_{2.5}$) in the respective scenarios considered.

MODEL VERIFICATION AND RESULT PROCESSING

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

3.2.22. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain

[15] Emission Factor Toolkit. Available at http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Accessed on 25.09.17].

[16] Calculator Using Realistic Emissions for Diesels (August 2016). Available at http://www.aqconsultants.co.uk/News/August-2016/Updated-CURED-to-V2A.aspx [Accessed on 25.09.17].

[17] Defra, 2017. Background Concentrations. [Online] <Available at https://uk-air.defra.gov.uk/data/laqm-background-home> [Accessed on 25.09.17].

[18] AQC, 2016. CURED Methodology. [Online] <Available at http://www.aqconsultants.co.uk/News/August-2016/Updated-CURED-to-V2A.aspx> [Accessed 25.09.17].

greater confidence in the final results, and was carried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG16.

3.2.23. Details of the verification factor calculations are presented in **Appendix E**. A factor of **2.34** was obtained during the verification process, which indicated that the model was under-predicting. This factor was applied to the model road-NO_x (oxides of nitrogen) outputs prior to conversion to annual mean NO_2 concentrations utilising the NO_x to NO_2 calculator (version 5.1, released June 2016) provided by Defra[19]. The NO_2 diffusion tube monitoring results provided by MCC were subsequently used to derive an indicative baseline annual mean NO_2 concentration for each site in the vicinity of the Proposed Scheme. Reference should be made to Figure 1 for a graphical representation of the diffusion tube monitoring locations within the assessment extents.

3.2.24. As local roadside monitoring data are not available for PM_{10} or $PM_{2.5}$, the modelled road-PM_{10} and road-$PM_{2.5}$ components have been adjusted by the verification factor obtained for NO_x before adding to the appropriate background concentration. The number of days with PM_{10} concentrations greater than 50µg/m^3 was then estimated using the relationship with the annual mean concentration described in LAQM.TG16.

3.2.25. Once processed, the predicted concentrations were compared against the relevant AQS objective levels for NO_2, PM_{10} and $PM_{2.5}$ set out in **Appendix B.**

ASSESSMENT OF IMPACTS DUE TO EMISSIONS GENERATED BY THE PROPOSED ENERGY CENTRE

3.2.26. At the time of assessment, the proposals for the Energy Centre have not been finalised. Consequently, the impact of emissions from such plant on local air quality has not been assessed within this report. This should be assessed at a later post planning stage, once the design is finalised.

SELECTION OF SENSITIVE RECEPTORS

3.2.27. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Scheme. These will include locations sensitive to an increase in dust deposition and PM_{10} exposure as a result of on-site construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Scheme.

Construction Phase

3.2.28. The IAQM assessment is undertaken where there are: 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

Operational Phase

3.2.29. In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. Box 1.1 of LAQM.TG16 provides examples of the locations where the air quality objectives should/should not apply.

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

[19] Defra NOx to NO2 Calculator. Available at: http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxsector [Accessed 25/09/2017].

3.2.31. The locations of the assessment receptors are shown on **Figure 2** and listed in **Table 1**.

Table 1 - Receptor Locations Used in this Assessment

Receptor	Description	Grid Reference (m, OS Grid Reference)		Height Above Ground Level (m)
		X	Y	
1	Slug and Lettuce	383773.1	398082.8	1.5
2	Dutton	383807.5	398082.8	1.5
3	Café Nero	383579.9	398080.1	1.5
4	Byron	383654.0	398237.6	1.5
5	Starbucks	383890.8	398154.2	1.5
6	Waterhouse	383960.9	398080.1	1.5
7	Arora	384054.9	397975.6	2.5
8	Midland	383845.9	397900.2	1.5
9	Brewdog	383742.7	397947.9	1.5
10	Watson Street	383633.4	397915.5	1.5
11	Watson Street	383633.4	397915.5	7.5
12	Revolution de Cuba	383570.7	398004.7	1.5
PWNW	Proposed West Building North West	383622.4	398051.0	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PWNE	Proposed West Building North East	383666.4	398043.0	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PWSE	Proposed West Building South East	383659.0	398004.0	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PWSW	Proposed West Building South West	383615.0	398012.7	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PENW	Proposed East Building North West	383678.5	398040.9	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PENE	Proposed East Building North East	383733.1	398022.4	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PESE	Proposed East Building South East	383726.5	397990.9	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PESW	Proposed East South West	383670.0	398002.3	1.5, 6.75, 9.75, 12.75, 15.75, 18.75
PWTN	Proposed West Building Tower North	383641.9	398040.4	21.75 – 123.75
PWTE	Proposed West Building Tower East	383651.4	398025.6	21.75 – 123.75
PWTS	Proposed West Building Tower South	383637.2	398014.8	21.75 – 123.75
PWTW	Proposed West Building Tower West	383628.1	398030.9	21.75 – 123.75

3.2.32. To complete the exposure assessment, pollution concentrations were also predicted at a number of locations within the Proposed Scheme. The receptors have been positioned at the midpoint of each floor of the Proposed Scheme.

3.3 SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

3.3.1. The IAQM assessment methodology recommends that significance criteria is only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

3.3.2. For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Application Site on local concentrations of NO_2 and particulate matter, the significance of residual effects have been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.

OPERATIONAL PHASE

3.3.3. The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Scheme once operational.

3.3.4. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 2**.

Table 2 - Impact Descriptors for Individual Receptors

Long Term Average Concentration At Receptors In Assessment Year	% Change In Concentration Relative to air quality assessment Level (AQAL)			
	1	2-5	6-10	>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

Notes
AQAL = air quality assessment Level, which for this assessment related to the UK Air Quality Strategy objectives.
Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.
When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase.
Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

3.3.5. The EPUK/IAQM guidance notes that the criteria in **Table 2** should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

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

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

3.3.7. The EPUK/IAQM guidance says that *'Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.'*

3.4 LIMITATIONS & ASSUMPTIONS

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

3.4.2. In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG16. As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

4 BASELINE CONDITIONS

4.1 MCC'S REVIEW & ASSESSMENT OF AIR QUALITY

4.1.1. The Greater Manchester Combined Authority (GMCA), of which MCC is a part, have designated one AQMA within their administrative area as a consequence of the Review and Assessment work carried out by the councils that comprise the GMCA. The site lies within the AQMA designated due to exceedances of the AQS objectives for NO_2.

4.2 LOCAL EMISSION SOURCES

4.2.1. The Application Site is located in area where air quality is mainly influenced by emissions from road transport using the A34 Peter Street and the A56 Deansgate.

4.2.2. There are no industrial pollution sources identified in the immediate vicinity of the site that would influence the local air quality.

4.3 BACKGROUND AIR QUALITY DATA

4.3.1. **Table 3** summarises the background pollutant concentrations of NO_2, PM $_{10}$ and $PM_{2.5}$ for 2015 and 2022 that were utilised in the assessment. All of the annual mean background concentrations are well below the relevant objectives.

Table 3 - Background Concentrations (µg/m^3)

Grid Square (Centre on O.S. Grid Reference)	NO_2 (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	2015	2022*	2015	2022	2015	2022
383500, 397500	31.3	26.8	17.1	16.2	12.1	11.2
383500, 398500	33.8	29.5	17.1	16.0	12.3	11.2
384500, 397500	34.1	29.1	18.2	17.2	12.8	11.8

*Concentrations adjusted in accordance with CURED methodology.

4.4 LOCAL AUTHORITY AIR QUALITY MONITORING DATA

4.4.1. Concentrations of NO_2 measured by passive diffusion tube monitors in the vicinity of the Site by MCC are provided in **Table 4**.

Table 4 - Local Authority Air Quality Monitoring Data

Site Name	Site Type	Annual Mean NO_2 Concentrations (µg/m^3)*				
		2012	2013	2014	2015	2016
MAN12 – Town Hall	Urban Background	36.30	32.26	33.82	31.22	-
MAN24 – Princess Street	Kerbside	**50.78**	**47.05**	**50.32**	**55.24**	**45.30**
MAN70 – Liverpool Road	Urban Centre	**45.99**	**41.88**	39.77	**40.52**	**-**

*Manchester City Council, 2016

4.4.2. Annual mean NO_2 concentrations have approached or exceeded the AQ objective of 40ug/m^3 at two of the sites. Overall, there is no clear trend in measured concentrations.

4.5 SUMMARY

4.5.1. Air quality along nearby roads in the vicinity of the Site is relatively poor as measured by the diffusion tube monitors at Princess Street and Liverpool Road. This is perhaps due to slow moving city traffic around a busy area of the city. Measured background concentrations of NO_2 at the Town Hall site (closest to the Proposed Scheme) are close to those predicted in the Defra background maps and well below the annual objectives.

4.5.2. For model verification purposes, in order to represent a robust approach, the higher 2015 values have been used. This is due to the construction of a major infrastructure project within Manchester city centre close to the Princess Street diffusion tube which may have affected results.

5 ASSESSMENT OF IMPACTS

5.1 CONSTRUCTION PHASE

DUST AND PM_{10} ARISING FROM ON-SITE ACTIVITIES

5.1.1. Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Securing of the Site and the implementation of temporary fencing;
- Creation of internal access, haulage routes; parking and traffic measures;
- Creation of construction compounds;
- Site clearance, including vegetation and tree removal and removal of existing below ground services and structures;
- Demolition of existing buildings;
- Earthworks and surface re-profiling/sub-base works to obtain required finished floor levels;
- Foundation construction (at this stage it is assumed that raft foundations would be required);
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Site (including excavators and dumper trucks);
- Use of crushing and screening equipment/plant;
- Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
- Internal and external finishing and refurbishment; and
- Site landscaping after completion.

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

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

5.1.3. The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition, earthworks, construction and trackout. The findings of the assessment are presented below.

Demolition

5.1.4. Total volume of buildings to be demolished on site is between 20,000m^3 and 50,000m^3, with potentially dusty construction material, and with demolition activities occurring between 10m and 20m above ground level. Therefore, the potential dust emission magnitude is considered to be **medium** for demolition activities.

Earthworks

5.1.5. The total area of the Application Site is between 2,500m^2 and 10,000m^2 which falls within the IAQM range for medium sites. It is expected that between 5 and 10 heavy earth moving vehicles may be present on site at any one time. Therefore, the potential dust emission magnitude is considered to be **medium** for construction activities.

Construction

5.1.6. The total volume of buildings to be constructed on the Application Site will be more than 100,000m^3 with site concrete batching and sand blasting activities being undertaken. Therefore, the potential dust emission magnitude is considered to be **large** for construction activities.

Trackout

5.1.7. Some information on the number of Heavy Duty Vehicles (HDVs) associated with this phase of the Proposed Scheme has been provided. It is estimated that there will be between 10-50 outward HDV movements in any one day. This is relatively low in comparison with flows on surrounding roads. There is no unpaved road surface due to the existing concrete paving and road nearby. It is considered that the potential dust emission is **medium** for trackout.

5.1.8. **Table 5** provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 5 - Potential Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Medium
Construction Activities	Large
Trackout	Medium

ASSESSMENT OF THE SENSITIVITY OF THE STUDY AREA

5.1.9. A wind rose generated from the meteorological data used for the dispersion modelling of operational phase impacts is provided in **Appendix F.** This shows that the prevailing wind direction is from the south and west. Therefore, receptors located to north and east of the Application Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

5.1.10. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The majority of the surrounding area is comprised of office units, bars and restaurants and a large public square to the north-east. There is one residential receptor within 20m of the Application Site boundary; however this is at a second floor location. This receptor is unlikely to be affected by trackout dust. There are no other residential receptors along potential trackout routes.

5.1.11. Taking the above into account and following IAQM assessment methodology, the sensitivity of the area to changes in dust and PM_{10} has been derived for each of the construction activities considered. The results are shown in **Table 6**.

Table 6 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Low
Human Health	Low	Low	Low	Low

RISK OF IMPACTS

5.1.12. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. **Table 7** below provides a summary of the risk of dust impacts for the Proposed Scheme. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 7 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Low
Human Health	Low	Low	Low	Low

CONSTRUCTION VEHICLES AND PLANT

5.1.13. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the Site access. It is anticipated that construction traffic will access the site via Deansgate and Jackson's Row and egress via Southmill Street and John Dalton Street, back onto Deansgate thus eliminating reversing of vehicles on Site. Due to the size of the Site, it is considered likely that the construction traffic (approximately 25 HDV AADT) will be low in comparison to the existing traffic flows on these roads.

5.1.14. Final details of the exact plant and equipment likely to be used on Site will be determined by the appointed contractor but are considered likely to comprise a range of vehicles tracked excavators, diesel generators, and cranes. The number of plant and their location within the Site are likely to be variable over the construction period.

5.1.15. Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore considered to be of **negligible** significance according to the significance criteria published by EPUK/IAQM.

5.2 OPERATIONAL PHASE

5.2.1. Full results of the dispersion modelling are presented in **Appendix G** and a summary is provided below.

ANNUAL MEAN NO_2 CONCENTRATIONS

5.2.2. The results of the assessment show that in the 2015 baseline concentrations exceed the annual mean objective at most non-sensitive locations chosen in the assessment. The highest predicted concentration is 45.9µg/m^3 at Receptor 6 (The Waterhouse). The highest predicted concentration at relevant sensitive receptors was 33.1µg/m^3 Receptor 11 (Watson Street). These results agree with the conclusions of the Review and Assessment work undertaken by MCC, which concluded that exceedances of the objective for this pollutant may occur in their areas.

5.2.3. By 2022, the opening year of the Proposed Scheme, concentrations at the specific locations chosen are all well below the relevant objectives. Concentrations at the considered sensitive receptor location on Watson Street are also below the relevant objective. The highest concentration is predicted at Receptor 6 (The Waterhouse), a non-relevant location where the concentration is 38.0µg/m^3 in the 'Without Development' scenario and 38.3µg/m^3 in the 'With Development' scenario.

5.2.4. The highest concentration at relevant sensitive receptors (Receptor 11 - Watson Street) is 28.1µg/m^3 in the 'Without Development' scenario and 28.2µg/m^3 in the 'With Development' scenario, which are well below the annual mean objective.

5.2.5. The predicted changes in annual mean NO_2 at nine of the selected existing receptors were 1% of the relevant AQS objective. Concentrations at the remaining three selected existing receptors were <0.5% of the relevant objective. Therefore, in accordance with the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Scheme on annual mean NO_2 concentrations is considered to be **negligible**.

HOURLY MEAN NO_2 CONCENTRATIONS

5.2.6. The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Scheme on hourly mean NO_2 concentrations at existing sensitive receptors is considered to be **negligible.**

ANNUAL MEAN PM_{10} CONCENTRATIONS

5.2.7. The AQS objective for annual mean PM_{10} concentrations is a concentration of 40µg/m^3. The results of the assessment show that in the 2015 baseline case concentrations at all of the receptors considered are predicted to meet the objective. The highest predicted concentration is 19.1µg/m^3 at Receptor 7. These results agree with the conclusions of the Review and Assessment work undertaken by MCC, which concluded that no AQMAs needed to be designated for this pollutant.

5.2.8. Predicted concentrations of PM_{10} are well below the annual mean objective at all receptors in each of the modelled 2022 scenarios. The highest concentration is predicted at Receptor 7, where a concentration of 18.0µg/m^3 is predicted in the 'Without- and 'With Development' scenarios. The predicted changes in annual mean PM_{10} concentrations are all <0.5% of the relevant AQS objective. Based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Scheme on annual mean PM_{10} concentrations is considered to be **negligible**.

DAILY MEAN PM_{10} CONCENTRATIONS

5.2.9. The AQS objective for daily mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that the highest number of predicted exceedances during 2015 was 2 at Receptors R3 to R7 and R9. This is significantly below the objective.

5.2.10. The largest increase in the number of days exceeding has been modelled at Receptor R7, with less than one day change during 2022.

5.2.11. As such, the impacts of increased emissions associated with the operational phase of the Proposed Scheme are **negligible**.

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS

5.2.12. Predicted annual mean concentrations of $PM_{2.5}$ in 2022 are all well below the AQS objective of 25µg/m^3 in all modelled scenarios. The highest modelled concentration is 12.3µg/m^3, which is predicted at Receptor 7. The highest concentration at a residential receptor is 11.3µg/m^3. All changes in $PM_{2.5}$ as a result of increased traffic associated with the Proposed Scheme are <0.5% of the relevant AQS objective and therefore, based on the EPUK/IAQM guidance, the Proposed Scheme is considered to have a **negligible** impact on annual mean $PM_{2.5}$ concentrations. In accordance with the EPUK/IAQM guidance, the impacts of increased emissions associated with the proposed development are **negligible**.

EXPOSURE OF FUTURE RESIDENTS

5.2.13. Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are all below the relevant objectives at all proposed receptor locations within the site boundary.

5.2.14. The highest predicted annual mean concentrations for NO_2 at relevant proposed residential sensitive receptors are 29.6µg/m^3 at Floor 20. The highest annual mean PM_{10} concentrations are 16.0µg/m^3, with less than one day exceeding 50µg/m^{3}at Floor 20. The highest predicted $PM_{2.5}$ concentration was 11.2µg/m^3 at Floor 20.

6 MITIGATION AND RESIDUAL EFFECTS

6.1 CONSTRUCTION PHASE

MITIGATION

6.1.1. Based on the assessment results, mitigation will be required during the construction phase. Recommended mitigation measures are given below.

General Communication

- A stakeholder communications plan that includes community engagement before work commences on site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.
- Display the head or regional office contact information.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority. The DMP may include a requirement for monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on- or off- site should be recorded, and then the action taken to resolve the situation recorded in the log book.

Monitoring

- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked.
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Where practicable, fully enclose site or specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid Site runoff of water or mud.
- Keep Site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on Site. If they are being re-used on-Site cover appropriately.
- Where practicable, cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicle operators 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.
- A Construction Logistics Plan should be produced 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 the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- 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.

Measures Specific to Earthworks

- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

RESIDUAL EFFECTS

6.1.2. The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice is considered to be **negligible.**

6.1.3. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be **negligible.**

6.2 OPERATIONAL PHASE

MITIGATION

6.2.1. The change in pollutant concentrations attributable to traffic emissions associated with the operation phase of the Proposed Scheme (i.e. impacts on local air quality) are negligible. The predicted concentrations for the future year are below the relevant objectives and as such, mitigation measures such as mechanical ventilation is not required.

6.2.2. Through consultation with the EHO at MCC, they have requested that should mitigation not be required, that best practice measures be used as outlined in parapgraph 5.8 of the IAQM/EPUK guidance[20].

6.2.3. According to the IAQM/EPUK, it is recommended that 'rapid-charge' Electric Vehicle 'EV' charging points be installed or the infrastructure to accommodate EV charging points in the future.

6.2.4. It should be noted that there is a large provision for cycle parking of which aims to assist in lowering the impact the development has on the surrounding road network and encouraging methods of sustainable transport to and from the Proposed Scheme.

RESIDUAL EFFECTS

6.2.5. The Proposed Scheme is predicted to cause a negligible increase in NO_2 and PM_{10} and $PM_{2.5}$ concentrations.

6.2.6. At the majority of locations concentrations are predicted to meet the statutory objectives both with and without the Proposed Scheme.

6.2.7. The residual effects of the Proposed Scheme on air quality are **negligible** for all pollutants considered within the assessment according to the IAQM/EPUK assessment criteria.

[20] Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality.

7 CONCLUSIONS

7.1.1. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Scheme using the IAQM methodology. This identified that there is a **Medium Risk** of dust soiling impacts and a **Low Risk** of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM_{10} releases would be significantly reduced. The residual effects of dust and PM_{10} generated by construction activities on air quality are therefore considered to be **not significant**. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be **negligible.**

7.1.2. In addition, a quantitative assessment of the potential impacts during the operational phase was undertaken using ADMS Roads to predict the changes in NO_x, NO_2 and PM_{10} concentrations that would occur due to traffic generated by the Proposed Scheme. The results show that the Proposed Scheme would cause a **negligible** increase in pollutant concentrations but would not cause any exceedances of the statutory objectives.

7.1.3. The results also show that future users of the Proposed Scheme would not be subject to the considered pollutants in concentrations that would exceed the statutory objectives.

7.1.4. Based on the assessment significance criteria, the residual effects of the Proposed Scheme are considered to be **negligible** for all pollutants assessed.

7.1.5. Furthermore, it is considered that the development proposals comply with national and local policy for air quality.

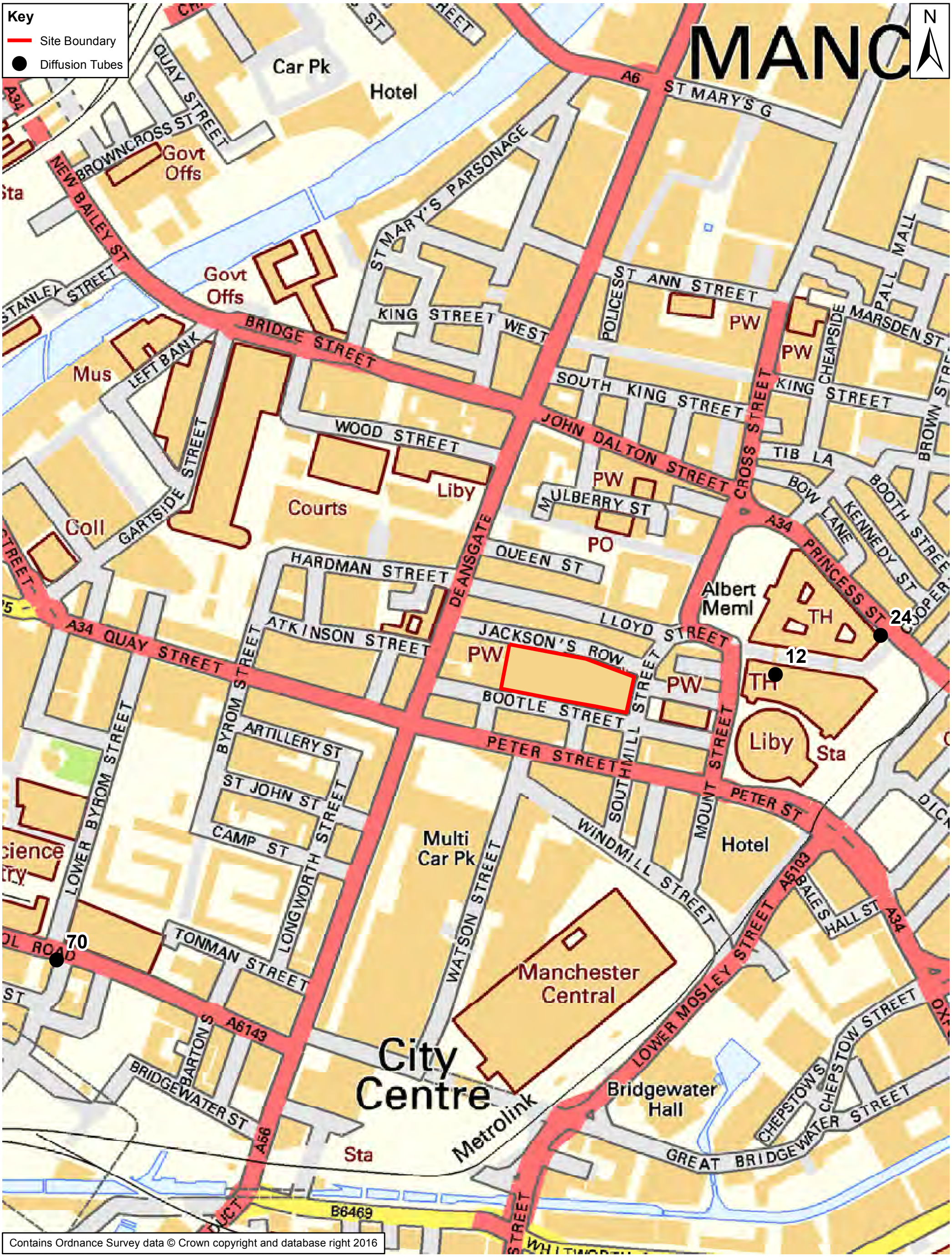
FIGURES AND APPENDICES

Figure 1 - NO_2 Diffusion Tube Monitoring Locations

Site Boundary and Diffusion Tube Locations

Scale @ A3 1 : 3,400

Figure 1

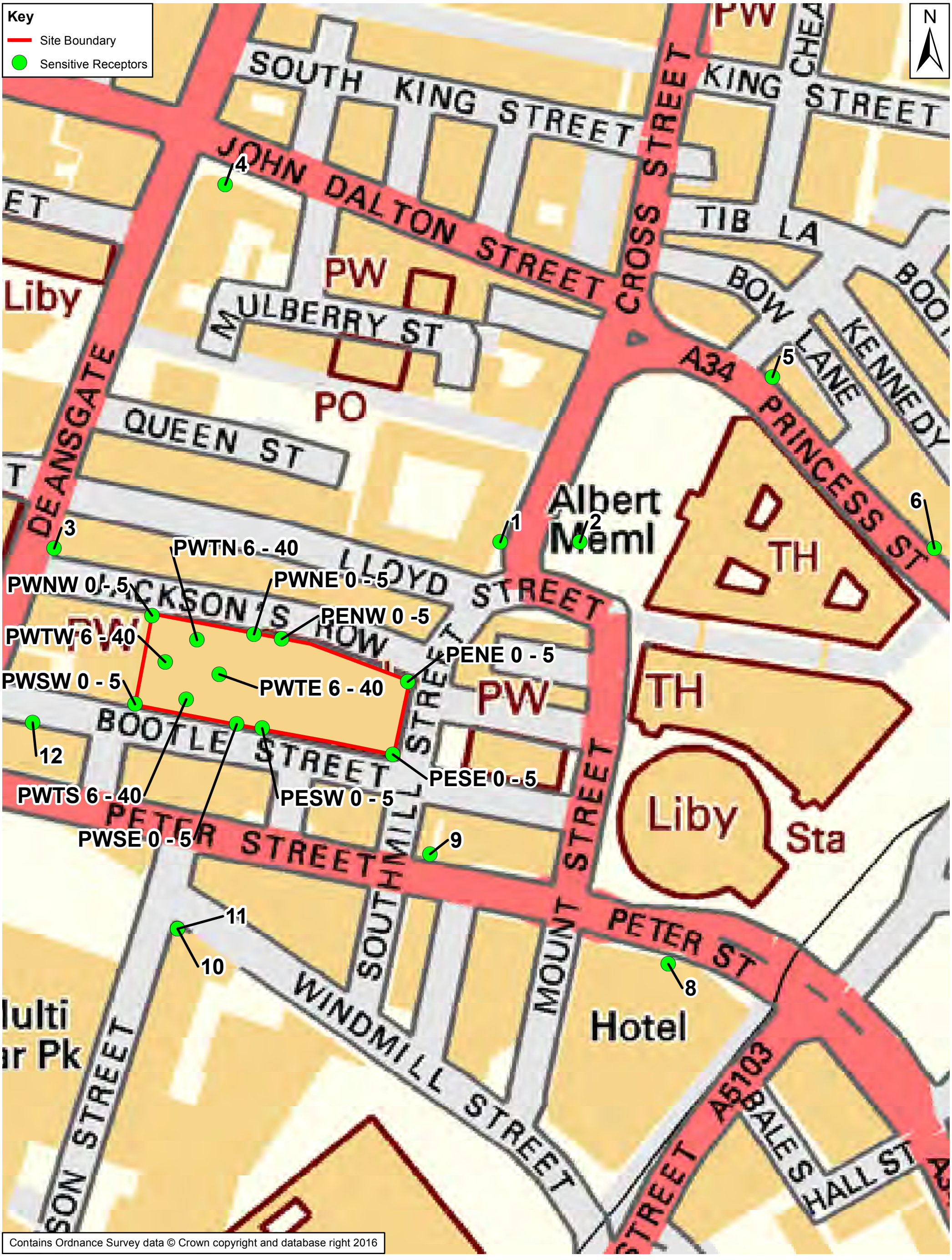


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PROJECT: St Michael's, Jackson's Row, Manchester
PROJECT No: 70010278
Client: St Michael's Partnership

Drawn: JH
Checked: GA
Approved: GA
Revision: A
Date: October 2017

Figure 2 - Receptor Locations



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PROJECT: St Michael's, Jackson's Row, Manchester
PROJECT No: 70010278
Client: St Michael's Partnership

Drawn: JH
Checked: GA
Approved: GA
Revision: A
Date: October 2017

Appendix A

GLOSSARY

GLOSSARY

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24hrs), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
AQO	Air Quality Objective
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of Defra
Conservative	Tending to over-predict the impact rather than under-predict.
CURED	Calculator Using Realistic Emissions for Diesels
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs.
DfT	Department for Transport.
EFT	Emissions Factor Toolkit
Emission rate	The quantity of a pollutant released from a source over a given period of time.
EPUK	Environmental Protection (UK)
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
GMCA	Greater Manchester Combined Authority
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management.
MCC	Manchester City Council
Minor roads	Non “A” roads or Motorways.
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.

Term	Definition
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
Street Canyon	A section of road where tall buildings affect the dispersion of pollutants, causing a trapping effect within the street and elevating concentrations.
$\mu g/m^3$ microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.
$\mu g/m^3$	Microgrammes per cubic metre.

Appendix B

RELEVANT UK AIR QUALITY STRATEGY OBJECTIVES

National Air Quality Objectives and European Directive Limit Values for the Protection of Human Health						
Nitrogen dioxide (NO_2)	UK	200µg/m^3 not to be exceeded more than 18 times a year	1 hour mean	31.12.2005	200µg/m^3 not to be exceeded more than 18 times a year	01.01.2010
Particulate Matter (PM_{10}) (gravimetric)[A]	UK	40µg/m^3	annual mean	31.12.2005	40µg/m^3	01.01.2010
	UK (except Scotland)	40µg/m^3	annual mean	31.12.2004	40µg/m^3	01.01.2005
Particulate Matter ($PM_{2.5}$)	UK (except Scotland)	50µg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31.12.2004	50µg/m^3 not to be exceeded more than 35 times a year	01.01.2005
	UK (except Scotland)	25µg/m^3	annual mean	2020	Target value 25µg/m^3	2010

[A] Measured using the European gravimetric transfer sampler or equivalent

µg/m^3 = microgram per cubic metre

Appendix C

IAQM CONSTRUCTION ASSESSMENT

METHODOLOGY

STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there are:

- ‘human receptors’ within 350m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- ‘ecological receptors’ within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is ‘negligible’.

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment.

Table C1 - Examples of Human Receptor Sensitivity to Construction Phase Impacts

Dust Emission Magnitude	Activity
Large	**Demolition** >50,000m^3 building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m^2 site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	**Demolition** 20,000 - 50,000m^3 building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m^2 site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m^3 building volume, dusty material e.g. concrete, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads

Dust Emission Magnitude	Activity
Small	**Demolition** <20,000m^3 building demolished, non-dusty material (e.g metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m^2 site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m^3, non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table C2- Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance From the Source (m)			
		<20	<50	<100	<350
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 C3 - Sensitivity of the Area to Human Health Impacts

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

Receptor Sensitivity	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table C4 - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance From The Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table C5 - Risk of Dust Impacts

Sensitivity of Surrounding Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			

Sensitivity of Surrounding Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

STEP 3 – SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

STEP 4 – DETERMINE SIGNIFICANT EFFECTS

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix D

TRAFFIC DATA

Table 8 – 2015 Verification/Baseline Traffic Data

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
1A	New Bailey Street	15	8,760	11.0	0.149095	0.005664	0.003712
1B	New Bailey Street	32	8,760	11.0	0.095941	0.005080	0.003157
1C	New Bailey Street	15	8,760	11.0	0.149095	0.005664	0.003712
2A	New Quay Street	15	12,391	2.1	0.098745	0.005896	0.003727
2B	New Quay Street	32	12,391	2.1	0.071092	0.005502	0.003353
2C	New Quay Street	15	12,391	2.1	0.098745	0.005896	0.003727
2D	New Quay Street	15	12,391	2.1	0.098745	0.005896	0.003727
2E	New Quay Street	15	12,391	2.1	0.098745	0.005896	0.003727
2F	New Quay Street	32	12,391	2.1	0.071092	0.005502	0.003353
2G	New Quay Street	15	12,391	2.1	0.098745	0.005896	0.003727
3A	Deansgate	15	9,551	4.4	0.098140	0.004960	0.003172
3B	Deansgate	32	9,551	4.6	0.068744	0.004604	0.002825
3C	Deansgate	15	9,551	4.8	0.102340	0.005039	0.003229
4A	John Dalton Street	15	8,554	12.1	0.155101	0.005710	0.003754
4B	John Dalton Street	32	8,554	12.1	0.099166	0.005103	0.003177
4C	John Dalton Street	15	8,554	12.1	0.155101	0.005710	0.003754
5A	Mount Street	15	5,346	7.1	0.069668	0.003054	0.001976
5B	Mount Street	32	5,346	7.1	0.046266	0.002780	0.001715
5C	Mount Street	15	5,346	7.1	0.069668	0.003054	0.001976
6A	Peter Street	15	8,765	4.9	0.094979	0.004645	0.002978
6B	Peter Street	15	8,765	4.9	0.094979	0.004645	0.002978
7A	Oxford Street	15	8,485	6.0	0.101070	0.004668	0.003007
7B	Oxford Street	15	8,485	6.0	0.101070	0.004668	0.003007
8A	Portland Street	15	12,036	19.4	0.307064	0.009710	0.006488
8B	Portland Street	32	12,036	19.4	0.190712	0.008515	0.005352
8C	Portland Street	15	12,036	19.4	0.307064	0.009710	0.006488
9A	Princess Street	15	8,873	6.3	0.108711	0.004939	0.003185
9B	Princess Street	32	8,873	6.3	0.072803	0.004510	0.002778
9C	Princess Street	15	8,873	6.3	0.108711	0.004939	0.003185
10A	Princess Street	15	8,005	6.6	0.099999	0.004492	0.002900
10B	Princess Street	32	8,005	6.6	0.066789	0.004098	0.002525
10C	Princess Street	15	8,005	6.6	0.099999	0.004492	0.002900
11A	Peter Street	15	9,672	3.5	0.090411	0.004854	0.003091

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
11B	Peter Street	32	9,672	3.5	0.063175	0.004495	0.002750
11C	Peter Street	15	9,672	3.5	0.090411	0.004854	0.003091

Table 9 – 2022 Without Development Traffic Data

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
1A	New Bailey Street	15	9,731	10.5	0.086130	0.004909	0.002829
1B	New Bailey Street	32	9,731	10.5	0.056139	0.004706	0.002637
1C	New Bailey Street	15	9,731	10.5	0.086130	0.004909	0.002829
2A	New Quay Street	15	13,764	2.0	0.076279	0.005531	0.003171
2B	New Quay Street	32	13,764	2.0	0.056944	0.005360	0.003008
2C	New Quay Street	15	13,764	2.0	0.076279	0.005531	0.003171
2D	New Quay Street	15	13,764	2.0	0.076279	0.005531	0.003171
2E	New Quay Street	15	13,764	2.0	0.076279	0.005531	0.003171
2F	New Quay Street	32	13,764	2.0	0.056944	0.005360	0.003008
2G	New Quay Street	15	13,764	2.0	0.076279	0.005531	0.003171
3A	Deansgate	15	10,609	4.2	0.067760	0.004541	0.002608
3B	Deansgate	32	10,609	4.2	0.048313	0.004386	0.002460
3C	Deansgate	15	10,609	4.2	0.067760	0.004541	0.002608
4A	John Dalton Street	15	9,502	11.5	0.087976	0.004913	0.002833
4B	John Dalton Street	32	9,502	11.5	0.056727	0.004706	0.002636
4C	John Dalton Street	15	9,502	11.5	0.087976	0.004913	0.002833
5A	Mount Street	15	5,938	6.7	0.043922	0.002728	0.001569
5B	Mount Street	32	5,938	6.7	0.029998	0.002626	0.001472
5C	Mount Street	15	5,938	6.7	0.043922	0.002728	0.001569
6A	Peter Street	15	9,736	4.7	0.064153	0.004229	0.002429
6B	Peter Street	15	9,736	4.7	0.064153	0.004229	0.002429
7A	Oxford Street	15	9,425	5.7	0.065844	0.004209	0.002419
7B	Oxford Street	15	9,425	5.7	0.065844	0.004209	0.002419
8A	Portland Street	15	13,369	18.4	0.159897	0.008032	0.004644
8B	Portland Street	32	13,369	18.4	0.097624	0.007650	0.004280
8C	Portland Street	15	13,369	18.4	0.159897	0.008032	0.004644

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
9A	Princess Street	15	9,857	6.0	0.070053	0.004439	0.002552
9B	Princess Street	32	9,857	6.0	0.048387	0.004278	0.002398
9C	Princess Street	15	9,857	6.0	0.070053	0.004439	0.002552
10A	Princess Street	15	8,892	6.2	0.064012	0.004030	0.002317
10B	Princess Street	32	8,892	6.2	0.044053	0.003882	0.002177
10C	Princess Street	15	8,892	6.2	0.064012	0.004030	0.002317
11A	Peter Street	15	10,744	3.3	0.064958	0.004485	0.002574
11B	Peter Street	32	10,744	3.3	0.047120	0.004338	0.002434
11C	Peter Street	15	10,744	3.3	0.064958	0.004485	0.002574

Table 10 – 2022 With Development Scenario Traffic Data

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
1A	New Bailey Street	15	10,047	10.3	0.088270	0.005048	0.002909
1B	New Bailey Street	32	10,047	10.3	0.057638	0.004840	0.002712
1C	New Bailey Street	15	10,047	10.3	0.088270	0.005048	0.002909
2A	New Quay Street	15	14,080	2.1	0.078409	0.005670	0.003251
2B	New Quay Street	32	14,080	2.1	0.058438	0.005493	0.003083
2C	New Quay Street	15	14,080	2.1	0.078409	0.005670	0.003251
2D	New Quay Street	15	14,080	2.1	0.078409	0.005670	0.003251
2E	New Quay Street	15	14,080	2.1	0.078409	0.005670	0.003251

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
2F	New Quay Street	32	14,080	2.1	0.058438	0.005493	0.003083
2G	New Quay Street	15	14,080	2.1	0.078409	0.005670	0.003251
3A	Deansgate	15	11,347	4.2	0.072706	0.004864	0.002793
3B	Deansgate	32	11,347	4.2	0.051788	0.004698	0.002635
3C	Deansgate	15	11,347	4.2	0.072706	0.004864	0.002793
4A	John Dalton Street	15	9,502	11.5	0.087986	0.004913	0.002833
4B	John Dalton Street	32	9,502	11.5	0.056732	0.004706	0.002636
4C	John Dalton Street	15	9,502	11.5	0.087986	0.004913	0.002833
5A	Mount Street	15	6,254	6.6	0.046029	0.002866	0.001648
5B	Mount Street	32	6,254	6.6	0.031481	0.002759	0.001547
5C	Mount Street	15	6,254	6.6	0.046029	0.002866	0.001648
6A	Peter Street	15	10,052	4.7	0.066294	0.004368	0.002509
6B	Peter Street	15	10,052	4.7	0.066294	0.004368	0.002509
7A	Oxford Street	15	9,741	5.7	0.067951	0.004347	0.002499
7B	Oxford Street	15	9,741	5.7	0.067951	0.004347	0.002499
8A	Portland Street	15	13,686	18.1	0.162015	0.008171	0.004723
8B	Portland Street	32	13,686	18.1	0.099114	0.007783	0.004355
8C	Portland Street	15	13,686	18.1	0.162015	0.008171	0.004723
9A	Princess Street	15	10,173	6.0	0.072195	0.004578	0.002632

Road Link	Name	Speed (km/h)	AADT (Total vehicles)	% HDV	NO_X Emission Factor (CURED, g/km/s)	PM_{10} Emission Factor (g/km/s)	$PM_{2.5}$ Emission Factors (g/km/s)
9B	Princess Street	32	10,173	6.0	0.049887	0.004412	0.002474
9C	Princess Street	15	10,173	6.0	0.072195	0.004578	0.002632
10A	Princess Street	15	9,208	6.2	0.066116	0.004168	0.002396
10B	Princess Street	32	9,208	6.2	0.045535	0.004015	0.002251
10C	Princess Street	15	9,208	6.2	0.066116	0.004168	0.002396
11A	Peter Street	15	11,060	3.3	0.067088	0.004624	0.002654
11B	Peter Street	32	11,060	3.3	0.048615	0.004472	0.002509
11C	Peter Street	15	11,060	3.3	0.067088	0.004624	0.002654

Appendix E

MODEL VERIFICATION

INTRODUCTION

The comparison of modelled concentrations with local monitored concentrations is a process termed "verification". Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- Estimates of background pollutant concentrations;
- Meteorological data uncertainties;
- Traffic data uncertainties;
- Model input parameters, such as 'roughness length'; and,
- Overall limitations of the dispersion model.

NITROGEN DIOXIDE

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides (NO_x = NO + NO_2), in line with the guidance provided within LAQM.TG16.

The model has been run to predict the 2015 annual mean road-NO_x contribution at two roadside diffusion tubes within the modelled road network. The model outputs of road-NO_x have been compared with the 'measured' road-NO_x, which was determined from the NO_2 concentrations measured using diffusion tubes at the monitoring locations, utilising the NO_x from NO_2 calculator provided by Defra and the NO_2 background concentration (from the Defra background map). As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2015 data.

Table D1 - Model Verification

Site ID	2015 Monitored Total NO_2 (µg/m^3)	2015 Background NO_2 (µg/m^3)	2015 Monitored Road Contribution NO_x (µg/m^3)	2015 Modelled Contribution NO_x (µg/m^3)	Ratio
24 – Princess Street	55.24	33.80	50.92	21.75	2.34

The road-NO_x adjustment factor of 2.34 was applied to the modelled road-NO_x concentration for the monitoring site to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentration was then determined by inputting the adjusted modelled road-NO_x concentration and the background NO_2 concentration into the NO_x to NO_2 calculator.

PM_{10} AND $PM_{2.5}$

There are no local PM_{10} or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG16.

MODEL UNCERTAINTY

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG16 identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

a) Root mean square error (RMSE);

b) Fractional bias (FB); and

c) Correlation coefficient (CC).

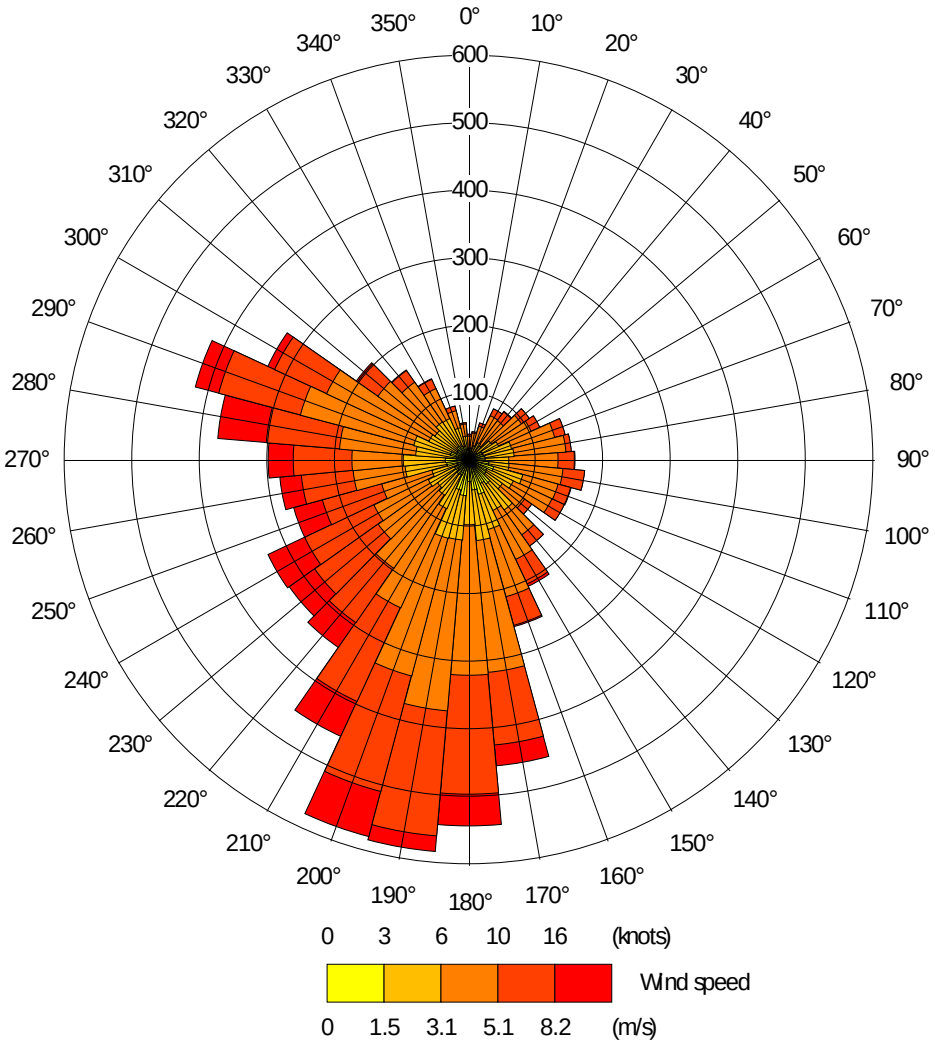
These parameters estimate how the model results agree or diverge from the observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement. Further details can be found in Box 7.17 of LAQM.TG16.

As data from only one diffusion tubes have been used to verify the model evaluation of model performance has not been undertaken.

Appendix F

WIND ROSE

WIND ROSE FOR MANCHESTER AIRPORT (RINGWAY) 2015



Appendix G

MODEL RESULTS

TABLE G1 - ANNUAL MEAN NO_2 CONCENTRATIONS ($\mu g/m^3$)

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
1	39.2	33.3	33.4	84	0.1	0%	Negligible
2	39.4	33.3	33.5	84	0.2	1%	Negligible
3	42.9	36.3	36.7	92	0.4	1%	Negligible
4	45.0	36.9	37.2	93	0.3	1%	Negligible
5	45.7	37.9	38.1	95	0.2	1%	Negligible
6	45.9	38.0	38.3	96	0.3	1%	Negligible
7	41.7	34.2	34.4	86	0.2	1%	Negligible
8	38.7	32.0	32.2	81	0.2	1%	Negligible
9	40.9	34.2	34.5	86	0.3	1%	Negligible
10	33.4	28.4	28.4	71	0.0	0%	Negligible
11	33.1	28.1	28.2	71	0.1	0%	Negligible
12	41.2	35.0	35.3	88	0.3	1%	Negligible
PWNW_0	-	-	32.0	-	-	-	-
PWNW_1	-	-	31.7	-	-	-	-
PWNW_2	-	-	31.4	-	-	-	-
PWNW_3	-	-	31.1	-	-	-	-
PWNW_4	-	-	30.8	-	-	-	-
PWNW_5	-	-	30.6	-	-	-	-
PWNE_0	-	-	31.5	-	-	-	-
PWNE_1	-	-	31.4	-	-	-	-
PWNE_2	-	-	31.2	-	-	-	-
PWNE_3	-	-	31.0	-	-	-	-
PWNE_4	-	-	30.8	-	-	-	-
PWNE_5	-	-	30.6	-	-	-	-
PWSE_0	-	-	32.1	-	-	-	-
PWSE_1	-	-	31.8	-	-	-	-
PWSE_2	-	-	31.4	-	-	-	-
PWSE_3	-	-	31.1	-	-	-	-
PWSE_4	-	-	30.8	-	-	-	-
PWSE_5	-	-	30.5	-	-	-	-
PWSW_0	-	-	32.6	-	-	-	-
PWSW_1	-	-	32.1	-	-	-	-
PWSW_2	-	-	31.7	-	-	-	-
PWSW_3	-	-	31.2	-	-	-	-
PWSW_4	-	-	30.9	-	-	-	-
PWSW_5	-	-	30.6	-	-	-	-

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PENW_0	-	-	31.5	-	-	-	-
PENW_1	-	-	31.3	-	-	-	-
PENW_2	-	-	31.2	-	-	-	-
PENW_3	-	-	31.0	-	-	-	-
PENW_4	-	-	30.8	-	-	-	-
PENW_5	-	-	30.6	-	-	-	-
PENE_0	-	-	31.6	-	-	-	-
PENE_1	-	-	31.4	-	-	-	-
PENE_2	-	-	31.2	-	-	-	-
PENE_3	-	-	31.0	-	-	-	-
PENE_4	-	-	30.8	-	-	-	-
PENE_5	-	-	30.6	-	-	-	-
PESE_0	-	-	29.5	-	-	-	-
PESE_1	-	-	29.1	-	-	-	-
PESE_2	-	-	28.7	-	-	-	-
PESE_3	-	-	28.4	-	-	-	-
PESE_4	-	-	28.1	-	-	-	-
PESE_5	-	-	27.8	-	-	-	-
PESW_0	-	-	32.1	-	-	-	-
PESW_1	-	-	31.7	-	-	-	-
PESW_2	-	-	31.4	-	-	-	-
PESW_3	-	-	31.1	-	-	-	-
PESW_4	-	-	30.8	-	-	-	-
PESW_5	-	-	30.5	-	-	-	-
PWTN_6	-	-	30.4	-	-	-	-
PWTN_7	-	-	30.2	-	-	-	-
PWTN_8	-	-	30.1	-	-	-	-
PWTN_9	-	-	30.0	-	-	-	-
PWTN_10	-	-	29.9	-	-	-	-
PWTN_11	-	-	29.8	-	-	-	-
PWTN_12	-	-	29.8	-	-	-	-
PWTN_13	-	-	29.7	-	-	-	-
PWTN_14	-	-	29.7	-	-	-	-
PWTN_15	-	-	29.7	-	-	-	-
PWTN_16	-	-	29.7	-	-	-	-
PWTN_17	-	-	29.6	-	-	-	-
PWTN_18	-	-	29.6	-	-	-	-

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PWTN_19	-	-	29.6	-	-	-	-
PWTN_20	-	-	29.6	-	-	-	-
PWTN_21	-	-	29.6	-	-	-	-
PWTN_22	-	-	29.6	-	-	-	-
PWTN_23	-	-	29.6	-	-	-	-
PWTN_24	-	-	29.6	-	-	-	-
PWTN_25	-	-	29.6	-	-	-	-
PWTN_26	-	-	29.6	-	-	-	-
PWTN_27	-	-	29.6	-	-	-	-
PWTN_28	-	-	29.5	-	-	-	-
PWTN_29	-	-	29.5	-	-	-	-
PWTN_30	-	-	29.5	-	-	-	-
PWTN_31	-	-	29.5	-	-	-	-
PWTN_32	-	-	29.5	-	-	-	-
PWTN_33	-	-	29.5	-	-	-	-
PWTN_34	-	-	29.5	-	-	-	-
PWTN_35	-	-	29.5	-	-	-	-
PWTN_36	-	-	29.5	-	-	-	-
PWTN_37	-	-	29.5	-	-	-	-
PWTN_38	-	-	29.5	-	-	-	-
PWTN_39	-	-	29.5	-	-	-	-
PWTN_40	-	-	29.5	-	-	-	-
PWTE_6	-	-	30.4	-	-	-	-
PWTE_7	-	-	30.2	-	-	-	-
PWTE_8	-	-	30.1	-	-	-	-
PWTE_9	-	-	30.0	-	-	-	-
PWTE_10	-	-	29.9	-	-	-	-
PWTE_11	-	-	29.8	-	-	-	-
PWTE_12	-	-	29.8	-	-	-	-
PWTE_13	-	-	29.7	-	-	-	-
PWTE_14	-	-	29.7	-	-	-	-
PWTE_15	-	-	29.7	-	-	-	-
PWTE_16	-	-	29.7	-	-	-	-
PWTE_17	-	-	29.6	-	-	-	-
PWTE_18	-	-	29.6	-	-	-	-
PWTE_19	-	-	29.6	-	-	-	-
PWTE_20	-	-	29.6	-	-	-	-

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PWTE_21	-	-	29.6	-	-	-	-
PWTE_22	-	-	29.6	-	-	-	-
PWTE_23	-	-	29.6	-	-	-	-
PWTE_24	-	-	29.6	-	-	-	-
PWTE_25	-	-	29.6	-	-	-	-
PWTE_26	-	-	29.6	-	-	-	-
PWTE_27	-	-	29.6	-	-	-	-
PWTE_28	-	-	29.5	-	-	-	-
PWTE_29	-	-	29.5	-	-	-	-
PWTE_30	-	-	29.5	-	-	-	-
PWTE_31	-	-	29.5	-	-	-	-
PWTE_32	-	-	29.5	-	-	-	-
PWTE_33	-	-	29.5	-	-	-	-
PWTE_34	-	-	29.5	-	-	-	-
PWTE_35	-	-	29.5	-	-	-	-
PWTE_36	-	-	29.5	-	-	-	-
PWTE_37	-	-	29.5	-	-	-	-
PWTE_38	-	-	29.5	-	-	-	-
PWTE_39	-	-	29.5	-	-	-	-
PWTE_40	-	-	29.5	-	-	-	-
PWTS_6	-	-	30.4	-	-	-	-
PWTS_7	-	-	30.2	-	-	-	-
PWTS_8	-	-	30.1	-	-	-	-
PWTS_9	-	-	30.0	-	-	-	-
PWTS_10	-	-	29.9	-	-	-	-
PWTS_11	-	-	29.8	-	-	-	-
PWTS_12	-	-	29.8	-	-	-	-
PWTS_13	-	-	29.7	-	-	-	-
PWTS_14	-	-	29.7	-	-	-	-
PWTS_15	-	-	29.7	-	-	-	-
PWTS_16	-	-	29.7	-	-	-	-
PWTS_17	-	-	29.6	-	-	-	-
PWTS_18	-	-	29.6	-	-	-	-
PWTS_19	-	-	29.6	-	-	-	-
PWTS_20	-	-	29.6	-	-	-	-
PWTS_21	-	-	29.6	-	-	-	-
PWTS_22	-	-	29.6	-	-	-	-

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PWTS_23	-	-	29.6	-	-	-	-
PWTS_24	-	-	29.6	-	-	-	-
PWTS_25	-	-	29.6	-	-	-	-
PWTS_26	-	-	29.6	-	-	-	-
PWTS_27	-	-	29.5	-	-	-	-
PWTS_28	-	-	29.5	-	-	-	-
PWTS_29	-	-	29.5	-	-	-	-
PWTS_30	-	-	29.5	-	-	-	-
PWTS_31	-	-	29.5	-	-	-	-
PWTS_32	-	-	29.5	-	-	-	-
PWTS_33	-	-	29.5	-	-	-	-
PWTS_34	-	-	29.5	-	-	-	-
PWTS_35	-	-	29.5	-	-	-	-
PWTS_36	-	-	29.5	-	-	-	-
PWTS_37	-	-	29.5	-	-	-	-
PWTS_38	-	-	29.5	-	-	-	-
PWTS_39	-	-	29.5	-	-	-	-
PWTS_40	-	-	29.5	-	-	-	-
PWTW_6	-	-	30.4	-	-	-	-
PWTW_7	-	-	30.2	-	-	-	-
PWTW_8	-	-	30.1	-	-	-	-
PWTW_9	-	-	30.0	-	-	-	-
PWTW_10	-	-	29.9	-	-	-	-
PWTW_11	-	-	29.8	-	-	-	-
PWTW_12	-	-	29.8	-	-	-	-
PWTW_13	-	-	29.7	-	-	-	-
PWTW_14	-	-	29.7	-	-	-	-
PWTW_15	-	-	29.7	-	-	-	-
PWTW_16	-	-	29.7	-	-	-	-
PWTW_17	-	-	29.6	-	-	-	-
PWTW_18	-	-	29.6	-	-	-	-
PWTW_19	-	-	29.6	-	-	-	-
PWTW_20	-	-	29.6	-	-	-	-
PWTW_21	-	-	29.6	-	-	-	-
PWTW_22	-	-	29.6	-	-	-	-
PWTW_23	-	-	29.6	-	-	-	-
PWTW_24	-	-	29.6	-	-	-	-

ANNUAL MEAN NO_2 CONCENTRATIONS							
Receptor	2015 Base (µg/m^3)	2022 Base (µg/m^3)	2022 With Dev (µg/m^3)	% of AQAL	Change (µg/m^3)	% of AQO	Impact
PWTW_25	-	-	29.6	-	-	-	-
PWTW_26	-	-	29.6	-	-	-	-
PWTW_27	-	-	29.6	-	-	-	-
PWTW_28	-	-	29.5	-	-	-	-
PWTW_29	-	-	29.5	-	-	-	-
PWTW_30	-	-	29.5	-	-	-	-
PWTW_31	-	-	29.5	-	-	-	-
PWTW_32	-	-	29.5	-	-	-	-
PWTW_33	-	-	29.5	-	-	-	-
PWTW_34	-	-	29.5	-	-	-	-
PWTW_35	-	-	29.5	-	-	-	-
PWTW_36	-	-	29.5	-	-	-	-
PWTW_37	-	-	29.5	-	-	-	-
PWTW_38	-	-	29.5	-	-	-	-
PWTW_39	-	-	29.5	-	-	-	-
PWTW_40	-	-	29.5	-	-	-	-

TABLE G2 - ANNUAL MEAN PM_{10} CONCENTRATIONS ($\mu g/m^3$)

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
1	17.8	16.6	16.7	42	0.1	0%	Negligible
2	17.8	16.6	16.7	42	0.1	0%	Negligible
3	18.4	17.2	17.3	43	0.1	0%	Negligible
4	18.2	17.0	17.1	43	0.1	0%	Negligible
5	18.6	17.4	17.5	44	0.1	0%	Negligible
6	18.7	17.5	17.6	44	0.1	0%	Negligible
7	19.1	18.0	18.0	45	0.0	0%	Negligible
8	17.9	16.9	16.9	42	0.0	0%	Negligible
9	18.5	17.5	17.6	44	0.1	0%	Negligible
10	17.4	16.5	16.5	41	0.0	0%	Negligible
11	17.3	16.4	16.4	41	0.0	0%	Negligible
12	18.0	16.9	16.9	42	0.0	0%	Negligible
PWNW_0	-	-	16.4	-	-	-	-
PWNW_1	-	-	16.4	-	-	-	-
PWNW_2	-	-	16.3	-	-	-	-
PWNW_3	-	-	16.3	-	-	-	-
PWNW_4	-	-	16.2	-	-	-	-
PWNW_5	-	-	16.2	-	-	-	-
PWNE_0	-	-	16.3	-	-	-	-
PWNE_1	-	-	16.3	-	-	-	-
PWNE_2	-	-	16.3	-	-	-	-
PWNE_3	-	-	16.2	-	-	-	-
PWNE_4	-	-	16.2	-	-	-	-
PWNE_5	-	-	16.2	-	-	-	-
PWSE_0	-	-	16.4	-	-	-	-
PWSE_1	-	-	16.4	-	-	-	-
PWSE_2	-	-	16.3	-	-	-	-
PWSE_3	-	-	16.3	-	-	-	-
PWSE_4	-	-	16.2	-	-	-	-
PWSE_5	-	-	16.2	-	-	-	-
PWSW_0	-	-	16.5	-	-	-	-
PWSW_1	-	-	16.4	-	-	-	-
PWSW_2	-	-	16.4	-	-	-	-
PWSW_3	-	-	16.3	-	-	-	-
PWSW_4	-	-	16.2	-	-	-	-
PWSW_5	-	-	16.2	-	-	-	-

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PENW_0	-	-	16.3	-	-	-	-
PENW_1	-	-	16.3	-	-	-	-
PENW_2	-	-	16.3	-	-	-	-
PENW_3	-	-	16.2	-	-	-	-
PENW_4	-	-	16.2	-	-	-	-
PENW_5	-	-	16.2	-	-	-	-
PENE_0	-	-	16.3	-	-	-	-
PENE_1	-	-	16.3	-	-	-	-
PENE_2	-	-	16.3	-	-	-	-
PENE_3	-	-	16.2	-	-	-	-
PENE_4	-	-	16.2	-	-	-	-
PENE_5	-	-	16.2	-	-	-	-
PESE_0	-	-	16.6	-	-	-	-
PESE_1	-	-	16.6	-	-	-	-
PESE_2	-	-	16.5	-	-	-	-
PESE_3	-	-	16.5	-	-	-	-
PESE_4	-	-	16.4	-	-	-	-
PESE_5	-	-	16.4	-	-	-	-
PESW_0	-	-	16.4	-	-	-	-
PESW_1	-	-	16.4	-	-	-	-
PESW_2	-	-	16.3	-	-	-	-
PESW_3	-	-	16.3	-	-	-	-
PESW_4	-	-	16.2	-	-	-	-
PESW_5	-	-	16.2	-	-	-	-
PWTN_6	-	-	16.1	-	-	-	-
PWTN_7	-	-	16.1	-	-	-	-
PWTN_8	-	-	16.1	-	-	-	-
PWTN_9	-	-	16.1	-	-	-	-
PWTN_10	-	-	16.1	-	-	-	-
PWTN_11	-	-	16.1	-	-	-	-
PWTN_12	-	-	16.0	-	-	-	-
PWTN_13	-	-	16.0	-	-	-	-
PWTN_14	-	-	16.0	-	-	-	-
PWTN_15	-	-	16.0	-	-	-	-
PWTN_16	-	-	16.0	-	-	-	-
PWTN_17	-	-	16.0	-	-	-	-
PWTN_18	-	-	16.0	-	-	-	-

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
PWTN_19	-	-	16.0	-	-	-	-
PWTN_20	-	-	16.0	-	-	-	-
PWTN_21	-	-	16.0	-	-	-	-
PWTN_22	-	-	16.0	-	-	-	-
PWTN_23	-	-	16.0	-	-	-	-
PWTN_24	-	-	16.0	-	-	-	-
PWTN_25	-	-	16.0	-	-	-	-
PWTN_26	-	-	16.0	-	-	-	-
PWTN_27	-	-	16.0	-	-	-	-
PWTN_28	-	-	16.0	-	-	-	-
PWTN_29	-	-	16.0	-	-	-	-
PWTN_30	-	-	16.0	-	-	-	-
PWTN_31	-	-	16.0	-	-	-	-
PWTN_32	-	-	16.0	-	-	-	-
PWTN_33	-	-	16.0	-	-	-	-
PWTN_34	-	-	16.0	-	-	-	-
PWTN_35	-	-	16.0	-	-	-	-
PWTN_36	-	-	16.0	-	-	-	-
PWTN_37	-	-	16.0	-	-	-	-
PWTN_38	-	-	16.0	-	-	-	-
PWTN_39	-	-	16.0	-	-	-	-
PWTN_40	-	-	16.0	-	-	-	-
PWTE_6	-	-	16.1	-	-	-	-
PWTE_7	-	-	16.1	-	-	-	-
PWTE_8	-	-	16.1	-	-	-	-
PWTE_9	-	-	16.1	-	-	-	-
PWTE_10	-	-	16.1	-	-	-	-
PWTE_11	-	-	16.1	-	-	-	-
PWTE_12	-	-	16.0	-	-	-	-
PWTE_13	-	-	16.0	-	-	-	-
PWTE_14	-	-	16.0	-	-	-	-
PWTE_15	-	-	16.0	-	-	-	-
PWTE_16	-	-	16.0	-	-	-	-
PWTE_17	-	-	16.0	-	-	-	-
PWTE_18	-	-	16.0	-	-	-	-
PWTE_19	-	-	16.0	-	-	-	-
PWTE_20	-	-	16.0	-	-	-	-

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base (µg/m³)	2022 Base (µg/m³)	2022 With Dev (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
PWTE_21	-	-	16.0	-	-	-	-
PWTE_22	-	-	16.0	-	-	-	-
PWTE_23	-	-	16.0	-	-	-	-
PWTE_24	-	-	16.0	-	-	-	-
PWTE_25	-	-	16.0	-	-	-	-
PWTE_26	-	-	16.0	-	-	-	-
PWTE_27	-	-	16.0	-	-	-	-
PWTE_28	-	-	16.0	-	-	-	-
PWTE_29	-	-	16.0	-	-	-	-
PWTE_30	-	-	16.0	-	-	-	-
PWTE_31	-	-	16.0	-	-	-	-
PWTE_32	-	-	16.0	-	-	-	-
PWTE_33	-	-	16.0	-	-	-	-
PWTE_34	-	-	16.0	-	-	-	-
PWTE_35	-	-	16.0	-	-	-	-
PWTE_36	-	-	16.0	-	-	-	-
PWTE_37	-	-	16.0	-	-	-	-
PWTE_38	-	-	16.0	-	-	-	-
PWTE_39	-	-	16.0	-	-	-	-
PWTE_40	-	-	16.0	-	-	-	-
PWTS_6	-	-	16.1	-	-	-	-
PWTS_7	-	-	16.1	-	-	-	-
PWTS_8	-	-	16.1	-	-	-	-
PWTS_9	-	-	16.1	-	-	-	-
PWTS_10	-	-	16.1	-	-	-	-
PWTS_11	-	-	16.0	-	-	-	-
PWTS_12	-	-	16.0	-	-	-	-
PWTS_13	-	-	16.0	-	-	-	-
PWTS_14	-	-	16.0	-	-	-	-
PWTS_15	-	-	16.0	-	-	-	-
PWTS_16	-	-	16.0	-	-	-	-
PWTS_17	-	-	16.0	-	-	-	-
PWTS_18	-	-	16.0	-	-	-	-
PWTS_19	-	-	16.0	-	-	-	-
PWTS_20	-	-	16.0	-	-	-	-
PWTS_21	-	-	16.0	-	-	-	-
PWTS_22	-	-	16.0	-	-	-	-

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
PWTS_23	-	-	16.0	-	-	-	-
PWTS_24	-	-	16.0	-	-	-	-
PWTS_25	-	-	16.0	-	-	-	-
PWTS_26	-	-	16.0	-	-	-	-
PWTS_27	-	-	16.0	-	-	-	-
PWTS_28	-	-	16.0	-	-	-	-
PWTS_29	-	-	16.0	-	-	-	-
PWTS_30	-	-	16.0	-	-	-	-
PWTS_31	-	-	16.0	-	-	-	-
PWTS_32	-	-	16.0	-	-	-	-
PWTS_33	-	-	16.0	-	-	-	-
PWTS_34	-	-	16.0	-	-	-	-
PWTS_35	-	-	16.0	-	-	-	-
PWTS_36	-	-	16.0	-	-	-	-
PWTS_37	-	-	16.0	-	-	-	-
PWTS_38	-	-	16.0	-	-	-	-
PWTS_39	-	-	16.0	-	-	-	-
PWTS_40	-	-	16.0	-	-	-	-
PWTW_6	-	-	16.1	-	-	-	-
PWTW_7	-	-	16.1	-	-	-	-
PWTW_8	-	-	16.1	-	-	-	-
PWTW_9	-	-	16.1	-	-	-	-
PWTW_10	-	-	16.1	-	-	-	-
PWTW_11	-	-	16.1	-	-	-	-
PWTW_12	-	-	16.0	-	-	-	-
PWTW_13	-	-	16.0	-	-	-	-
PWTW_14	-	-	16.0	-	-	-	-
PWTW_15	-	-	16.0	-	-	-	-
PWTW_16	-	-	16.0	-	-	-	-
PWTW_17	-	-	16.0	-	-	-	-
PWTW_18	-	-	16.0	-	-	-	-
PWTW_19	-	-	16.0	-	-	-	-
PWTW_20	-	-	16.0	-	-	-	-
PWTW_21	-	-	16.0	-	-	-	-
PWTW_22	-	-	16.0	-	-	-	-
PWTW_23	-	-	16.0	-	-	-	-
PWTW_24	-	-	16.0	-	-	-	-

ANNUAL MEAN PM_{10} CONCENTRATIONS							
Receptor	2015 Base (µg/m^3)	2022 Base (µg/m^3)	2022 With Dev (µg/m^3)	% of AQAL	Change (µg/m^3)	% of AQO	Impact
PWTW_25	-	-	16.0	-	-	-	-
PWTW_26	-	-	16.0	-	-	-	-
PWTW_27	-	-	16.0	-	-	-	-
PWTW_28	-	-	16.0	-	-	-	-
PWTW_29	-	-	16.0	-	-	-	-
PWTW_30	-	-	16.0	-	-	-	-
PWTW_31	-	-	16.0	-	-	-	-
PWTW_32	-	-	16.0	-	-	-	-
PWTW_33	-	-	16.0	-	-	-	-
PWTW_34	-	-	16.0	-	-	-	-
PWTW_35	-	-	16.0	-	-	-	-
PWTW_36	-	-	16.0	-	-	-	-
PWTW_37	-	-	16.0	-	-	-	-
PWTW_38	-	-	16.0	-	-	-	-
PWTW_39	-	-	16.0	-	-	-	-
PWTW_40	-	-	16.0	-	-	-	-

TABLE G3 - DAILY PM_{10} (NO. OF DAYS OF EXCEEDANCE)

DAILY MEAN PM_{10} (NO. OF DAYS OF EXCEEDANCE)				
Receptor	2015 Base (Days)	2022 Base (Days)	2022 With Dev (Days)	Change
1	1	1	1	0
2	1	1	1	0
3	2	1	1	0
4	2	1	1	0
5	2	1	1	0
6	2	1	1	0
7	2	1	1	0
8	1	1	1	0
9	2	1	1	0
10	1	0	0	0
11	1	0	0	0
12	1	1	1	0
PWNW_0	-	-	0	-
PWNW_1	-	-	0	-
PWNW_2	-	-	0	-
PWNW_3	-	-	0	-
PWNW_4	-	-	0	-
PWNW_5	-	-	0	-
PWNE_0	-	-	0	-
PWNE_1	-	-	0	-
PWNE_2	-	-	0	-
PWNE_3	-	-	0	-
PWNE_4	-	-	0	-
PWNE_5	-	-	0	-
PWSE_0	-	-	0	-
PWSE_1	-	-	0	-
PWSE_2	-	-	0	-
PWSE_3	-	-	0	-
PWSE_4	-	-	0	-
PWSE_5	-	-	0	-
PWSW_0	-	-	1	-
PWSW_1	-	-	0	-
PWSW_2	-	-	0	-
PWSW_3	-	-	0	-
PWSW_4	-	-	0	-
PWSW_5	-	-	0	-
PENW_0	-	-	0	-
PENW_1	-	-	0	-
PENW_2	-	-	0	-
PENW_3	-	-	0	-
PENW_4	-	-	0	-
PENW_5	-	-	0	-
PENE_0	-	-	0	-
PENE_1	-	-	0	-
PENE_2	-	-	0	-

DAILY MEAN PM_{10} (NO. OF DAYS OF EXCEEDANCE)				
Receptor	2015 Base (Days)	2022 Base (Days)	2022 With Dev (Days)	Change
PENE_3	-	-	0	-
PENE_4	-	-	0	-
PENE_5	-	-	0	-
PESE_0	-	-	1	-
PESE_1	-	-	1	-
PESE_2	-	-	1	-
PESE_3	-	-	0	-
PESE_4	-	-	0	-
PESE_5	-	-	0	-
PESW_0	-	-	0	-
PESW_1	-	-	0	-
PESW_2	-	-	0	-
PESW_3	-	-	0	-
PESW_4	-	-	0	-
PESW_5	-	-	0	-
PWTN_6	-	-	0	-
PWTN_7	-	-	0	-
PWTN_8	-	-	0	-
PWTN_9	-	-	0	-
PWTN_10	-	-	0	-
PWTN_11	-	-	0	-
PWTN_12	-	-	0	-
PWTN_13	-	-	0	-
PWTN_14	-	-	0	-
PWTN_15	-	-	0	-
PWTN_16	-	-	0	-
PWTN_17	-	-	0	-
PWTN_18	-	-	0	-
PWTN_19	-	-	0	-
PWTN_20	-	-	0	-
PWTN_21	-	-	0	-
PWTN_22	-	-	0	-
PWTN_23	-	-	0	-
PWTN_24	-	-	0	-
PWTN_25	-	-	0	-
PWTN_26	-	-	0	-
PWTN_27	-	-	0	-
PWTN_28	-	-	0	-
PWTN_29	-	-	0	-
PWTN_30	-	-	0	-
PWTN_31	-	-	0	-
PWTN_32	-	-	0	-
PWTN_33	-	-	0	-
PWTN_34	-	-	0	-
PWTN_35	-	-	0	-
PWTN_36	-	-	0	-

DAILY MEAN PM_{10} (NO. OF DAYS OF EXCEEDANCE)				
Receptor	2015 Base (Days)	2022 Base (Days)	2022 With Dev (Days)	Change
PWTN_37	-	-	0	-
PWTN_38	-	-	0	-
PWTN_39	-	-	0	-
PWTN_40	-	-	0	-
PWTE_6	-	-	0	-
PWTE_7	-	-	0	-
PWTE_8	-	-	0	-
PWTE_9	-	-	0	-
PWTE_10	-	-	0	-
PWTE_11	-	-	0	-
PWTE_12	-	-	0	-
PWTE_13	-	-	0	-
PWTE_14	-	-	0	-
PWTE_15	-	-	0	-
PWTE_16	-	-	0	-
PWTE_17	-	-	0	-
PWTE_18	-	-	0	-
PWTE_19	-	-	0	-
PWTE_20	-	-	0	-
PWTE_21	-	-	0	-
PWTE_22	-	-	0	-
PWTE_23	-	-	0	-
PWTE_24	-	-	0	-
PWTE_25	-	-	0	-
PWTE_26	-	-	0	-
PWTE_27	-	-	0	-
PWTE_28	-	-	0	-
PWTE_29	-	-	0	-
PWTE_30	-	-	0	-
PWTE_31	-	-	0	-
PWTE_32	-	-	0	-
PWTE_33	-	-	0	-
PWTE_34	-	-	0	-
PWTE_35	-	-	0	-
PWTE_36	-	-	0	-
PWTE_37	-	-	0	-
PWTE_38	-	-	0	-
PWTE_39	-	-	0	-
PWTE_40	-	-	0	-
PWTS_6	-	-	0	-
PWTS_7	-	-	0	-
PWTS_8	-	-	0	-
PWTS_9	-	-	0	-
PWTS_10	-	-	0	-
PWTS_11	-	-	0	-
PWTS_12	-	-	0	-

DAILY MEAN PM_{10} (NO. OF DAYS OF EXCEEDANCE)				
Receptor	2015 Base (Days)	2022 Base (Days)	2022 With Dev (Days)	Change
PWTS_13	-	-	0	-
PWTS_14	-	-	0	-
PWTS_15	-	-	0	-
PWTS_16	-	-	0	-
PWTS_17	-	-	0	-
PWTS_18	-	-	0	-
PWTS_19	-	-	0	-
PWTS_20	-	-	0	-
PWTS_21	-	-	0	-
PWTS_22	-	-	0	-
PWTS_23	-	-	0	-
PWTS_24	-	-	0	-
PWTS_25	-	-	0	-
PWTS_26	-	-	0	-
PWTS_27	-	-	0	-
PWTS_28	-	-	0	-
PWTS_29	-	-	0	-
PWTS_30	-	-	0	-
PWTS_31	-	-	0	-
PWTS_32	-	-	0	-
PWTS_33	-	-	0	-
PWTS_34	-	-	0	-
PWTS_35	-	-	0	-
PWTS_36	-	-	0	-
PWTS_37	-	-	0	-
PWTS_38	-	-	0	-
PWTS_39	-	-	0	-
PWTS_40	-	-	0	-
PWTW_6	-	-	0	-
PWTW_7	-	-	0	-
PWTW_8	-	-	0	-
PWTW_9	-	-	0	-
PWTW_10	-	-	0	-
PWTW_11	-	-	0	-
PWTW_12	-	-	0	-
PWTW_13	-	-	0	-
PWTW_14	-	-	0	-
PWTW_15	-	-	0	-
PWTW_16	-	-	0	-
PWTW_17	-	-	0	-
PWTW_18	-	-	0	-
PWTW_19	-	-	0	-
PWTW_20	-	-	0	-
PWTW_21	-	-	0	-
PWTW_22	-	-	0	-
PWTW_23	-	-	0	-

DAILY MEAN PM_{10} (NO. OF DAYS OF EXCEEDANCE)				
Receptor	2015 Base (Days)	2022 Base (Days)	2022 With Dev (Days)	Change
PWTW_24	-	-	0	-
PWTW_25	-	-	0	-
PWTW_26	-	-	0	-
PWTW_27	-	-	0	-
PWTW_28	-	-	0	-
PWTW_29	-	-	0	-
PWTW_30	-	-	0	-
PWTW_31	-	-	0	-
PWTW_32	-	-	0	-
PWTW_33	-	-	0	-
PWTW_34	-	-	0	-
PWTW_35	-	-	0	-
PWTW_36	-	-	0	-
PWTW_37	-	-	0	-
PWTW_38	-	-	0	-
PWTW_39	-	-	0	-
PWTW_40	-	-	0	-

TABLE G4 - ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS ($\mu g/m^3$)

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
1	12.7	11.6	11.6	46	0.0	0%	Negligible
2	12.7	11.6	11.6	46	0.0	0%	Negligible
3	13.1	11.9	11.9	48	0.0	0%	Negligible
4	13.0	11.8	11.8	47	0.0	0%	Negligible
5	13.3	12.0	12.0	48	0.0	0%	Negligible
6	13.3	12.0	12.1	48	0.1	0%	Negligible
7	13.3	12.2	12.3	49	0.1	0%	Negligible
8	12.6	11.6	11.6	46	0.0	0%	Negligible
9	12.9	11.9	12.0	48	0.1	0%	Negligible
10	12.3	11.3	11.3	45	0.0	0%	Negligible
11	12.2	11.3	11.3	45	0.0	0%	Negligible
12	12.9	11.7	11.7	47	0.0	0%	Negligible
PWNW_0	-	-	11.4	-	-	-	-
PWNW_1	-	-	11.4	-	-	-	-
PWNW_2	-	-	11.4	-	-	-	-
PWNW_3	-	-	11.4	-	-	-	-
PWNW_4	-	-	11.3	-	-	-	-
PWNW_5	-	-	11.3	-	-	-	-
PWNE_0	-	-	11.4	-	-	-	-
PWNE_1	-	-	11.4	-	-	-	-
PWNE_2	-	-	11.4	-	-	-	-
PWNE_3	-	-	11.3	-	-	-	-
PWNE_4	-	-	11.3	-	-	-	-
PWNE_5	-	-	11.3	-	-	-	-
PWSE_0	-	-	11.5	-	-	-	-
PWSE_1	-	-	11.4	-	-	-	-
PWSE_2	-	-	11.4	-	-	-	-
PWSE_3	-	-	11.3	-	-	-	-
PWSE_4	-	-	11.3	-	-	-	-
PWSE_5	-	-	11.3	-	-	-	-
PWSW_0	-	-	11.5	-	-	-	-
PWSW_1	-	-	11.4	-	-	-	-
PWSW_2	-	-	11.4	-	-	-	-
PWSW_3	-	-	11.4	-	-	-	-
PWSW_4	-	-	11.3	-	-	-	-
PWSW_5	-	-	11.3	-	-	-	-

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
PENW_0	-	-	11.4	-	-	-	-
PENW_1	-	-	11.4	-	-	-	-
PENW_2	-	-	11.4	-	-	-	-
PENW_3	-	-	11.3	-	-	-	-
PENW_4	-	-	11.3	-	-	-	-
PENW_5	-	-	11.3	-	-	-	-
PENE_0	-	-	11.4	-	-	-	-
PENE_1	-	-	11.4	-	-	-	-
PENE_2	-	-	11.4	-	-	-	-
PENE_3	-	-	11.3	-	-	-	-
PENE_4	-	-	11.3	-	-	-	-
PENE_5	-	-	11.3	-	-	-	-
PESE_0	-	-	11.4	-	-	-	-
PESE_1	-	-	11.4	-	-	-	-
PESE_2	-	-	11.4	-	-	-	-
PESE_3	-	-	11.3	-	-	-	-
PESE_4	-	-	11.3	-	-	-	-
PESE_5	-	-	11.3	-	-	-	-
PESW_0	-	-	11.4	-	-	-	-
PESW_1	-	-	11.4	-	-	-	-
PESW_2	-	-	11.4	-	-	-	-
PESW_3	-	-	11.3	-	-	-	-
PESW_4	-	-	11.3	-	-	-	-
PESW_5	-	-	11.3	-	-	-	-
PWTN_6	-	-	11.3	-	-	-	-
PWTN_7	-	-	11.3	-	-	-	-
PWTN_8	-	-	11.3	-	-	-	-
PWTN_9	-	-	11.2	-	-	-	-
PWTN_10	-	-	11.2	-	-	-	-
PWTN_11	-	-	11.2	-	-	-	-
PWTN_12	-	-	11.2	-	-	-	-
PWTN_13	-	-	11.2	-	-	-	-
PWTN_14	-	-	11.2	-	-	-	-
PWTN_15	-	-	11.2	-	-	-	-
PWTN_16	-	-	11.2	-	-	-	-
PWTN_17	-	-	11.2	-	-	-	-
PWTN_18	-	-	11.2	-	-	-	-

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
PWTN_19	-	-	11.2	-	-	-	-
PWTN_20	-	-	11.2	-	-	-	-
PWTN_21	-	-	11.2	-	-	-	-
PWTN_22	-	-	11.2	-	-	-	-
PWTN_23	-	-	11.2	-	-	-	-
PWTN_24	-	-	11.2	-	-	-	-
PWTN_25	-	-	11.2	-	-	-	-
PWTN_26	-	-	11.2	-	-	-	-
PWTN_27	-	-	11.2	-	-	-	-
PWTN_28	-	-	11.2	-	-	-	-
PWTN_29	-	-	11.2	-	-	-	-
PWTN_30	-	-	11.2	-	-	-	-
PWTN_31	-	-	11.2	-	-	-	-
PWTN_32	-	-	11.2	-	-	-	-
PWTN_33	-	-	11.2	-	-	-	-
PWTN_34	-	-	11.2	-	-	-	-
PWTN_35	-	-	11.2	-	-	-	-
PWTN_36	-	-	11.2	-	-	-	-
PWTN_37	-	-	11.2	-	-	-	-
PWTN_38	-	-	11.2	-	-	-	-
PWTN_39	-	-	11.2	-	-	-	-
PWTN_40	-	-	11.2	-	-	-	-
PWTE_6	-	-	11.3	-	-	-	-
PWTE_7	-	-	11.3	-	-	-	-
PWTE_8	-	-	11.3	-	-	-	-
PWTE_9	-	-	11.2	-	-	-	-
PWTE_10	-	-	11.2	-	-	-	-
PWTE_11	-	-	11.2	-	-	-	-
PWTE_12	-	-	11.2	-	-	-	-
PWTE_13	-	-	11.2	-	-	-	-
PWTE_14	-	-	11.2	-	-	-	-
PWTE_15	-	-	11.2	-	-	-	-
PWTE_16	-	-	11.2	-	-	-	-
PWTE_17	-	-	11.2	-	-	-	-
PWTE_18	-	-	11.2	-	-	-	-
PWTE_19	-	-	11.2	-	-	-	-
PWTE_20	-	-	11.2	-	-	-	-

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base (µg/m^3)	2022 Base (µg/m^3)	2022 With Dev (µg/m^3)	% of AQAL	Change (µg/m^3)	% of AQO	Impact
PWTE_21	-	-	11.2	-	-	-	-
PWTE_22	-	-	11.2	-	-	-	-
PWTE_23	-	-	11.2	-	-	-	-
PWTE_24	-	-	11.2	-	-	-	-
PWTE_25	-	-	11.2	-	-	-	-
PWTE_26	-	-	11.2	-	-	-	-
PWTE_27	-	-	11.2	-	-	-	-
PWTE_28	-	-	11.2	-	-	-	-
PWTE_29	-	-	11.2	-	-	-	-
PWTE_30	-	-	11.2	-	-	-	-
PWTE_31	-	-	11.2	-	-	-	-
PWTE_32	-	-	11.2	-	-	-	-
PWTE_33	-	-	11.2	-	-	-	-
PWTE_34	-	-	11.2	-	-	-	-
PWTE_35	-	-	11.2	-	-	-	-
PWTE_36	-	-	11.2	-	-	-	-
PWTE_37	-	-	11.2	-	-	-	-
PWTE_38	-	-	11.2	-	-	-	-
PWTE_39	-	-	11.2	-	-	-	-
PWTE_40	-	-	11.2	-	-	-	-
PWTS_6	-	-	11.3	-	-	-	-
PWTS_7	-	-	11.3	-	-	-	-
PWTS_8	-	-	11.2	-	-	-	-
PWTS_9	-	-	11.2	-	-	-	-
PWTS_10	-	-	11.2	-	-	-	-
PWTS_11	-	-	11.2	-	-	-	-
PWTS_12	-	-	11.2	-	-	-	-
PWTS_13	-	-	11.2	-	-	-	-
PWTS_14	-	-	11.2	-	-	-	-
PWTS_15	-	-	11.2	-	-	-	-
PWTS_16	-	-	11.2	-	-	-	-
PWTS_17	-	-	11.2	-	-	-	-
PWTS_18	-	-	11.2	-	-	-	-
PWTS_19	-	-	11.2	-	-	-	-
PWTS_20	-	-	11.2	-	-	-	-
PWTS_21	-	-	11.2	-	-	-	-
PWTS_22	-	-	11.2	-	-	-	-

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base ($\mu g/m^3$)	2022 Base ($\mu g/m^3$)	2022 With Dev ($\mu g/m^3$)	% of AQAL	Change ($\mu g/m^3$)	% of AQO	Impact
PWTS_23	-	-	11.2	-	-	-	-
PWTS_24	-	-	11.2	-	-	-	-
PWTS_25	-	-	11.2	-	-	-	-
PWTS_26	-	-	11.2	-	-	-	-
PWTS_27	-	-	11.2	-	-	-	-
PWTS_28	-	-	11.2	-	-	-	-
PWTS_29	-	-	11.2	-	-	-	-
PWTS_30	-	-	11.2	-	-	-	-
PWTS_31	-	-	11.2	-	-	-	-
PWTS_32	-	-	11.2	-	-	-	-
PWTS_33	-	-	11.2	-	-	-	-
PWTS_34	-	-	11.2	-	-	-	-
PWTS_35	-	-	11.2	-	-	-	-
PWTS_36	-	-	11.2	-	-	-	-
PWTS_37	-	-	11.2	-	-	-	-
PWTS_38	-	-	11.2	-	-	-	-
PWTS_39	-	-	11.2	-	-	-	-
PWTS_40	-	-	11.2	-	-	-	-
PWTW_6	-	-	11.3	-	-	-	-
PWTW_7	-	-	11.3	-	-	-	-
PWTW_8	-	-	11.3	-	-	-	-
PWTW_9	-	-	11.2	-	-	-	-
PWTW_10	-	-	11.2	-	-	-	-
PWTW_11	-	-	11.2	-	-	-	-
PWTW_12	-	-	11.2	-	-	-	-
PWTW_13	-	-	11.2	-	-	-	-
PWTW_14	-	-	11.2	-	-	-	-
PWTW_15	-	-	11.2	-	-	-	-
PWTW_16	-	-	11.2	-	-	-	-
PWTW_17	-	-	11.2	-	-	-	-
PWTW_18	-	-	11.2	-	-	-	-
PWTW_19	-	-	11.2	-	-	-	-
PWTW_20	-	-	11.2	-	-	-	-
PWTW_21	-	-	11.2	-	-	-	-
PWTW_22	-	-	11.2	-	-	-	-
PWTW_23	-	-	11.2	-	-	-	-
PWTW_24	-	-	11.2	-	-	-	-

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS							
Receptor	2015 Base (µg/m^3)	2022 Base (µg/m^3)	2022 With Dev (µg/m^3)	% of AQAL	Change (µg/m^3)	% of AQO	Impact
PWTW_25	-	-	11.2	-	-	-	-
PWTW_26	-	-	11.2	-	-	-	-
PWTW_27	-	-	11.2	-	-	-	-
PWTW_28	-	-	11.2	-	-	-	-
PWTW_29	-	-	11.2	-	-	-	-
PWTW_30	-	-	11.2	-	-	-	-
PWTW_31	-	-	11.2	-	-	-	-
PWTW_32	-	-	11.2	-	-	-	-
PWTW_33	-	-	11.2	-	-	-	-
PWTW_34	-	-	11.2	-	-	-	-
PWTW_35	-	-	11.2	-	-	-	-
PWTW_36	-	-	11.2	-	-	-	-
PWTW_37	-	-	11.2	-	-	-	-
PWTW_38	-	-	11.2	-	-	-	-
PWTW_39	-	-	11.2	-	-	-	-
PWTW_40	-	-	11.2	-	-	-	-

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Appendix 5.2

SCOPING NOTE

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Jackson's Row Developments Ltd

ST MICHAELS

Update to Scoping Report



70010278
NOVEMBER 2017

PUBLIC

Jackson's Row **Developments Ltd**

ST MICHAELS

Update to Scoping Report

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 70010278
OUR REF. NO. 70010278

DATE: NOVEMBER 2017

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3/4
Remarks	Draft for comment	Update and new template	For issue	Following legal review/further comment
Date	25 Sept 2017	12 Oct 17	26 October 17	6/23 November 17
Prepared by	Alice White	Alice White	Alice White	Alice White
Signature				
Checked by	Sally Newbold	Sally Newbold	Sally Newbold	Sally Newbold
Signature				
Authorised by	Andrew Ricketts	Andrew Ricketts	Andrew Ricketts	Andrew Ricketts
Signature				
Project number	70010278	70010278	70010278	70010278
Report number	70010278	70010278	70010278	70010278
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APPENDICES

Appendix A

1 INTRODUCTION

1.1.1. Jackson's Row Developments Ltd submitted a detailed planning application for the St Michaels development which was registered in January, 2017. This scheme was designed by Make Architects and featured two towers.

1.1.2. Following public consultation and feedback from statutory consultees on the submitted scheme, a revised scheme for St Michaels is under preparation. The revised scheme design is being led by architects Hodder + Partners, for which two public consultations have taken place; the first took place 12th July 2017, the second 23rd August 2017.

1.1.3. The Environmental Statement (ES) and other Application Documents previously submitted in support of the application (dated, November, 2016) have been appraised. To ensure the supporting documents robustly assess the revised scheme, a new ES and Application Documents are currently being prepared which will replace those previously submitted. Further detail on this is provided in the sections below.

1.1.4. WSP prepared an EIA Scoping Report in February 2016, and submitted this to Manchester City Council (MCC) alongside a request for a Scoping Opinion. Whilst there were a number of information discussions on the scope of the EIA during pre-application meetings in 2015-2017, no Scoping Opinion has been provided to date and WSP proceeded on a scope that was considered to be robust and proportionate. The subsequent ES went through statutory consultation when the application was registered; there were no comments received with regards to the scope of the EIA, so it is assumed that it is acceptable on that basis.

1.1.5. Whilst, the new documents are under preparation, this scoping note provides an update to the EIA Scoping Report, February 2016, in order that MCC can provide WSP with a Scoping Opinion in accordance with Regulation 13 of the EIA Regulations 2011 (the project will remain under the 2011 Regulations; further information on transitional arrangements is provided below).

1.1.6. We assume that this Scoping Opinion can be provided within 5 weeks of the receipt of this report.

2 THE SCHEME

2.1 THE SITE

2.1.1. The 0.56 hectare Site remains as per the Planning Application Boundary previously submitted, bound by Southmill Street to the east, Jackson Row to the north and Bootle Street to the south, shown in Figure 1.3 Planning Application Boundary of the previously submitted ES, dated November, 2016. The Site lies within the Deansgate Conservation Area, with many listed buildings in close proximity.

2.1.2. The Proposed Scheme has been revised in response to comments received from the statutory consultation exercise, most notably from members of the public and Historic England. The scheme has changed such that it will now comprise a single tower which has been reoriented and moved to the extreme west of the site. The elevations and shape of the tower have also been redesigned to be lighter weight in appearance and to increase visual interest. The position and design of the revised tower reduces visual impacts from key views. The Portland Stone element of the Police Station, as well as the Sir Ralph Abercromby public house, will also be retained in the revised scheme. A new north-south public square will be created through the site, reinstating an historic street. A new mid-rise office block will be created to the east of the new square. The former police station will also be converted into a new boutique hotel. These changes address concerns raised about the visual impact of the scheme from key views, the quality of the architecture, the loss of the buildings on site and need to create street level links through the site.

2.2 OVERVIEW OF THE PROPOSED SCHEME

2.2.1. The Proposed Scheme consists of two mixed use blocks, known as Blocks A and B, located around a new street level public square. This allows Block A to form the podium of a proposed tower whilst Block B will incorporate a roof level garden terrace. The podium of Block A will also incorporate roof top amenity garden space for use by hotel and apartment residents. The blocks will be linked with a feature stair, connecting the roof garden at the base of the tower with the roof terrace above Block B. The street level public square will create a new public route through the north/south axis of the Site.

2.2.2. Block A is located to the west of the Site, it will be formed of 6 storeys which act as a podium for a new tower consisting of an additional 34 storeys. The block will include a mix of uses between levels 01 to 06; these will consist of retail/leisure space, a new Manchester Reform Synagogue and the conference and spa facilities for a 5* hotel. The tower will then provide a mix of rooms for the 5* hotel up to level 18 with the remaining levels providing a range of residential apartments. Level 06 of Block A will support the hotel lounge and contain a roof garden. The included retail/leisure use will face the new public square at street level created between the two blocks, whilst the synagogue, 5* hotel and residential apartments will each have a dedicated entrance opening onto Jackson's Row. The existing Sir Ralph Abercromby pub will be retained and will lie to the south east of the new Block A. Support spaces for the synagogue, hotel and residential, including car parking and bike storage, will be provided at basement level with access from Bootle Street.

2.2.3. Block B is located to the east of the Site. It comprises the retention of the Portland Stone building of the former Police Station which fronts on to Southmill Street, and a new build development which will be 10 storeys high. The new block's principal use will be for commercial office, with dual aspect floor plates located from levels 02 through to 09. The entrance for the office space will open onto the new public square whilst the reminder of the ground floor will consist of retail/leisure units opening onto the street level public square and Bootle Street. The renovated police station building will be utilised as a boutique hotel from basement to level 04 with a glass rooftop extension forming a new bar and restaurant with an internal mezzanine (levels 05 and 06).

2.2.4. The feature stair will connect the level 06 roof garden on Block A, which will provide access to the 5* hotel lounge, with the level 10 roof terrace of Block B.

2.2.5. Both blocks in the Proposed Scheme are to be serviced via Bootle Street. A loading bay will be integrated within Block A at street level, with a two way ramp at the south western end of Block A providing access from Bootle Street to two levels of private basement car parking for residents, the synagogue and offices. Block B will have service access via a lobby with an entrance on Bootle Street. There are proposed a total of 136 car spaces.

2.2.6. The revised scheme is summarised as follows:

- **Towers and height**: The number of towers proposed is reduced from two to one. The overall height of the single tower is 40 storeys (which includes a 6 storey podium); it is 171.6m high AOD; lower than the highest point of the previous scheme (173.03m high AOD). The tower has also been rotated and moved westward within the development site to take advantage of the fall in topography towards Deansgate;
- **Proposed uses**: The revised scheme will continue to comprise residential (up to 189 apartments over 21 storeys), office (16,310 GIA m^2), 5* hotel (17,608 GIA m^2 over 12 storeys, up to 216 rooms), 30-bed boutique hotel (2,064 GIA m^2, 30 rooms), place of worship, retail, restaurants and public open space, in two blocks (A and B) with Block A providing the base for the single tower;
- **Retained buildings**: The Portland Stone building of the Police Station will be retained and converted into a boutique hotel. The Abercromby public house will also be retained as part of the scheme;
- **Public open space**: The revised scheme is much more outward looking and engaging at street level. There will be a public square linking Jacksons Row and Bootle Street creating a north-south route through the development to and from other areas of the City Centre. In addition, public access will be provided to the rooftop terrace above Block B via a dedicated entrance at street level;
- **Quantum**: The revised scheme proposes slightly reduced floorspace quantum across all types of development to that detailed in Table 3.1 of Chapter 3 of the submitted Environmental Statement (ES), dated November, 2016, as shown in the table below. However, the number of residential apartments proposed in the revised scheme is different, increasing from 159 to 189.

Table 1 – Quantum of Use

Type of Development	Class Use	Quantum (January, 2017) (GIA m^2)	Quantum (November,2017) (GIA m^2)
Dwelling Houses (Apartments)	C3	19,175	18,710
Hotel (5*) Including Assembly and Leisure (Gym) and Boutique Hotel	C1 / D2	17,491	19,672
Retail / Restaurants and Cafes / Drinking Establishments / Hot Food Takeaways	A1 / A3 / A4 / A5	4,571	3,228
Non-residential Institutions (Synagogue)	D1	2,119	2,458
Business (Office Space)	B1	18,100	16,310

2.3 PURPOSE OF REPORT

2.3.1. The purpose of this report is to provide key information relating to the updating of the ES for the scheme, covering:

- The EIA strategy, including transitional arrangements;
- EIA methodology in relation to baseline scenarios and the approach to cumulative; and
- An informal overview of the scope of the updated ES.

3 EIA STRATEGY

3.1 INTRODUCTION

3.1.1. This section provides the strategy and approach in relation to the following:

- Transitional arrangements;
- Replacement documents;
- Further technical evaluation;
- Baseline scenario for new ES; and
- Approach to cumulative assessment.

3.2 TRANSITIONAL ARRANGEMENTS

3.2.1. The original ES was prepared under the Town and Country (Environmental Impact Assessment) Regulations 2011 (as amended).

3.2.2. The updated 2014 EU EIA Directive was transposed into English law on 16th May 2017 with the Town and Country (Environmental Impact Assessment) Regulations 2017. Under transitional provisions in regulation 76(2) of the 2017 Regulations, 'the 2011 Regulations continue to apply where before the commencement of these regulations… an applicant, appellant or qualifying body, as the case may be, has submitted an environmental statement or requested a scoping opinion'.

3.2.3. A scoping opinion was requested from the Manchester City Council in February 2016. Although a Scoping Opinion was not issued in response to the EIA Scoping Report (February, 2016), an ES was submitted early 2017 prior to the commencement of the 2017 Regulations. On both these counts, the ES therefore falls under the transitional arrangements set out in regulation 76(2) and the 2011 Regulations continue to apply. In addition, we have assumed that Manchester City Council will have screened the Proposed Scheme under the 2011 Regulations upon submission in November, 2016 when the application was validated.

3.2.4. Therefore, the transitional arrangements apply to the new ES, in accordance with the 2011 and 2017 Regulations; it will therefore be prepared in compliance with the requirements of the 2011 Regulations.

3.3 REPLACEMENT DOCUMENTS

3.3.1. A revised planning submission is being prepared as an amendment to the existing, previously submitted, detailed planning application.

3.3.2. Given the nature of changes to the Proposed Scheme and the implications these changes will have on the effects on the environment, it seems practical to revise the previously submitted ES and some of the Application Documents in their entirety.

3.3.3. The following table sets out the documents to be revised which will support the planning application.

Table 2 – Documents to be revised and submitted

Document
Covering Letter
Full Drawing Pack of Proposals
Landscape Drawings
Planning and Tall Buildings Statement
Design and Access Statement (and appendices)
Regeneration Statement
Environmental Standards Statement including Energy Statement
TV Reception Survey
Consultation Statement
Crime Impact Statement

Document
Heritage Significance Statement
Heritage Impact Statement
Demolition Justification Statement
Viability Appraisal
ES: Volume 1 – Main Text and Figures ES: Volume 2 – Technical Appendices ES: Volume 3 – Non-technical Summary
Transport Statement
Framework Travel Plan
Flood Risk Assessment
Drainage Strategy
Waste Management Strategy

3.4 FURTHER TECHNICAL EVALUATION

3.4.1. WSP are currently undertaking technical modelling based on the revised scheme for the following technical areas:

- Noise and vibration;
- Wind;
- Daylight, sunlight and overshadowing
- Transport; and
- Air quality.

3.4.2. This additional modelling will also feed into the design, alongside other specific design advice in relation to waste management and drainage.

3.4.3. This will be required in order to ensure that the revised assessments are in accordance with the revised proposals for which consent is sought. Upon completion of the modelling and resolution of any significant design issues, a combination of new and supplementary assessments will be undertaken as part of the preparation of the new ES and Application Documents.

3.5 BASELINE SCENARIO FOR NEW ES

3.5.1. The baseline within the majority of the ES will not be updated. The following table sets out the baseline information used in the previously submitted ES for each topic, alongside justification where this baseline is considered suitable for use in the new ES.

Table 3 – Baseline data collection by topic

Topic	Baseline used in submitted ES	Application in new ES
Noise	Noise monitoring as part of an environmental noise survey to establish baseline noise levels was undertaken in November 2015.	It was found that the noise environment present within the vicinity of the Site predominantly consists of road traffic noise on the local road network, fixed plant / delivery noise sources and entertainment noise associated with existing commercial premises surrounding the site. This has not changed and therefore the baseline is considered to be appropriate.

Topic	Baseline used in submitted ES	Application in new ES
Socio-economics	A desk study and site visit were undertaken in November 2015.	The nature of socio-economic conditions at and around the Site has not changed, so the baseline is considered to be appropriate.
Townscape and Visual	A desk study and site visit were undertaken in June and August 2016.	Elements of the baseline will be updated for this assessment, such as photography, kinetic track video and 3D reference data surveys, to take account of changes to visual baseline from other development in the centre of Manchester.
Cultural Heritage	A desk study and a site visit were undertaken in April 2016.	There has been no change to the Site location or proposed Scheme footprint so the baseline is considered to be appropriate.
Wind	A baseline scenario was modelled based on the existing conditions at the Site at the time of assessment. A cumulative scenario took into account committed developments identified during preparation of the original ES.	Due to the retention of the Sir Ralph Abercromby Public House in the revised scheme and the ongoing development in Manchester City Centre, the baseline modelling scenario will be updated for the new ES. Also, other development schemes currently under construction are to be included in the baseline scenario to account for the strong interdependency between wind and the changing urban environment.
Daylight, Sunlight and Overshadowing	A baseline scenario was modelled based on the existing buildings at and around the Site.	An updated baseline modelling scenario will be prepared for this assessment taking account of recent construction activity in Manchester City Centre.
Archaeology	A desk study and site visit were undertaken in February 2016.	There has been no change to the Site location or proposed Scheme footprint so the baseline is considered to be appropriate.
Biodiversity	A desk study and walkover survey was undertaken in October 2015. Bat surveys were undertaken in September 2016.	Given the nature and location of the Site (i.e. city centre urban, disused buildings) and the length of time since the bat survey (less than 2 years), it is considered that survey findings are still appropriate for use as baseline.
Geotechnical	Fieldwork was undertaken during November 2015.	Given the nature and location of the Site, no change in geotechnical baseline conditions is likely to have occurred, and therefore the baseline is considered to be appropriate.
Air Quality	A desk study and modelling of a baseline scenario was undertaken in 2016.	The desk study and baseline modelling will be updated to reflect the latest figures.

3.6 APPROACH TO CUMULATIVE ASSESSMENT

3.6.1. Due to the location of the project there are a number of additional committed schemes which will require an appropriate level of assessment within the ES.

3.6.2. A new cumulative assessment will follow the same methodology as outlined in the ES, dated November, 2016. Additional projects will be considered in-combination if the projects meet the following criteria:

- Projects that are under construction;
- Permitted application(s) not yet implemented;
- Submitted applications(s) not yet determined;
- All refusals subject to appeal procedures not yet determined; and
- Projects identified in the relevant development plan (and emerging development plans).

3.6.3. The projects will then be assessed as to whether they meet all of the following criteria:

- Concurrent construction or / and operational phase with the Proposed Scheme;
- Located within a relevant geographical boundary to the Proposed Scheme; and
- Common sensitive receptors.

3.6.4. The projects proposed to be included in this assessment as future baseline are as follows:

- Granada House
- 123 Deansgate
- Former Studio Space adjacent to Grape Street
- Owen Street
- Axis
- London Scottish House
- Former Odeon Cinema Building, Oxford Street (Landmark)
- No7 First Street

3.6.5. The One Spinningfields project will now be considered as baseline, due to progress of construction of the project.

3.6.6. The projects proposed to be included in this assessment as cumulative are as follows:

- 11 York Street
- 10-12 Whitworth Street
- Bonded Warehouse Grape Street
- 2-4 Chester Road
- Deansgate South
- Former MMU Aytoun Campus
- Invicta House
- Land Bounded by River Irwell
- Former Bauer Millet Site
- 3 St John Street
- Princess Street/Whitworth Street
- St Peters Square
- Land Bounded By Water Street And The V&A Hotel To The West, The Bonded Warehouse And Railway Viaducts To The South, Atherton Street & Granada House To The East And Quay Street & The Globe & Simpson Building To The North Manchester
- Starlight Theatre Water Street Manchester
- Land Bounded By Quay Street & Manchester College To The North, Gartside Street & Quay Street To The East, Granada House & Studios & The Victoria & Albert Marriott Hotel To The South & Water Street & The River Irwell To The West Manchester
- Land Adjacent Manchester Hall 44 - 48 Bridge Street Manchester M3 3BW
- Olympia Trading Estate Great Jackson Street Manchester M15 4NP
- Middlewood Locks
- New Bailey, near Spinningfields

4 SCOPING

INTRODUCTION

4.1.1. An EIA Scoping Report was submitted to MCC in February, 2016 (as presented in Appendix A), together with a formal request for an EIA Scoping Opinion, in accordance with Regulation 13 of the EIA Regulations 2011 (as amended 2015). To date a Scoping Opinion has not been received from MCC. The EIA Scoping Report is the output of the EIA process which has been undertaken in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 (Ref 1.1) as amended 2015 (Ref 1.2) (hereafter referred to as the 'EIA Regulations'). The Scoping Report is one of the application documents submitted to the determining planning authority (Manchester City Council) in order that they can make an informed decision on the planning application.

4.1.2. As set out in Chapter 1 (Introduction) of this note, it has been necessary to revise the scheme and prepare a revised ES and planning documents. In order to ensure the scope of the ES is appropriate in relation to the revised scheme, this scoping note has been prepared. The decision to clearly set out the scoping process for a second time also considers the lack of a Scoping Opinion from MCC to date, although we appreciate the continuous informal advice provided by MCC throughout.

4.1.3. The following sections set out the proposed topics to be scoped into and out of the assessment, alongside justification for each. These sections will provide clear justifications of decisions made during the appraisal of the significance of each environmental topic, whilst considering all impacts of the changes made to the Scheme since November 2016.

4.2 INSIGNIFICANT TOPICS

4.2.1. As outlined in Chapter 5 (Approach to EIA) of the ES, dated November, 2016, a number of topics were not considered to be significant and an evidence base was provided.

4.2.2. Following an appraisal of the revised scheme and in advance of the further technical evaluation as outlined in Section 2.4 (the Proposed Scheme), the following topics will not be considered within the ES.

Table 4 – Justification for scoping out insignificant topics

Topic to be scoped out	Justification
Agriculture	The revised scheme is located in its entirety upon the same previously developed land as the original scheme. Therefore, its implementation would not involve the loss of agricultural land or affect farm businesses during the construction and operation phases. The available ALC mapping (1:250,000) scale produced by the Ministry of Agriculture, Fisheries and Food (MAFF) shows that the whole of the Site is classified as Urban. Therefore, potential effects upon agriculture will not be assessed within the revised ES.
Transport and access	The Proposed Scheme is located within a city centre environment with numerous retail and leisure facilities, where HGV movements are common. In this context, it is considered there is unlikely to be a significant increase in HGV movements as a result of the construction of the Proposed Scheme, assuming that there would be no more than 25 HGVs operating per day. HGV demand to / from the Site is therefore anticipated to be negligible and there are not expected to be noticeable effects on congestion. It is also assumed that the construction of the Proposed Scheme would directly generate a maximum of 500 employees travelling to the Site, with a further 360 employed indirectly or through the supply chain, who would not usually be travelling to the site on a regular basis. However, again considering the city centre context such additional movements are not considered to be significant. Suspension of car parking on Jackson's Row, Bootle Street and Southmill Street may be required during construction; however, the number of car parking spaces to be suspended is unlikely to cause a significant increase in congestion and therefore is not considered to be significant. It is assumed that development operational traffic would utilise the local road network in Manchester City Centre to gain access to the Site, including Deansgate, Southmill Street, Jackson's Row and Bootle Street. An initial assessment of this local road network and the transport facilities within walking distance of the Site has demonstrated that it is in a highly sustainable and accessible location given a large number of facilities (i.e. destinations) are located within the Chartered Institution of Highways and Transportation (CIHT) recommended walking distance in Manchester City Centre. There are consequently significant opportunities for sustainable modes of travel for future residents, users and employees of the Proposed Scheme. There are approximately 70 parking spaces contained on the existing Site and, once complete, the Proposed Scheme is expected to contain approximately 132 parking spaces. An analysis of the Proposed Scheme, including its size, development mix and proposed parking provision, has shown that the anticipated development traffic during operational phases is unlikely to have a significant effect on the operation of the junctions at the Site, and would not cause any significant congestion. In addition, the proposals include measures to promote sustainable travel patterns and a significant percentage of journeys to and from the Site are assumed to be taken by modes of transport other than private car.

Topic to be scoped out	Justification
	A Transport Statement (TS) will be produced to support the revised ES and the planning application, and a (Framework) Travel Plan ((F)TP) will be produced to ensure sustainable transport. The likely number of operational traffic movements associated with the Proposed Scheme will be set out within the TS together with any identified delivery vehicle movements. Therefore, potential effects upon traffic and transport will not be assessed within this ES.
Flooding, hydrology and water resources	The Site is not located within the vicinity of the coast, nor in a tidal estuary, and therefore the risk of such flooding is low. The Environment Agency's Reservoir Flood Map also shows that the Site is not in an area that would be inundated with flood waters due to catastrophic failure of reservoir dams. The Site is located within Flood Risk Zone 1, which is considered to be at low risk of flooding, and there would not be a significant change in the permeability of the ground due to the presence of existing hardstanding on the Site. A Drainage Strategy would be implemented to mitigate any surface water flood risk. Run-off would be managed by the collection of surface water and discharge from the Site. This would reduce any flood risk on-site. The Manchester Salford and Trafford Councils Level 2 Hybrid Strategic Flood Risk Assessment (SFRA) (2011) Groundwater Flooding Map indicated that the Site is neither at risk from groundwater flooding nor in an area at risk of groundwater rebound. Although the Proposed Scheme involves construction of a basement floor, the Preliminary Geotechnical and Environmental Assessment (Appendix 2.3 of the original ES) confirms that the lowest basement slab is currently anticipated to be 29.8m AOD. Excavations to around 28.3m AOD will likely be required for foundations, with excavations locally to around 26.8m AOD for lift pits. Based on groundwater standing at a minimum depth of 25.49m AOD the excavations for foundations (including piling) are anticipated to be above the groundwater table. It is therefore assumed that the construction of these structures alone would not significantly alter the risk of groundwater flooding at this location. Therefore, the potential increase in flood risk to construction workers and future Site users and third parties is considered to be insignificant. Should foundations (including piling) be revised such that the depths of works were to go below the groundwater level, further assessment will be required. During the construction phase, there would be a number of activities which could reduce surface water quality with respect to physical contaminants. These include: installation of temporary drainage and service diversions / installations; site clearance; and materials handling, storage, stockpiling, spillage and disposal etc. The construction activities may lead to the disturbance and mobilisation of physical contaminants (i.e. dust, sediments and muds). However, there are no open watercourses within the Site or its vicinity, and a surface water drainage system would be implemented, together with SuDS to restrict and treat surface water run-off. There would also be a sediment control system that would ensure no sediments enter any wider connections. Based on the assumption that flows would be controlled and attenuated as part of the drainage system, potential increase in sediment loading entering surface watercourses and drainage features is considered to be insignificant. During the operational phase of the Proposed Scheme, the majority of the Site would be occupied by built form and hard-standing. Therefore, there is anticipated to be a low volume of physical contaminants (sediment) which could

Topic to be scoped out	Justification
	potentially be entrained in surface water run-off over hard standing and landscaping areas and discharged to surface water receptors. Furthermore, the Proposed Scheme includes for covered car-parking which should reduce the risk of pollutant transport. The potential effects of changes to physical contamination (i.e. sedimentation) entering surface water bodies and drainage features during the operational phase are therefore considered to be insignificant. It is anticipated that the increase in potable water demand in relation to the wider water resources and capacity would not be significant in the context of current water demand within the city centre. In addition, non-potable water demand would also be minimised by the use of water recycling. It is assumed that the existing infrastructure would be able to handle any increase in demand. However, financial contribution to the supplier (United Utilities) may be required to upgrade the current supply system accordingly, although this in itself is not an environmental consideration. It is also anticipated that the increase in foul flows in relation to the foul sewerage capacity would not be significant. There are no permitting limits for the Site in terms of foul water discharge. The Site benefits from a combined sewer system therefore there is not anticipated to be significant effects upon sewer capacity. Therefore, potential effects upon flooding, hydrology and water resources will not be assessed within the revised ES.
Ground conditions, hydrogeology and contamination	The Site is located within a City Centre location. Historical mapping indicates the Site has had land use classes C3 / D2 / A4 / B1 for a number of years (Appendix 2.1 of the original ES). The Site is underlain by a shallow layer of Made Ground, which is assumed to be removed as part of the Proposed Scheme (including basement excavations). Contaminants within the soil (see Appendix 2.3 of the original ES) are therefore expected to be removed, and the potential exposure of future Site users and third parties to contamination during the operational phase is considered to be insignificant. The removal of contaminants during the construction phase has the potential to affect construction workers and cause contaminated runoff which has the potential to affect soils and controlled waters. However, Chapter 3 – Description of the Proposed Scheme confirms that construction works would be managed in accordance with the EA Pollution Prevention Guidelines (Ref 5.4 – Ref 5.11) and CIRIA guidance 'C532 - Control of Pollution from Construction Sites' (Ref 5.12) to help ensure a well-managed operation which minimises potential environmental risks. As such, effects due to potential releases / migration of contamination (uncontrolled discharges / accidental spillages) to controlled waters during the construction phase are considered insignificant. The ground gas monitoring data available confirms that no special gas protection measures are required (Appendix 2.3 of the original ES). Furthermore, there are no areas of concern such as historic landfills or mining activities within close proximity to the Site that could pose any potential risk. However, if any potential effects were to arise from ground gas following further investigation, they will be appropriately mitigated prior to the construction phase under Part IIA of the Environmental Protection Act 1990 and through following construction best practice measures. Therefore, the potential risk of hazardous ground gas during the construction and operation phases is considered to be insignificant. Initial site investigations undertaken in November 2015 (Appendix 2.3 of the original ES) confirm that rock strength is significant at the proposed formation level. It is possible that rock mass in the vicinity of the West Manchester Fault

Topic to be scoped out	Justification
	may have an increased weathering profile or have a weakened / broken state. Subject to further ground investigation the basement construction is therefore anticipated to require the use of embedded bored pile wall and propping of the basement wall will likely be required to control deflections and ground movement at the Site boundaries. Following implementation of such design measures and further monitoring, the potential risks from unstable and compressible ground as a result of the Proposed Scheme are considered to be insignificant. During construction it is anticipated that the basement and foundations work may expose the underlying sandstone bedrock. A Construction Environmental Management Plan (CEMP) will be in place that will control activities with a potential to cause contamination to prevent discharges to the sandstone. During the operational phase of the Proposed Scheme there is potential for localised spillage of fuel, which may be carried to the underlying aquifers and surface water drainage system. However, the Proposed Scheme would implement an appropriate Drainage Strategy. Contaminants from fuel spillages which are likely to occur on areas of hard-standing (car parking areas) would be subject to a controlled drainage scheme and therefore would minimise contaminants reaching groundwater and surface water features. Furthermore, proposed car parks would be under cover and not subject to weather, which would further reduce the risks of contaminant transport. Therefore, the potential release / migration of contamination from accidental spillages on groundwater and surface water receptors is considered to be insignificant. Therefore, potential effects upon ground conditions, hydrogeology and contamination will not be assessed within the revised ES.
Artificial lighting	The Site is currently lit and is likely to be classified as an E4 Environmental Zone ('i.e. an area of high district brightness') (Ref 5.13) due to its location within Manchester City Centre with high levels of night-time activity. Sources of existing lighting include street lighting on the roads along the Site boundary, bulkheads fixed on the Bootle Street side of Greater Manchester Police Station building and fugitive light spill from the surrounding buildings. The surrounding road network is therefore already lit by inconsistent levels of lighting. Potential sensitive receptors to light spill and glare include residential properties and users of the local road and footpaths surrounding the Site. The key receptors are residents in close proximity to the Site which have windows directly facing the Site and which may be subject to an increase in light that may be termed a statutory nuisance. Residents in the immediate vicinity of the Site are limited to one property above the Old Nag Head pub on Jackson's Row. During the construction phase, floodlighting / security and health lighting installations associated with on-going working areas, where equipment is stored and safety hazards may be present. However, a Construction Environmental Management Plan (CEMP) will be prepared and agreed with MCC prior to the commencement of works. As part of the CEMP, the detailed measures will be implemented to minimise light spill and glare to nearby sensitive receptors. It is assumed that operational lighting installations will be designed to relevant British Standards (including BS 5489-1: 2013

Topic to be scoped out	Justification
	'Code of practice for the design of road lighting: Lighting of roads and public amenity areas') (Ref 5.14) and will take account of the ILP 'Guidance Notes for the Reduction of Obtrusive Light' (Ref: 5.13). Any illuminated signs would be designed to meet the ILP 'PLG05 'The Brightness of Illuminated Advertisements' (Ref: 5.15). As such, any increase in light spill and glare is unlikely to be significant. It is considered that any new lighting installations will be operational prior to occupation of future residential properties and therefore it is not anticipated that future residential receptors will experience a change from baseline conditions. During operation, the potential for light spill and glare will be limited to one residential receptor on Jackson's Row. It is expected that the operational lighting installations associated with the Proposed Scheme will be designed to best practice guidance, including British Standard (BS) 5489-1:2013. It is therefore considered that upward light will be limited and new lighting will provide a more consistent level of lighting improving a sense of security. Additionally, any new lighting will be designed to ensure that the source of lighting is not facing or adjacent to a residential window. Based on the evidence to date, effects relating to nuisance from lighting are considered insignificant and will not be considered in the revised ES.
Solar glare	The design of the facades of the two blocks and the tower comprises a varied grain dependent upon the internal use immediately behind. The façades will comprise glazing with solid areas of cladding. A super durable finish will be applied for weather and UV radiation resistance. All finishes will have a gloss factor of 30%. The Proposed Scheme façade is therefore not dominated by glass which is associated with significant solar glare effects but is broken by the use of solid cladding. The inclusion of a significant proportion of all façade comprising of non reflective / non specular solid cladding is likely to reduce the risk of significant solar glare effects on surrounding major road junctions. However, as part of the post planning detailed design process further consideration of solar glare effects will be undertaken once the glass specification and final façade design are known, to ensure that any necessary mitigation measures are implemented.
Air quality	Since the issue of the EIA Scoping Report an assessment of construction dust has been undertaken and is provided in Appendix 2.4 of the original ES. The assessment confirms that provided the appropriate mitigation measures within the Construction Environment Management Plan (CEMP) (as detailed within Chapter 3 – Description of the Proposed Scheme of the original ES) are implemented, dust and PM10 generated by on-site activities would be expected to have a negligible effect on sensitive receptors. It is anticipated that during construction, there will be no more than 25 HGV movements per day. As the Site is within the Greater Manchester Air Quality Management Area (AQMA), MCC utilises guidance published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) in May 2015 to determine the requirement for an air quality assessment. This guidance sets out a number of criteria, including the change in traffic on local roads. The threshold for assessment of HGVs within an AQMA is a change of Heavy Duty Vehicle (HDV; HGVs and buses)

Topic to be scoped out	Justification
	flows of more than 25 Annual Average Daily Traffic (AADT). Therefore, the threshold is not exceeded and effects are not considered to be significant and will not be assessed within the ES. In accordance with guidance provided by the Institute of Air Quality Management (IAQM) (Ref: 5.16) an initial search has been undertaken for designated ecological sites within proximity to the Site. This search has identified that the closest international or nationally designated site (the Rochdale Canal SAC) is located 6.1km to the northeast of the Site. Due to this distance, habitat degradation associated within construction dust and exhaust emissions is considered insignificant and will not be assessed within the ES. With regards to the potential effects of emissions from operational traffic on designated habitats, the Design Manual for Roads and Bridges (DMRB) (Ref: 5.17) provides relevant guidance. Significant air quality effects would potentially be experienced at ecological receptors located within 200m of roads where daily traffic flows change by 1,000 (as Annual Average Daily Traffic (AADT)) or more, or Heavy Goods Vehicles (HGVs) flows change by 200 AADT or more. Once completed, the Proposed Scheme is expected to contain approximately 132 parking spaces, indicating daily traffic flow changes of well below the 1,000 AADT limit. In addition, the closest designated habitat is located 6.1km to the northeast. Consequently, it is considered unlikely that there would be any significant effects at ecological receptors as a result of the operation of the Proposed Scheme. At this stage A3 and A4 uses are proposed within the Scheme along with other planning uses. Although there is the potential for odorous emissions due to these proposed uses, it is anticipated that any emissions would be minimised through adoption of design measures consistent with those set out in Defra's Control of Odour and Noise from Commercial Kitchen Exhaust Systems guidance and would be subject to additional approvals. The assessment of the potential air quality effects as a result of traffic associated with the operational phase of the Proposed Scheme has been completed in line with published methodologies and technical guidance (Appendix 2.4 of the original ES). The pollutants considered in this part of the assessment were NO2 and particulate matter (PM10 and PM2.5). The results show that the Proposed Scheme would cause a negligible effect on concentrations of all three pollutants at nearby sensitive receptors. The potential air quality effects as a result of traffic associated with the construction phase was also considered to be negligible. The effects on the Proposed Scheme are considered to be insignificant and therefore air quality will not be assessed further within the ES.
Biodiversity	There are no statutory designated ecological sites within or immediately bordering the Site. There is one Special Area of Conservation (SAC) (Rochdale Canal SAC) located 6.1km to the northeast. The Site does not share any contiguous or complimentary habitat with the SAC, and the SAC's primary classification is for its aquatic vegetation community (the SAC is not protected for bat or bird species). However, there are no connecting features between the described statutory or non-statutory sites and the Site. In addition, given the distance between the SAC and the Site, there is unlikely to be a significant increase in recreational pressure from new residents, or deterioration in surface or

Topic to be scoped out	Justification
	groundwater (refer to Section 5.4 and Section 5.5 of this EIA Scoping Report). Therefore, potential effects on the statutory designated site are not anticipated to be significant and will not be assessed within the ES. Habitat Regulations Assessment (HRA) Screening is therefore not considered necessary. A review of available information identified three non-statutory sites (SBI's), within 2km of the Site. However, there is no connecting or complimentary habitat between the Site and these sites and therefore potential effects are not anticipated to be significant and will not be assessed within the ES. A review of the available information within the local area has found no suitable habitat or records for protected species other than breeding birds and bats. Since the completion of the EIA Scoping, bat surveys have been completed (see Appendix 2.2 - Biodiversity Assessment of the original ES). The bat surveys conclude that there is no evidence of bats roosting in the Site and there is very limited potential for foraging across the Site given the limited vegetation present on the Site. Therefore the potential for disturbance or loss of bats during the construction phase is considered to be low. As a precautionary measure, buildings should be re-surveyed prior to demolition or other construction activities. Additionally, given the limited vegetation on Site the potential for disturbance or loss to breeding birds during the construction phase is also considered low. It is assumed that the Construction Environmental Management Plan will include measures to ensure an ecologist provides appropriate checks for the presence of breeding birds prior to any demolition or other construction activities. Assuming these precautionary measures are implemented, the effects of the Proposed Scheme on biodiversity are not considered to be significant and therefore biodiversity will not be assessed further within the revised ES.
Waste	The majority of demolition waste will comprise stone and brick from the existing buildings on the Site. The Applicant has confirmed that demolition waste will be used for temporary works on Site and then recycled off Site. The volume of demolition waste has been estimated to be between 20,000m^3 and 50,000m^3. Based on the worst case total building volume (i.e. 50,000m^3) the estimated demolition has been quantified using the methodology as outlined in the EIA Scoping Report (Appendix 5.1 of the original ES). It is estimated that 25,000 tonnes of demolition waste will be generated as a result of the proposed demolition activities at the Proposed Scheme. The retention of the Abercromby public house and the Portland Stone front of the Police Station means that this estimate is conservative and real-life volumes may in fact be less than that stated here. Compared to the 2010 Construction and Demolition (C+D) recycling facility capacity (c. 2.4m tonnes) (Ref 5.18), 25,000 tonnes of demolition waste would not significantly increase pressures on C+D recycling facility capacity, when considering the inert nature of the demolition waste, the short-term nature of the required C+D recycling facilities, the current number of operational sites and the current capacity. In addition to demolition waste it is understood that the total volume of excavation will be approximately 3,000m^3. Using a conversion factor of 0.43m^3 = 1 metric tonne it is estimated that 6,977 tonnes of earthworks will be generated as a result of proposed earthwork activities at the Site. It is confirmed that excavation material will be used as temporary

Topic to be scoped out	Justification
	works on Site and then be recycled off Site. Compared to the 2010 Construction and Demolition (C+D) recycling facility capacity as detailed in Table 5.1 of the original ES (c. 2.4m tonnes), 6,977 tonnes of earthworks would not significantly increase pressures on Construction and Demolition (C+D) recycling facility capacity when considering the short term nature of the required C+D recycling facilities, the current number of operational sites and the current capacity. With regards to construction waste, this is likely to consist of materials such as packaging from deliveries and materials that become surplus to requirements. Estimated construction waste arisings have been quantified based on Environmental Performance Indicators (EPIs) developed by the Building Research Establishment (BRE) which measure tonnes of construction waste/100m2 (Ref 5.19). It is estimated that 12,666 tonnes of construction waste will be generated throughout the construction phase of the Proposed Scheme. Over the duration of the construction works (expected to be 2018-2020), this equates to an average of approximately 3,167 tonnes per year, although this is likely to vary significantly according to the construction programme and phasing. It is assumed that the vast majority of construction waste will either be re-used on Site or recycled off-Site. Compared to the 2010 C+D recycling facility capacity as detailed in Table 5.1 of the original ES (c. 2.4m tonnes), 3,167 tonnes of construction waste per year would not significantly increase pressures on C+D recycling facility capacity. The management of waste produced during the operational phase of the Proposed Scheme will be considered and addressed through the design process and a Waste Management Strategy (Core Document, submitted to support the planning application) to ensure it is managed in a way to minimise environmental effects in accordance with legislation, guidance and local targets. Therefore, effects of operational waste are not considered significant, and will therefore not be considered in the ES. Based on the above, it is considered that waste generated during the construction and operational phases will be insignificant and will not be assessed further within the revised ES.

4.3 POTENTIALLY SIGNIFICANT TOPICS

4.3.1. Following an appraisal of the revised scheme and in advance of the further technical evaluation as outlined in Section 2.4, the Proposed Scheme has the potential to result in likely significant effects on the environment associated with the following topic areas:

- Noise and Vibration;
- Townscape and Visual;
- Built Heritage;
- Wind;
- Daylight, Sunlight and Overshadowing;
- Socio-economics;
- Archaeology; and
- Cumulative Effects.

4.3.2. In conclusion, it has been determined that the scope of topics in the revised ES remain the same as the previously submitted ES.

4.3.3. Table 5 confirms the anticipated scope of the new ES.

Table 5: Scope of the ES

Technical Topic Area	Potential Significant Effect Identified at the Scoping Stage, February, 2016	Potential Significant Effect Assessed as part of the ES (January, 2017)	A Potential Significant Effect Identified at the Scoping Stage, September, 2017
Noise and Vibration	Construction ▪ Disturbance to sensitive receptors from noise generated by on-site construction activities; and ▪ Disturbance to sensitive receptors from vibration generated by any construction activities likely to be particularly vibration generative. Operation ▪ Disturbance to existing sensitive receptors and future proposed noise sensitive uses from noise generated by the fixed plant / goods delivery noise and entertainment noise; and ▪ Disturbance to future proposed noise sensitive uses from the prevailing noise environment (e.g. existing road traffic, existing fixed plant on nearby buildings and existing entertainment from surrounding premises).	Construction ▪ Disturbance to sensitive receptors from noise generated by on-site construction activities; and ▪ Disturbance to sensitive receptors from vibration generated by any construction activities likely to be particularly vibration generative. Operation ▪ Disturbance to existing sensitive receptors and future proposed noise sensitive uses from noise generated by the fixed plant / goods delivery noise and entertainment noise; and ▪ Disturbance to future proposed noise sensitive uses from the prevailing noise environment (e.g. existing road traffic, existing fixed plant on nearby buildings and existing entertainment from surrounding premises).	Construction ▪ Disturbance to sensitive receptors from noise generated by on-site construction activities; and ▪ Disturbance to sensitive receptors from vibration generated by any construction activities likely to be particularly vibration generative. Operation ▪ Disturbance to existing sensitive receptors and future proposed noise sensitive uses from noise generated by the fixed plant / goods delivery noise and entertainment noise; and ▪ Disturbance to future proposed noise sensitive uses from the prevailing noise environment (e.g. existing road traffic, existing fixed plant on nearby buildings and existing entertainment from surrounding premises).
Air Quality	Construction ▪ None. Operation ▪ Increase in pollutant concentrations (NO2, PM10 and PM2.5) as a result of exhaust emissions arising from	N/A	An assessment of road traffic generated by the Proposed Scheme is anticipated to confirm that the potential effects on pollutant concentrations are negligible.

Technical Topic Area	Potential Significant Effect Identified at the Scoping Stage, February, 2016	Potential Significant Effect Assessed as part of the ES (January, 2017)	A Potential Significant Effect Identified at the Scoping Stage, September, 2017
	operational traffic on local air quality at sensitive residential receptors.		
Townscape and Visual	Construction ▪ Change to Site and surrounding character due to the presence of machinery, hoardings, scaffolding, tower cranes, earthworks, stockpiles and construction activities; ▪ Change in visual amenity; and ▪ Change in urban grain height and massing. Operation ▪ Change to Site and surrounding character due to new built form and landscaping; ▪ Change in visual amenity; and ▪ Change in urban grain height and massing.	Construction ▪ Change to local townscape character due to the presence of machinery, hoardings, scaffolding, tower cranes, earthworks, stockpiles and construction activities within the Site; ▪ Change in visual amenity; and ▪ Change in urban grain height and massing. Operation ▪ Change to local townscape character due to new built form and landscaping; ▪ Change in visual amenity; and ▪ Change in urban grain height and massing.	Construction ▪ Change to local townscape character due to the presence of machinery, hoardings, scaffolding, tower cranes, earthworks, stockpiles and construction activities within the Site; ▪ Change in visual amenity; and ▪ Change in urban grain height and massing. Operation ▪ Change to local townscape character due to new built form and landscaping; ▪ Change in land use and visual amenity; and ▪ Change in urban grain height and massing.
Built Heritage	Construction ▪ Change in setting of listed buildings in the vicinity of the Proposed Scheme both inside and outside the Deansgate Conservation Area; and ▪ Change in setting of non-designated heritage assets within the Deansgate Conservation Area.	Construction ▪ Visual impact on setting of listed buildings; ▪ Visual impact on character and appearance of conservation areas; and ▪ Demolition of existing buildings. Operation	Construction ▪ Visual impact on setting of listed buildings; ▪ Visual impact on character and appearance of conservation areas; and ▪ Demolition of existing buildings. Operation

Technical Topic Area	Potential Significant Effect Identified at the Scoping Stage, February, 2016	Potential Significant Effect Assessed as part of the ES (January, 2017)	A Potential Significant Effect Identified at the Scoping Stage, September, 2017
	Operation ▪ Change in setting of listed buildings in the vicinity of the Proposed Scheme both inside and outside the Deansgate Conservation Area; and ▪ Change in setting of non-designated heritage assets within the Deansgate Conservation Area.	▪ Visual impact on setting of listed buildings; and ▪ Visual impact on character and appearance of conservation areas.	▪ Visual impact on setting of listed buildings; and ▪ Visual impact on character and appearance of conservation areas.
Wind	Construction ▪ None. Operation ▪ Reduction in the safety of pedestrians as a result of an increase in wind speeds; and ▪ Pedestrian discomfort as a result of localised zones of acceleration.	Construction ▪ None. Operation ▪ Reduction in the safety of pedestrians as a result of an increase in wind speeds; and ▪ Pedestrian discomfort as a result of localised zones of acceleration.	Construction ▪ None. Operation ▪ Reduction in the safety of pedestrians as a result of an increase in wind speeds; and ▪ Pedestrian discomfort as a result of localised zones of acceleration.
Daylight, Sunlight and Overshadowing	Construction ▪ None. Operation ▪ Loss of natural light (daylight and sunlight) to adjacent properties.	Construction ▪ None. Operation ▪ Loss of natural light (daylight) to adjacent properties; ▪ Loss of natural light (sunlight) to adjacent properties; and ▪ Increased overshadowing to open spaces.	A re-assessment of overshadowing of open spaces will be undertaken. The results will be included in this Chapter for transparency given concern raised during consultation (see **Statement of Community Involvement**). Operation ▪ Loss of natural light (daylight) to adjacent properties; ▪ Loss of natural light (sunlight) to adjacent properties; and

Technical Topic Area	Potential Significant Effect Identified at the Scoping Stage, February, 2016	Potential Significant Effect Assessed as part of the ES (January, 2017)	A Potential Significant Effect Identified at the Scoping Stage, September, 2017
			▪ Increased overshadowing to open spaces.
Biodiversity	Construction ▪ None. Operation ▪ Disturbance and loss of breeding birds and bats.	N/A	Bat surveys confirmed absence of species and therefore no further assessment required as detailed in Table 4. Given limited vegetation and appropriate ecological controls through the CEMP effects on breeding birds are not considered significant.
Waste	Construction ▪ Increase in solid waste generation from excavation and construction materials and increase in demand for local waste treatment and disposal facilities. Operation ▪ None.	N/A	Further information since the EIA Scoping has been made available. The volume of waste during the construction phase is considered to be insignificant as set out in Table 4.
Socio-economics	Construction ▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by contractors and contracts placed with suppliers; ▪ Displacement of users of the synagogue; and ▪ Displacement of users of the public house.	Construction ▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by contractors and contracts placed with suppliers; and ▪ Displacement of users of the synagogue and public house. Operation	Construction ▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by contractors and contracts placed with suppliers; and ▪ Displacement of users of the synagogue. Operation

Technical Topic Area	Potential Significant Effect Identified at the Scoping Stage, February, 2016	Potential Significant Effect Assessed as part of the ES (January, 2017)	A Potential Significant Effect Identified at the Scoping Stage, September, 2017
	Operation ▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by employees and contracts placed with suppliers and contractors; ▪ Spending from the new community, and users of hotel and offices, and associated benefits to local economic receptors; ▪ Delivery of the high quality public realm and new infrastructure while maintaining and enhancing the existing heritage character; and ▪ Improved community connectivity within and around the Site.	▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by employees and contracts placed with suppliers and contractors; ▪ Spending from the new community, and users of hotel and offices, and associated benefits to local economic receptors; ▪ Delivery of the high quality public realm and new infrastructure; and ▪ Improved community connectivity within and around the Site.	▪ Direct employment opportunities for local population; ▪ Indirect and induced employment associated with spending in the local economy by employees and contracts placed with suppliers and contractors; ▪ Spending from the new community, and users of hotel and offices, and associated benefits to local economic receptors; ▪ Delivery of the high quality public realm and new infrastructure; and ▪ Improved community connectivity within and around the Site.
Archaeology	Construction ▪ Loss or disturbance of potential buried archaeological remains.	Construction ▪ Loss or disturbance of potential buried archaeological remains.	Construction ▪ Loss or disturbance of potential buried archaeological remains However, the consideration of archaeology will remain a separate Chapter of the ES which should be read in conjunction with Built Heritage.

5 CONCLUSION

5.1.1. A revised scheme for St Michaels is under preparation, following public consultation and feedback from statutory consultees on the previously submitted scheme (January, 2017).

5.1.2. To ensure the ES and other Application documents submitted in support of the application reflect the revised scheme, a new set of these documents is being prepared.

5.1.3. An EIA Scoping Report for the previous scheme was submitted to MCC in February, 2016, under the 2011 EIA Regulations. No Scoping Opinion has been provided to date. This scoping note therefore requests a Scoping Opinion for the revised scheme under the 2011 EIA Regulations, in accordance with the transitional arrangements set out in the 2017 EIA Regulations.

5.1.4. The scope of the topics for the ES remain the same as set out in the previous Scoping Opinion. In principal, this is due to the nature and location of the site, and general massing and uses of the proposed scheme, remaining the same as in the previous scheme. Those topics which would be most affected by the changes are already scoped into the assessment. This scoping note provides further detail and justification for this conclusion.

5.1.5. We assume that a Scoping Opinion can be provided within 5 weeks of the receipt of this report.

BIBLIOGRAPHY

- July, 2017 Proposal to Zerum
- Chapter 5 of the original ES

REFERENCES

Ref 1.1: Statutory Instrument 2011 No.1824 Town and Country Planning 'The Town and Country Planning (Environmental Impact Assessment) Regulations 2011'.

Ref 1.2: Statutory Instrument 2015 No.660 Town and Country Planning, England 'The Town and Country Planning (Environmental Impact Assessment) (Amendment) Regulations 2015'.

Ref 5.4: Environment Agency (2013) PPG 1 'Understanding Your Environmental Responsibilities - Good Environmental Practices'

Ref 5.5: Environment Agency (2011) PPG 2 'Above Ground Oil Storage Tanks'

Ref 5.6: Environment Agency (2006) PPG 3 'Use and Design of Oil Separators in Surface Water Drainage Systems'

Ref 5.7: Environment Agency (2007) PPG 5 'Works and Maintenance in or Near Water'

Ref 5.8: Environment Agency (2012) PPG 6 'Working at Construction and Demolition Sites'

Ref 5.9: Environment Agency (2004) PPG 8 'Safe Storage and Disposal of Used Oils'

Ref 5.10: Environment Agency (2009) PPG 21 'Incident Response Planning'

Ref 5.11: Environment Agency (2011) PPG 22 'Dealing with Spills'

Ref 5.12: CIRIA C532 Control of Water Pollution from Construction Site: Guidance for Consultant and Contractors

Ref 5.13: Institute of Lighting Professionals (2011) 'Guidance Notes for the Reduction of Obtrusive Light'

Ref 5.14: British Standard 5489 -1:2013 'Code of practice for the design of road lighting: Lighting of roads and public amenity areas'

Ref: 5.15: ILP (2015) 'PLG05 'The Brightness of Illuminated Advertisements'

Ref 5.16: IAQM (2014) Guidance on the assessment of dust from demolition and construction

Ref 5.17: HA, (2007). DMRB: Volume 11, Section 3, Part 1: Air Quality. HA 207/07

Ref 5.18: Greater Manchester Geological Unit (March 2010) 'Joint Waste Development Plan Document for Greater Manchester – Needs Assessment Update Report'

Ref 5.19: BRE Smartwaste (June 2012) 'BRE Waste Benchmark Data'

Appendix A

SCOPING REPORT

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Appendix 6.1

ACOUSTIC TERMINOLOGY

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

ACOUSTIC TERMINOLOGY

dB (decibel): The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5 Pa).

dB(A): A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

$L_{Aeq,T}$: Defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L_{Amax}: The maximum A-weighted sound pressure level recorded over a particular period. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall $L_{Aeq,T}$ noise level, but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response, denoted L_{AFmax} or $L_{Amax,F}$.

L_{10} and L_{90}: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time. Unless described otherwise, they are measured using the 'fast' sound level meter response, denoted L_{AF10} and L_{AF90}.

Free-field Level: A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and at least 3.5 m away from buildings.

Façade Level: A sound field determined at a distance of 1 m in front of a large sound reflecting object such as a building façade.

Ambient Noise Level: The all-encompassing noise level measured in $L_{Aeq,T}$. The Ambient Noise Level incorporates background sounds as well as the industrial source noise under consideration.

Background Noise Level: The noise level exceeded for 90% of the time, the L_{A90} noise index, in the absence of sound of an industrial and/or commercial nature (BS 4142).

Specific Sound Level, $L_s = L_{Aeq,T}$: The term used in BS 4142 to describe the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time period.

Rating Level, $L_{Ar,Tr}$: The term used in BS 4142 to describe the specific sound level plus any adjustment for the characteristic features of the sound.

Peak Particle Velocity (PPV): The maximum instantaneous velocity of a particle at a point during a given time interval.

Peak Component Particle Velocity: The maximum value of any one of three orthogonal component particle velocities measured during a given time interval.

Appendix 6.2

NOISE AND VIBRATION POLICY GUIDANCE

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

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NOISE AND VIBRATION POLICY AND GUIDANCE

NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

Published in March 2012, this document sets out the Government's planning policies for England and supersedes a number of previous Planning Policy Guidance Notes and Planning Policy Statements (amongst other documents), including Planning Policy Guidance Note 24: Planning and Noise. In contrast to PPG 24, reference to noise is scant within the new NPPF. However it does make the following references to noise in the section entitled Conserving and enhancing the natural environment:

"The planning system should contribute to and enhance the natural and local environment by... [a number of points including]...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".

And

"*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."*

NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy, which is to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

That vision is supported by the following aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*

- *Where possible, contribute to the improvement of health and quality of life."*

The Explanatory Note to the NPSE has introduced three concepts to the assessment of noise in this country:

- **NOEL - No Observed Effect Level.** This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise;
- **LOAEL - Lowest Observable Adverse Effect Level.** This is the level above which adverse effects on health and quality of life can be detected; and
- **SOAEL - Significant Observed Adverse Effect Level.** This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day / day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed in Paragraph 9.2.10 above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when "*…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.*" The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

PLANNING PRACTICE GUIDANCE

In 2014 the Department for Communities and Local Government (DCLG) launched the Planning Practice Guidance web-based resource. It is stated that the guidance is to complement the NPPF and provide advice on how to deliver its policies.

The PPG section on noise includes a table that summarises "*…the noise exposure hierarchy, based on the likely average response*". This table offers 'Examples of Outcomes' relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE. The guidance offers no numerical definition of the NOEL, LOAEL and SOAEL, or detailed advice regarding methodologies for their determination. There is also no reference to the further research that was identified as necessary in the NPSE in 2010 to assist in the determining of NOEL, LOAEL and SOAEL.

BS 5228-1:2009+A1:2014 NOISE AND VIBRATION CONTROL ON CONSTRUCTION AND OPEN SITES. PART 1: NOISE (BS 5228-1)

BS 5228-1 provides guidance on appropriate methods for minimising noise from construction activities. Techniques for predicting the likely noise effects from construction works are given; these are based on detailed information on the type and number of plant items being used, their location and the length of time they are in operation. The noise prediction method is used to establish likely

noise levels in terms of the $L_{Aeq,T}$ over the core working day. A database of information is also provided, including measured sound pressure level data for a variety of different construction plant undertaking various common activities, which can be used to estimate levels of noise generated by typical construction works.

Three methods are presented for the assessment of the significance of noise effects. In summary, the assessment could adopt either a series of fixed noise limits, be concerned with ambient noise level changes as a result of the construction operations, or consider a combination of these approaches.

With respect to absolute fixed noise limits, BS 5228-1 discusses those included within the Department of the Environment Advisory Leaflet 72 'Noise Control on Building Sites'. These limits are presented according to the nature of the surrounding environment, for a 12 hour working day. The presented limits are:

- 70dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise;
- 75dB(A) in urban areas near main roads and heavy industrial areas.

The Standard goes on to provide methods for determining the significance of construction noise levels considering the change in the ambient noise level with the construction noise. Two example assessment methods are presented. These are the ABC method (as shown in Table A6.1-1) and the 5dB(A) change method, described below.

Table A6.2-1: Example Threshold of Potential Significant Effect at Dwellings, ABC Method (BS 5228-1)

Assessment Category and Threshold Value Period	**Threshold Values, in decibels (dB), $L_{Aeq,T}$**		
	Category (A) [A]	**Category (B) [B]**	**Category (C) [C]**
Night-time (2300 – 0700)	45	50	55
Evenings and Weekends[D]	55	60	65
Daytime (0700 – 1900) and Saturdays (0700 – 1300)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. NOTE 3: Applies to residential receptors only.			
A) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values. B) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values. C) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values. D) 1900 – 2300 weekdays, 1300 – 2300 Saturdays and 0700 – 2300 Sundays.			

With respect to the 5dB(A) change method, the guidance states:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless

works of a shorter duration are likely to result in significant effect."

BS 5228-2: 2009+A1:2014 NOISE AND VIBRATION CONTROL ON CONSTRUCTION AND OPEN SITES. PART 2: VIBRATION (BS 5228-2)

BS 5228-2 provides recommendations for basic methods of vibration control relating to construction and open sites. The legislative background is described and guidance is provided on methods of measuring vibration and assessing its effects on the environment.

Guidance criteria are suggested for the assessment of vibration effects. Such criteria are provided in terms of Peak Particle Velocities (PPV) and are concerned with both human and structural responses to vibration, as shown in the table below:

Table A6.2-2: Guidance Criteria for the Assessment of Vibration (BS 5228-2)

Vibration PPV (mms^{-1})	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10.0	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.
A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient. B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available. C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment	

BS 5228-2 goes on to present guidance criteria applicable to the vibration response limits of buildings in terms of the component PPV; these criteria are presented in the table below. It should be noted that the values in this table are applicable to cosmetic damage only. It is stated within BS 5228-2 that minor damage is possible at vibration magnitudes greater than twice those given in the table.

Table A6.2-3: Guidance Criteria for the Assessment of Vibration (BS 5228-2)

Type of Building	Peak component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	**15 Hz and above**
Reinforced or framed structures	50 mms^{-1} at 4 Hz and above	50 mms^{-1} at 4 Hz and above
Industrial and heavy commercial Unreinforced or light framed structures	15 mms^{-1} at 4 Hz increasing to 20 mms^{-1} at 15 Hz	20 mms^{-1} at 15 Hz increasing to 50 mms^{-1} at 40 Hz and above
NOTE 1: Values referred to are at the base on the building. NOTE 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

BS 4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND (BS 4142)

BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

Sound from any plant associated with the employment area, the local facilities and proposed school should be considered in accordance with the requirements of BS 4142:2014 and for both existing and proposed noise-sensitive receptors. The Standard also advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

The Standard effectively compares and rates the difference between the specific sound level of the source ($L_{Aeq,T}$) and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound. If appropriate, the specific sound level is corrected, by the application of one or more corrections, for acoustic features such as tonal qualities and/or distinct impulses to give a 'rating' level ($L_{Ar,Tr}$).

The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background noise level.

Comparing the rating level with the background sound level, BS 4142 states:

- "*Typically, the greater this difference, the greater the magnitude of impact*

- *A difference of around 10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
- *A difference of around +5 dB is likely to be an indication of a significant adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*"

The Standard states that the methodology is applicable for the assessment of industrial and/or commercial sound at proposed new dwellings. However the guidance also states:

"NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."

CODE OF PRACTICE ON ENVIRONMENTAL NOISE CONTROL AT CONCERTS

Published by the Noise Council in 1995, and commonly known as 'The Pop Code', this document sets out guidance for bodies involved in planning music events, those responsible for licensing such events and those responsible for enforcing the nuisance provisions of the Environmental Protection Act 1990 (England and Wales).

Table A6.2-4 below sets out the guidance contained in this document for events held between 09:00 and 23:00 hours (N.B. not extending past 11PM). The Music Noise Level (MNL) is defined as "*the L_{Aeq} of the music noise measured at a particular location*".

Table A6.2-4 – Guidance Criteria for Music Events Held between (09:00 – 23:00) at the Façade of Noise Sensitive Premises, LAeq,T

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL not exceed 75 dB(A) over a 15 minute period
1 to 3	Other urban and rural venues	The MNL should not exceed 65 dB(A) over a 15 minute period
4 to 12	All venues	The MNL not exceed the background noise level by more than 15 dB(A) over a 15 minute period

The background noise should level is defined as the prevailing level at a location, measured in terms of the $L_{A90,T}$ noise index, on an equivalent day and at an equivalent time when no concert or sound checks are taking place. It is stated that the value to be used should be the "*arithmetic average of the hourly L_{A90} measured over the last four hours of the proposed music event or over the entire period of the proposed music event if scheduled to last for less than four hours*".

For indoor venues "*used for up to about 30 events per calendar year"* this document suggests that the music noise level should not exceed the background noise by more than 5 dB(A) over a fifteen minute period, for events finishing no later than 23:00 hours.

For events '*continuing*' or '*held between*' the hours of 23:00 and 09:00 hours, it is stated that "*the*

music noise should not be audible within the noise sensitive premises with windows open in a typical manner for ventilation".

Whilst it is acknowledged within the document that the use of 'inaudibility' as a guideline is not universally accepted as an appropriate method of control, to goes on to state that "*Control can be exercised in this situation by limiting the music noise so that it is just audible outside the noise sensitive premises. When that is achieved, it can be assumed that the music noise is not audible inside the noise sensitive premises*."

The document goes on to state that and assessment in terms of dB(A) (i.e. in terms of the $L_{Aeq,T}$ criteria detailed within

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL not exceed 75 dB(A) over a 15 minute period
1 to 3	Other urban and rural venues	The MNL should not exceed 65 dB(A) over a 15 minute period
4 to 12	All venues	The MNL not exceed the background noise level by more than 15 dB(A) over a 15 minute period

above), can underestimate the intrusiveness of low frequency noise, and that low frequency noise can be very noticeable indoors. It is advised therefore that even if the dB(A) guideline is being met, unreasonable disturbance may be occurring because of low frequency noise. Additional guidance on low frequency noise is therefore provided with reference to the recommendations of a study undertaken by J.E.T Griffiths, J. Staunton and S. Kamath: *A study of Low Frequency Sound from Pop Concerts*. In this regard it is recommended that a level of up to 70 dB in either the 63Hz or 125Hz octave frequency band is "*satisfactory"* a level of 80 dB or more in either of those octave frequency bands causes "*significant disturbance"*.

Appendix 6.3

CONSTRUCTION CALCULATIONS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Pre-mitigation Construction Calculations

							Old Nags Head		Radisson Blu Hotel	
Plant	**Number**	**LWA** *(dB ref 1pW)*	**LAeq @ 10m** *(dB ref 20 µPa)*	**% On-time**	**Tonal correction**	**Screening correction**	**Distance (m)**	**LAeq** *(dB ref 20 µPa)*	**Distance (m)**	**LAeq** *(dB ref 20 µPa)*
Activity: Demolition pre-enabling works										
Tracked Excavator	1	110		60			27	71.2	60	64.2
Tracked Crusher	1	110		80			27	72.4	60	65.5
Articulated Dump truck	1	106		60			27	67.2	60	60.2
Pulverisor	1	104		30			27	62.1	60	55.2
Breaker mounted on excavator	1	114		30			27	72.1	60	65.2
Scaffold access platform	1	95		20			27	51.4	60	44.4
Road Sweeper	1	104		25			27	61.4	60	54.4
Skip Wagon	1	106		10			27	59.4	60	52.4
Diesel Generator	1	94		100			27	57.4	60	50.4
Tower Crane	4	105		40			27	70.4	60	63.5
							Total	**78.3**	**Total**	**71.4**
Activity: Foundation Construction Phase										
Tracked excavator	1	110		60			30	70.2	65	63.5
Articulated dump truck	1	106		60			30	66.2	65	59.5
Concrete mixer truck	2	108		40			30	69.5	65	62.8
Concrete pump and concrete mixer truck idling	1	103		60			30	63.2	65	56.5
Poker Vibrator	2	97		50			30	59.5	65	52.7
Vibratory roller	1	105		20			30	60.5	65	53.8
Tower crane	1	105		40			30	63.5	65	56.8
Road Sweeper	1	104		25			30	60.4	65	53.7
Diesel generator	2	94		100			30	59.5	65	52.8
Tower crane	4	105		40			30	69.5	65	62.8
							Total	**76.1**	**Total**	**69.4**
Activity: Tower Construction										
Telescopic Handler	1	99		80			30	60.5	65	53.8
Tower Crane	4	105		40			30	69.5	65	62.8
Mobile telescopic crane	1	105		40			30	63.5	65	56.8
Concrete mixer truck	2	108		40			30	69.5	65	62.8
Concrete pump and concrete mixer truck idling	1	103		60			30	63.2	65	56.5
Poker vibrator	2	97		50			30	59.5	65	52.7
Angle grinder	1	108		50			30	67.4	65	60.7
Road Sweeper	1	104		25			30	60.4	65	53.7
Diesel generator	2	94		100			30	59.5	65	52.8
							Total	**75.0**	**Total**	**68.3**

Appendix 6.4

NOISE SURVEY DATA

NOTE

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Noise Survey Data

DAYTIME	LAeq, 16 hr				LAeq, 1 hr (Worst Case)				LA90, 1 hour (Average)				LA90, 1 hour (Mode)			
Date	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Thurs 05/11/2015*	58.6	62.7	58.7	58.7	59.5	64.2	59.5	60.2	55	57	55	54	56	56	56	55
Fri 06/11/2015	60.2	63.6	57.7	60.7	64.8	65.6	60	65	56	59	55	55	56	59	55	55
Sat 07/11/2015	59.4	68.5	57.9	61.7	60.1	68.5'	59.3	64.2	56	59	55	57	56	58	55	55
Sun 08/11/2015	57.9	61.4	56.1	59.6	59.5	61.9	57	60.8	55	56	54	54	57	55	55	55
Mon 09/11/2015	59.2	61.5	58.8	58.9	60.8	62.7	60.2	60.3	56	57	55	55	57	55	55	56
Tue 10/11/2016	64.8	63.1	58.2	66.7	60.2	68.3	59.6	62.1	55	57	55	62	56	58	55	
Wed 11/11/2017	59.2	62.2	58.2		61.9	63.6	59.3		56	57	55		56	57	55	
Thurs 12/11/2018*	58.8	64.3	58		59.2		58.9		57		55		57			
*Not Full daytime period	Use with caution															

NIGHT	LAeq, 8 hr				LAMax (15th)				LAeq, 1 hr (Worst Case)				LA90, 1 hour (Average)				LA90, 1 hour (Mode)			
Date	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Thurs-Fri 05+06/11/2015	55.6	59.2	56	56.8	74.5	77.7	77.6	73.4	56.7	62.9	62.7	57.9	53	52	53	51	52	50	53	50
Fri-Sat 06+07/11/2016	61.5	62.2	58.2	62.8	76.1	76.6	73.1	78.6	65.1	63.6	59.9	65.7	57	56	55	57	57	57	55	58
Sat-Sun 07+08/11/2017	62.0	67.6	58.8	64.1	79.2	87.2	75.1	80.6	65.7	72.3	62.2	67.6	58	61	55	59	61	65	58	64
Sun-Mon 08+09/11/2018	55.4	58	53.7	56.3	71.6	74.7	67.3	70.7	61.1	60.2	54.3	63	52	53	51	51	53	53	51	51
Mon-Tues 09+10/11/2019	55.5	60.4	54.2	56.1	73.3	82	72.2	74.8	61.6	61.5	56.9	63.6	53	51	51	51	52	51	50	50
Tues-Wed 10+11/11/2016	55.3	60.1	55		76.7	79	73.3		57.1	61.3	57.8		53	51	52		52	51	52	
Wed-Thurs 11+12/11/2017	59.7	59.7	55.7		76.6	79.2	73.4		63.9	66	59		55	53	52		55	53	53	

Albert Hall - up to 60dB LAeq, 1hour when event on

Appendix 7.1

GLOSSARY OF TECHNICAL TERMINOLOGY FOR SOCIO-ECONOMICS

NOTE

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Glossary of Technical Terminology for Socio-Economics

Additionality – The extent to which activity takes place at all, on a larger scale, earlier or within a specific designated area or target group as a result of the Proposed Scheme.

Direct Employment - Initial injection of expenditure, i.e. people employed in the construction of the Proposed Scheme (direct and contracted employment) and expenditure of goods, services and capital for the construction.

Displacement – A reduction in economic activity elsewhere within the target area due to an increase in activity caused by the Proposed Scheme.

Gross direct effect – An estimate of the total effects of the Proposed Scheme in terms of specific outputs, which include the consideration of wider consequential or induced effects.

Indices of Multiple Deprivation - The English indices of deprivation measure relative deprivation in small areas in England called lower-layer super output areas.

Indirect Employment - Subsequent rounds of expenditure generated throughout the supply chain by the initial expenditure on goods, services and capital.

Induced Employment - Refers to the expenditure of those who derive their income from the direct and indirect effects of the Proposed Scheme.

Leakage - Proportion of the Proposed Scheme's benefits that accrue outside the study area.

NOMIS – Official labour market statistics provided by the Office for National Statistics, ONS.

Multiplier Effects – Economic activity (jobs or expenditure) associated with an increase in local income through contracts and supplier purchases and created through the supply chain associated with the Proposed Development. There are two types of multiplier effect: indirect and induced

Substitution – Effect where a firm substitutes one activity for a similar one to take advantage of public sector assistance.

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 8.1

TOWNSCAPE BASELINE AND EFFECT

Appendix 8.1: Townscape Baseline and Sensitivity

Townscape Elements	Baseline Description	Townscape Value ►	Susceptibility to Change ►	Overall Sensitivity of Receptor
Heritage Designations	Heritage dominates the immediate townscape. No Listed Buildings within the Site boundary. However, within the setting of a large number of listed structures, including the Grade I Listed Town Hall, Albert Memorial and John Ryland's Library, as well as other key Grade II* Listed city landmarks such as the Midland Hotel, Central Library and Town Hall Extension. Grade II Listed buildings lie adjacent to the Site's northern, eastern and southern boundaries. The Site is located within the Deansgate/ Peter Street Conservation Area and adjacent to the St. Peter's Square Conservation Area. The existing contained nature of the Site and surrounding townscape limits intervisibility to adjacent heritage assets. Any development of scale will need to consider the impact on the setting of wider heritage assets.	Medium/ High	Medium	**Medium/ High**
Townscape Character Area – Civic Quarter	The Site is located within Manchester City Centre, as defined by the Local Plan. The Core Strategy splits the City Centre into a number of neighbourhoods, each with their own distinctive townscape character. These neighbourhoods have since been updated by the City Centre Strategic Plan 2015-2018, which redefines the Site from the Central Business District to the Civic Quarter. The strategic prominence of the Site is not reflected by the built form that sits within it. The 'lost block' notion of the Site refers to its location along secondary and tertiary streets with limited use to support the city centre. Moving away from the grand landmark buildings to the east, the Site holds a very different character. This character is less about impressive Manchester buildings within civic space. It is not a destination. Rather, it is functional and relatively forgotten. The boundaries between City Centre neighbourhoods have been tightly drawn. The Site therefore sits at a pivotal point between St. John's and Spinningfields to the west and the Central Business District to the north. The latter two are defined largely by commercial use. Spinningfields is defined further by modern commercial development, which is supplemented by high quality restaurant use and public realm. The Central Business District is defined more by its historical built form. Narrow streets of a tight urban grain provide commercial use with a mix of high end retail use. St. John's to the south-west is unique in that it provides geometric low-rise residential use within the heart of the city centre, around a rare green space. The Site's location at the centre of these neighbourhoods, combined with the relative disconnects from its existing neighbourhood highlights the importance for any new development to strengthen and support all the surrounding neighbourhoods. The opportunity exists to weave together neighbourhood characters, helping to develop a more coherent and legible city core.	Medium	Medium	**Medium**
Urban Grain	The Site lacks a coherent structure, instead providing a mixed urban grain. The former Police Station provides a strong frontage to the Site's eastern boundary, as well as defining a building line along Jackson's Row and Bootle Street. Within the west of the Site, the Synagogue and Sir Ralph Abercromby Pub are equally inefficient. For a strategic city centre location, these blocks both provide a negative solid to void ratio which causes the buildings to sit within areas of 'dead' space, breaking the frontages along Bootle Street and Jackson's Row, and give way to uses such as surface car parking which is not expected so close to the centre of the city. The Synagogue and Sir Ralph Abercromby pub provide interesting townscape value as distinctive solitary blocks. The pub in particular plays with the street frontage by stepping forward into Bootle Street. This creates interest along the streetscape and creates a townscape landmark out of a building of only minor heritage value. Within the wider area, a mix within the urban grain can largely be defined by larger, newer blocks to the west supporting key routes and space. This is supplemented by a tight grain to the north and east made up of mostly more historical plots set to the back of pavement along narrower streets. Landmark buildings can be easily picked out of the plan, given their unique shapes set within larger urban voids reflecting their associated public realm. It is only in these spaces, which give landmark buildings 'breathing space' within the city centre where streets do not display a strong sense of enclosure on both sides – reflecting the density expected for the core of a major city.	Low/ Medium	Medium	**Medium**
Land Use	The Site provides a mix of uses, which includes a former civic use in the Police Station, religious use and a Public House. Despite the mix of uses, the Site remains largely inefficient due to the amount of 'dead' space, which is not expected given the strategic location. The pivotal location of the Site between a number of neighbourhoods of different characters highlights the mix of land uses within the surrounding area. To the north and west, large areas of commercial use reflect the Central Business District and Spinningfields clusters. Hotel uses to the south is mixed with commercial defining the conference quarter. Civic use to the east sits within the Civic Quarter at the heart of the city. The uses on Site are not a true reflection of the remaining character area the Site sits within. This highlights the requirement for the Site to change – to support and enhance the Civic Quarter, but also to complement the adjacent neighbourhoods and the city centre as a whole.	Low	Low	**Low**

This Appendix has been replaced in full.
Please refer to the Environmental Statement Addendum (2019)

Terminology for Townscape Impact:

Townscape Value:	High, Medium, Low	Duration:	Long-term, Medium-term, Short-term
Susceptibility to Change:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Overall Sensitivity of Receptor:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Geographical Extent of Impact:	(Descriptive)	Significance:	Significant, Moderately Significant, Minor Significance, Not Significant

Building Heights	Development on Site is provided at a scale which is largely alien to the majority of the city centre. The mix between 2-4 storeys is lost within the surrounding townscape. The surrounding tight grain, density and medium height 'hides' a large majority of the Site. This creates the opportunity for new height to be accommodated without harm. New development within Figure 8.7 of Appendix 8.4 is apparent due to gradual height increases across the city in recent years. Recent development is being brought forward at an increased scale to ensure the city is adequately densified to ensure it can operate efficiently with limited sprawl. Within the city centre, this is starting to develop a secondary cluster of tall buildings within the city centre (primary cluster along west and south of city centre), drawn down from the River Irwell, through Spinningfields and to the Great Northern Tower and the Beetham Tower. The gradual increase in scale across the city has caused the Town Hall spire to become lost within the roofscape of Manchester. The city has lost the marker for the heart of the city, instead replacing it with further markers around the edge of the city centre. Marker buildings can act as useful guides for all to navigate the city. An opportunity exists to provide a new marker at the heart of the city centre.	Low	Medium	**Low/ Medium**
Topography & Flood Risk	The Site is not located within or near a flood zone. The Site is subject to a substantial level change. The Site falls approximately 4.2 metres from its junction with Southmill Street down to Deansgate along Jackson's Row. The Site however does not fall in a similar way along Bootle Street, instead falling more gradually by 2.9 metres from Southmill Street down to Deansgate.	Low	Low	**Low**
Movement & Linkages	Due to the Site's strategic location, it is highly accessible from a number of transport nodes. The newly orientated St. Peter's Square tram stop is located 200 metres to the east of the Site, providing frequent and extensive services to the wider Greater Manchester area. This is supplemented by the Deansgate/ Castlefield tram stop 500 metres to the south. Oxford Road railway station lies within a 10-minute walk to the south-east, providing a regular regional and national rail service. Primary vehicular and pedestrian routes within the context of the Site include Deansgate to the west, Peter Street to the south and John Dalton Street to the north. The Site is connected to these via the secondary routes of Southmill Street and Jackson's Row as well as the tertiary link along Bootle Street. Due to the prominent road connections, the Site is well serviced by bus stops. In contrast to the highly accessible surroundings, the Site itself is entirely impermeable – instead pushing movement routes around its northern, eastern or southern boundaries. The lack of active use prevents these routes becoming more prominent pedestrian routes, further defining the area as a 'lost block' within the city core. Any development at the Site could potentially strengthen and activate these routes to facilitate improved permeability between Albert Square and Deansgate.	Low	Low	**Low**
Environmental Designations, Public Realm & Public Open Space	There are no formal environmental designations affecting the Site. No public realm exists within the current Site boundary. The Site's central location ensures it is surrounded by a network of public squares, with further public green spaces located to the west. Any development proposals must consider the relationship and impact on the surrounding public spaces, particularly Albert Square and St. Peter's Square due to their popularity and key civic use.	Low/ Medium	Low/ Medium	**Low/ Medium**
Site Character	The Site can be characterised as a 'lost block'. Despite the Site's strategic city core location, it provides very little activity or townscape significance to merit its location. The north-east corner of the Site acts as a key gateway into the area around the Site. Currently, this gateway is poorly defined and very few city goers are drawn across Albert Square along Southmill Street towards the Site. The landmarks to the east of the Site and key movement routes to the south and west cause city-goers to move around this 'lost block' rather than through it via Jackson's Row or Bootle Street. This is partly due to the route hierarchy, however also facilitated by a lack of draw into the Site or a lack of active use onto the surrounding streets. Localised views tend to focus towards the key landmarks.	Low	Low	**Low**

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Please refer to the Environmental
Statement Addendum (2019)

Terminology for Townscape Impact:

Townscape Value:	High, Medium, Low	Duration:	Long-term, Medium-term, Short-term
Susceptibility to Change:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Overall Sensitivity of Receptor:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Geographical Extent of Impact:	(Descriptive)	Significance:	Significant, Moderately Significant, Minor Significance, Not Significant

Townscape Resources	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance
Heritage Designations	Construction Phase: Potential impact on the setting of nearby Listed Buildings, including the Grade I Listed Town Hall and Albert Square Memorial. Potential impact on the setting of Deansgate/ Peter Street Conservation Area, as well as St. Peter's Square Conservation Area and Albert Square Conservation Area.	Construction works will be considered to control impacts on surrounding heritage through the accordance with a Construction Environmental Management Plan. Adverse impacts will be temporary and therefore removed after the construction phase.	**Medium/ High**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Direct + Indirect	Moderately Significant
	Operational Phase: No direct impacts on listed buildings, however, indirect impacts to the setting of a high number of heritage assets, across the grades, including two grade I listed buildings. Direct impact on Deansgate/ Peter St. Conservation Area, further indirect effects on the setting of Albert Square and St. Peter's Square Conservation Area.	The Proposed Scheme is intending to be bold, and act as a landmark for the city. The bold, contemporary design ensures it can be read as a separate element within the townscape to heritage features, however it may become difficult to appreciate some elements of heritage without also reading the Proposed Development. The proposed high quality finishing and a responsive colour palette ensures where the Proposed Scheme is visible, the colours reflect the broad tones of the Civic Quarter and finishing ensures the building looks as intended.		Moderate	City Centre Scale	Long-Term Irreversible	**Minor**	**Adverse** Direct + Indirect	**Moderately Significant**
Townscape Character – Civic Quarter	Construction Phase: Minor effects primarily due to predicted impact of construction traffic and operations.	Site hoarding will visually screen construction works. Deliveries will arrive 'just in time', utilising strict 'left turn only' policy and one-way access into the Site via Deansgate - Jackson's Row and out via Southmill Street – John Dalton Street.	**Medium**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Direct + Indirect	Minor Significance
	Operational Phase: The Site represents a rare opportunity to develop a strategic Site to support and enhance the growth of the city centre. A new mix of uses is proposed to directly improve the existing offer of the Civic Quarter and create a new destination. The strategic location of the Quarter and proposed mix of uses help to tie surrounding Character Areas together into a legible and coherent city centre.	The Civic Quarter demands high quality architecture. Whilst the proposed architectural style may differ from the majority of the Civic Quarter, the Proposed Development provides a contemporary alternative. Proposed materials have been chosen to reflect the broad colouration of the Civic Quarter, utilising the warm tones of the Town Hall and Town Hall Extension.		Moderate	Local	Long-Term Irreversible	**Moderate**	**Beneficial** Direct + Indirect	**Moderately Significant**
Urban Grain	Construction Phase: Construction works will include demolition of the existing Synagogue and rear portion of the Police Station buildings on Site. The urban form associated with the Police Station frontage onto Southmill Street and the Sir Ralph Abercromby Pub will remain throughout construction and form part of the new development. The initial demolition stage will lead onto the gradual evolution of the proposed grain, with timescales associated with an urban void on site limited to approximately 9 months.	N/A	**Medium**	Minor	Local	Short/ Medium-Term Reversible	Negligible	Adverse Direct	Not Significant
	Operational Phase: The Proposed Development seeks to maximise development quantum within the Site whilst retaining and strengthening the existing building line. The retained buildings of the Sir Ralph Abercromby Pub and former Police Station façade along Southmill Street provide familiar features from which the Proposed Development arises. The interest along Bootle Street created by the stepping of the Sir Ralph Abercromby has been retained as a feature to ensure the retained forms on Site are not inundated by contemporary forms. The inclusion of the square at ground level helps to split the form of Block A and Block B, limiting consideration of the Proposed Development as one solid mass within an area of predominantly finer grain development. The proposed grain reflects a more 'efficient' layout expected for a strategic City Centre Site.	Building form, scale, massing and arrangement to reflect wider context forms 'embedded' mitigation. Alterations to the grain respond to existing building lines – allowing the Proposed Development to support and enclose the existing movement routes. The Proposed Development will also allow a new route through the Site associated with a new public space, creating a break in the building form.		Moderate	Local	Long-Term Irreversible	**Moderate**	**Beneficial** Direct	**Moderately Significant**

This Appendix has been replaced in full. Please refer to the Environmental Statement Addedum (2019)

Terminology for Townscape Impact:

Townscape Value:	High, Medium, Low	Duration:	Long-term, Medium-term, Short-term
Susceptibility to Change:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Overall Sensitivity of Receptor:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Geographical Extent of Impact:	(Descriptive)	Significance:	Significant, Moderately Significant, Minor Significance, Not Significant

Appendix 8.1: Townscape Residual Impacts Table: Description of Change, Magnitude and Significance

Townscape Resources	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance
Land Use	Construction Phase: The Site currently hosts limited land use. Due to the inability of the Site to be phased, Manchester Reform Synagogue will be impacted by construction works and will be required to be temporarily relocated, in an equivalent facility, during the construction period until the permanent new Synagogue is operational. The limited number of surface car parking spaces on Site will also be lost. The former Police Station is not currently occupied therefore will not cause further land use impacts. It is expected that the Sir Ralph Abercromby Pub will remain operational throughout the construction period, limiting further construction impact on existing uses.	N/A	**Low**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Direct	Not Significant
	Operational Phase: Provision of a completely new mix of land uses, to respond to the uses within the surrounding context, including: - Replacement of Manchester Reform Synagogue within the podium of the scheme; - Retention of the Sir Ralph Abercromby public house; - Retention of the former Police Station along Southmill Street to facilitate a new Boutique Hotel; - Provision of a new 5* hotel including conference and leisure facilities; - Grade A office space to supplement offer of Spinningfields and CBD; - City core residential development; and - Retail, restaurant, cafes and drinking establishment use to supplement the above uses.	Land uses respond to the character and mix of the Civic Quarter and support and strengthen surrounding character areas. The wide mix of uses responds to the rare opportunity the Site represents to develop in this strategic location.		Major	Local	Long-Term Irreversible	**Major**	**Beneficial** Direct + Indirect	**Moderately Significant**
Building Heights	Construction Phase: Initial construction stage will result in the demolition of the existing Synagogue and rear portion of the Police Station prior to the erection of new structures. The Site will then undergo construction of the proposed development – where the construction impact is likely to increase as the tower is built to its full height.	A single construction phase construction approach reduces the length of construction works.	**Low/ Medium**	Moderate	City Centre Scale	Short/ Medium-Term Reversible	Moderate	Adverse Direct	Minor Significance
	Operational Phase: The Proposed Development seeks to remark the middle of Manchester, since views of the Town Hall spire have been lost amongst the surrounding townscape. The tower is proposed within an emerging secondary cluster of city core towers, to counteract development along the city centre periphery. From afar, viewers of Manchester will see an evolving skyline, with the Proposed Development central to this.	The elliptic shape to the tower helps to reduce the bulky massing, particularly along its wide elevation as the scale of the tower diminishes across its width. The vertical pattern within the façade seeks to accentuate the height, rather than the width. The behaviour of the anodised finish in differing light conditions softens the massing against the open sky.		Moderate	City Centre Scale	Long-Term Irreversible	**Moderate**	**Neutral** Direct	**Moderately Significant**
Topography & Flood Risk	Construction Phase: Minor changes in topography to facilitate construction and implement scheme.	N/A	**Low**	Negligible	Local	Short/ Medium-Term Reversible	Negligible	N/A	Not Significant
	Operational Phase: Minor changes in topography	Development will work with existing ground levels and tie in to the surrounding ground levels		Negligible	Local	Long-Term Irreversible	**Negligible**	**N/A**	**Not Significant**

This Appendix has been replaced in full.
Please refer to the Environmental
Addendum (2019)

Terminology for Townscape Impact:

Townscape Value:	High, Medium, Low	Duration:	Long-term, Medium-term, Short-term
Susceptibility to Change:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Overall Sensitivity of Receptor:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Geographical Extent of Impact:	(Descriptive)	Significance:	Significant, Moderately Significant, Minor Significance, Not Significant

Appendix 8.1: Townscape Residual Impacts Table: Description of Change, Magnitude and Significance

Townscape Resources	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance
Movement & Linkages	Construction Phase: No existing movement routes through the Site for construction to impact. Pedestrian and vehicular access along Bootle Street, Jackson's Row and Southmill Street will be maintained throughout the construction period, with limited closure to footpaths potentially required where necessary. Wider movement routes are likely be impacted by construction traffic. New movement and linkages through the Site will be limited until after construction completes.	Site hoarding to visually screen construction works and retain the use of the existing routes during construction. Deliveries will be made 'just in time' to limit congestion on local routes, with construction vehicles utilising a 'left turn only' policy and follow one-way access through the immediate road network to minimise disruption.	**Low**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Indirect	Not Significant
	Operational Phase: The Proposed Development will retain and support the existing movement hierarchy, activating the surrounding streets along 90% of its perimeter. New public space created between the two proposed blocks allows a new north-south route to emerge through the centre of the Site, connecting Bootle Street to Jackson's Row, with further active uses facing along it.	Existing street hierarchy is retained and enhanced. Activation occurs along Jackson's Row, Bootle Street and Southmill Street, as well as onto the new public space. Inactive frontages have been minimised, and where necessary (such as access to the basement), this has been provided along Bootle Street to respond to the existing street hierarchy. New activity created by the proposed offer has the potential to enhance the vibrancy of existing routes.		Minor	Local	Long-Term Irreversible	**Minor**	**Beneficial** Direct	**Not Significant**
Environmental Designations, Public Realm & Public Open Space	Construction Phase: No existing designations or public realm within the Site for construction to impact. Access to the public realm will be limited to after construction completes. Amenity of adjacent Albert Square may be affected by the presence of nearby construction works.	N/A	**Low/ Medium**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Direct + Indirect	Not Significant
	Operational Phase: The Proposed Development seeks to provide two new squares within the Site. The first is at ground level, between the proposed blocks and created to provide access and an appropriate setting for the retained Sir Ralph Abercromby public house. The new square will be supported by three retail units, the hotel lobby, office entrance and the retained public house. The second space is the roof garden, located on top of Block B, accessed by a public lift from Jackson's Row and via a landscaped feature stair from the roof of the Block A podium. Associated terraces are proposed to provide a food and beverage offer – drawing users to the roof garden, facilitating the potential for events and supporting general dwell time.	New linkages into existing public realm network – activation of spaces through adjacent units. Simple and well tested materials and finishes will be used to attenuate the retained and proposed buildings and ensure the long term look and feel of the public realm.		Major	Local	Long-Term Irreversible	**Major**	**Beneficial** Direct + Indirect	**Moderately Significant**
Site Character	Construction Phase: The Site currently lacks a strong character, due to the dominance of the vacant Police Station portraying an 'empty' and underutilised place. Any existing character will be disrupted due to the presence of construction works.	N/A	**Low**	Minor	Local	Short/ Medium-Term Reversible	Minor	Adverse Direct	Not Significant
	Operational Phase: Development will facilitate an entirely new character, overturning the existing 'lost block' nature. This character will be defined by the mix of uses proposed – creating a new destination at the heart of the city centre and supporting the growth of the city core.	Remnants of the existing character will be embedded into the design, including the Synagogue, retention of the Sir Ralph Abercromby public house and re-use of the former Police Station frontage along Southmill Street.		Moderate	Local	Long-Term Irreversible	**Moderate**	**Beneficial** Direct	**Minor Significance**

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Terminology for Townscape Impact:

Townscape Value:	High, Medium, Low	Duration:	Long-term, Medium-term, Short-term
Susceptibility to Change:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Overall Sensitivity of Receptor:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Geographical Extent of Impact:	(Descriptive)	Significance:	Significant, Moderately Significant, Minor Significance, Not Significant

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 8.2

TVA BASELINE AND EFFECT

Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
1: View from Regent Road Bridge looking north-east	Designation: View of Grade I Listed Town Hall spire // Water Street Townscape Character Area Distance to site: c. 1km south-west	The evolving Manchester skyline is apparent in this view. The tip of the Town Hall spire is noticeable at the centre of view, however its legibility is partially obscured by City Tower rising behind it and the development surrounding Grape Street rising before it (as a future baseline scheme). The Beetham Tower dominates the skyline, with clear views of Great Northern Tower, Civil Justice building and the newly completed No. 1 Spinningfields also apparent in the rapidly evolving skyline. These have become the new city markers, replacing the heritage markers representing the core of the city. The open view is caused by development plots yet to come forward, therefore the view is likely to be temporary.	Open view of skyline. Few pedestrian viewers as high wall of bridge obscures the view for the majority of vehicular traffic. Viewers of the city skyline would expect to see an evolving city – which is currently apparent.	Low	Low	**Low**
2. View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre	Designation: Grade II Listed St. Chad Church Distance to site: c. 2.4km north	Cluttered viewpoint on the northern approach into Manchester. The Beetham Tower is clearly visible at the centre of the view, marking the city centre down Cheetham Hill Road. This has since been supplemented by the development of Owen Street, shown here as a future baseline scheme, which will rise and form a cluster of towers. Road infrastructure prevalent in the foreground. The Oratory Church of St. Chad is visible and provides a sole piece of heritage value within the view, albeit one which has been obscured by the development of Owen Street. The viewpoint is popular for travellers into the city centre, however most are not likely to be appreciating the view given the extent of road infrastructure - only requiring a marker to the city centre – provided by the existing tower cluster.	View framed by trees and the shopping centre. Glimpse of the city along Cheetham Hill Road. A high number of people are likely to experience the view, within the context of travelling along Cheetham Hill Road into the city centre	Low	Low	**Low**
3: View from Cathedral Gardens looking south	Designation: Grade I Listed Manchester Cathedral, Grade II Listed Corn Exchange, Grade II Listed Royal Exchange // Cathedral Conservation Area// Medieval Quarter Townscape Character Area Distance to site: c. 775m north	The view is dominated by significant heritage assets, including the Grade I Listed Cathedral. This heritage is visible in relation to new development containing Selfridges and Harvey Nichols which draw the eye due to their bold signage and advertising. The view is taken from the south-western corner of Cathedral Gardens and represents a likely wayfinding and/or appreciation point of the city within a significant portion of public realm. Owen Street – as a representation of future baseline, rises in the gap between the turret of the Royal Exchange and Selfridges, limiting the appreciation of the Grade I Listed feature and adding a further contemporary element into the view.	Framed view between the historical Cathedral and Corn Exchange. View further framed by Royal Exchange turret and contemporary advertising for Harvey Nichols. Potential for a high number of viewers, particularly when Cathedral Gardens is active.	High	High	**High**
4: View facing south-west from the corner of High Street and Copperas Street	Designation: Grade II Listed Former Wholesale Fish Market, 104-106 High Street and 75-77 High Street // Smithfield Conservation Area // Northern Quarter Townscape Character Area Distance to site: c. 950m north-east	The viewpoint is characterised by low density heritage assets, including the retained façade of Grade II Listed frontages facing onto a cobbled street of interesting townscape value. The viewpoint is not particularly popular, however the character of view is moderately important to the route. The Arndale car park provides a distinctive closure of the street at the back of the view, highlighting a clear contrast against the red brick, detailed facades of High Street.	View is relatively contained by the surrounding townscape. Low number of viewers.	Low	Medium	**Low/ Medium**
5: View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street	Designation: Retail Core Townscape Character Area Distance to site: c. 720m north-east	View from the northern edge of Piccadilly Gardens, facing into the significant public space. The viewpoint is cluttered, both at street level and across the surrounding townscape. A mixture of architectural styles and cranes suggest a city in flux. The busy, bustling environment limits the ability to stop and appreciate the view. The character of the view includes no heritage, and there are no markers to guides the viewer towards the heart of the city.	High number of viewers. Open view above the townscape surrounding Piccadilly Gardens and landscape within	Medium	Low	**Low/ Medium**
6: View facing along Fairfield Street from the corner of South Pump Street	Designation: Grade II* London Road Fire Station, Grade II Shena Simon 6th Form College // Whitworth Conservation Area // Piccadilly Townscape Character Area Distance to site: c. 1km south-east	The view is characterised by red brick and terracotta heritage buildings, with a complicated roofscape and detailed fenestration. The roadway represents a busy bus corridor and the arrival point into the city centre for a number of vehicular travellers.	Moderate number of viewers, travelling along route - fleeting, however a first glimpse within the city arriving through gateway	Medium	Medium	**Medium**

This Appendix has been superseded by the Environmental Statement Addendum (2019). Please refer to the ES Addendum for the latest information.

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
7: View facing north-west from the corner of Oxford Street and Whitworth Street	Designation: Grade II* Listed Central Library, Town Hall Extension and the Broadhurst and Lee Building. Grade II Listed Palace Theatre and Princes Building // Petersfield Townscape Character Area Distance to site: c. 560m south-east	Mixed townscape in the view. The view is framed, with strong enclosure onto the street, terminating in the Central Library and pitched gable of the Town Hall Extension. Heritage dominant in the view, however mixed in with contemporary architecture including the Portland Stone One St. Peter's Square. The view represents the arrival point from Oxford Road station or from travellers along Oxford Road.	Framed View. High number of viewers – potential to be enjoying the view as waiting to cross the street. Due to the location of Oxford Road Station, this is likely to be the less busy side of the street, however vista is more apparent	Medium	Medium	**Medium**
8: View facing north across Whitworth Street from the arches of First Street	Designation: Grade II* Listed Manchester Central and Grade II Listed 13-17 Albion Street // Petersfield Townscape Character Area Distance to site: c. 500 south	The character of the view is defined by the busy road junction and the lower levels of Axis tower (included as a future baseline scheme) and the Beetham Tower. The arched roof of Manchester Central is modest in height, and the view is primarily of the back and side of the listed building. Axis partially obscures this view, causing the listed building to fall into the background of the view. Greater Northern Tower breaks the ridgeline above this listed building. The view is characterised by urban influences including the contemporary Beetham Tower and Axis Tower, roadway and elevated tram track. Heritage assets which would have previously been more dominant in this view have become secondary to the baseline viewpoint character.	View framed by Beetham Tower, the future baseline scheme of Axis and listed 13-17 Albion Street. High number of travelling viewers, mostly vehicular users where view is fleeting	Low/ Medium	Low	**Low**
9: View facing north-east along Chester Road from the corner of Angela Street	Designation: Grade II* Listed St. George Church // Castlefield Conservation Area // Castlefield Townscape Character Area Distance to site: 1km south-west	The view is dominated by St. George Church. This is visible in the context of the busy vehicular arrival route into Manchester City Centre. The backdrop of the view is characterised as a wall of contemporary development along the edge of the Bridgewater Canal/ River Medlock – framed by the ongoing construction of Owen Street to the right of the view, which forms a future baseline development. The Beetham Tower and Citygate Central building are also clearly apparent. It is expected that the majority of vehicular travellers approaching the visible major junction are unlikely to be appreciating the view.	High number of travelling viewers, where view is fleeting. View is open. Historic value of St. George Church is lost within the surrounding context.	Low/ Medium	Low	**Low**
10: View facing north-east from Bridgewater Canal Tow Path	Designation: Grade II Listed Merchants Warehouse // Castlefield Conservation Area // Castlefield Townscape Character Area Distance to site: c. 740m south-west	The corner of Grade II Listed Merchants Warehouse forms the edge of the view. This has been redeveloped with contemporary features which reflect the Beetham Tower just beyond. Canal edge forms the dominant feature, with the elevated busy railway route partially obscured across the left of the view. The view addresses the recreational route along the Bridgewater Canal.	High number of viewers along Canal Towpath. Contemporary features in view framing the right, railway infrastructure and trees framing the left	Low/ Medium	Medium	**Medium**
11: View facing south-east from the bridge along Bridge Street	Designation: Spinningfields Townscape Character Area Distance to site: c. 470m north-west	The arrival point into the city from Salford Central train station is addressed by this view. The contemporary Civil Justice building dominates the viewpoint and provides a key gateway landmark. No further markers aid wayfinding within the view to other areas of the city.	Not a particularly popular viewpoint. Travellers are not appreciating views, rather require a route into the city. Cultural association of Manchester gateway and Crown Court	Low/ Medium	Low	**Low**
12: View facing north from the platform of Deansgate/ Castlefield Tram Stop	Designation: Grade II* Manchester Central. Spire of Grade I Listed Town Hall // Petersfield Townscape Character Area Distance to site: c. 430m south	View from the platform of Deansgate/ Castlefield tram stop, as a major arrival point for the city. The view directly faces the back of Manchester Central, which forms a distinctive architectural form within the view. The Town Hall spire is apparent at the centre of the view. The Beetham Tower forms the edge of the view, and provides an unprecedented scale against other features in the view. Great Northern Tower forms the other dominant feature of the view, with its unique stepped architecture and materiality which reflects the Beetham Tower. Landmark (a future baseline scheme) rises to the right of the view to ensure contemporary development is read in and amongst the heritage assets.	Open view. High number of viewers who utilise the view to orientate themselves after disembarking the tram, or appreciating the view whilst waiting to embark	Medium	Medium	**Medium**
13: View east along Jackson's Row from its junction with Deansgate	Designation: Grade II* Listed Town Hall Extension and Grade II Listed Elliott House, 1-5 Central Street and Lloyds House // Deansgate Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 50m west	The scene is framed by heritage assets on the left of the view, terminated by the partially visible Grade II* Listed 1-5 Central Street and the roofscape of the Town Hall Extension. 201 Deansgate forms the dominant feature of the view and comprises of six storeys of predominantly inactive contemporary frontage along Jackson's Row. Rising slightly up Jackson's Row, the Manchester Reform Synagogue is noticeable due to it mid-C20th architecture alongside a small amount of surface car parking. Cranes above the immediate townscape add an urban feeling expected from the heart of the city centre.	View framed by heritage and 201 Deansgate. Few viewers along this minor street, however the potential exists for fleeting views from pedestrians travelling along Deansgate.	Low	Low	**Low**

This Appendix has been reproduced in full from the Environmental Statement Addendum (2019)

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
14: View west along Jackson's Row from its junction with Southmill Street	Designation: Grade II Listed Lloyds House and 184-186 Deansgate // Deansgate Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 10m north-east	The view is characterised by the dominance of Bootle Street Police Station. This is split between the Portland stone frontage along Southmill Street and a functional frontage along Jackson's Row. Grade II Listed Lloyds House frames the opposite edge of the view, pushing the viewers eye down the hill and towards Deansgate which at this point, is defined by the Listed 184-186 Deansgate. The contemporary form of Invicta House (a future baseline scheme) rises above 184-186 Deansgate and provides a contemporary feature to the view. A lack of activity is apparent within the character of the view. The falling levels along the Police Station frontage cause an unwelcoming environment, preventing overlooking onto the pavement.	The view is framed by Bootle Street Police Station and Lloyds House. A small number of users are likely to experience the view, given the lack of destinations, and the unwelcoming environment limiting use as a shortcut across the city centre.	Low	Low	**Low**
15: View east along Bootle Street from its junction with Deansgate	Designation: Grade II* Listed Central Library and Grade II Listed Onward Buildings // Deansgate Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 60m south-west	The view is framed along Bootle Street by Onwards Buildings and 201 Deansgate adding a contemporary character. Onward Buildings are less impressive along Bootle Street than its Deansgate frontage. The glimpse of the Central Library terminates the view up Bootle Street and reminds the viewer of the location within the core of the city. Within the view, Bootle Street expresses its character as a tertiary street. Activity along the length of Bootle Street is limited, with bins and surface car parking visible. Cranes above the immediate townscape add an urban feeling expected from the heart of the city centre. This is juxtaposed against the gap visible halfway along Bootle Street.	Framed view. Few viewers along this minor street, however the potential exists for fleeting views from pedestrians travelling along Deansgate.	Low	Low	**Low**
16: View west along Bootle Street from its junction with Southmill Street	Designation: Grade II Listed Harvester House, Royal London House and Sunlight House // Deansgate Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 10m south-east	The view has the character of an urban backstreet and presents a glimpse down Bootle Street. The Police Station façade is dominant, and presents a similar lack of activity onto the street. The Sir Ralph Abercromby pub creates interest along Bootle Street by breaking the building line and stepping into the street. The low stature of the pub creates the feeling of a hidden asset within the city. A number of bins suggests the status of Bootle Street as a minor 'back street'. A mix of architectural styles and materials are apparent in the view. The Orthogonal turret of Sunlight House visible above the blank frontage of 201 Deansgate at the back of the view.	Framed View. Few users are likely to experience the view, given the lack of destinations, and the unwelcoming environment limiting use as a shortcut across the city centre.	Low	Low	**Low**
17: View north-east from the corner of Deansgate and Quay Street	Designation: Grade II Listed Onward Buildings, Albert Memorial Hall and Harvester House // Deansgate Conservation Area // Petersfield Townscape Character Area Distance to site: c.100m south-west	The viewpoint is taken from a key orientation point for the city at the junction between key north-south and east-west routes. The dominant building in the foreground is not listed, although it does provide some heritage and townscape value. Activity at the ground floor is visible, despite dominant road infrastructure. Tower of Albert Memorial Hall prominent heritage feature, as is the corner of the Onward Buildings. The detailed roofscape and façade provides some interest to the view. Although the view is potentially unnatural during the crossing of busy junction	Open view experienced by a high number of viewers	Medium	Medium	**Medium**
18: View north-east from Byrom Street	Designation: Grade II Listed 24, 24a, 26 and 28 St. John Street and The Opera House // St. John Street Conservation Area // St. John's Townscape Character Area Distance to site: c. 275m south-west	The viewpoint is characterised by the Grade II listed Georgian terrace at the centre of the view. The architecture provides strong regularity, highlighting distinctive features such as chimney columns and porticos. Contemporary architecture does feature in the view along Byrom Street, juxtaposing between the Georgian terraces and the Grade II Listed Opera House. The trees to the left of the view represent the edge of St. John's Gardens – a precious green space within the heart of the city.	Open view. Relatively few viewers, however some will be experiencing the oasis of St. John's Gardens.	Medium	Medium	**Medium**
19: View facing north along Deansgate from the corner of Tonman Street	Designation: Grade II Listed 235-291 Deansgate // Petersfield Townscape Character Area Distance to site: c. 310m south-west	The viewpoint is taken along the strong movement corridor of Deansgate, directly through the heart of Manchester. The Grade II listed frontage of 235-291 Deansgate dominates this viewpoint. The building provides a regular and continuous frontage along this length of Deansgate, with a strong linear pattern both vertically and horizontally, reinforcing its scale. Regular increases to the storey height along the length break up the massing and create interest in the roofscape. The ground floor is activated behind the wide vehicular section of Deansgate. Due to the building to width ratio of Deansgate, large portions of the sky are visible. The viewer is drawn down the length of the building frontage, rather than guided by a marker to the city centre. This view is punctuated by 125 Deansgate – due to its point in construction, it forms a future baseline feature adding a contemporary feel above the listed regular frontage.	Open view experienced by a high number of viewers	Medium	Medium	**Medium**

This Appendix has been replaced in the Environmental Statement Addendum (2019)
Please refer to the new

Terminology for Visual Impact:

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Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
20: View north-west across Lower Mosley Street from the centre of Barbirolli Square	Designation: Grade II* Listed Manchester Central and Midland Hotel. Grade II Listed Royale Club and 56-58 Peter Street // Petersfield Townscape Character Area Distance to site: c. 280m south-east	The view can be characterised by the large mix of architectural styles. Grade II* Listed buildings frame the edges of the view. Within the centre of the view, a mix of more contemporary developments are apparent, with Grade II Listed buildings mixed between. The material palette also varies considerably. The orange tones of the terracotta facing the Midland Hotel reinforces the location within the Civic Quarter. The strength of colour diminishes further from the city core, down to the grey/ blue tones of the Great Northern Tower. The view presents cluttered townscape beyond the infrastructure in the foreground. The development of London Scottish House is included within the future baseline representing its advanced stage of construction. This will add an additional contemporary feature to the view, adjacent to the listed Midland Hotel.	Open view. Moderate numbers of viewers are likely to experience this view in Barbirolli Square, either in relation to the cultural attraction of Bridgewater Hall, or directly relating to the office use surrounding the viewpoint location. The experience of Barbirolli Square is not limited by its view.	Medium	Low	**Low/ Medium**
21: View facing west along Central Street from the entrance to Library Walk	Designation: Grade II* Listed Lawrence Buildings and Grade II Listed Friends Meeting House and 1-5 Central Street // St. Peters Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 100m east	The viewpoint frames Central Street between the listed Lawrence Buildings to the right of the view and Friends Meeting House. The Lawrence Buildings reflect the Gothic Revival architecture of the Town Hall. Central Street is terminated by the Portland Stone Bootle Street Police Station, marking the eastern edge of the site. No. 1 Spinningfields has recently risen above the Police Station and adds a completely new contemporary architectural style to the viewpoint.	Framed view. High number of viewers appreciating the wider architecture of the core of the city, within areas of public space. View will be fleeting during travel towards/ from Albert Square or St. Peters Square for the majority of people.	Medium	Medium	**Medium**
22: View west from the centre of Library Walk	Designation: Grade II* Listed Central Library and Town Hall Extension and Grade II Listed Friends Meeting House // St. Peters Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 150m east	The viewpoint is taken from the managed access route between Central Library and the Town Hall Extension. The viewpoint is characterised by the narrow view between the historic assets, set within the context of contemporary public realm and a contemporary access into the Library. The viewpoint is only accessible during the day, however Library Walk remains a movement route of interest, if not a busy one, through the civic quarter. The limited space between the buildings visible in the view provides an oasis from the busy city beyond, therefore creating an opportunity to sit and relax, as seen in the view. This provides the potential for the view to be enjoyed. The Portland stone Bootle Street Police Station terminates the view down Central Street. No. 1 Spinningfields rises above the Police Station, providing architecture to the viewpoint as a modern alternative to the historic architecture which dominates the viewpoint.	Framed view. Moderate number of viewers, however this includes visitors there to appreciate the architectural attraction and setting of the Civic Quarter, and cultural association of the Town Hall and Central Library. Viewers are able to stop and appreciate the view, which forms an important part of the experience of the place.	High	High	**High**
23: View west across St. Peters Square from northern corner of 1 St. Peter's Square	Designation: Grade II* Listed Town Hall Extension, Central Library and Midland Hotel // St. Peters Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 230m east	The viewpoint directly faces Central Library, across St. Peter's Square, a key civic space for the city and major disembarkation point for those arriving into the city from outlying areas on the Metrolink. Recent works to the square have re-orientated the space to benefit the pedestrian and has activated the edges of the space behind the viewpoint location with new Grade A office space. This viewpoint will therefore be visible to a large number guests to the city, visiting the new office space or appreciating the square and its heritage assets, and therefore becomes a major point of impression on visitors to the city. Currently, the viewpoint is dominated by the heritage assets of Central Library, Town Hall Extension and Midland Hotel which together, form a cluster of important city landmarks. Contemporary architecture is visible above the Midland Hotel, as the Great Northern Tower reaches its peak. Roofscape is a noticeable feature to the view, with an interesting mix of angular turrets, chimneys and gable ends, reflected in the angular form of Great Northern Tower, all of which is softened by the regular and controlled curved form of the Central Library. Materiality is mixed across the view. The materials of the heritage assets range from terracotta, Portland stone to sandstone – however despite the range, the tones blend to complement each other. The blue/ grey tones of Great Northern Tower stand out as differing from the heritage assets.	Open view for a high number of viewers across a key civic space with cultural associations and heritage value. Major point of arrival into the city. Likely to be visible to residents, workers and visitors to the city.	High	High	**High**
24: View south-west along Deansgate from the junction with Wood Street	Designation: Grade I Listed John Rylands Library and Grade II Listed Elliott House // Deansgate Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 170m north-west	The viewpoint faces south along the key movement corridor of Deansgate. The enclosure along Deansgate allows people to be drawn along it, with east-west breaks (marked by the tree canopy in the view) allowing permeation across the city. The viewpoint highlights a mix of architectural styles apparent across Manchester. The view is framed by Grade I Listed John Rylands Library, adjacent to the glazed, contemporary Spinningfields development. 125 Deansgate frames the left of the view (future baseline). Building lines along the corridor are strong to support the enclosure, with Beetham Tower and Owen Street (future baseline) visible as a cluster to mark the southern end of Deansgate and the edge of the core of the city.	Framed view for a high number of viewers travelling along Deansgate. Whilst the foreground of the view is constantly changing and cluttered with street activity, distant views towards the Beetham are more solid and act as markers for city navigation.	High	Medium	**Medium/ High**

This page has been redacted in full as it has been assessed by the Environment Agency (2019) as not relevant to the determination of the application.

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Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
25: View south from the centre of New Cathedral Street	Designation: Grade I Listed St. Ann's Church and Grade II Listed Royal Exchange // St. Ann's Square Conservation Area // Retail Core Townscape Character Area Distance to site: c. 600m north	The viewpoint is taken at the centre of New Cathedral Street, a popular street within the heart of Manchester's retail district. The viewpoint is characterised by a mixed architectural townscape. Both contemporary and historic buildings preserve the historical view through the city, towards St. Ann's Church, a Grade I Listed building. The Beetham Tower, Great Northern Tower and Owen Street (future baseline) also sit within this vista, forming a cluster of towers at the back of the view, with the Beetham Tower located directly behind the tower of St. Ann's Church, forcing the church to be read in conjunction with contemporary townscape. Yellow to terracotta tones are apparent in the view, responding to the materiality of St. Ann's, through Royal Exchange and the modern cladding to the right of the view.	Framed view. High number of viewers however activity in the foreground, and the potential high number of users along the street could limit the opportunity to stop and enjoy the viewpoint. The viewpoint has already experienced contemporary buildings rising within it directly competing with the historic vista.	High	Medium	**Medium/ High**
26: View north-east from the junction of Liverpool Road and Stone Street	Designation: Grade II Listed Museum of Science and Industry, Former Market Hall and Castlefield Information Centre // Castlefield Conservation Area // St. John's Townscape Character Area Distance to site: c. 435m south-west	The viewpoint directly faces the listed MOSI building, alongside on-street parking. The tree framing the right of the view hides the Beetham Tower which provides a major wayfinding marker during travel into the city along Liverpool Road. No other wider city markers exist in the view. Architectural styles are mixed, providing a cluttered character. The Castlefield Urban Heritage Park off the right of the view is a major green space on the edge of the city, however the character of the viewpoint relates closer to Manchester's industrial past, rather than the Roman heritage characterising Castlefield.	Framed view from a tourist/ cultural attraction. Moderate number of viewers arriving into the city from the south-west where the view may be required to provide some markers for wayfinding.	Medium	Medium	**Medium**
27: View facing south-west across Albert Square	Designation: Grade I Listed Town Hall and Albert Square Memorial, Grade II* Listed Memorial Hall, Grade II Listed Heywoods Statue, Gladstones Statue, St. Andrews Chambers, Carlton House, Lloyds House and Albert Chambers // Albert Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 150m north-east	The view faces directly across Albert Square, within the presence of the surrounding historic townscape which characterises the heart of the city. The view is framed by the Grade I Listed Town Hall to the left of the view, and tree canopies to the right of the view – with the Grade I listed Albert Memorial providing the dominant feature drawing the attention of the viewer. The trees attenuate the dominance of Albert Memorial by limiting distractions of the surrounding uses, including the perimeter road. Contemporary architecture is apparent in the view. Heron House lies directly behind the Albert Memorial, and acts as 'background architecture' – limiting the amount of attention that may be drawn away from the Albert Memorial. Beetham Tower, Great Northern Tower and Owen Street (future baseline) cluster together to the left of the view and compete again the Albert Memorial for attention. The mix of glazing and grey cladding within these contemporary towers limit their visual impact against blue or grey skies.	The view is framed at this point and represents a major tourist/ cultural attraction. The view is likely to be experienced by a high number of viewers, with the view forming a major feature of the experience	High	High	**High**
28: View facing north-west from the corner of Oxford Street and Lower Mosley Street	Designation: Spire of Grade I Listed Town Hall, Grade II* Listed Town Hall Extension, Central Library and Midland Hotel // St. Peters Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c. 220m south-east	The view is located at a decision point where the arrival route of Oxford Road terminates with St. Peters Square at the heart of the city. The character of the view has recently altered with the redevelopment of St. Peters Square, visible to the far right of the view. This has introduced a cluttered foreground, littered with signage – which has the potential to limit attention on the background consisting of the listed Midland Hotel, Central Library and Town Hall Extension. These three buildings together provide architectural quality and richness to the view, consistent with the expected grandeur of the city core. The location of the view at a crossing point provides the opportunity for users to stop and take in the view, even if it is just for wayfinding. This decision point is likely to lead to an additional focus or appreciation on the townscape to guide users through the heart of the city. The spire of the Grade I Listed Town Hall is visible above the Town Hall Extension, adding further interest in the character of the visible roofscape – defined by a mixture of steep pitches and long sweeping curves, mitigated by clear architectural rhythm. Contemporary architecture is also apparent in the view, with a glazed building visible in the gap between Central Library and the Midland Hotel.	Open view with the potential for a high number of viewers travelling into the city. Travellers may utilise the townscape for orientation, therefore the view forms a moderately important element of the experience.	High	Medium	**Medium/ High**

This Appendix has been read in full
Please refer to the Environmental
Statement Addendum (2020)

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Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2: Visual Receptors - Baseline and Sensitivity

Viewpoint No. and Location	Designation, Townscape Character Area and Approx. Distance to Site Boundary	Description of Baseline View	Type of View and Number of Users	Value of Views	Susceptibility to Change	Overall Sensitivity of Receptor
29: View facing north-west along Princess Street from the corner with Lower Mosley Street	Designation: Grade I Listed Town Hall, Grade II* Listed Town Hall Extension and Manchester War Memorial // Periphery of George Street and Upper King Street Conservation Area facing into Albert Square Conservation Area // Civic Quarter Townscape Character Area Distance to site: c.280m east	The view faces across Lower Mosely Street towards the listed Town Hall and Town Hall Extension from the vicinity of the Grade I Listed Manchester Art Gallery. The view is dominated in the foreground by road infrastructure, tramway and street clutter which, coupled with the trees associated with the edge of the recently completely St. Peters Square, limit views of the listed buildings. This does not take the attention away from the Town Hall however. It remains the dominant feature of the view, characterised by its neo-gothic style, in particular its dramatic roofscape. Contemporary architecture is present in the view, framing the right of the viewpoint.	Predominantly open view with the potential to be appreciated by a high number of viewers due to the heritage and cultural associations of the immediate townscape. Visitors to the Town Hall and Manchester Art Gallery are likely to appreciate the surrounding townscape, particularly due to the opportunity provided by St. Peters Square.	High	High	**High**
30: View facing south along Cross Street opposite the junction with South King Street	Designation: Grade II* Listed Memorial Hall and Grade II Listed Anglia House, Albert Chambers and Abbey National Building // Albert Square Conservation Area // Central Business District Townscape Character Area Distance to site: c.250m north-east	The viewpoint is framed by historic townscape which opens up onto Albert Square in the distance. The impression of the view is of a key movement route through the city, supported by the sense of enclosure and nature of the surrounding architectural form. A limited view of contemporary architecture is visible along the horizon of the view, including Axis tower, drawing users down the canyon of buildings towards the open Albert Square, marked in the view by tree canopies. Trams add to the foreground of the view and hint towards the bustle and clutter expected within the heart of a city which draws users attention away from the built form. The canyon of townscape steps down as the perspective shrinks the townscape away from the viewpoint.	Framed, travelling viewpoint with limited opportunity to stop and enjoy the townscape. Potential for a high number of viewers.	Medium	Medium	**Medium**
31: View facing north along Deansgate from the corner with Camp Street	Designation: Grade II Listed 223-233 Deansgate and 235-291 Deansgate // Periphery between St. Johns and Petersfield Townscape Character Area Distance to site: c. 200m south-west	The viewpoint is characterised by immediate townscape to the left of the view, and the Grade II Listed units and former entrance to Deansgate Goods Station to the right of the view. The latter building provides regular linearity to the view, both horizontally and vertically, reinforcing scale. Regular increases to the storey height along the length of the journey break up the massing and create interest in the roofscape. Due to the building to width ratio of Deansgate, large portions of the sky are visible. The viewer is drawn down the length of the building frontage, rather than being guided by a marker to the city centre. Contemporary architecture is limited in the view. This is focussed further along Deansgate, marked by 125 Deansgate (as a future baseline development).	The view is framed. It is likely to be experienced by a high number of travelling users, where their view is moderately important, as a key vista through the city. The view is characterised by the dominant heritage asset to the right of the view, however the value of this is only moderately important with local cultural associations. The overall sensitivity of the experience is expected to be medium.	Medium	Medium	**Medium**

This Appendix has been replaced by Environmental Statement Addendum (2019)
Please refer to the Environmental Statement Addendum (2019)

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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
1: View from Regent Road Bridge looking north-east Construction phase	Construction works will be visible from this viewpoint. The distance of the viewpoint from the site will limit the impact of works. Visibility of cranes on the horizon will be limited by the urban character of the view, existing visible construction works and the temporary nature of the works. Visibility of further construction works will therefore not feel out of character within the viewpoint.	A single phase construction approach reduces the length of construction works.	**Low**	Minor	City-wide	Short/Medium-term Reversible	Minor	Neutral Direct	Not Significant	Medium
Operational phase	The Proposed Development is visible on the skyline at the centre of the view. The Scheme obscures the remaining views of the Town Hall spire, replacing the historic marker for the heart of the city with a contemporary landmark. The proposals cause a noticeable change to the view; however, the character of the skyline is considered to be enhanced by the building form.	The massing of the Proposed Development provides some interest on the skyline, by filling the gap between the Great Northern Tower and One Spinningfields. The height of the Proposed Development ensures Beetham Tower remains the dominant feature on the skyline, and undulates building heights across the view. The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the skyline. The character of the view remains materially unchanged by proposals, with only the loss of the remaining visibility of the Town Hall spire causing a slight negative change to the view.		Minor	City-wide	Long-term Irreversible	**Minor**	Beneficial Direct	**Not Significant**	High
Cumulative Impacts	Cumulative developments within the foreground of the view, associated with the development adjacent to Trinity Way/ Water Street will completely obscure the Proposed Development, and the rest of the Manchester skyline from view. This impact is solely associated with the cumulative development. The lack of visibility of the Scheme has led to no further in-combination effects resulting from the Proposed Development expected to occur.	No additional mitigation required.		Minor	City-wide	Long-term Irreversible	Minor	Beneficial	Not Significant	Medium
2. View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre Construction phase	Construction works will be visible from this viewpoint. The distance of the viewpoint from the site will limit the impact of works. Visibility of cranes on the horizon will be mitigated by the urban character of the view and the temporary nature of the works.	A single phase construction approach reduces the length of construction works.	**Low**	Negligible	City-wide	Short/Medium-term Reversible	Negligible	Adverse Direct	Not Significant	Medium
Operational phase	The Proposed Development is visible at the centre of the view along the horizon, as a new tower within the cluster formed by Beetham Tower and Owen Street. The proposals will cause a slight change to the view, however this is unlikely to materially affect the overall composition, instead the Scheme is in keeping with, and further supporting the existing tower cluster.	The proposed massing is within the scale of the surrounding skyline. The orientation of the tower projects the slender elevation within this viewpoint to add to, yet not dominate the tower cluster.		Minor	City-wide	Long-term Irreversible	**Minor**	Beneficial Direct	**Not Significant**	High

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Statement Addedum (2019)

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Cumulative Impacts	Further committed development is expected to support the emerging tower cluster alongside the Proposed Development. This cumulative development is expected to appear in and amongst Owen Street, therefore is unlikely to extend the cluster in width or height. As such, cumulative development is anticipated to not cause further in-combination effects resulting from the Proposed Development.	No additional mitigation required.		Minor	City-wide	Long-term Irreversible	Minor	Beneficial	Not Significant	Medium
3: View from Cathedral Gardens looking south Construction phase	Views of construction works will be mostly obscured by the existing townscape.	N/A	**High**	No Change	Neighbourhood	Short/Medium-term Reversible	No Change	N/A	Not Significant	Medium
Operational phase	The Proposed Development is not visible in the viewpoint. The tower will be obscured by the turret associated with Harvey Nichols.	N/A		No Change	Neighbourhood	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	The Proposed Development is not visible. Further in-combination effects are therefore not anticipated to occur.	No additional mitigation required.		No Change	Neighbourhood	Long-term Irreversible	No Change	N/A	Not Significant	Medium
4: View facing south-west from the corner of High Street and Copperas Street Construction phase	Views of construction works will be obscured by the existing townscape framing the left of the view.	N/A		No Change	Local	Short/Medium-term Reversible	No Change	N/A	Not Significant	Medium
Operational phase	The Proposed Development is not visible in the viewpoint. The towers are obscured by the townscape towards the back of the view.	N/A	**Low/ Medium**	No Change	Local	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required.		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
5: View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street Construction phase	An obscured view of construction works of the upper storeys will be visible above the existing contemporary townscape and tree screening. Cranes are already apparent in the view, therefore the visual impact of additional construction works is unlikely to affect the character of the view.	A single phase construction approach reduces the length of construction works.	**Low/ Medium**	Negligible	Local	Short/Medium-term Reversible	Negligible	Adverse Direct	Not Significant	Medium

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Terminology for Visual Impact:

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Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

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Operational phase	The top storeys of the Proposed Development is visible above the townscape and street trees within the centre of the view. Where the Proposed Development is visible, it provides a beneficial wayfinding tool to mark the centre of the city and responds to the surrounding contemporary architecture. The cluttered viewpoint limits the extent of the change, causing a negligible effect which does not alter the character of the view.	N/A		Negligible	Local	Long-term Irreversible	**Negligible**	Beneficial Direct	**Not Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Negligible	Local	Long-term Irreversible	Negligible	Beneficial	Not Significant	Medium
6: View facing along Fairfield Street from the corner of South Pump Street Construction phase	An obscured view of construction works of the upper storeys will be visible above the heritage assets at the back of the view. Construction works will be visible in the context of existing adjacent cranes. The visual impact of additional construction works is unlikely to affect the character of the view.	A single phase construction approach reduces the length of construction works.	**Medium**	Negligible	Local	Short/Medium-term Reversible	Negligible	Adverse Direct	Not Significant	Medium
Operational phase	The Proposed Development emerges at the back of the view, rising about the Shena Simon 6th Form College. The Proposed Development adds a new contemporary feature to the view, differing in architectural form, height and materiality to the character observed within the existing view. The tower will act as a wayfinding marker for the centre of the city along this key gateway route into Manchester. The slight change in the composition of the view does cause a perceptible change, however it is not considered this will materially affect the appreciation of the view.	The contemporary architecture of the tower, in particular the clean, regular form of its silhouette, juxtaposes against the immediate townscape, separating and contrasting from the existing form so as to ensure the heritage assets can be deciphered within the view. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the skyline.		Minor	Local	Long-term Irreversible	**Minor**	Beneficial Direct	**Minor Significance**	High
Cumulative Impacts	Kampus is visible at the end of the vista, replacing the existing contemporary townscape. Construction works and operation of the contemporary scheme will be visible in the portion of the view already characterised by contemporary development. Kampus is likely to obscure a portion of the Proposed Development. It is anticipated that Kampus will support the visibility of the Proposed Development at the back of the view, however as visibility of the Scheme is reduced, this is unlikely to lead to further additional impact being experienced.	No additional mitigation required.		Minor	Local	Long-term Irreversible	Minor	Beneficial	**Minor Significance**	Medium
7: View facing north-west from the corner of Oxford Street and Whitworth Street Construction phase	Views of construction works will be obscured by the existing townscape framing the left of the view.	N/A	**Medium**	No Change	Local	Shot/Medium term Reversible	No Change	N/A	Not Significant	Medium

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Terminology for Visual Impact:

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Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational phase	The Proposed Development is not visible in the viewpoint. The Scheme is obscured by the townscape framing Oxford Road.	N/A		No Change	Local	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
8: View facing north across Whitworth Street from the arches of First Street Construction phase	An obscured view of construction works of the upper storeys will be visible above the listed building and Great Northern Tower. Due to the limited extent of the view, it is not anticipated that constructions works will materially alter the character of the view.	A single phase construction approach reduces the length of construction works.		Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Not Significant	Medium
Operational phase	The upper storeys of the tower area visible above the ridgeline of Manchester Central from this viewpoint, blending with the contemporary Great Northern Tower which has already broken this ridgeline. The Proposed Development sits behind the heritage assets within the view, therefore does not further limit views of Manchester Central. The Proposed Development will add to the vast array of contemporary development which has rapidly altered this viewpoint. However, the Scheme will cause little further change. The towers will provide a further wayfinding marker for the Civic Quarter. Whilst the change is perceptible – the character of the view, namely the dominance of the Beetham Tower and Axis with heritage assets beyond is unlikely to alter materially.	The orientation of the tower projects the slender elevation within this viewpoint, limiting the scale of effect further. The distance of the viewpoint has ensured the tower is overshadowed in scale by Axis and Beetham Tower.	**Low**	Minor	Local	Long-term Irreversible	**Minor**	Neutral Direct	**Not Significant**	High
Cumulative Impacts	The additional view of Manchester Central between Axis and the Proposed Development is likely to lead to further in-combination effects arising from the Proposed Development, due to further loss of visibility of the listed Central building amongst contemporary development. The change is expected to be in-keeping with the contemporary towers characterising the centre of the view.	No additional mitigation required.		Moderate	Local	Long-term Irreversible	Moderate	Neutral	Minor Significance	Medium
9: View facing north-east along Chester Road from the corner of Angela Street Construction phase	A limited view of construction works will be visible behind the existing contemporary townscape. Cranes are already apparent in the view, therefore the visual impact of additional construction works is unlikely to affect the character of the view.	A single phase construction approach reduces the length of construction works.	**Low**	Negligible	Local	Short/Medium-term Reversible	Negligible	Neutral Direct	Not Significant	Medium

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Terminology for Visual Impact:

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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational phase	A small extent of the Proposed Development is visible at the centre of the view, in the gap between Beetham Tower and the City Gate development. The towers are in keeping with the surrounding contemporary built form, and therefore provide a negligible change to the view which is in keeping with the existing character. Where visible, the Proposed Development provides a wayfinding marker for the heart of the city from this key gateway location.	Where visible, the choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester. This further aids the Proposed Development as a wayfinding marker from this location.		Negligible	Local	Long-term Irreversible	**Negligible**	Beneficial Direct	**Not Significant**	High
Cumulative Impacts	A number of committed developments will be visible in this view, namely 2-4 Chester Road, Deansgate South and Manchester Central, strengthening the emerging contemporary tower cluster to the right of the view. Given the distance of this cluster across the view from the Scheme, and the limited visibility of the Scheme, no further in-combination effects resulting from the Proposed Development are expected to occur.	No additional mitigation required.		Negligible	Local	Long-term Irreversible	Negligible	Beneficial	Not Significant	Medium
10: View facing north-east from Bridgewater Canal Tow Path Construction phase	A small extent of construction works may be visible during winter months, when the trees screening the left of the view are not in leaf.	A single phase construction approach reduces the length of construction works.		Negligible/ No Change	Local	Short/Medium-term Reversible	Negligible/ No Change	Adverse Direct	Not Significant	Medium
Operational Phase	The Proposed Development is not visible within this viewpoint, as the elevated railway and existing tree coverage obscures the Proposed Development location. During winter months, the roofscape of the Scheme is likely to come into view above the elevated railway infrastructure and through the canopy of the mid-ground trees. It is expected that this will only cause a negligible change to the view.	N/A	**Medium**	Negligible/ No Change	Local	Long-term Irreversible	**Negligible/ No Change**	Neutral Direct	**Not Significant**	High
Cumulative Impacts	A slight view of Manchester Central may occur at the centre of the view. The nature of the impact and obscured view of the Proposed Development ensures no further cumulative impacts are expected.	No additional mitigation required		Negligible/ No Change	Local	Long-term Irreversible	Negligible/ No Change	Neutral/ N/A	Not Significant	Medium
11: View facing south-east from the bridge along Bridge Street Construction phase	A view of construction works of the upper storeys will be visible above the existing contemporary townscape at the centre of the view. The works are likely to cause a minor, non-material change to the character of the view.	A single phase construction approach reduces the length of construction works.	**Low**	Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Not Significant	Medium

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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The top portion of the tower of the Proposed Development is visible at the centre of the view, rising above the existing townscape. The tower causes a clearly noticeable change to the view, causing the Proposed Development to form a new addition to the view, and act as a key wayfinding marker for the city from a strategic gateway location. The Proposed Development is visible in the context of surrounding contemporary development.	The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester – aiding the landmark potential of the Proposed Development. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the skyline.		Minor	Local	Long-term Irreversible	**Moderate**	Beneficial Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Minor	Local	Long-term Irreversible	Moderate	Beneficial	Minor Significance	Medium
12: View facing north from the platform of Deansgate/ Castlefield Tram Stop Construction phase	A view of construction works of the upper storeys will be visible above the existing contemporary townscape towards the left of the view. Construction works are likely to cause a temporary effect on the appreciation of the view.	A single phase construction approach reduces the length of construction works.	**Medium**	Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium
Operational Phase	The slender elevation of the Proposed Development is visible in the gap between Beetham Tower and Great Northern Tower. The siting of the Scheme does not affect the appreciation of the heritage assets within the view, including the listed Manchester Central structure and the spire of the Town Hall. The Proposed Development does cause a noticeable new feature to the view, however due to the scale of Beetham Tower and the Scheme's proximity to it, it is not expected that the change will materially affect the appreciation of the view. Given the location of the viewpoint at a key point of disembarkation for the city, the Proposed Development provides a useful wayfinding tool to mark the centre of the city. This provides a beneficial aspect to the new view character.	The orientation of the tower projects the slender elevation within this viewpoint, with the elliptic shape along the wide elevation providing interest within the columns of the façade. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester – aiding the landmark potential of the Proposed Development from this key orientation point within the city.		Moderate	Local	Long-term Irreversible	**Minor**	Beneficial Direct	**Minor Significance**	**High**
Cumulative Impacts	A direct view of the proposed Manchester Central development will entirely obscure the right of the view, limiting views of heritage assets which are currently visible. Manchester Central will frame the right of the view in a similar manner to the framing of the left of the view from Beetham Tower. The Proposed Development will remain visible in the centre of this view. The framing of the view limits the appreciation of the view as a wayfinding marker across the wider city. The Proposed Development does however remain a marker. No further cumulative effects are expected to arise in-combination with cumulative development.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Minor	Beneficial	Minor Significance	Medium

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13: View east along Jackson's Row from its junction with Deansgate Construction phase	An open view of construction works will be visible in this viewpoint. The extent of the works is likely to cause a clearly noticeable change to the view which will temporarily affect the character of the viewpoint.	The use of site hoarding will limit visual impact of groundworks. Sensitive siting of stockpiles within the site boundary and delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided.		Moderate	Local	Short/Medium-term Reversible	Moderate	Adverse Direct	Minor Significance	Medium
Operational Phase	The Proposed Development replaces the townscape at the centre of the view, causing a loss of the existing townscape heritage of the synagogue and side of the former Police Station from the view. The Scheme will cause a clearly noticeable change to the view, adding a significant mass of contemporary development and reducing views of the sky. The remaining view of the sky does retain the visibility of the Town Hall Extension. The height of the podium broadly follows the scale of the existing building to the right of the view, before stepping up the street. The overall character of the view is altered by the Scheme, shifting the feel of the townscape towards a contemporary character. New entrances onto Jackson's Row can be deciphered, strengthening the impression of activity within the viewpoint. Further activity is noticeable atop the podium, running up the grand stair and through visibility to the lower levels of the tower – providing an impression of surveillance onto the viewer.	The materiality of the Proposed Development reflects the broad colour tones which characterise the Civic Quarter. The anodised façade softens the tone of the building where direct sunlight will hit the building. Entrances at ground level along Jackson's Row and the visibility of glazing helps to mitigate the massing and provide an element of human activity within the viewpoint.	**Low**	Major	Local	Long-term Irreversible	**Moderate**	Beneficial Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Major	Local	Long-term Irreversible	Moderate	Beneficial	Minor Significance	Medium
14: View west along Jackson's Row from its junction with Southmill Street Construction phase	An open view of construction works will be visible in this viewpoint. The extent of the works is likely to cause a clearly noticeable change to the view which will temporarily affect the character of the viewpoint.	The use of site hoarding will limit visual impact of groundworks. Sensitive siting of stockpiles within the site boundary and delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided.	**Low**	Major	Local	Short/Medium-term	Moderate	Adverse Direct	Minor Significance	Medium

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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The character of the viewpoint has been altered by the Proposed Development. Whilst the Southmill Street frontage of the Former Police Station has been retained, this is now visible alongside significant contemporary development. This development fills the viewpoint with the scale of the podium alone, replacing views of the Former Police Station frontage along Jackson's Row with associated retail commercial use. The addition of substantial new use, including retail frontages provide new activity onto Jackson's Row, with a further public access lift onto the roof, beyond the extent of the viewpoint. The new character of activity along Jackson's Row is supported by the retained view along its length to Deansgate, providing a familiar, yet more contemporary feel to the route. It is anticipated that the Proposed Development will cause a major change to the view, with the character of the view undergoing a clearly noticeable change to its composition. The potential for substantial new activity suggests new change will be beneficial due to the proximity to the heart of the City.	The retention of the Former Bootle Street Police Station provides a familiar marker which has the potential to guide users through the mass of new contemporary development which otherwise dominates the viewpoint. The materiality of the Proposed Development reflects the broad colour tones which characterise the Civic Quarter. Entrances and retail uses at ground level along Jackson's Row, alongside the visibility of glazing helps to mitigate against the massing and provide an element of human activity within the viewpoint.		Major	Local	Long-term Irreversible	**Moderate**	Beneficial Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Major	Local	Long-term Irreversible	Moderate	Beneficial	Minor Significance	Medium
15: View east along Bootle Street from its junction with Deansgate Construction phase	An obscured view of construction works will be visible in this viewpoint. The extent of the works is likely to cause an impact on the view without materially altering the character.	The use of site hoarding will limit visual impact of groundworks. Sensitive siting of stockpiles within the site boundary and delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided.		Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Not Significant	Medium
Operational Phase	The Proposed Development is visible at the far end of Bootle Street, behind the listed and contemporary buildings framing views towards Central Library. The character of the street is mostly retained in the view, with the library still visible, however the Scheme does cause a perceptible change to the view, adding a contemporary element which has the potential to draw the eye away from the existing vista. The massing of the podium supports the building line and existing height datum of the street, retaining and enhancing views of the retained Sir Ralph Abercromby Public House. An obscured view of the tower exists towards the periphery of the view, further framing views down towards Central Library.	The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year.	**Low**	Moderate	Local	Long-term Irreversible	**Minor**	Beneficial Direct	**Not Significant**	High

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Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Cumulative Impacts	The development at 3 St. Peter's Square is visible above the Central Library at the end of the vista along Bootle Street. This adds further contemporary development into the character of the view. The scale of this change is minimum, although it influences a substantial heritage and cultural asset within the city. It is considered that any impact on the Library from this viewpoint is solely caused by 3 St. Peter's Square and no further in-combination effects arise from the Proposed Development.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Minor	Beneficial	Not Significant	Medium
16: View west along Bootle Street from its junction with Southmill Street Construction phase	An open view of construction works will be visible in this viewpoint. The extent of the works is likely to cause a clearly noticeable change to the view which will temporarily affect the character of the viewpoint.	The use of site hoarding will limit visual impact of groundworks. Sensitive siting of stockpiles within the site boundary and delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided.		Major	Local	Short/Medium-term Reversible	Moderate	Adverse Direct	Minor Significance	Medium
Operational Phase	The Proposed Development replaces the Former Police Station frontage along Bootle Street, however it retains the Southmill Street Police frontage and the Sir Ralph Abercromby Public House. The proposals cause a clear change to the view which is likely to alter the character of the viewpoint. The massing of the podium supports the vista along Bootle Street, albeit with the view narrowed and focussed towards the retained Public House. The tower rises beyond the top of the view and adds a new element of scale not previously apparent in the view.	The materiality of the proposed seeks to broadly respond to the surrounding colour tones of the Civic Quarter. The retention of the Former Bootle Street Police Station and Sir Ralph Abercromby Public House provide familiar markers which provide the potential to guide users through the mass of new contemporary development which otherwise dominates the viewpoint. The anodised materials allow interest to be created within the façade as light hits the building. The massing of the podium broadly follows the surrounding building line and massing along Bootle Street. The extent of glazing within the view creates a new impression of surveillance onto Bootle Street.	**Low**	Major	Local	Long-term Irreversible	**Moderate**	Beneficial Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Major	Local	Long-term Irreversible	Moderate	Beneficial	Minor Significance	Medium
17: View north-east from the corner of Deansgate and Quay Street Construction phase	A view of construction works of the upper storeys will be visible above the existing townscape at the centre of the view. Construction works are likely to cause an effect that will temporarily alter the appreciation of the view.	A single phase construction approach reduces the length of construction works.	**Medium**	Moderate	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium

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Please refer to the Environmental
Statement Addedum (2019)

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The Proposed Development rises the existing townscape at the centre of the view. The proposals cause a clearly noticeable change to the view – through the addition of contemporary development of a substantial new scale which is not already apparent in the view. This is likely to noticeably affect the composition of the view. This development directly juxtaposes the existing townscape of moderate heritage value, rather than tying into the existing built form. Existing listed buildings at either side of the view are not directly affected, however these assets will be limited to views in the context of the Proposed Development. Given that the effect is constrained to the periphery of the view, it is anticipated that this will not materially affect the appreciation of the view.	The Proposed materiality provides a contextual response to the site location, helping to reduce the contrast of the Scheme against the existing townscape. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish some of the width of the wide elevation.		Moderate	Local	Long-term Irreversible	**Minor**	Adverse Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Minor	Adverse	Minor Significance	Medium
18: View north-east from Byrom Street Construction phase	A limited view of construction works of a small portion of the upper storeys will be visible above the existing listed terrace. The works may cause a limited temporary change to the character of the view.	A single phase construction approach reduces the length of construction works.		Negligible	Local	Short/Medium-term Reversible	Negligible	Adverse Direct	Not Significant	Medium
Operational Phase	A small extent of the Proposed Development is visible to the right of the view. The Proposed Development punctuates the roofline above the listed terrace, which is a new character to the view. Contemporary development is visible in the baseline, however this is concentrated towards the left of the view and can broadly be considered as contextual through the height and materiality of the surroundings. Although the impact of the Proposed Development is perceptible, it is not expected to materially affect the appreciation of the view due to the clear definition between the historic foreground and the Scheme.	The materiality of the proposed seeks to broadly respond to the surrounding colour tones of the Civic Quarter.	**Medium**	Minor	Local	Long-term Irreversible	**Minor**	Adverse Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Minor	Local	Long-term Irreversible	Minor	Adverse	Minor Significance	Medium
19: View facing north along Deansgate from the corner of Tonman Street Construction phase	A limited view of construction works of the upper storeys will be visible above the existing listed frontage onto Deansgate. The works may cause a minor, non-material temporary change to the character of the view.	A single phase construction approach reduces the length of construction works.	**Medium**	Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium

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Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	A small extent of the Proposed Development is visible above the listed structure framing the right of the view. The Proposed Development causes a minor change to the periphery of the view, however does not materially alter the strong enclosure and linearity characterising the view. The Scheme's contemporary character responds to the new character created by the development of 125 Deansgate which draws the attention at the centre of the view. It is not expected that the character of the view will materially alter.	The repetitive vertical nature of the listed building along Deansgate is reflected in the form of the fenestration of the Proposed Development. The materiality of the Proposed Development provides a contextual marker for the centre of the city and provides enough contrast to retain views of the interesting roofscape of the listed building within the foreground. The elliptic shape is accentuated in this view, and has ensured the building curves out of view rather dominating more of the skyline.		Minor	Local	Long-term Irreversible	**Minor**	Neutral Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are anticipated to influence the character of this viewpoint. No additional cumulative effects.	No additional mitigation required.		Minor	Local	Long-term Irreversible	Minor	Neutral	Minor Significance	Medium
20: View north-west across Lower Mosley Street from the centre of Barbirolli Square Construction phase	An open view of construction works of the tower will be visible in this viewpoint., within the setting of listed buildings. The works are likely to cause a temporary contrast to the character of the view.	A single phase construction approach reduces the length of construction works.		Moderate	Local	Short/Medium-term Reversible	Moderate	Adverse	Minor Significance	Medium
Operational Phase	The tower of the Proposed Development becomes dominant, tallest feature at the centre of the view, altering the character whereby taller elements sit at the edge of the view. Contemporary architecture is not a new feature of the view. The curved façade can be read from this viewpoint, however the impact of the wide elevation is still read from this location. As the Proposed Development is located behind the existing visible townscape, the cluttered townscape character of the view is retained, with the tower adding to this character by providing a new focus to conflict with the existing features.	The orientation of the tower projects the corner within this viewpoint, with the elliptic shape along the wide elevation providing interest within the columns of the façade. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The choice of colour within the materiality of the Scheme subtly projects the cold tones of the Civic Quarter across to the skyline of Manchester – aiding the landmark potential of the Proposed Development from this key orientation point within the city.	**Low/ Medium**	Moderate	Local	Long-term Irreversible	**Moderate**	Neutral Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required.		Moderate	Local	Long-term Irreversible	Moderate	Neutral	Minor Significance	Medium
21: View facing west along Central Street from the entrance to Library Walk Construction phase	A view of construction works will be visible at the end of Central Street, within the setting of the surrounding listed buildings. The works will cause a temporary change to the character of the view.	The use of site hoarding will limit visual impact of groundworks. The delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided. A single phase construction approach reduces the length of construction works.	**Medium**	Moderate	Local	Short/Medium-term Reversible	Moderate	Adverse Direct	Moderately Significant	Medium

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Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The Proposed Development retains the Portland stone Bootle Street Police Station at the centre of the view, engulfing it with contemporary development and replacing the view of No.1 Spinningfields. The scale of the Proposed Development introduces a new character to the view. The scale of the podium rises above the former Police Station, adding a substantial new contemporary feature within the centre of the view which diminishes the existing sense of scale created by the current townscape. The wider elevation of the tower rises beyond the mass of the podium, adding additional scale which is alien to the baseline view. This increases the dominance of contemporary architecture within the character of the view and creates a sense of overbearing through limiting the view of the sky. The Scheme does sit beyond the heritage in the foreground, therefore alterations to the view does not cause any loss of heritage features, instead the Proposed Development competes for the attention of the view. The Proposed Development suggests activity may add a new character to the view at the back of Central Street.	The elliptic shape of the tower along its wide elevation limits some of the impact of the tower mass from this viewpoint. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester. The retention of the Former Bootle Street Police Station provides a familiar marker which has the potential to guide users through the mass of new contemporary development which otherwise dominates the viewpoint. The visibility of glazing within the podium helps to mitigate against the massing and provide an element of human activity within the viewpoint.		Moderate	Local	Long-term Irreversible	**Moderate**	Adverse Direct	**Moderately Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
22: View west from the centre of Library Walk Construction phase	A view of construction works will be visible within the setting of the existing listed buildings. The works are likely to cause a temporary change to the view.	The use of site hoarding will limit visual impact of groundworks. The delivery and removal of materials utilising a 'just in sequence' approach along designated one way routes to allow potential visual impacts to be reduced or avoided. A single phase construction approach reduces the length of construction works.		Moderate	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Moderately Significant	Medium
Operational Phase	The Proposed Development is visible in the gap between the listed buildings framing the view, replacing the view of the recently completed No. 1 Spinningfields. The setting of Friends Meeting House is impacted by the Proposed Development, which forms a new contemporary feature to the view. The scale of the podium rises above the former Police Station, adding a substantial new contemporary feature within the centre of the view which diminishes the existing sense of scale created by the current townscape. The wider elevation of the tower rises beyond the mass of the podium, adding additional scale which is alien to the baseline view. This increases the dominance of contemporary architecture within the character of the view and creates a sense of overbearing through limiting the view of the sky.	The materiality of the Scheme reflects the broad colour tones of the Civic Quarter, creating a shared architectural language between the contemporary and historic forms. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape of the tower along its wide elevation limits some of the impact of the tower mass from this viewpoint. The retention of the Former Bootle Street Police Station provides a familiar marker which has the potential to guide users through the mass of new contemporary development which otherwise dominates the viewpoint. The visibility of glazing within the podium helps to mitigate against the massing and provide an element of human activity within the viewpoint.	**High**	Moderate	Local	Long-term Irreversible	**Moderate**	Adverse Direct	**Moderately Significant**	High

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Terminology for Visual Impact:

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Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
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Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
23: View west across St. Peters Square from northern corner of 1 St. Peter's Square Construction phase	A limited view of construction works of the top of the tower will be visible above the existing listed building. The works are unlikely to cause a material change to the appreciation of the viewpoint.	A single phase construction approach reduces the length of construction works.	**High**	Negligible	Local	Short/Medium-term Reversible	Negligible	Adverse Direct	Minor Significance	Medium
Operational Phase	A small extent of the Proposed Development is visible above the roofline of the listed Central Library. The Proposed Development will be read in the context of the heritage assets. The tower does not obscure the library, however the Scheme removes the ability to read the architecture of the library, particularly its sweeping roofscape, without also reading the Proposed Development. The reflectivity of the glazing on a dull day such as in the photograph greys the majority of the glazing, blending the Scheme further into the materiality of the Library roof. This further limits the ability for the Library to be read as a distinctive building. The Proposed Development causes a noticeable change to the composition of the view.	Where visible, the responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year.		Minor	Local	Long-term Irreversible	**Minor**	Adverse Direct	**Moderately Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required		Minor	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
24: View south-west along Deansgate from the junction with Wood Street Construction phase	Views of construction works will be obscured by the 125 Deansgate framing the left of the view.	N/A		No Change	Local	Short/Medium-term Reversible	No Change	N/A	Not Significant	Medium
Operational Phase	The Proposed Development is not visible in the viewpoint. The towers are obscured by the development of 125 Deansgate.	N/A	**Medium/ High**	No Change	Local	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	As the Proposed Development is not visible, no further in-combination effects are expected to arise.	No additional mitigation required		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
25: View south from the centre of New Cathedral Street Construction phase	A view of construction works of the upper storeys will be visible behind the Grade I Listed St. Ann's Church. The works are likely to cause a temporary, noticeable change to the view which will impact the appreciation of the listed building.	A single phase construction approach reduces the length of construction works.	**Medium/ High**	Moderate	Local	Short/Medium-term Reversible	Moderate	Adverse Direct	Moderately Significant	Medium

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Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The Proposed Development rises above the Grade I Listed St. Ann's Church to form the backdrop of the vista through St. Ann's Square. The slender elevation of the tower is visible, however this sits directly behind the tower of St. Ann's Church, limiting the legibility of this Grade I listed building and preventing it from being read without appreciating the contemporary townscape beyond. This is not a new character to the view – which is already impacted by Beetham Tower, Owen Street and Great Northern Tower – however the proximity between the Proposed Development and the heritage asset accentuates this relationship. The scale of the Proposed Development confuses the perspective within the view, ensuring the Scheme is the most prominent within the emerging tower cluster. The Scheme causes a clearly noticeable change to the view, despite the character of the view experiencing a tower cluster beyond – particularly due to the increased impact on the legibility of the church.	The orientation of the tower projects the slender elevation within this viewpoint, limiting the scale of effect further. The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the skyline.		Moderate	Local	Long-term Irreversible	**Moderate**	Adverse Direct	**Moderately Significant**	High
Cumulative Impacts	Minor views of 10-12 Whitworth Street is visible within the emerging tower cluster at the back of the view. The cumulative impact is unlikely to cause a further change above the effect already identified at construction and operation stage.	No additional mitigation required		Moderate	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
26: View north-east from the junction of Liverpool Road and Duke Street Construction phase	Views of construction works will be obscured by the existing townscape framing the left of the view.	N/A		No Change	Local	Short/Medium-term Reversible	No Change	N/A	Not Significant	Medium
Operational Phase	The Proposed Development is not visible in the viewpoint. The towers are obscured by the Museum of Science and Industry.	N/A	**Medium**	No Change	Local	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	No committed developments are likely to be perceptible in this viewpoint. No additional cumulative effects.	No additional mitigation required		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
27: View facing south-west across Albert Square Construction Phase	An open view of construction works will be visible in this view causing a temporary yet clearly noticeable change to the character of the view. This is likely to have a direct impact on the setting of the heritage assets.	A single phase construction approach reduces the length of construction works.	**High**	Moderate	Local	Short/Medium-term Reversible	Moderate	Adverse Direct	Moderately Significant	Medium

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Operational Phase	The Proposed Development is clearly visible at the centre of the view, directly behind the Grade I Listed Albert Memorial and rising above the Grade II* Listed Memorial Hall and Grade II Listed Lloyds House. Whilst contemporary towers exist within the current viewpoint, the Proposed Development sits at an entirely new scale, which is alien within the existing view composition. The scale of the podium is also dominant, at a scale beyond the approximate 6 storey datum of the surrounding townscape. The orientation of the tower has caused the wide elevation to sit behind Albert Memorial, preventing this structure from being appreciated from this viewpoint without reading the Proposed Development.	The orientation of the tower presents the wider elevation to this viewpoint, with the elliptic shape providing some interest within the columns of the façade and preventing a more oppressive form onto the square. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The retention of the Former Bootle Street Police Station provides a familiar marker at the back of the view which has the potential to orientate users through the mass of new contemporary development which otherwise dominates the viewpoint. The visibility of glazing within the scheme helps to mitigate against the massing, complement the sky and, within the podium, provide an element of human activity within the viewpoint.		Major	Local	Long-term Irreversible	**Major**	Adverse Direct	**Significant**	High
Cumulative Impacts	Minor views of 10-12 Whitworth Street is visible to the left of the view, within the emerging cluster of contemporary development. The separation between the Scheme and 10-12 Whitworth Street has led to the cumulative impact to be considered unlikely to cause a further change above the effect already identified at construction and operation stage.	No additional mitigation required.		Major	Local	Long-term Irreversible	Major	Adverse	Significant	Medium
28: View facing north-west from the corner of Oxford Street and Lower Mosley Street Construction Phase	A limited view of construction works related to the upper storeys of the tower will be visible at the back of the viewpoint. It is unlikely that this will materially affect the composition of the view.	A single phase construction approach reduces the length of construction works.		Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium
Operational Phase	The Proposed Development rises above the contemporary development towards the left of the view. The Scheme sits within the background and despite its height, is unlikely to affect the composition of the heritage assets which define the predominant character within the view.	The orientation of the tower presents the wider elevation to this viewpoint, with the elliptic shape providing some interest within the columns of the façade. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year.	**Medium/ High**	Minor	Local	Long-term Irreversible	**Minor**	Neutral Direct	**Minor Significance**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required.		Minor	Local	Long-term Irreversible	Minor	Neutral	Minor Significance	Medium
29: View facing north-west along Princess Street from the corner with Lower Mosley Street Construction Phase	A limited view of the upper storeys of construction works will be visible beyond the listed buildings in the mid-ground. Due to the limited visibility and temporary nature, this is unlikely to have a material impact despite the sensitive character of the view.	A single phase construction approach reduces the length of construction works.	**High**	Minor	Local	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium

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Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The Proposed Development is visible, rising above the Grade II* Town Hall Extension to a height which begins to compete with the legibility of the Grade I Listed Town Hall. Whilst the Scheme does not obscure views of the heritage, its prevents the viewer from appreciating the Town Hall pairing without also reading the Proposed Development. Whilst the foreground of the view is cluttered, this cluttering of the background alters the character of the view.	The orientation of the tower presents the wider elevation to this viewpoint, with the elliptic shape providing some interest within the columns of the façade. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year.		Minor	Local	Long-term Irreversible	**Moderate**	Adverse Direct	**Moderately Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required.		Minor	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
30: View facing south along Cross Street opposite the junction with south King Street Construction Phase	Views of construction works will be obscured by the existing townscape framing the right of the view.	N/A	**Medium**	No Change	Local	Short/Medium-term Reversible	No Change	N/A	Not Significant	Medium
Operational Phase	The Proposed Development is not visible in the viewpoint. The towers are obscured by the townscape to the right of the view	N/A		No Change	Local	Long-term Irreversible	**No Change**	N/A	**Not Significant**	High
Cumulative Impacts	As the Proposed Development is not visible, e no further in-combination effects are expected to arise.	No additional mitigation required		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
31: View facing north along Deansgate from the corner with Camp Street Construction Phase	Construction works will be visible in this view above the listed townscape. Views of construction will be temporary and not expected to materially alter the composition of the view.	A single phase construction approach reduces the length of construction works.	**Medium**	Minor	Neighbourhood	Short/Medium-term Reversible	Minor	Adverse Direct	Minor Significance	Medium

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.2 Visual Effects Table: Description of Change, Magnitude and Significance

Viewpoint No. and Location	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor (from table above)	Size/Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Operational Phase	The Proposed Development rises above the listed townscape which frames the right of the view. The tower will be at a completely new scale which, like the contemporary 125 Deansgate, alters the strong sense of perspective gained by the regular townscape along Deansgate. The tower provides a marker for the centre of the city, which this view currently lacks – with users instead guided along Deansgate.	The repetitive vertical nature of the listed building along Deansgate is reflected in the form of the fenestration of the Proposed Development. The orientation of the tower projects the corner within this viewpoint, with the elliptic shape along the wide elevation providing interest within the columns of the façade. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Civic Quarter across to the skyline of Manchester – aiding the landmark potential of the Proposed Development from this key orientation point within the city. The materiality of the Proposed Development provides a contextual marker for the centre of the city and provides enough contrast to retain views of the interesting roofscape of the listed building within the foreground.		Moderate	Neighbourhood	Long-term Irreversible	**Moderate**	Beneficial Direct	**Moderately Significant**	High
Cumulative Impacts	No committed developments are visible in this viewpoint. No additional cumulative effects.	No additional mitigation required.		Moderate	Neighbourhood	Long-term Irreversible	Moderate	Beneficial	Moderately Significant	Medium

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Terminology for Visual Impact:

Type of View:	Glimpsed, Open, Oblique, Framed, Filtered	Geographical Extent of Impact:	(Descriptive)
Number of Viewers:	Few, Moderate, High	Duration:	Long-term, Medium-term, Short-term, Direct, Indirect
Value of Views:	High, Medium, Low	Reversibility:	Yes, within (timescale)/No
Susceptibility to Change:	High, Medium, Low	Overall Magnitude of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change
Overall Sensitivity of Receptor:	High, Medium, Low	Nature of Impact:	Adverse, Benefit, Neutral, Not Applicable, Direct, Indirect, Secondary
Size/Scale of Impact:	Major, Moderate, Minor, Negligible, Neutral, No Change	Significance:	Significant, Moderately Significant, Not Significant

Appendix 8.3

KINETIC TRACKS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid. Please refer to the Environmental Statement Addendum (2019) Volume 1 for more information.

REFERENCE
PL1556.1

PROJECT
ST. MICHAELS

DOCUMENT
APPENDIX 8.3 - ST MICHAELS VERIFIED KINETIC ASSESSMENT

STATUS	DATE
PLANNING	**NOVEMBER 2017**

DOCUMENT CONTROL

FILE NAME

PL1556.2-LV-010-02-APPENDIX 8.3 - KINETIC ASSESSMENT RESUBMISSION

PREPARED BY **CH**	
CHECKED BY **PS**	

TRACK LOCATIONS

Track 1

Kinetic track from Princess Street, traveling north-west before turning west into St. Peters Square

Track 2

Kinetic track north-west along Princess Street and turning along the western edge of Albert Square at its northern corner



KINETIC TRACK

CHARACTER CHANGE

VERIFIED VIDEO METHODOLOGY

PREAMBLE/ BACKGROUND

A8.3.1 Planit-IE LLP were appointed by Jacksons Row Developments Ltd. to prepare a Townscape and Visual Impact Assessment (TVIA) for the proposed development of the site currently comprising the Jackson's Row Police Station (vacant); Sir Ralph Abercrombie public house and the Manchester Reform Synagogue.

A8.3.2 During the early stages of the work discussions were had internally and with Manchester City Council Officers regarding the number and location of Verified Viewpoints. It quickly became clear that, when numbers of close images in particular began to increase significantly, in the main over very short distances, that the normal methodology of static views alone was not fit for purpose for the scale, sensitivity and complexity of the St. Michael's proposals.

ASSESSMENT METHODOLOGY

A8.3.3 This assessment has been carried out with reference to the Guidelines for Landscape & Visual Impact Assessment, 3rd Edition, 2013 (referred to hereafter as "the Guidelines").

A8.3.4 An assessment of townscape value and susceptibility of townscape to change enables the overall sensitivity of townscape receptors to be determined. This forms the baseline from which the impact of the Proposed Scheme can be assessed.

A8.3.5 The assessment has considered the Proposed Scheme against the Site as it currently stands. The Site comprises of the former Bootle Street Police Station, Manchester Reform Synagogue, Sir Ralph Abercromby pub and surface car parking, as detailed within the Chapter 2: Description of the Site and Surrounding Area. The Site is limited in use, due to the vacancy of the Police Station. The built form is located in the parcel of land which is bound to the north by Jackson's Row, east by Southmill Street and south by Bootle Street. The existing 201 Deansgate and Onward Buildings lie outside the Site's western boundary and provide separation between the Site and Deansgate.

A8.3.6 This TVIA introduces the use of kinetic viewpoints (known as 'tracks') to supplement the static viewpoint assessment. These tracks provide a dynamic experience along key localised routes and approaches to the application Site through adjacent Conservation Areas. These represent a closer to reality view of how pedestrians would experience the Proposed Scheme in the context of a tight-knit, dynamic and constantly changing city centre. These tracks have been selected and compiled following a rigorous methodology emanating from the accepted static viewpoint photomontage methodology as set out in the Guidelines.

A8.3.7 In order to provide the most comprehensive, rounded and objective view of the Townscape and Visual Impacts of the Proposed Scheme, assessed effects have been agreed following round-table discussions by a team of individual assessors.

KINETIC VERIFIED MONTAGE (KVM) PRODUCTION METHODOLOGY

Track Selection

A8.3.8 Tracks were chosen to represent the main approach sequences to Albert Square and St. Peters Square which have the potential to be impacted by the Proposed Development.

A8.3.9 The tracks were agreed based on the City 3D model, with the proposed buildings located as blocks.

Videography

A8.3.10 A professional videographer was employed, using a 4K quality steady-cam (to match the normal walking motion of a human being) with focal length to match that of the human eye (equivalent to 31-33mm with static views). The cameraman followed a prescribed route for each track, looking ahead rather than artificially towards the location of the proposed development – only stopping or turning at key junctions and/or when crossing the road.

3D Point Survey

A8.3.11 As with static verified views, a surveyor was sent out to survey locations of known points along each of the four video tracks.

A8.3.12 Rather than bearings, the surveyor surveyed known points in 3D space, at each key location along the routes. Within each view (or change in view) a minimum of 12 points was surveyed – this ensures that when matched into moving footage, at least four points are visible (as some may disappear behind obstructions momentarily), allowing accurate triangulation to occur.

A8.3.13 The data from the surveyor is then overlaid on a CAD tile of Manchester that is aligned to the 3D city model.

City Model verification

A8.3.14 Manchester has an accurate City Model that is made available to those bringing forward major development. However, the accuracy has never been independently verified. With the point cloud data, we were able to ascertain that the 3D city model was over 95% accurate, giving a high degree of confidence to the matching of any animated sequences with the verified video footage.

Post-processing of raw footage

A8.3.15 The raw footage is loaded into the software and 'tracker nodes' are used to identify each survey points' location in the footage, every 25 frames (equivalent of half a second). The matching of frames between these manual track points are then automated - this is a lengthy process often taking over an hour per track of which there may be up to 12.

A8.3.16 To compensate for any camera 'bounce' or remove any anomalies each tracked survey point is 'cleaned' using a graph of relative x and y movements to ensure the highest possible level of alignment. Single frames are corrected by hand for the entire duration of the film for each of the tracks.

A8.3.17 After the cleaning process is complete the 3D world space survey points are imported and linked to the corresponding video tracked point. The software then triangulates where the camera is in 3D space.

A8.3.18 This camera animation is then exported and transferred to 3D Studio Max (the CGI modelling and animation software) which should drop into location.

Compositing & masking

A8.3.19 The next stage in the process is akin to the masking of static views, which would in that case take place in Photoshop.

A8.3.20 Once the animation is rendered, the St Michael's development proposals have to be placed into the video footage. Any elements that lie in front of the proposals (i.e. buildings, trees, lamppost, people, vehicles etc.) would be 'masked' so that the proposals are accurately superimposed behind the existing context.

A8.3.21 In a static view, this is done once for each viewpoint location. For verified video tracks every frame is masked at 25 frames per second and automatically 'tracked' over the entire duration. These are then 'cleaned' to make sure they align to their subject - correcting alignment in single frames by hand for the entire duration of the film.

A8.3.22 The rendered animation of the development proposal and masked video footage is then exported as a high-resolution MP4 file.

KINETIC VERIFIED MONTAGE (KVM) ASSESSMENT METHODOLOGY

A8.3.23 This assessment has been carried out with reference to the Guidelines. The kinetic tracks differ from static viewpoints in their ability to present an evolving character along the length of a track. In order for an assessment of the kinetic tracks to follow the Guidelines, the tracks have been split into separate viewpoint characters, defined within the baseline. Each of these characters have then been individually assessed. The assessment of a character allows the same recognised assessment headings to be applicable as set out in methodology included within Chapter 8.

A8.3.24 Transitions have been considered between the viewpoint characters. This simply provides reasoning for potential jumps in sensitivities or magnitude based on abrupt changes in character. These jumps are unlikely to occur during gradual transitions of character.

TRACK 1 - CLICK ON THE IMAGE TO VIEW THE BASELINE TRACK

Manual URL:

https://youtu.be/MMPfgaRBFNs



BASELINE AND SENSITIVITY

Track 1

Kinetic track from Princess Street, traveling north-west before turning west into St. Peters Square

Designation and Approx. Distance to Site Boundary	Length of Track	Description of Baseline Track	Type of View and Number of Users	Value of Track	Susceptibility to Change	Overall Sensitivity of Receptor
Designations: Grade I Listed Town Hall, Grade II* Listed Town Hall Extension and Manchester War Memorial // boundary of George Street, Upper King Street and facing predominantly into Albert Square Conservation Area **Distance to site:** 300 - 240m north-east	00:42	The track travels along Princess Street, alongside Manchester Art Gallery, to the junction with Mosley Street before crossing into St. Peter's Square, facing towards Lloyds Street. The Town Hall forms a prominent feature throughout the length of the track, characterising the experience and drawing users into St. Peter's Square towards the key landmark. As users head towards St. Peter's Square, the Town Hall Extension, War Memorial and the recently completed square surrounds the Town Hall within an attractive setting. The experience along the track remains open throughout the length of the journey, representing arrival into the heart of the city. Trams cross in front of users along the length of the track and alight at stops just beyond the left of the view. These have the potential to distract users from the surrounding townscape, alongside traffic travelling along Princess Street during the first portion of the track. The extent of the view into St. Peter's Square and the dominance of the Town Hall buildings provide subtle character changes with gradual transitions throughout the kinetic track. This occurs at three occasions, and splits the track into the following characters; 00:00 - 00:18 (Princess Street), 00:18 - 00:35 (St. Peter's Square crossing) and 00:35 - 00:42 (St. Peter's Square). The initial experience along Princess Street is characterised by the view towards the Grade I Listed Town Hall. This is apparent alongside the contemporary architecture (80 Mosley Street) visible to the right of the view. Traffic along Princess Street presents a barrier as it travels directly towards the user, with visible tram tracks running perpendicular to the direction of travel suggesting views towards the Town Hall are likely to be interrupted during travel. The initial view towards the Town Hall from Princess Street is further cluttered by lamp posts, signage and overhead tram cables - all further distracting from the impressive heritage feature. The angular roofscape of the Town Hall, along with its spire at each end ensures the building is not lost within the mid and low level city clutter and draws the users eye up the building when the attention is not focussed on traffic and trams. The track experience changes as it traverses Princess Street, with St. Peter's Square characterising the foreground. From here, the Town Hall and Town Hall Extension are viewed as a pair of buildings which dominate the majority of the view. Trees and street furniture clutter the fore and mid-ground of the view, again reducing some of the dominance of the buildings at lower levels of the view. The interaction between the Town Hall and Town Hall Extension is particularly apparent, with the gap created by Lloyd Street between the two landmarks accentuated by the angle of the facade of the Town Hall Extension. Pedestrian movement is highlighted along the western edge of the square, close to where the Town Hall Extension meets St. Peter's Square. This pedestrian flow would ensure the townscape would prevent all views westward from St. Peter's Square. No contemporary architecture is apparent in this track. The final portion of the track is characterised by a more open, yet dominating view of the Town Hall and Town Hall Extension, with Manchester War Memorial in the foreground. This experience accentuates the interrelationship between the Town Hall buildings, with the sky penetrating between, reminding users of the route along Lloyd Street. Views down Lloyd Street present the only glimpses of wider townscape from this track. Pedestrian flow is limited in its route towards Lloyd Street by Manchester War Memorial, forcing users to travel towards either Town Hall building, ensuring the glimpse along Lloyd Street is lost. No contemporary architecture is apparent in this track.	The view remains open along the track, due to its proximity to St. Peter's Square. The potential exists for a high number of viewers to appreciate the nationally appreciated heritage buildings (Manchester Town Hall and Town Hall Extension) with important cultural associations. Visitors to these heritage/ cultural attractions are likely to appreciate the surrounding townscape, particularly due to the opportunity provided by St. Peter's Square. The overall sensitivity of the receptor is therefore considered to be High along the length of the journey.	High	High	**High**

TRACK 1 - CLICK ON THE IMAGE TO VIEW THE PROPOSED TRACK

Manual URL:

https://youtu.be/LqUzqjHgcFE



RESIDUAL EFFECTS

Track 1

Kinetic track from Princess Street, traveling north-west before turning west into St. Peters Square

Visual Elements	Timestamp of character	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor	Size/ Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Track 1 - Character 1 - Princess Street Construction Phase	00:00 - 00:18	Views of construction works will not be visible due to the orientation of the track.	No additional mitigation required.	High	No Change	Local	Short/ Medium-term Reversible	No Change	N/A	Not Significant	Medium
Track 1 - Character 1 - Princess Street Operational Phase		The Proposed Development is not visible in the portion of the track due to the orientation of the track.	No additional mitigation required.		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	High
Track 1 - Character 1 - Princess Street Cumulative Phase		The Proposed Development is not visible. Further in-combination effects are therefore not anticipated to occur.	No additional mitigation required.		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
	Gradual transition - The character of the view gradually changes as the track turns towards St. Peter's Square										
Track 1 - Character 2 - St Peter's Square Crossing Construction Phase	00:18 - 00:35	Views of construction works will be apparent above the Town Hall Extension, in the gap between the Town Hall. Construction works will be partially obscured, with partial views of the upper storeys visible.	A single phase construction approach reduces the length of construction works.	High	Minor	Local	Short/ Medium-term Reversible	Minor	Adverse Direct	Moderately Significant	Medium
Track 1 - Character 2 - St Peter's Square Crossing Operational Phase		The Proposed Development will break the ridgeline above the Town Hall Extension, the in gap between the Town Hall, limiting views of the sky. A partially obscured view of the wide elevation of the tower of the Proposed Development will be visible. The Scheme will prevent the user from reading the interrelationship between the Town Hall buildings without also reading the tower of the Proposed Development. Whilst the view is glimpsed along the alignment of Lloyd Street, where the Proposed Development is visible it will cause a clearly noticeable change to the character of the view which will alter the composition and presence currently accorded to the landmark Town Hall buildings.	The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Town Hall whilst presenting itself in a contemporary manner. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the view.		Moderate	Local	Long-term Irreversible	Moderate	Adverse Direct	Moderately Significant	High
Track 1 - Character 1 - St Peter's Square Crossing Cumulative Phase		St. John's Place will be visible, low in the gap between the Town Hall buildings. Only a small portion of the development will be visible. Whilst the development lies at the centre of the view, it is unlikely to be dominant, due to the attention of the viewer likely to be focussed on the historic facades, historic roofscape or indeed the proposed development. It is not considered that the in-combination effects are likely to increase the assessment further.	No additional mitigation required.		Moderate	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium
	Gradual transition - The character of the view gradually changes as the track moves towards Lloyd Street										

Track 1 - Character 3 - St. Peter's Square **Construction Phase**	**00:35 - 00:42**	Views of construction works will be apparent above the Town Hall Extension, in the gap between the Town Hall. Construction works will be mostly obscured, with partial views of the upper storeys visible, limiting the appearance of sky.	A single phase construction approach reduces the length of construction works.	High	Minor	Local	Short/ Medium-term Reversible	Minor	Adverse Direct	Moderately Significant	Medium
Track 1 - Character 3 - St. Peter's Square **Operational Phase**		The Proposed Development will break the ridgeline above the Town Hall Extension, the in gap between the Town Hall, limiting views of the sky at the top of the view. A partially obscured view of the wide elevation of the tower of the Proposed Development will be visible, albeit above and beyond the Town Hall buildings. The Scheme will prevent the user from reading the interrelationship between the Town Hall buildings without also reading the tower of the Proposed Development. Whilst the view is glimpsed along the alignment of Lloyd Street, where the Proposed Development is visible it will cause a clearly noticeable change to the character of the view which will alter the composition and presence currently accorded to the landmark Town Hall buildings.	The choice of colour within the materiality of the Scheme subtly projects the colour tones of the Town Hall whilst presenting itself in a contemporary manner. The responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year. The elliptic shape, along with the changing colour of the anodised finish helps to diminish the width of the wide elevation, helping to reduce some of the mass on the view.		Moderate	Local	Long-term Irreversible	Moderate	Adverse Direct	Moderately Significant	High
Track 1 - Character 3 - St. Peter's Square **Cumulative Phase**		St. John's Place will be visible, low in the gap between the Town Hall buildings. Only a small portion of the development will be visible. Whilst the development lies at the centre of the view, it is unlikely to be dominant, due to the attention of the viewer likely to be focussed on the historic facades, historic roofscape or indeed the proposed development. It is not considered that the in-combination effects are likely to increase the assessment further.	No additional mitigation required.		Moderate	Local	Long-term Irreversible	Moderate	Adverse	Moderately Significant	Medium

TRACK 2 - CLICK ON THE IMAGE TO VIEW THE BASELINE TRACK

Manual URL:

https://youtu.be/qWdXbYVETnQ



BASELINE AND SENSITIVITY

Track 2

Kinetic track north-west along Princess Street and turning along the western edge of Albert Square at its northern corner

Designation and Approx. Distance to Site Boundary	Length of Track	Description of Baseline Track	Type of View and Number of Users	Value of Track	Susceptibility to Change	Overall Sensitivity of Receptor
Designations: Grade I Listed Albert Memorial, Grade II* Listed Memorial Hall and Grade II Listed Abbey National Building, Albert Chambers and Anglia House // Albert Square Conservation Area **Distance to site:** 180 - 130m north-east	01:01	The Track extends from Princess Street, facing down John Dalton Street before turning to cross Princess Street and travelling along the western edge of Albert Square towards the north-eastern corner of the site, stopping before the Albert Memorial. The experience has been split into two separate characters, reflecting the change in orientation along the track. The first character (00:00 - 00:20) is defined by the view of the road junction and landmark buildings defining key corners as the townscape responds to this strategic movement decision point within the city centre. To the right of the view, Cross Street leads users north directly through the City Centre to the Cathedral Quarter. Straight ahead, John Dalton Street takes users west to Deansgate and directly across the River Irwell to Salford. The foreground is therefore busy with cars and pedestrians crossing, with associated signage and street furniture and limited opportunities to stop and enjoy the setting. The view is focussed straight ahead. Any views left towards Albert Square would be obscured by tree canopies which line the square. Townscape further frames the right of the view and channels attention along John Dalton Street and strengthening the presence of the Abbey National Building and Anglia House. As the track turns and crosses Princess Street, the character of the view changes considerably (00:20 - 01:01). Grade I Listed Albert Memorial draws attention to the left of the view, with views down to the Site framed by the contemporary townscape to the right of the view. The Portland Stone colour defining the Former Bootle Street Police Station is apparent at the centre of the view, with the contrast in colour and materiality drawing users eye towards this point. Contemporary architecture is also dominant at the centre of the view, with Beetham Tower, Great Northern Tower and Owen Street (future baseline) rising above the townscape at the back of the view. Albert Memorial remains a defining feature along the length of the track, drawing the eye and inciting users into Albert Square as defined by the line of street trees. Opportunities to stop and enjoy the setting are apparent. The track does not highlight the Grade I listed Town Hall which is likely to draw the eye further off the view to the left, although the track represents pedestrians using the alignment of the track to traverse the space. The dominance of the Albert Memorial is clearly apparent in the baseline view from the point where the track turns into the square through to the end of the view. The changing relationship with the Albert Memorial broadly alters the character of the view a number of times through the kinetic experience. These include; where the Memorial is not visible, where the Memorial forms a dominant feature at the centre of the view and close to the Memorial where it acts to frame the view.	Majority of the track is open and subject to a high number of viewers with the potential to appreciate the important civic space and the associated buildings of significant heritage quality. The overall sensitivity of the track is therefore considered to be high across the changes in character.	High	High	**High**

TRACK 2 - CLICK ON THE IMAGE TO VIEW THE PROPOSED TRACK

Manual URL:

https://youtu.be/bEp9uyU5tRI



RESIDUAL EFFECTS

Track 2

Kinetic track north-west along Princess Street and turning along the western edge of Albert Square at its northern corner

Visual Elements	Timestamp of character	Description of Change	Embedded Mitigation	Overall Sensitivity of Receptor	Size/ Scale of Impact	Geographical Extent of Impact	Duration/ Reversibility	Overall Magnitude of Impact	Nature of Impact	Significance	Confidence
Track 2 - Character 1 - Princess St. Construction Phase	00:00 - 00:20	Views of construction works will not be visible due to the orientation of the track.	No additional mitigation required.	High	No Change	Local	Short/ Medium-term Reversible	No Change	N/A	Not Significant	Medium
Track 2 - Character 1 - Princess St. Operational Phase		The Proposed Development is not visible in the portion of the track due to the orientation of the track.	No additional mitigation required.		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	High
Track 2 - Character 1 - Princess St. Cumulative Phase		The Proposed Development is not visible. Further in-combination effects are therefore not anticipated to occur.	No additional mitigation required.		No Change	Local	Long-term Irreversible	No Change	N/A	Not Significant	Medium
		Abrupt transition - The character of the view completely changes as the track turns into Albert Square									
Track 2 - Character 2 - Albert Sq. North Construction Phase	00:20 - 01:01	A view of construction works of the podium will be visible at the centre of the view, amongst the existing townscape, including the contemporary Beetham, Great Northern and Owen Street (future baseline) towers and within the setting of the Grade I Listed Albert Memorial. The works are likely to cause a temporary effect on the appreciation of the view.	A single phase construction approach reduces the length of construction works.	High	Minor	Local	Short/ Medium-term Reversible	Minor	Adverse Direct	Moderately Significant	Medium
Track 2 - Character 2 - Albert Sq. North. Operational Phase		The Proposed Development will be visible at the centre of the view, amongst the existing townscape and marked by the retention of the Portland Stone Former Bootle Street Police Station. Only the podium will be visible at the centre of the view. The tower is partially visible on the edge of the viewpoint, above the existing townscape. The placement of the tower on the Deansgate edge ensures its impact on the view is limited. Contemporary development atop the retained Police Station is broadly in keeping with the height datum of the existing townscape in this view, and is visible directly amongst the contemporary towers rising beyond the heritage. Whilst the Proposed Development is visible within the setting of the Grade I listed Albert Memorial, it is not anticipated that the Scheme will noticeably alter the character of the view.	The orientation of the tower has prevented its visibility from this viewpoint. The choice of colour within the materiality of the podium subtly projects the colour tones of the Town Hall whilst presenting itself in a contemporary manner. Where visible, the responsive nature of the anodised finish to the building façade helps to soften the colour and provide townscape interest as elevations will react differently to the sun, throughout the day and year.		Minor	Local	Long-term Irreversible	Minor	Neutral Direct	Moderately Significant	High
Track 2 - Character 2 - Albert Square North Cumulative Phase		Glimpsed views of Manchester Central are visible beyond the existing townscape within the view. The limited view of the tower has deemed it unlikely that further in-combination effects will arise as a result of the Proposed Scheme.	No additional mitigation required.		Minor	Local	Long-term Irreversible	Minor	Neutral	Moderately Significant	Medium

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This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 8.4

TVA FIGURES

REFERENCE
PL1556.1

PROJECT
ST. MICHAELS

DOCUMENT
APPENDIX 8.4: TVIA FIGURES

STATUS
PLANNING

DATE
22/11/17

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Please refer to the Environmental
Statement Addedum (2019)

DOCUMENT CONTROL

FILE NAME

PL1556.1-ID-001-05-TVIA FIGURES

PREPARED BY (INITIALS) **CJ**	
CHECKED BY (INITIALS) **PS**	

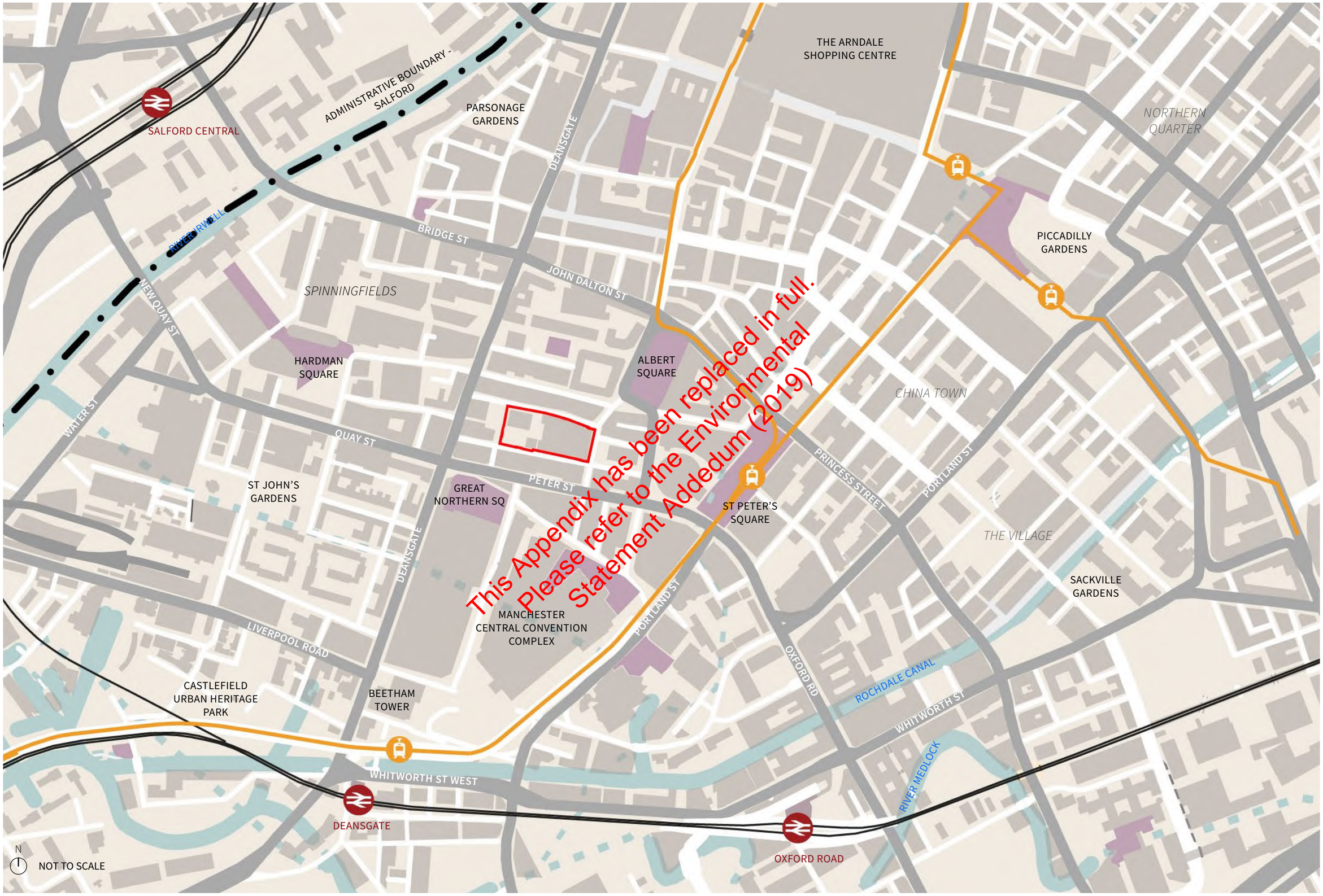
This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

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FIGURE 8.2: URBAN MORPHOLOGY - HISTORICAL DEVELOPMENT
FIGURE 8.3: HERITAGE DESIGNATIONS
FIGURE 8.4: TOWNSCAPE CHARACTER
FIGURE 8.5: URBAN GRAIN
FIGURE 8.6: LAND USE
FIGURE 8.7: BUILDING HEIGHTS
FIGURE 8.8: TOPOGRAPHY & FLOOD RISK
FIGURE 8.9: MOVEMENT & LINKAGES
FIGURE 8.10: ENVIRONMENTAL DESIGNATIONS & PUBLIC OPEN SPACE
FIGURE 8.11: SURROUNDING COMMITTED DEVELOPMENTS
FIGURE 8.12: EXISTING SITE ANALYSIS
FIGURE 8.13: VIEWPOINTS
FIGURE 8.14: LONG DISTANCE VIEWPOINT

This Appendix has been replaced in full.
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Statement Addedum (2019)

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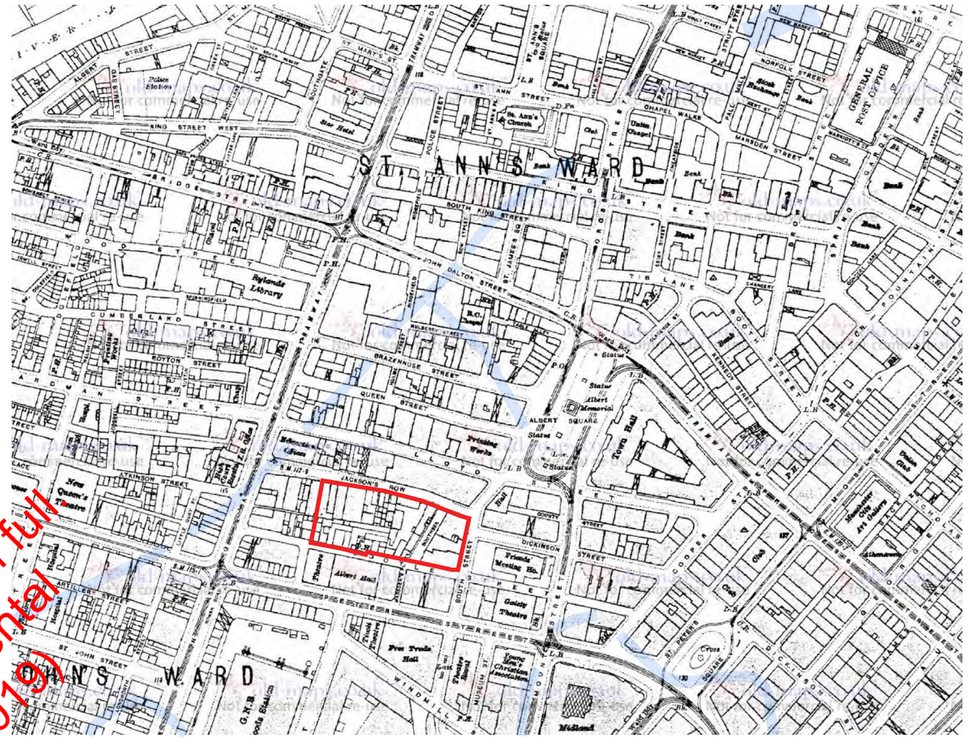


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Please refer to the Environmental
Statement Addedum (2019)

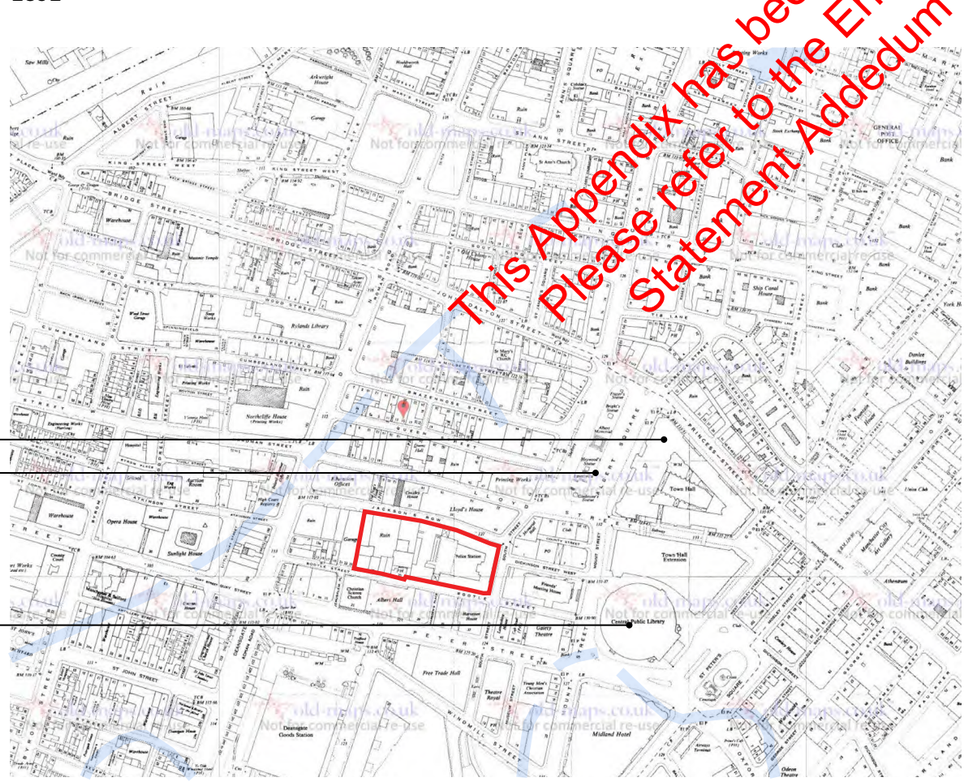
FIGURE 8.1 - SITE LOCATION



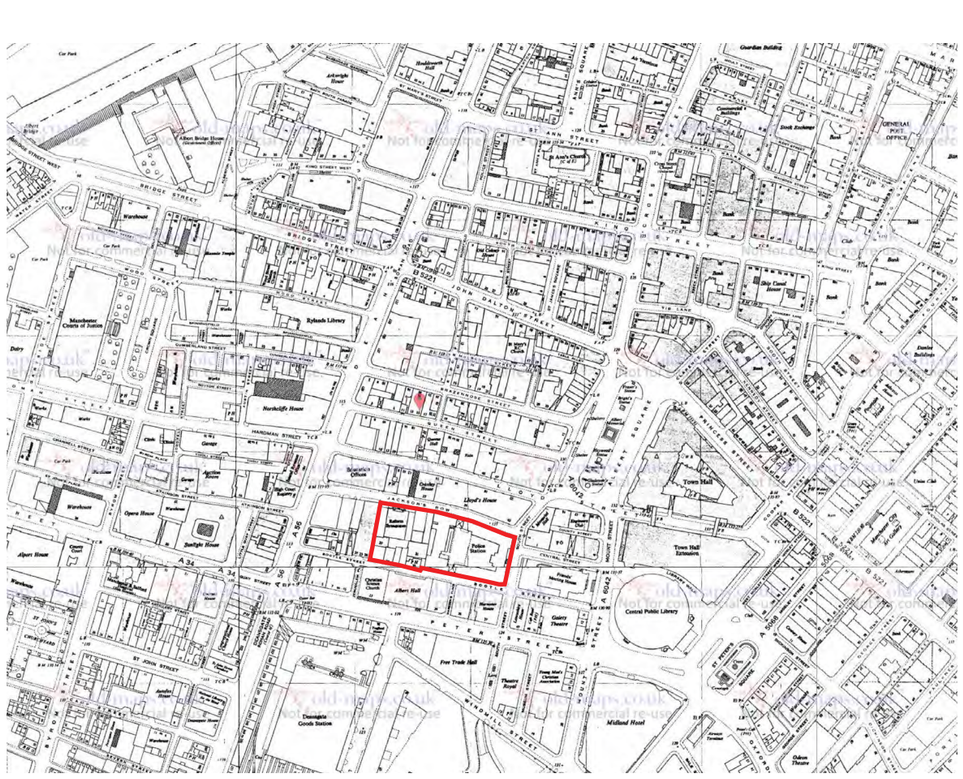
1891



1922



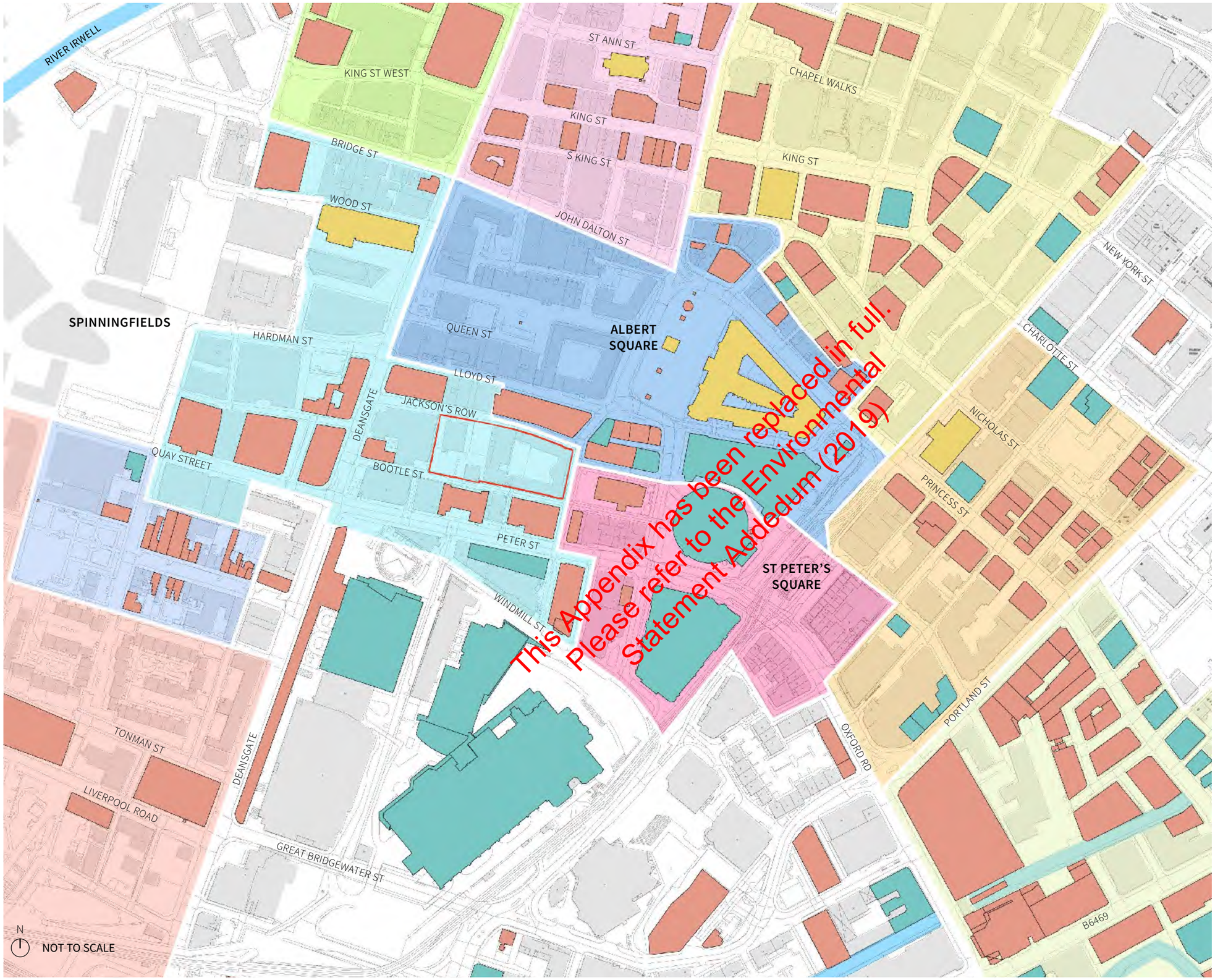
1946



1959

This Appendix has been replaced in full
Please refer to the Environmental
Statement Addedum (2019)

FIGURE 8.2 - URBAN MORPHOLOGY - HISTORICAL DEVELOPMENT



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

FIGURE 8.3 - HERITAGE DESIGNATIONS

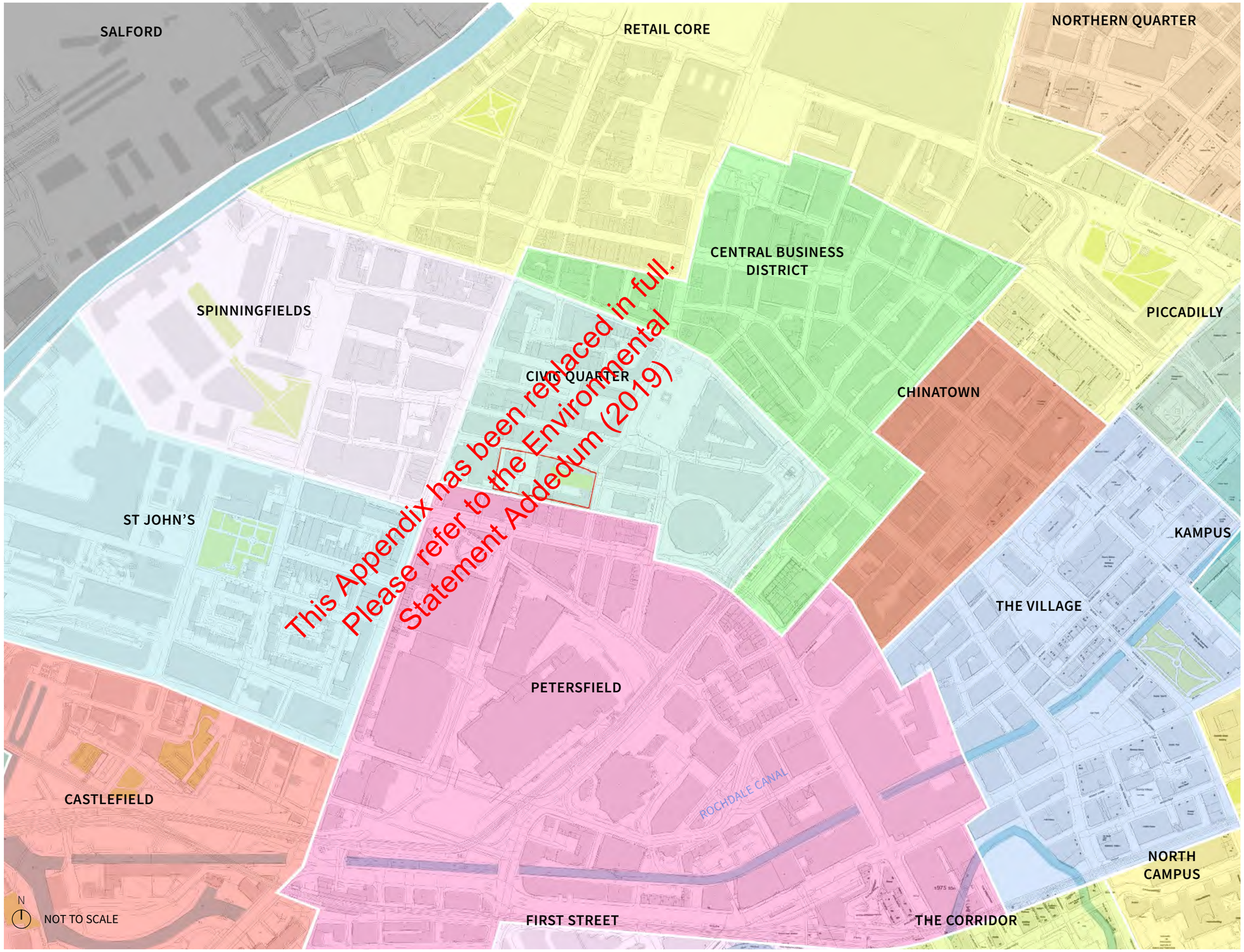


FIGURE 8.4 - TOWNSCAPE CHARACTER

N

NOT TO SCALE



FIGURE 8.5 - EXISTING URBAN GRAIN

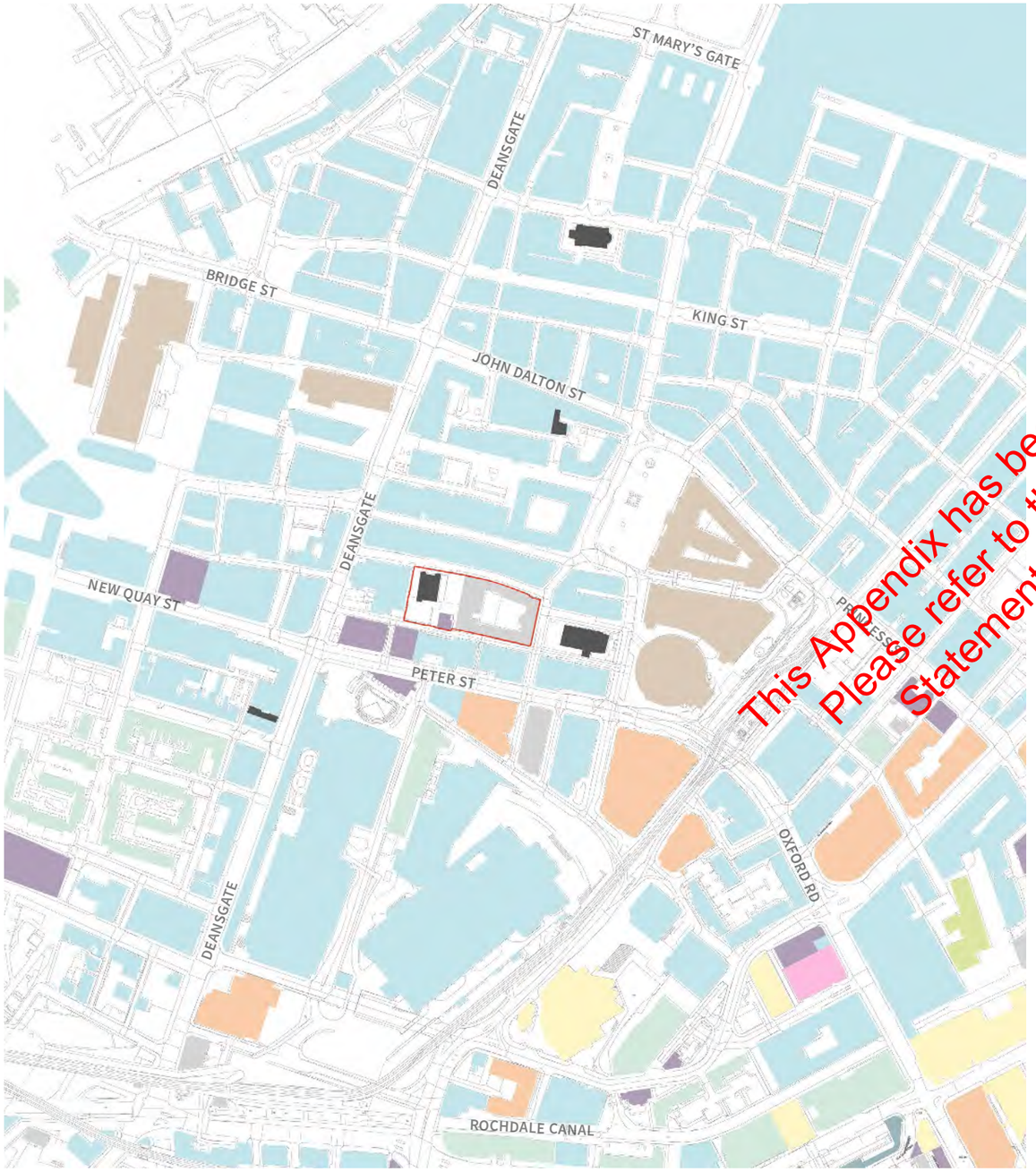


FIGURE 8.5B - PROPOSED URBAN GRAIN

This Appendix has been replaced in full,
Please refer to the Environmental
Statement Addendum (2019)

KEY

- Commercial/Retail
- Residential
- Leisure
- Higher Education
- Entertainment
- Hotel
- Religious
- Primary School
- Community
- Multi-Storey Car Park
- Unknown/Derelict / Under Construction/ Vacant



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

FIGURE 8.6 - EXISTING LAND USE

KEY

- L1-5 Level 1-5 Uses: Synagogue/ Spa & Gym/ Conference & Ballroom
- B-G Basement Uses: Retail/ Ground Floor Uses: Retail
- Hotel
- Commercial/ Retail
- T-B Tower Block Uses: Hotel/ Residential
- Entertainment

N

NOT TO SCALE

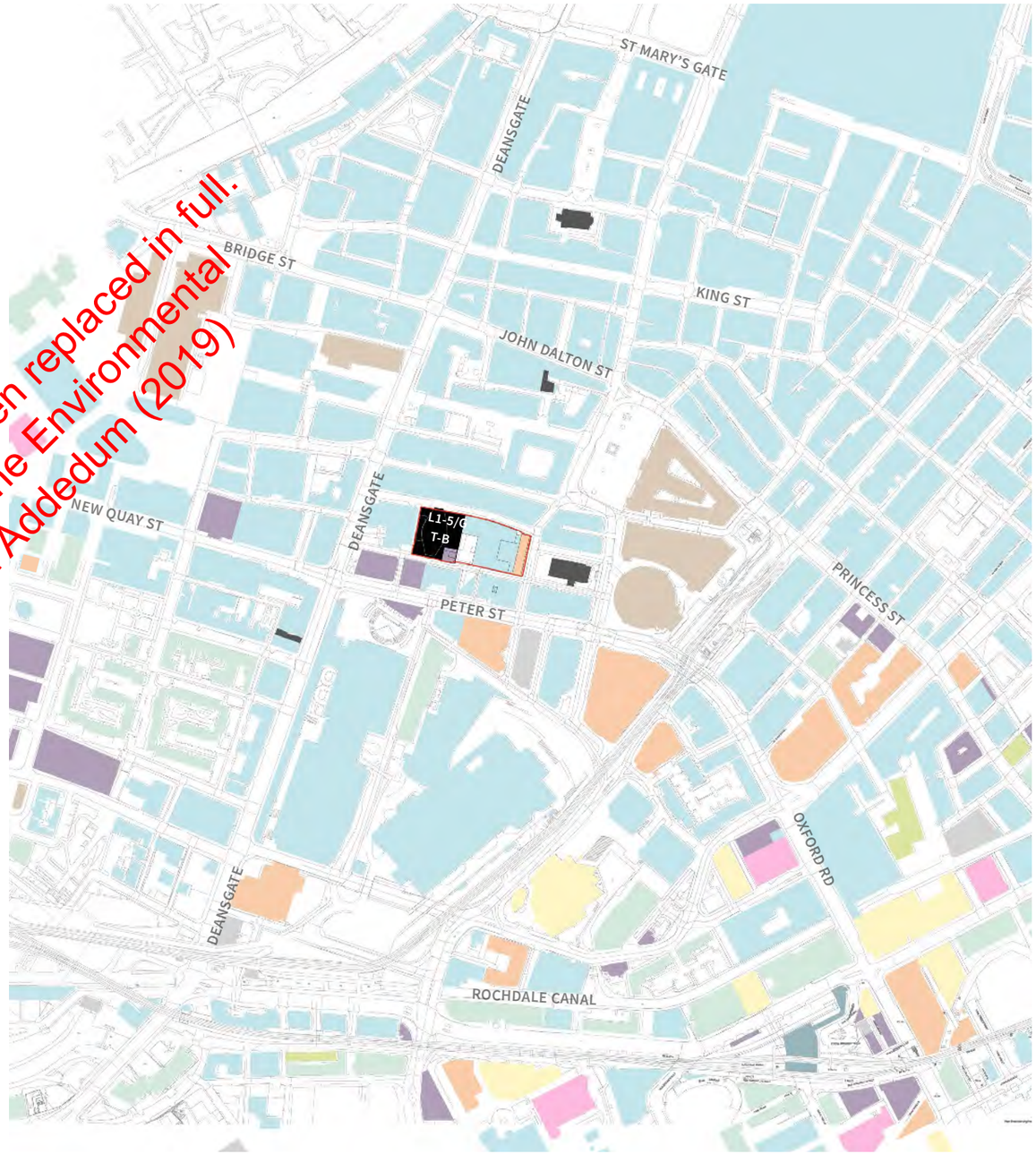


FIGURE 8.6B - PROPOSED LAND USES

KEY

- 1-3 Storeys
- 4-6 Storeys
- 7-10 Storeys
- 11-13 Storeys
- 14-16 Storeys
- 17-20 Storeys
- 21-30 Storeys
- 30+ Storeys

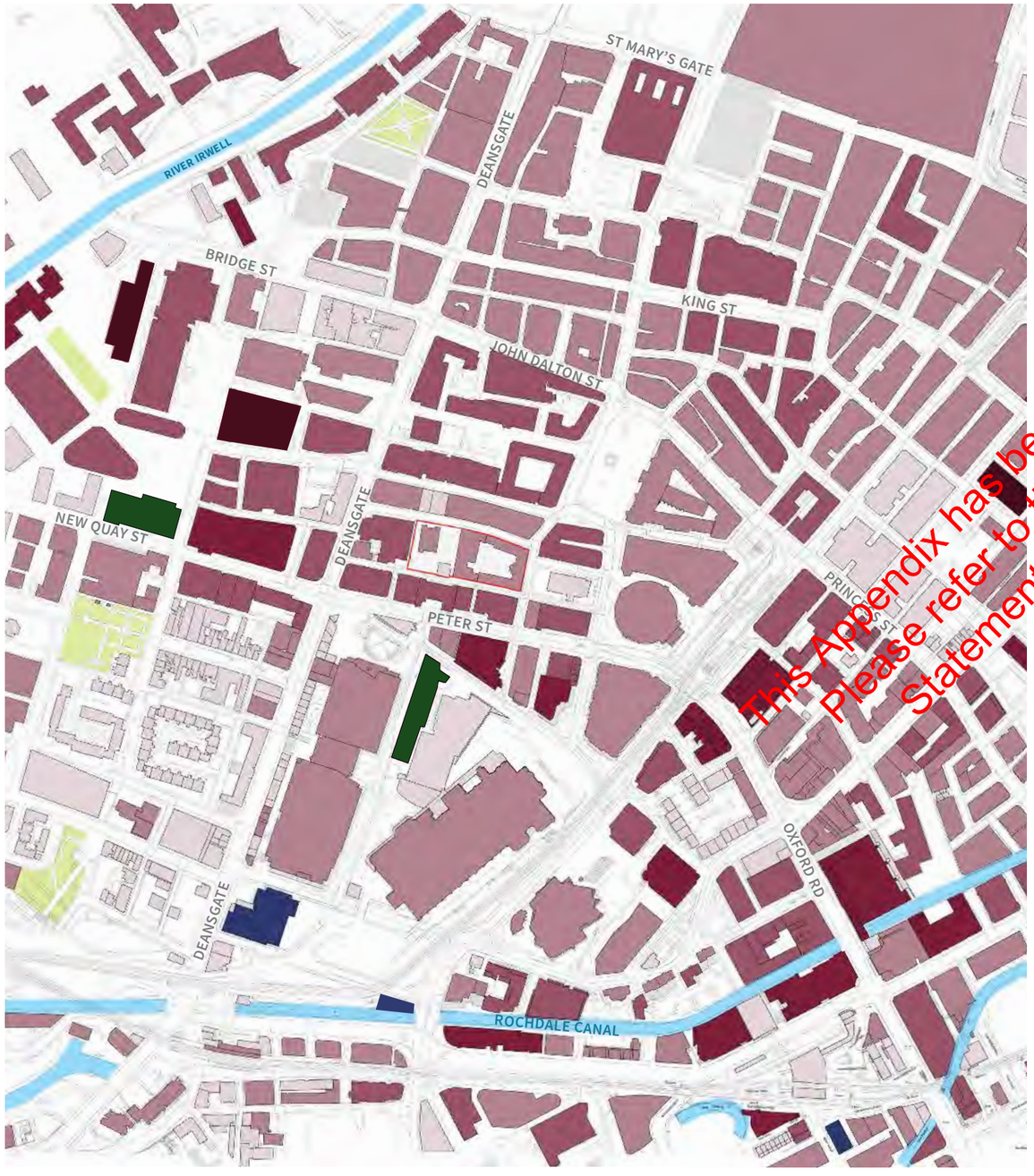


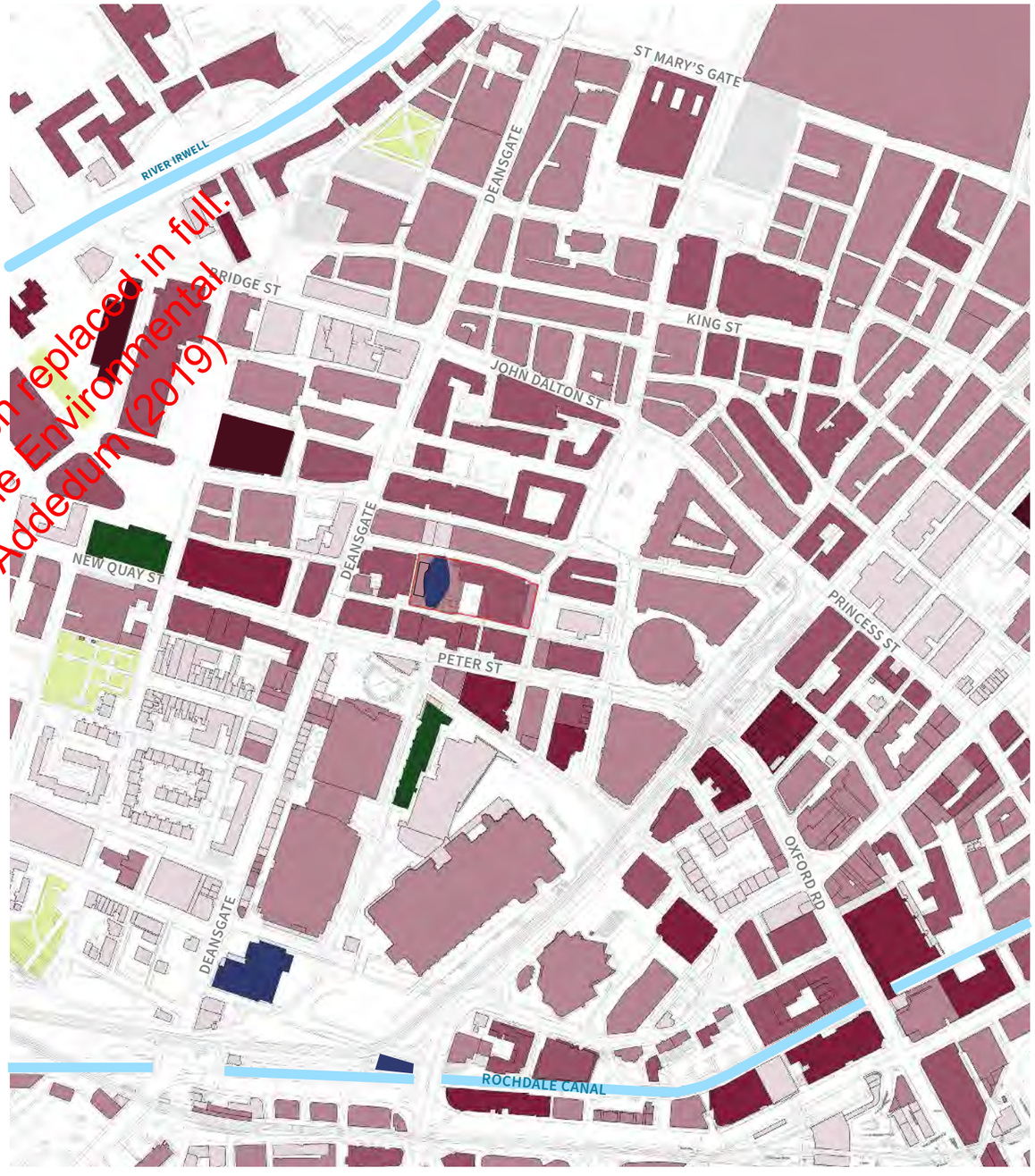
FIGURE 8.7 - EXISTING BUILDING HEIGHTS

KEY

- 1-3 Storeys
- 4-6 Storeys
- 7-10 Storeys
- 11-13 Storeys
- 14-16 Storeys
- 17-20 Storeys
- 21-30 Storeys
- 30+ Storeys

N

NOT TO SCALE



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

FIGURE 8.7B - PROPOSED BUILDING HEIGHTS



FIGURE 8.8 - EXISTING TOPOGRAPHY & FLOOD RISK

KEY

- Primary route
- Secondary route
- Bus stop
- Railway
- Railway station
- Metrolink route
- Metrolink station
- National Cycle Route 6
- Local Cycle Route
- Pedestrian Links

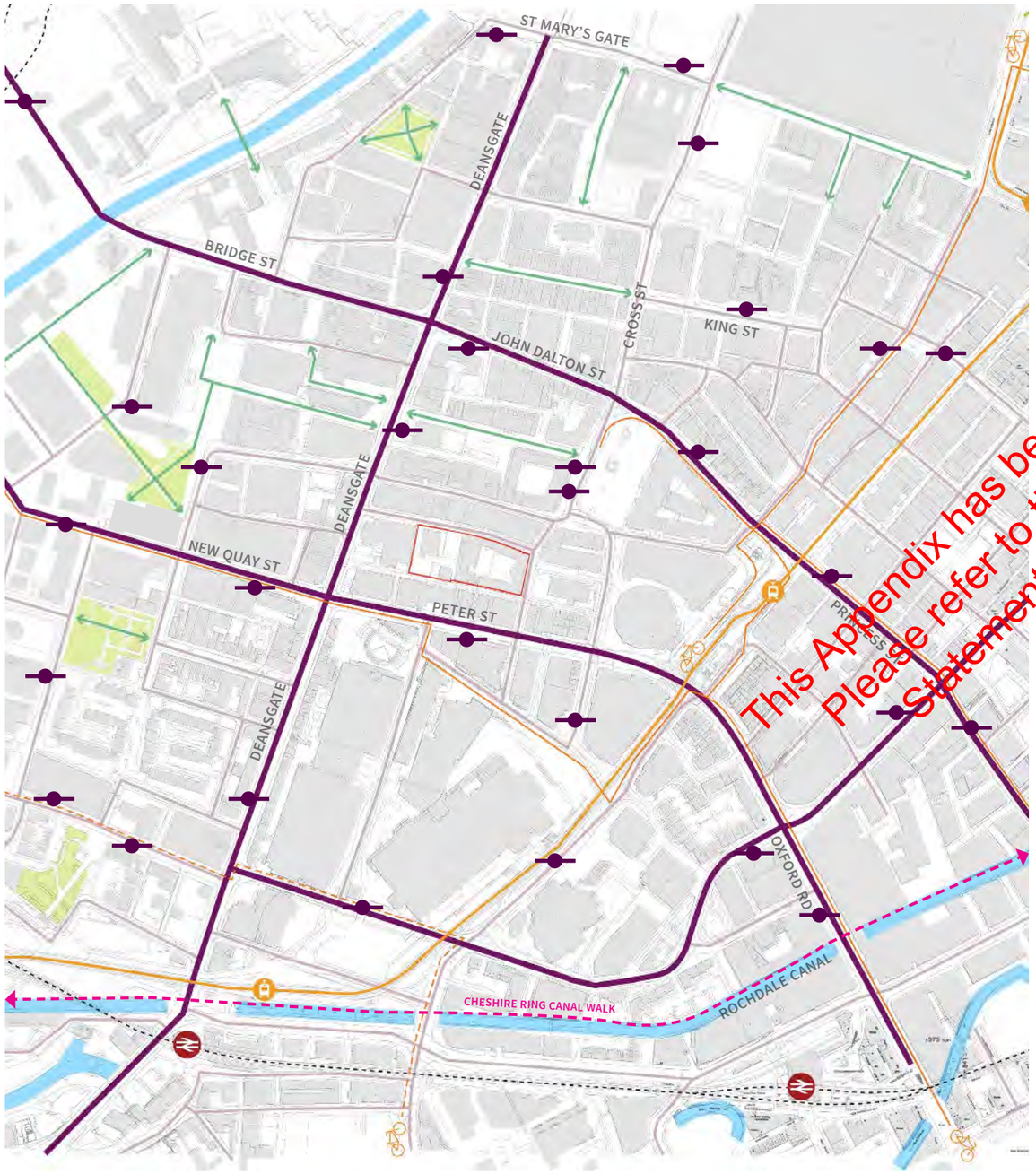
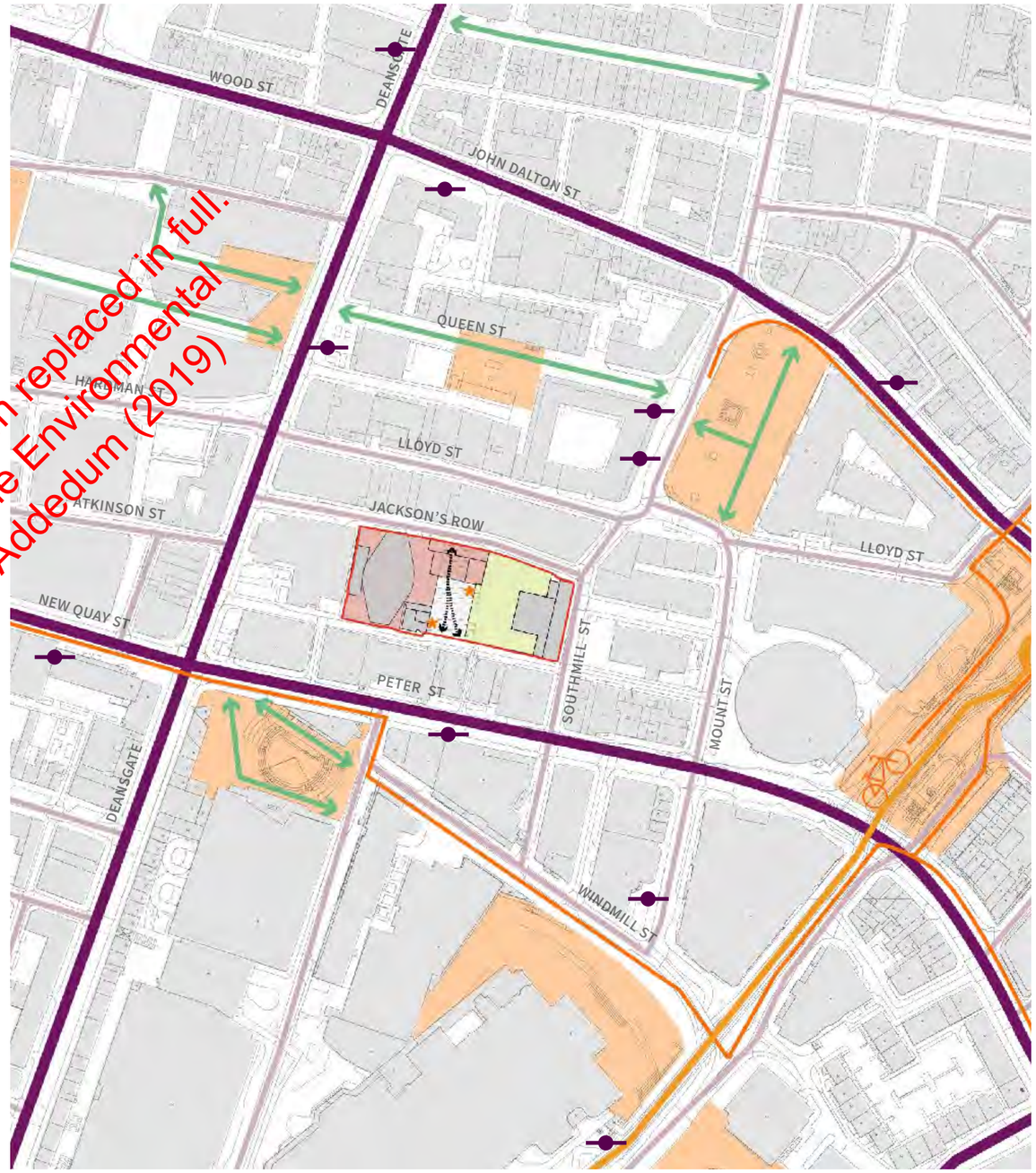


FIGURE 8.9 - EXISTING MOVEMENT & LINKAGES

KEY

- Primary route
- Secondary route
- Existing Public Space
- Existing Pedestrian Links
- Local Cycle Route
- Proposed Pedestrian Linkages
- Proposed Semi-Private Space
- Proposed Focal Points
- Proposed Managed Rooftop Garden

N
NOT TO SCALE



This Appendix has been replaced in full.
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Statement Addedum (2019)

FIGURE 8.9B - PROPOSED MOVEMENT & LINKAGES

KEY

- Parks and gardens
- Public squares

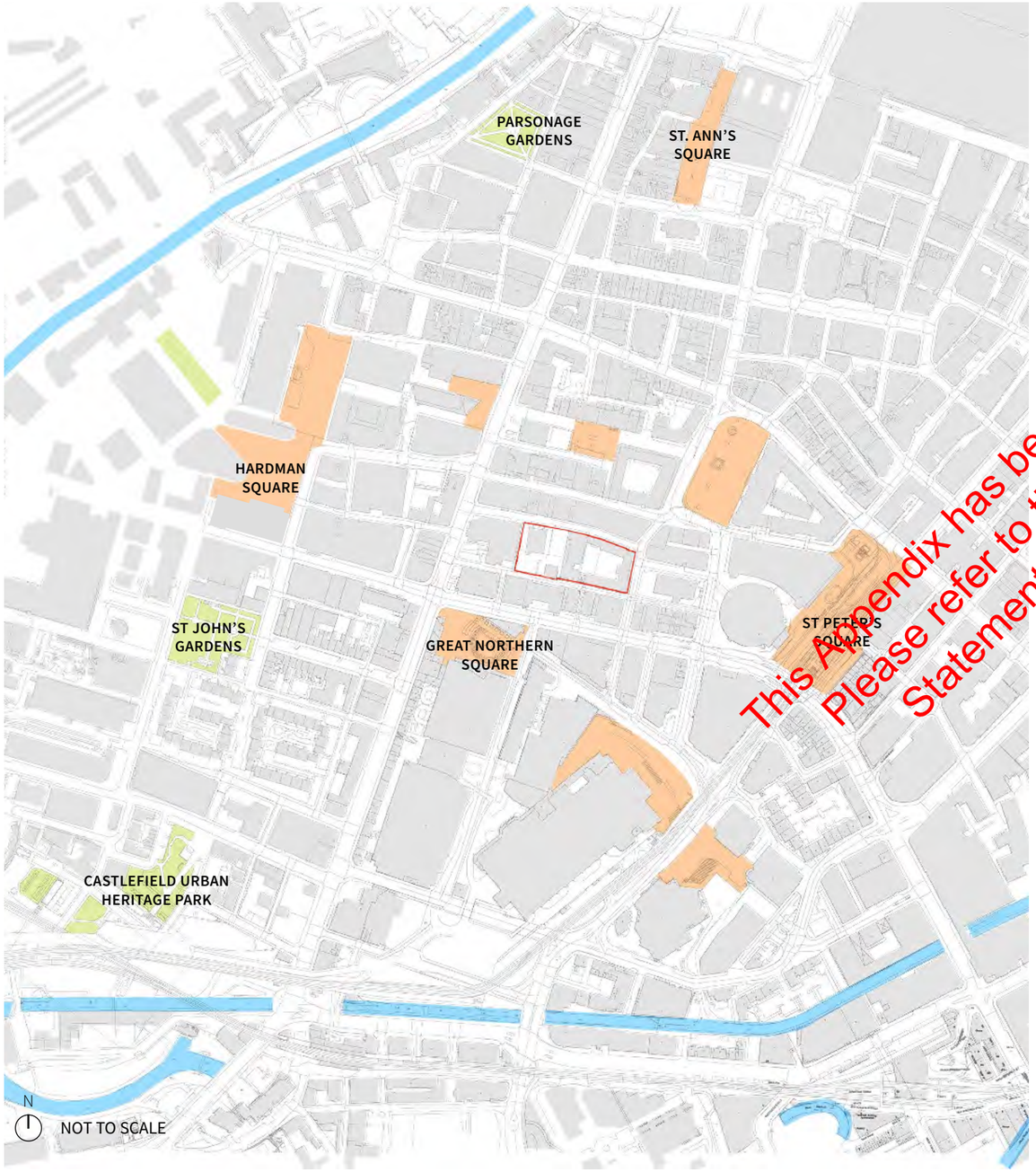
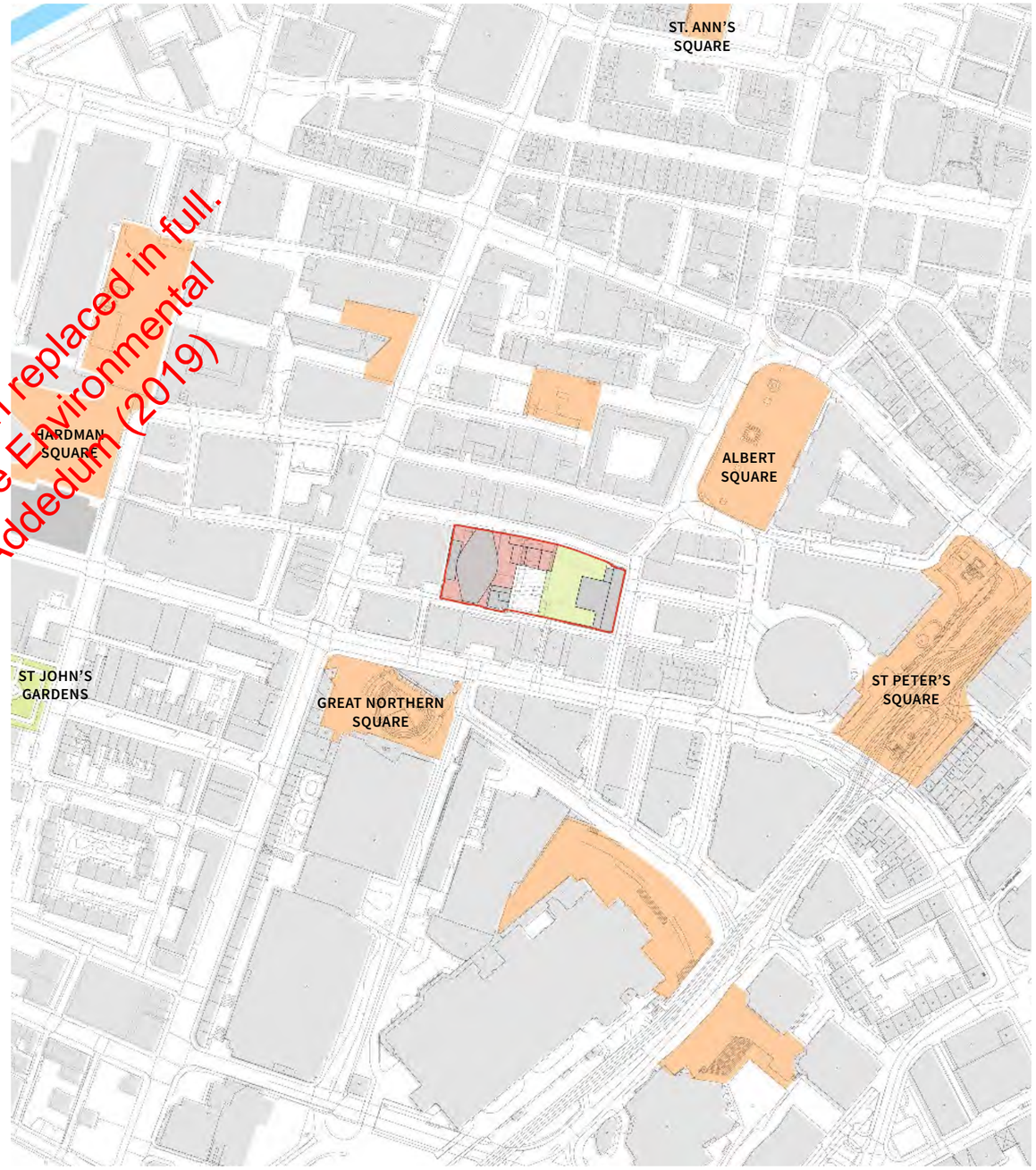


FIGURE 8.10 - EXISTING PUBLIC OPEN SPACE

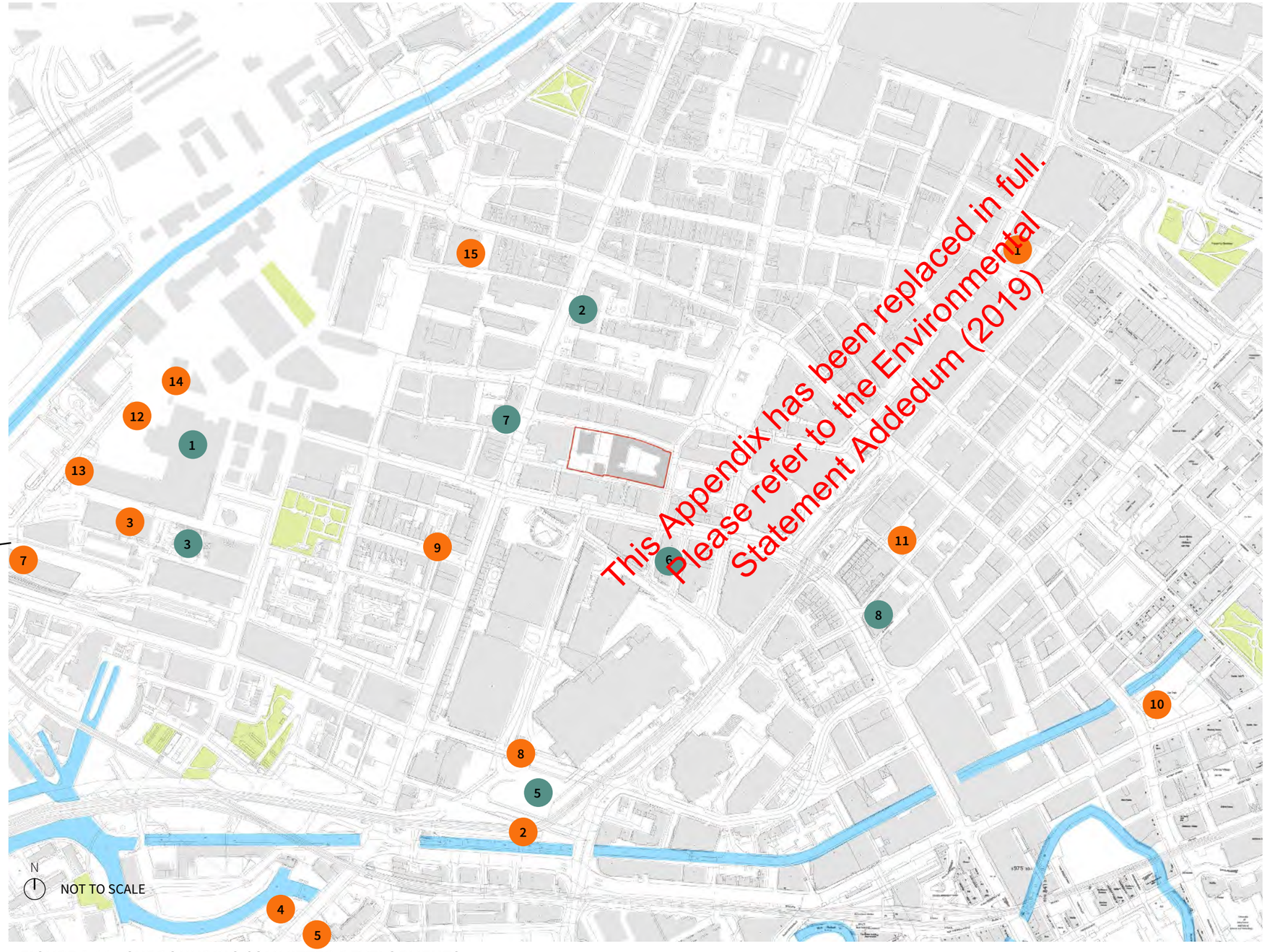
KEY

- Existing Parks and gardens
- Existing Public squares
- Proposed Managed Rooftop Garden
- Semi-private Roof Space
- Proposed Public Square (Ground Level)



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addeddum (2019)

FIGURE 8.10B - PROPOSED PUBLIC OPEN SPACE



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

KEY

Committed Developments

1. 11 York Street, M2 2AW
   Ref: 109161/FO/2015/C1
2. 10-12 Whitworth St, M1 5WY
   Ref: 111003/FO/2015/C1
3. Bonded Warehouse, Grape St
   Ref: 109241/FO/2015/C1
4. 2-4 Chester Road, M15 4QG
   Ref: 113870/FO/2016
5. Deansgate South, Land at Chester Road
   Ref: 110730/FO/2015/C1
6. Kampus
   Ref: 112034/FO/2016/C2
7. Water Street
   Ref: 115107/FO/2017
8. Manchester Central (Former Bauer Millet Site)
   Ref: 115871/FO/2017
9. 3 St. John Street
   Ref: 115233/FO/2017
10. Princess St./ Whitworth St.
    Ref: 114585/FO/2017
11. 3 St. Peters Square
    Ref: 115294/FO/2017
12. St. Johns Living
    Ref: 114385
13. Factory
    Ref: 114294
14. St. Johns Place
    Ref: 109660
15. 44-48 Bridge Street
    Ref: 115200

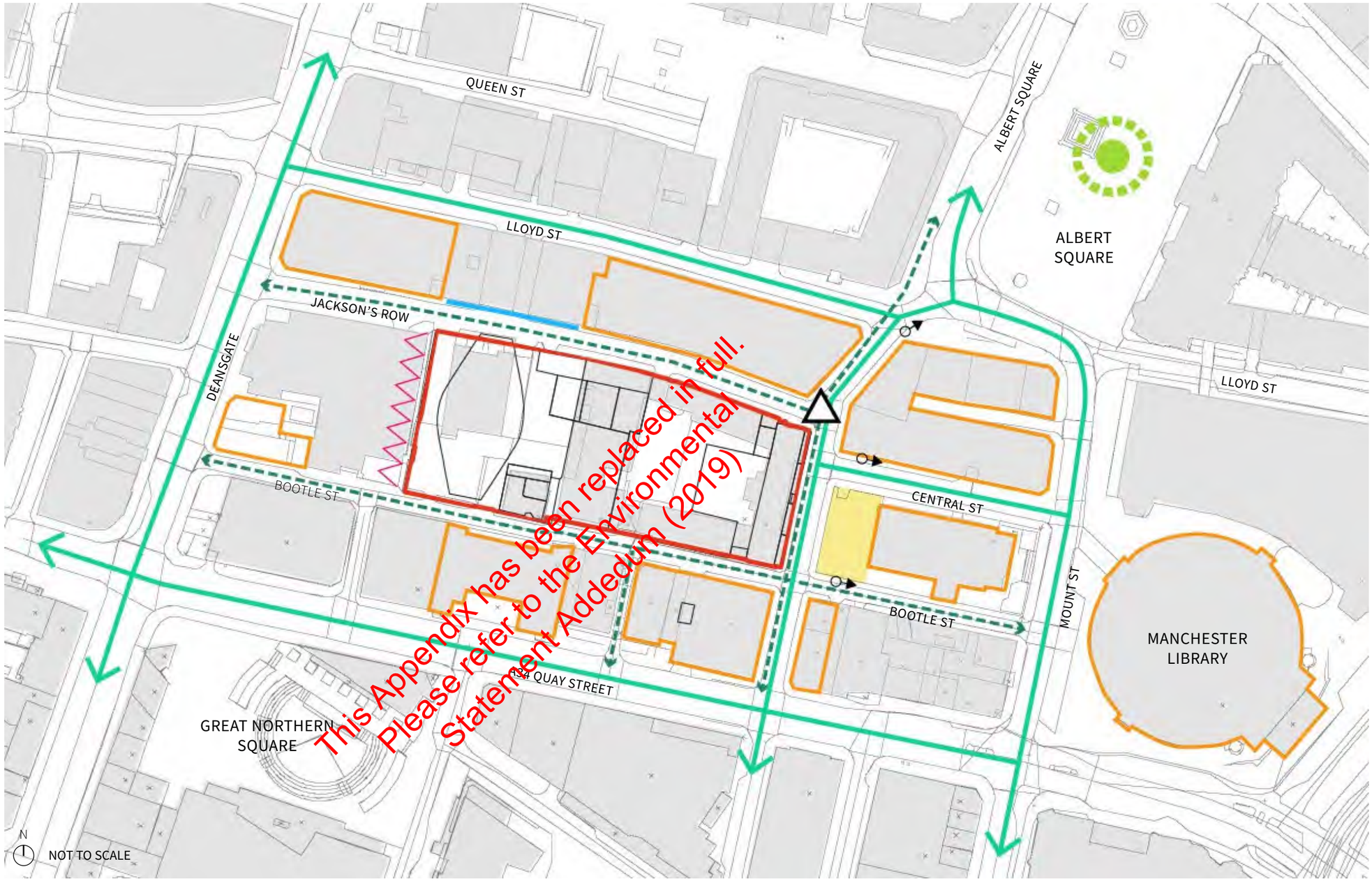
Future Baseline

1. Granada House, Atherton St
   Ref: 109246/FO/2015/C1
2. 125 Deansgate, M3 2BY
   Ref: 110078/F0/2015/C1
3. Former Granada Studio Space
   Ref: 109466/FO/2015/C1
4. Owen St
   Ref: 111719/FO/2016/C1
5. Axis
   Ref: 106490/FO/2014/C1
6. London Scottish House, 24 Mount Street
   Ref: 112455/FO/2016
7. Invicta House
   Ref: 116164/FO/2017
8. Landmark
   Ref: 102859/FO/2013/C2

FIGURE 8.11 - SURROUNDING COMMITTED DEVELOPMENTS

KEY

- Key pedestrian flow
- Key vehicular movement
- Proposed development footprint
- Poorly defined gateway
- Views
- Surface car parking
- Lack of permeability
- Active frontage
- Key listed building
- Local focal point

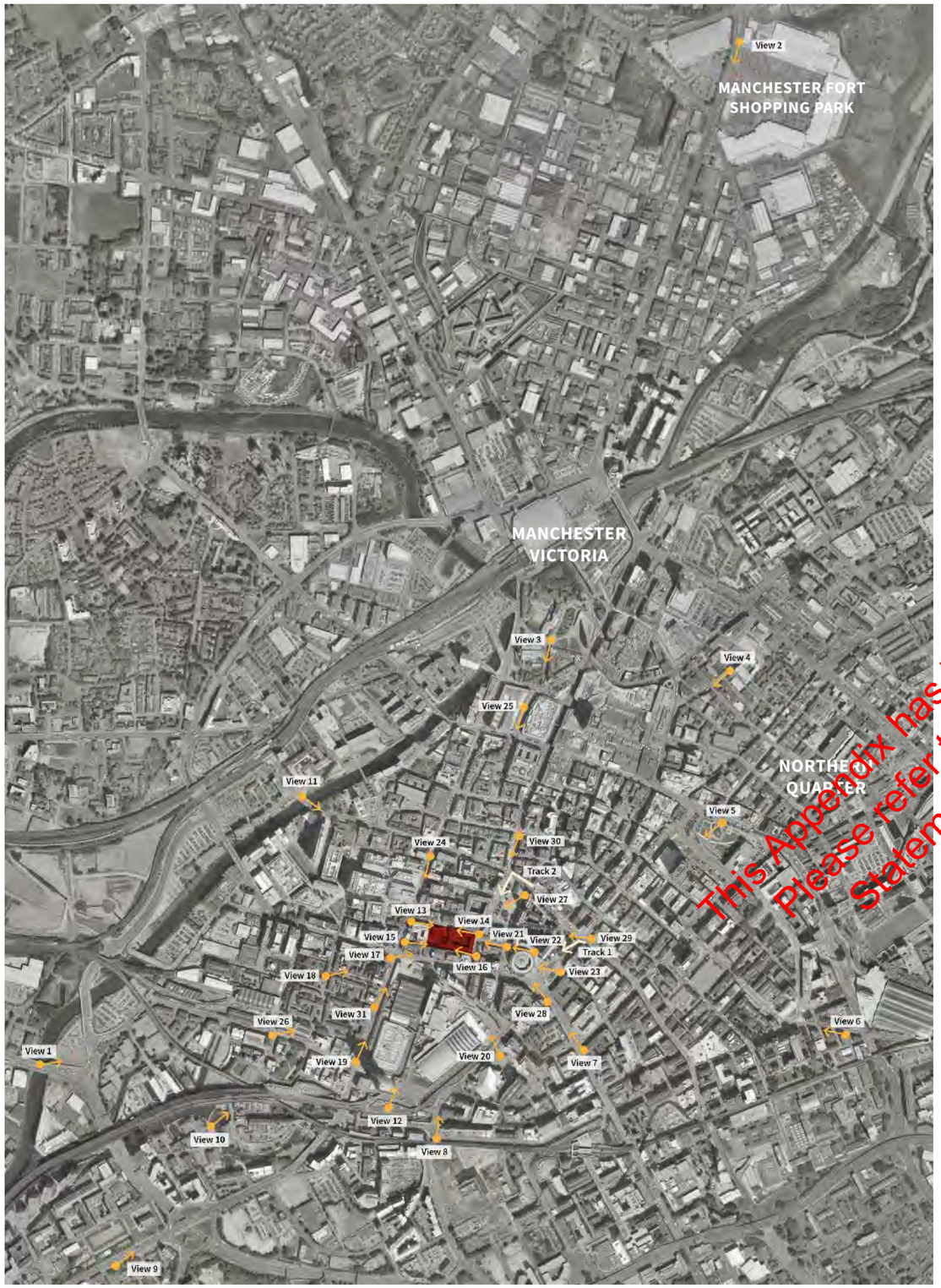


This Appendix has been replaced in full.
Please refer to the Environmental Statement Addedum (2019)

FIGURE 8.12 - SITE CHARACTER



FIGURE 8.13 - VIEWPOINTS



KEY

- Extent of Proposed Site
- Static Viewpoint
- Kinetic Viewpoint

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

FIGURE 8.14 - LONG DISTANCE VIEWPOINT

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

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Appendix 8.5

VIEWS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as 'the Applicant') is seeking to construct a major development proposal known as St Michael's, Jackson's Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an 'Addendum' to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid, except for views 13, 14, 15, 16, 21 and 27 which have been revised to reflect the development as now proposed (the Approved Scheme with the Proposed Amendments). Only these views have been selected to be updated as they have been considered the only views with the potential to result in further significant effects.

REFERENCE
PL1556.1

PROJECT
ST. MICHAELS

DOCUMENT
APPENDIX 8.5 - ST MICHAELS VERIFIED VIEWPOINTS

STATUS
PLANNING

DATE
22.11.17

DOCUMENT CONTROL

FILE NAME

PL1556.1-ID-002-07-VIEWS REVISED

PREPARED BY **CH**	
CHECKED BY **PS**	



KEY

- Extent of Proposed Site
- Static Viewpoint
- Kinetic Viewpoint

N

NOT TO SCALE

VIEWPOINTS (VIEWPOINT 1, 3-31)



KEY

- Extent of Proposed Site
- Static Viewpoint
- Kinetic Viewpoint

N

NOT TO SCALE

LONG DISTANCE VIEWPOINT (VIEWPOINT 2)

VIEWPOINT LOCATIONS

Viewpoint 1: View from Regent Road Bridge looking north-east

Viewpoint 2: View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre

Viewpoint 3: View from Cathedral Gardens looking south

Viewpoint 4: View facing south-west from the corner of High Street and Copperas Street

Viewpoint 5: View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street

Viewpoint 6: View facing along Fairfield Street from the corner of South Pump Street

Viewpoint 7: View facing north-west from the corner of Oxford Street and Whitworth Street

Viewpoint 8: View facing north across Whitworth Street from the arches of First Street

Viewpoint 9: View facing north-east along Chester Road from the corner of Angela Street

Viewpoint 10: View facing north-east from Bridgewater Canal Tow Path

Viewpoint 11: View facing south-east from the bridge along Bridge Street

Viewpoint 12: View facing north from the platform of Deansgate/ Castlefield Tram Stop

Viewpoint 13: View east along Jackson's Row from its junction with Deansgate

Viewpoint 14: View west along Jackson's Row from its junction with Southmill Street

Viewpoint 15: View east along Bootle Street from its junction with Deansgate

Viewpoint 16: View west along Bootle Street from its junction with Southmill Street

Viewpoint 17: View north-east from the corner of Deansgate and Quay Street

Viewpoint 18: View north-east from Byrom Street

Viewpoint 19: View facing north along Deansgate from the corner of Tonman Street

Viewpoint 20: View north-west across Lower Mosley Street from the centre of Barbirolli Square

Viewpoint 21: View facing west along Central Street from the entrance to Library Walk

Viewpoint 22: View west from the centre of Library Walk

Viewpoint 23: View west across St. Peters Square from northern corner of 1 St. Peter's Square

Viewpoint 24: View south-west along Deansgate from the junction with Wood Street

Viewpoint 25: View south from the centre of New Cathedral Street

Viewpoint 26: View north-east from the junction of Liverpool Road and Stone Street

Viewpoint 27: View facing south-west across Albert Square

Viewpoint 28: View facing north-west from corner of Oxford Street and Lower Mosley Street

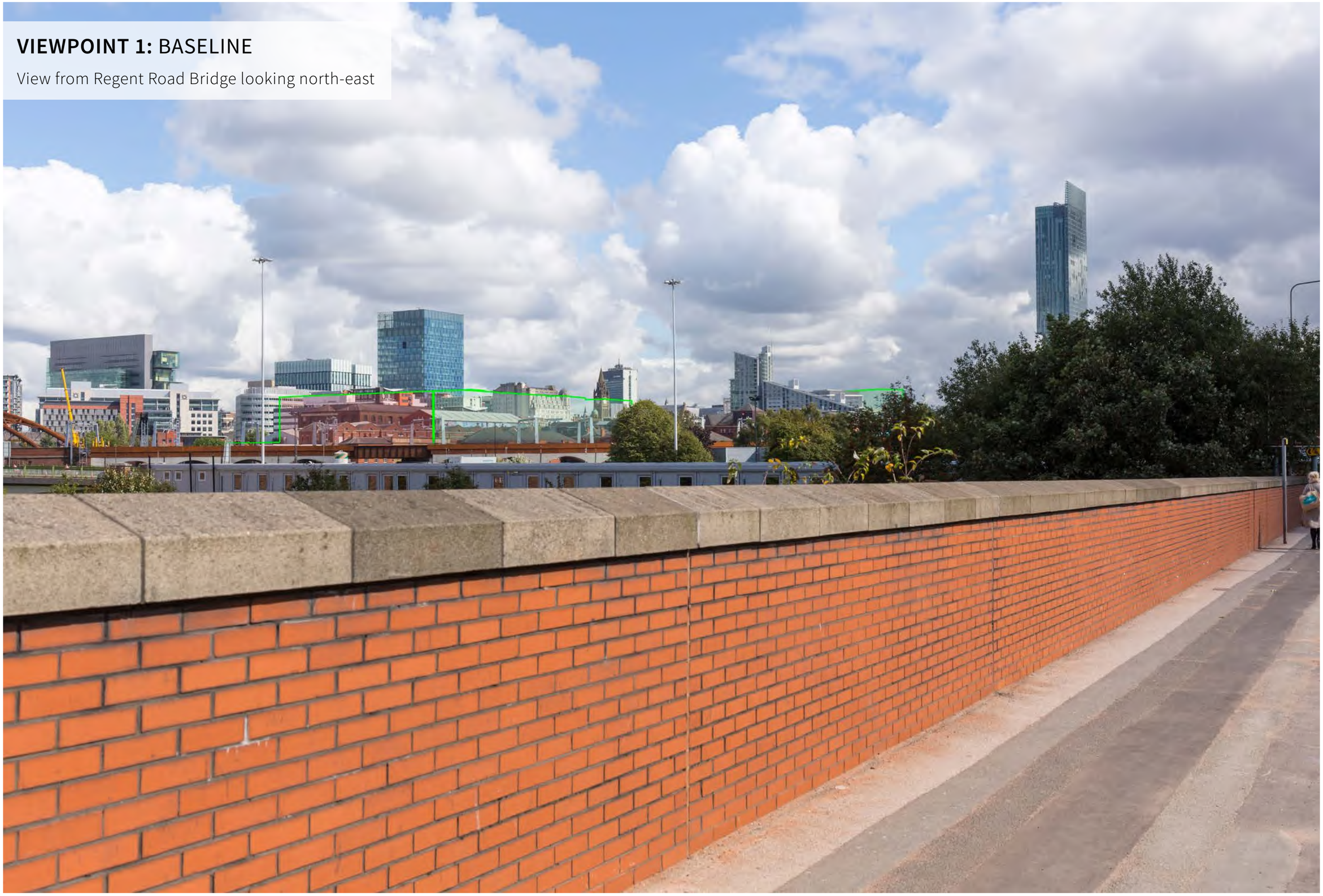
Viewpoint 29: View facing north-west along Princess Street from the corner with Lower Mosley Street

Viewpoint 30: View facing south along Cross Street opposite the junction with south King Street

Viewpoint 31: View facing north along Deansgate from the corner with Camp Street

VIEWPOINT 1: BASELINE

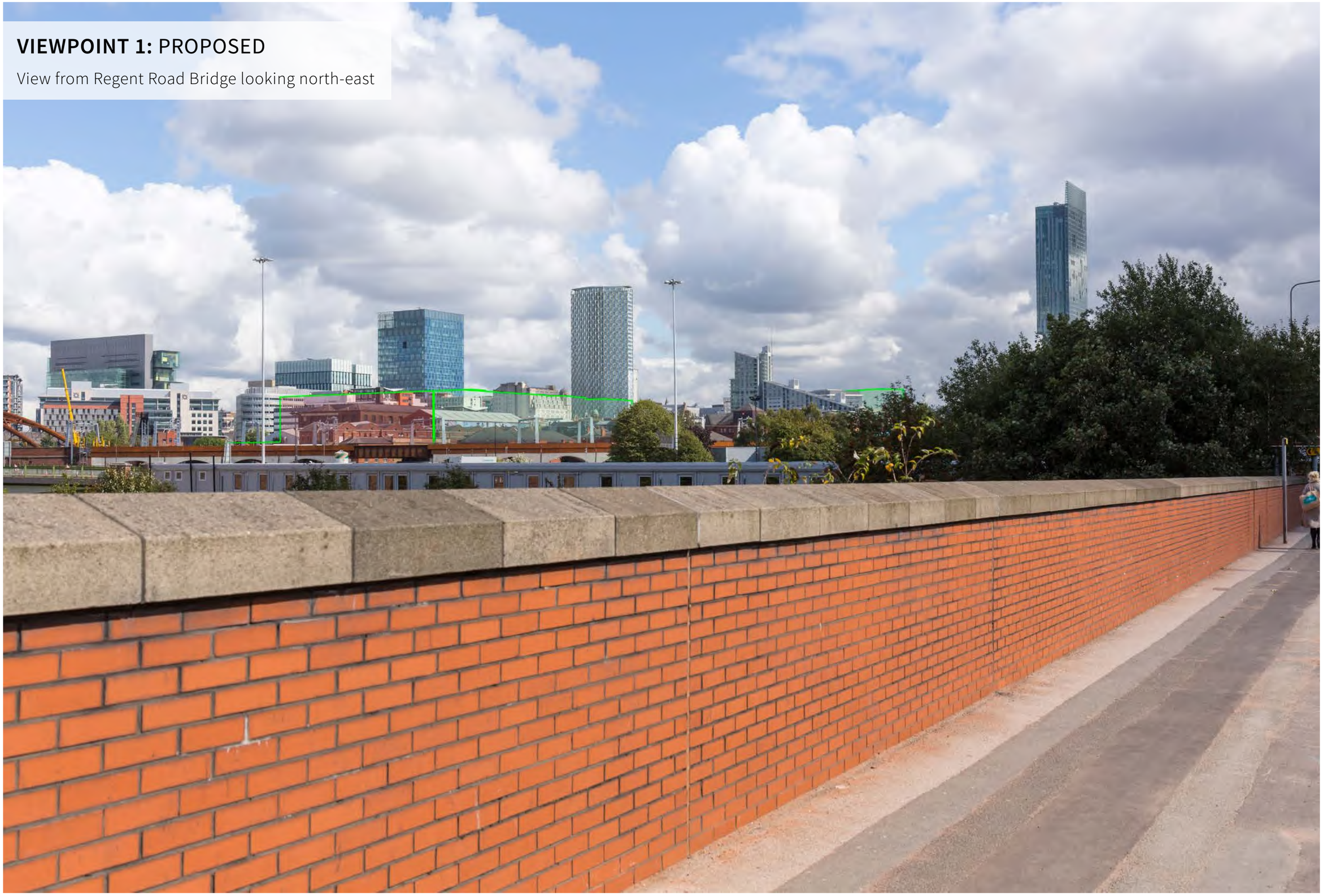
View from Regent Road Bridge looking north-east



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 1: PROPOSED

View from Regent Road Bridge looking north-east



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 1: PROPOSED + CUMULATIVE

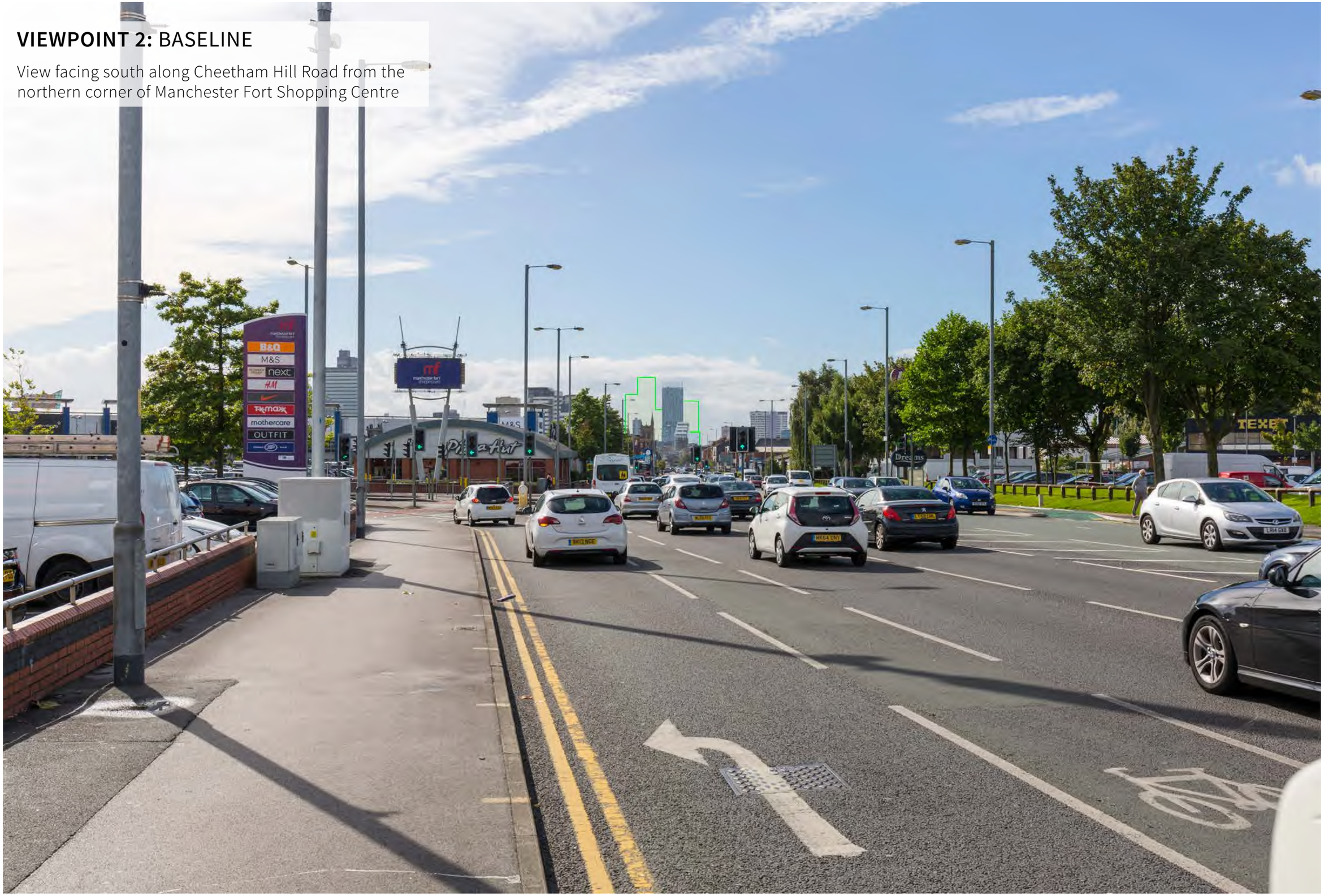
View from Regent Road Bridge looking north-east



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 2: BASELINE

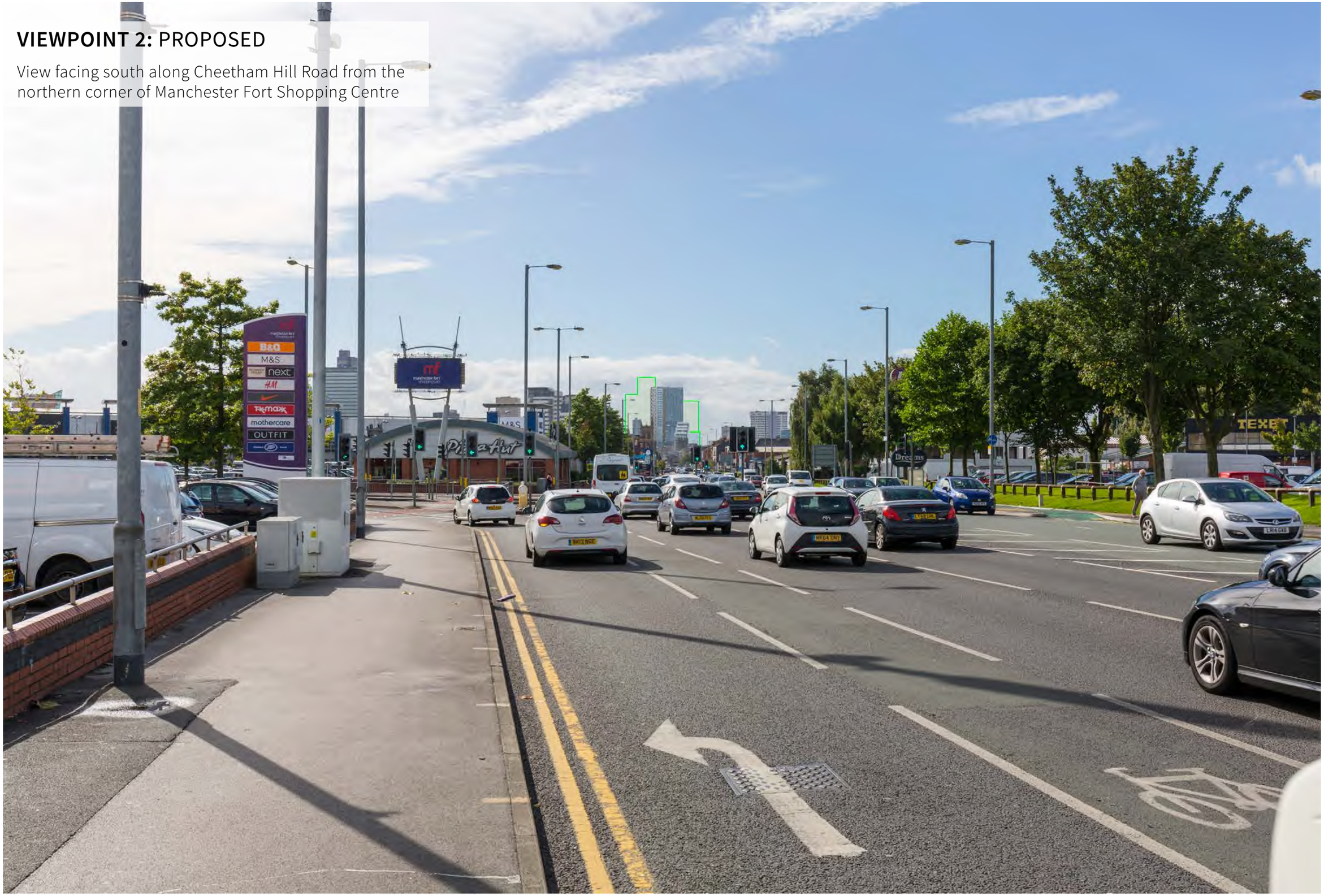
View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 2: PROPOSED

View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 2: PROPOSED + CUMULATIVE

View facing south along Cheetham Hill Road from the northern corner of Manchester Fort Shopping Centre



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 3: BASELINE

View from Cathedral Gardens looking south



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 3: PROPOSED

View from Cathedral Gardens looking south

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 3: PROPOSED + CUMULATIVE

View from Cathedral Gardens looking south

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 4: BASELINE

View facing south-west from the corner of High Street and Copperas Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 4: PROPOSED

View facing south-west from the corner of High Street and Copperas Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 4: PROPOSED + CUMULATIVE

View facing south-west from the corner of High Street and Copperas Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 5: BASELINE

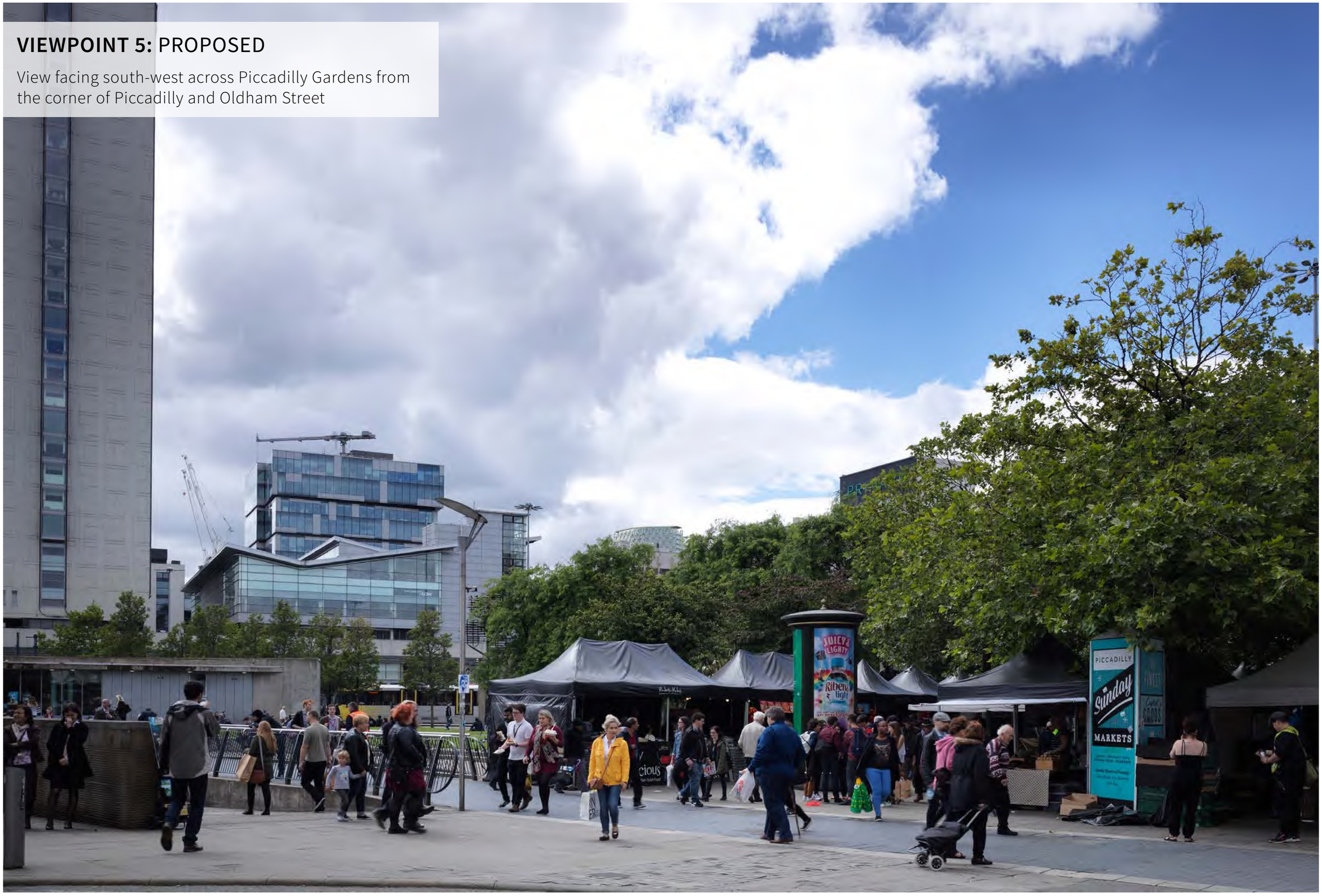
View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 5: PROPOSED

View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street



This image dates from the 2017 assessment and had not been updated.

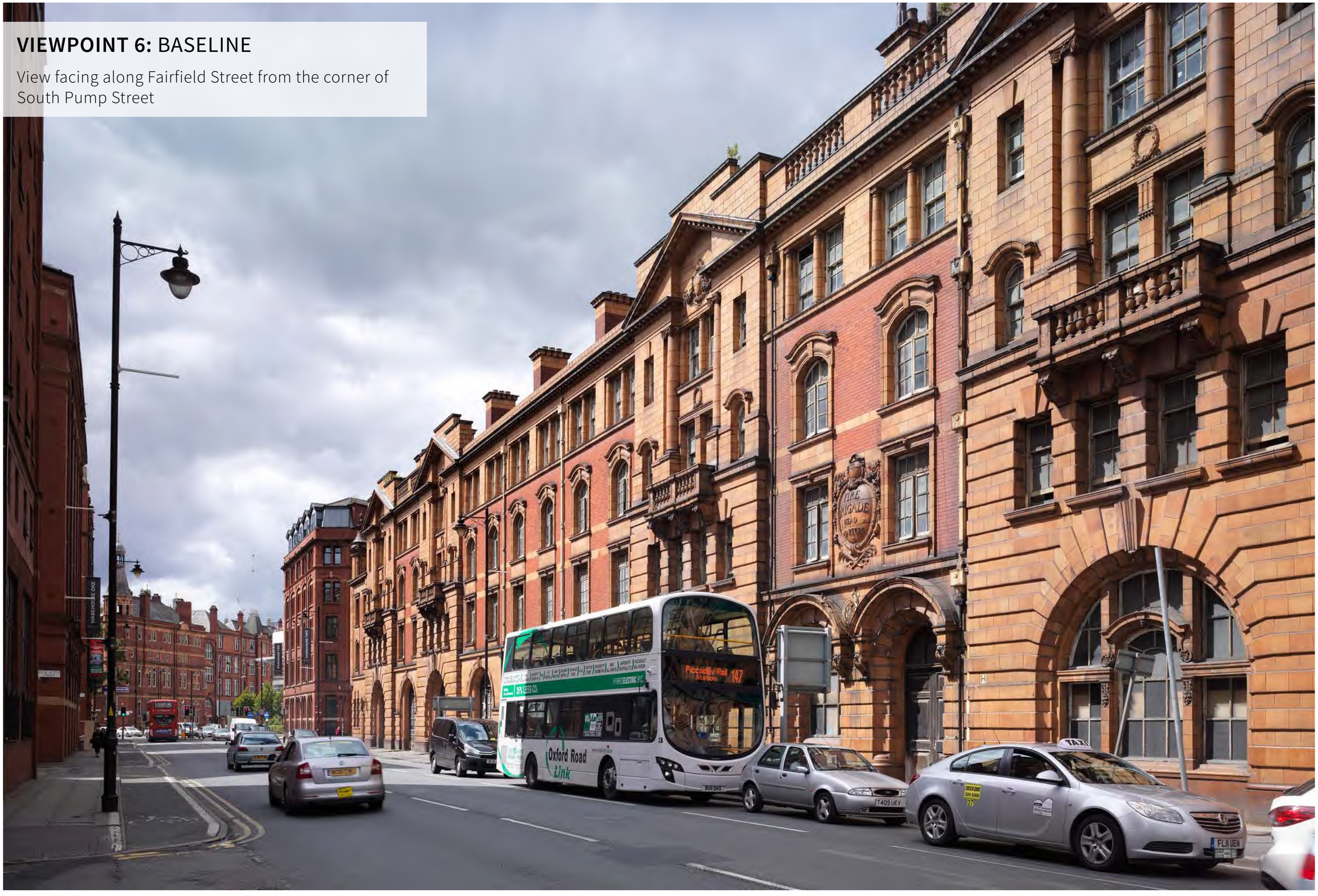
VIEWPOINT 5: PROPOSED + CUMULATIVE

View facing south-west across Piccadilly Gardens from the corner of Piccadilly and Oldham Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 6: BASELINE

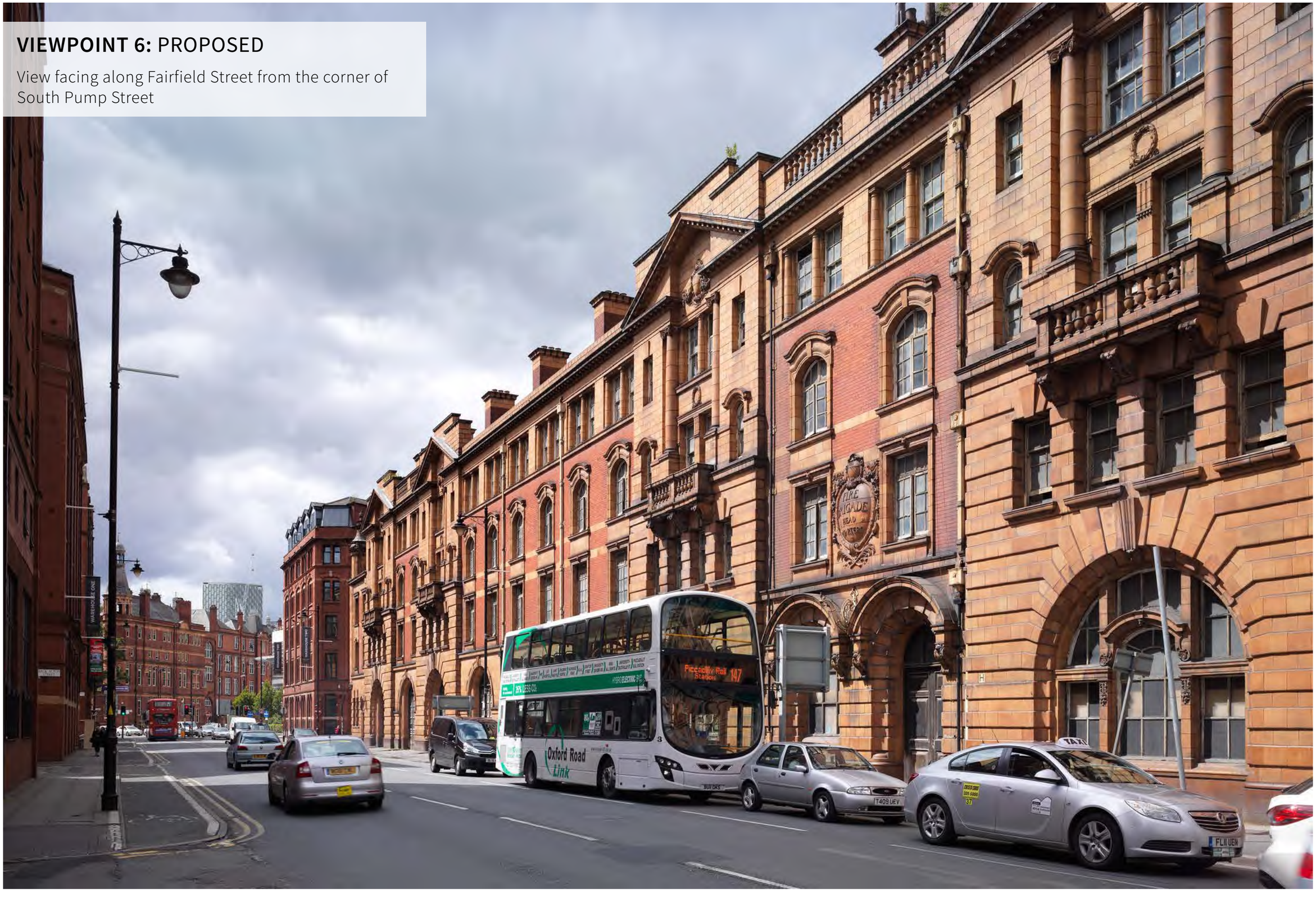
View facing along Fairfield Street from the corner of South Pump Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 6: PROPOSED

View facing along Fairfield Street from the corner of South Pump Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 6: PROPOSED + CUMULATIVE

View facing along Fairfield Street from the corner of South Pump Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 7: BASELINE

View facing north-west from the corner of Oxford Street and Whitworth Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 7: PROPOSED

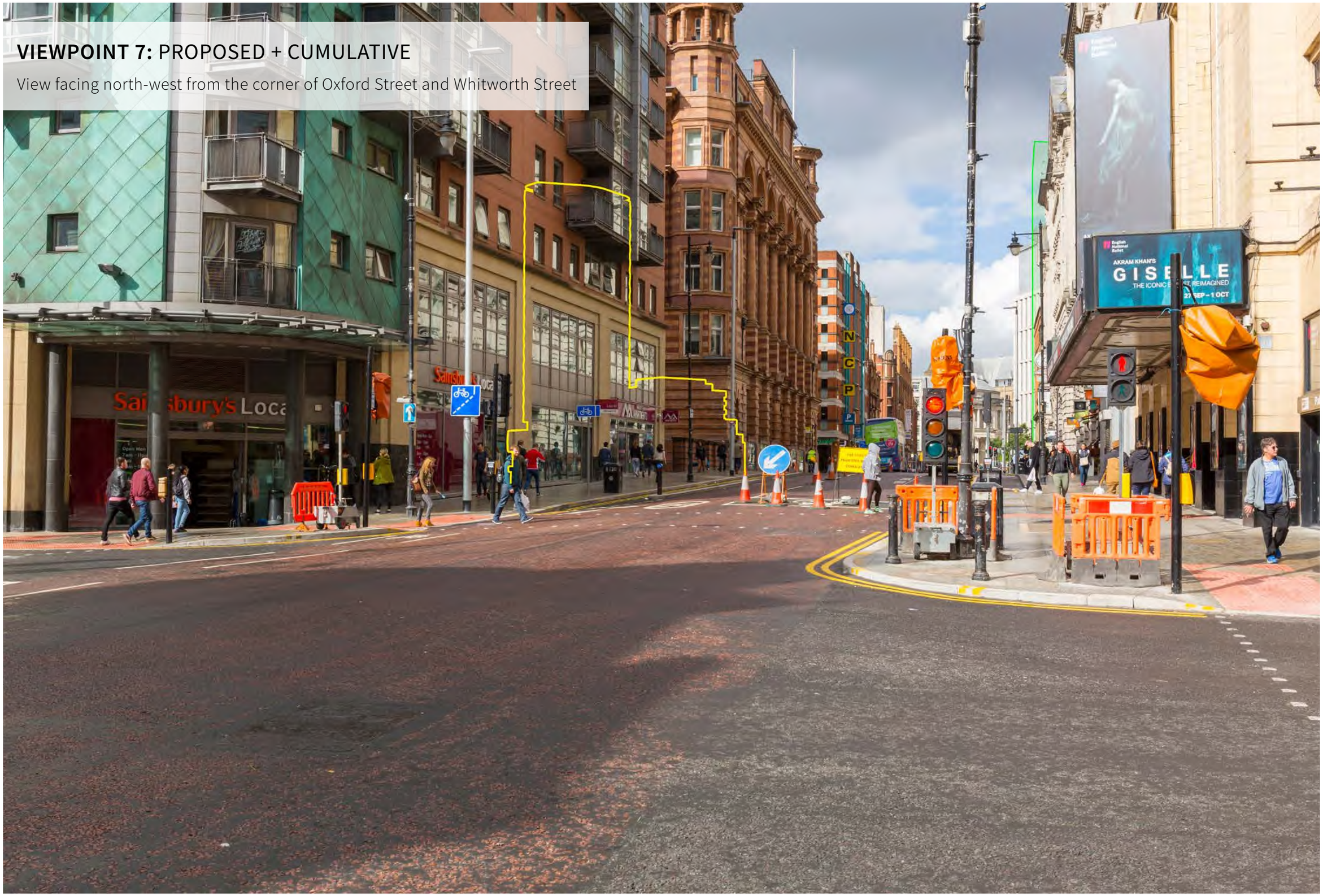
View facing north-west from the corner of Oxford Street and Whitworth Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 7: PROPOSED + CUMULATIVE

View facing north-west from the corner of Oxford Street and Whitworth Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 8: BASELINE

View facing north across Whitworth Street from the arches of First Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 8: PROPOSED

View facing north across Whitworth Street from the arches of First Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 8: PROPOSED + CUMULATIVE

View facing north across Whitworth Street from the arches of First Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 9: BASELINE

View facing north-east along Chester Road from the corner of Angela Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 9: PROPOSED

View facing north-east along Chester Road from the corner of Angela Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 9: PROPOSED + CUMULATIVE

View facing north-east along Chester Road from the corner of Angela Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 10: BASELINE

View facing north-east from Bridgewater Canal Tow Path



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 10: PROPOSED

View facing north-east from Bridgewater Canal Tow Path



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 10: PROPOSED + CUMULATIVE

View facing north-east from Bridgewater Canal Tow Path



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 11: BASELINE

View facing south-east from the bridge along Bridge Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 11: PROPOSED

View facing south-east from the bridge along Bridge Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 11: PROPOSED + CUMULATIVE

View facing south-east from the bridge along Bridge Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 12: BASELINE

View facing north from the platform of Deansgate/ Castlefield Tram Stop



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 12: PROPOSED

View facing north from the platform of Deansgate/ Castlefield Tram Stop



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 12: PROPOSED + CUMULATIVE

View facing north from the platform of Deansgate/ Castlefield Tram Stop



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 13: BASELINE

View east along Jackson's Row from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 13: PROPOSED

View east along Jackson's Row from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 13: PROPOSED + CUMULATIVE

View east along Jackson's Row from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 14: BASELINE

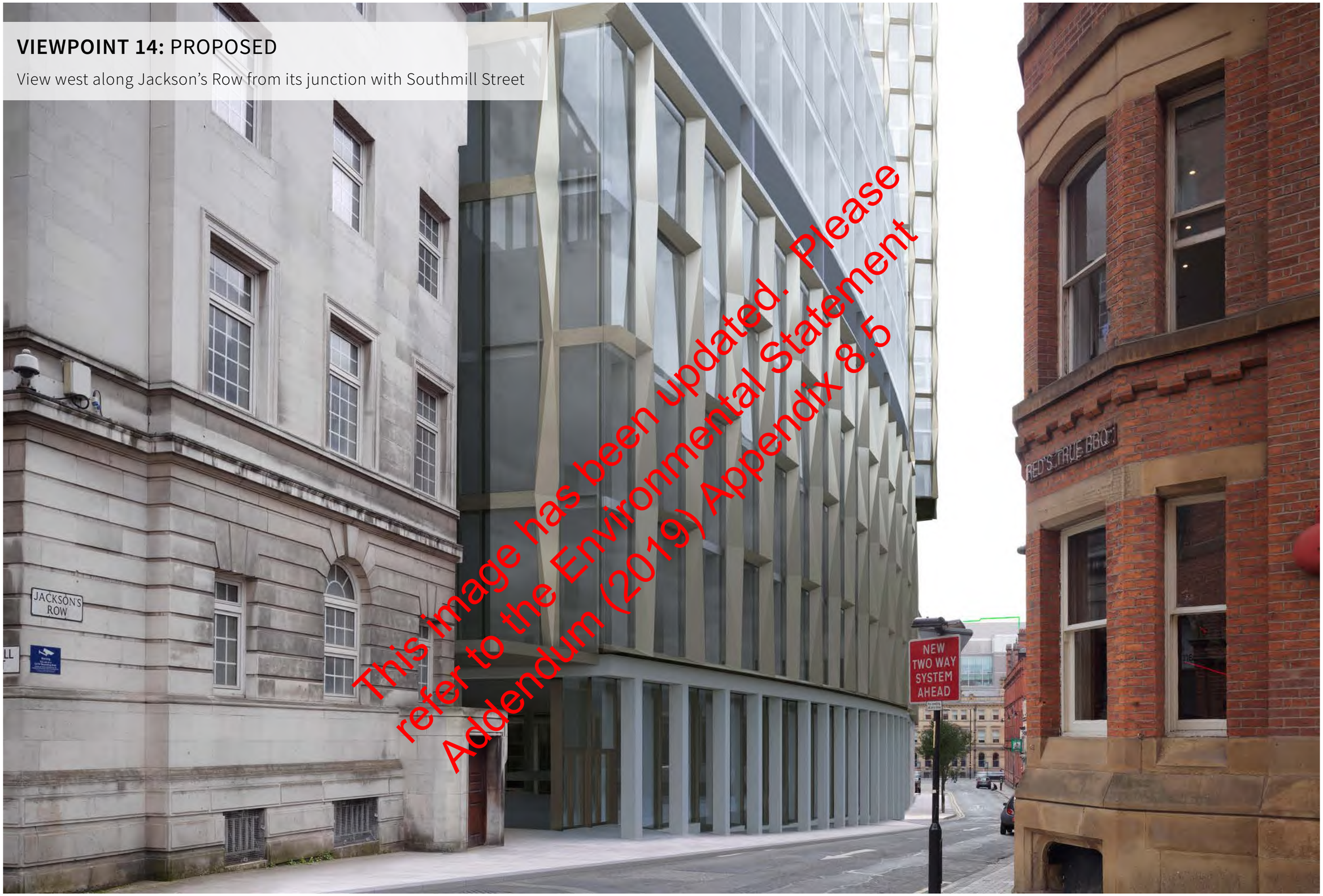
View west along Jackson's Row from its junction with Southmill Street



This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 14: PROPOSED

View west along Jackson's Row from its junction with Southmill Street



VIEWPOINT 14: PROPOSED + CUMULATIVE

View west along Jackson's Row from its junction with Southmill Street



VIEWPOINT 15: BASELINE

View east along Bootle Street from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 15: PROPOSED

View east along Bootle Street from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 15: PROPOSED + CUMULATIVE

View east along Bootle Street from its junction with Deansgate

This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

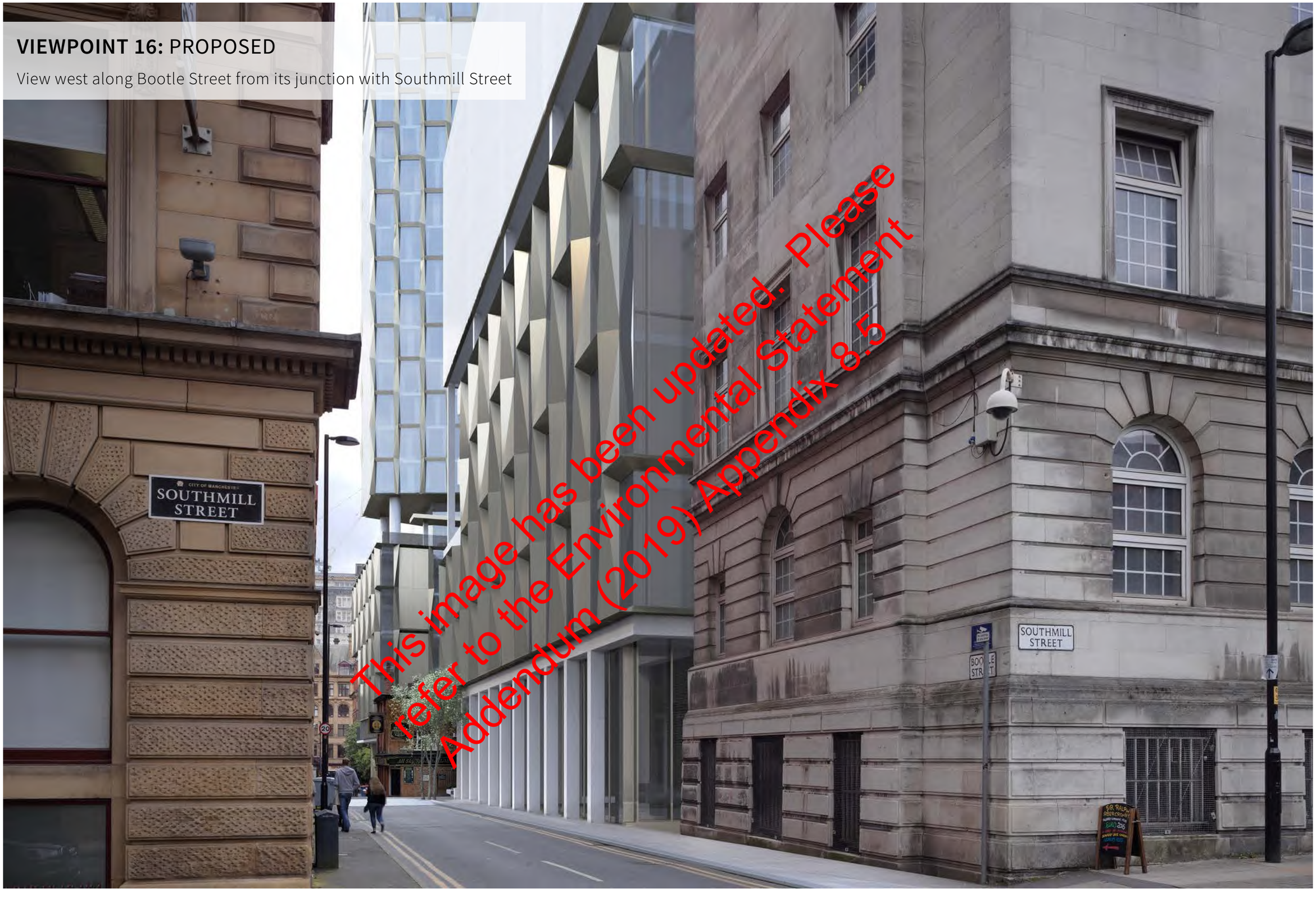
VIEWPOINT 16: BASELINE

View west along Bootle Street from its junction with Southmill Street



VIEWPOINT 16: PROPOSED

View west along Bootle Street from its junction with Southmill Street



This image has been updated. Please refer to the Environmental Statement Addendum (2019) Appendix 8.5

VIEWPOINT 16: PROPOSED + CUMULATIVE

View west along Bootle Street from its junction with Southmill Street



VIEWPOINT 17: BASELINE

View north-east from the corner of Deansgate and Quay Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 17: PROPOSED

View north-east from the corner of Deansgate and Quay Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 17: PROPOSED + CUMULATIVE

View north-east from the corner of Deansgate and Quay Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 18: BASELINE

View north-east from Byrom Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 18: PROPOSED

View north-east from Byrom Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 18: PROPOSED + CUMULATIVE

View north-east from Byrom Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 19: BASELINE

View facing north along Deansgate from the corner of Tonman Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 19: PROPOSED

View facing north along Deansgate from the corner of Tonman Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 19: PROPOSED + CUMULATIVE

View facing north along Deansgate from the corner of Tonman Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 20: BASELINE

View north-west across Lower Mosley Street from the centre of Barbirolli Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 20: PROPOSED

View north-west across Lower Mosley Street from the centre of Barbirolli Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 20: PROPOSED + CUMULATIVE

View north-west across Lower Mosley Street from the centre of Barbirolli Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 21: BASELINE

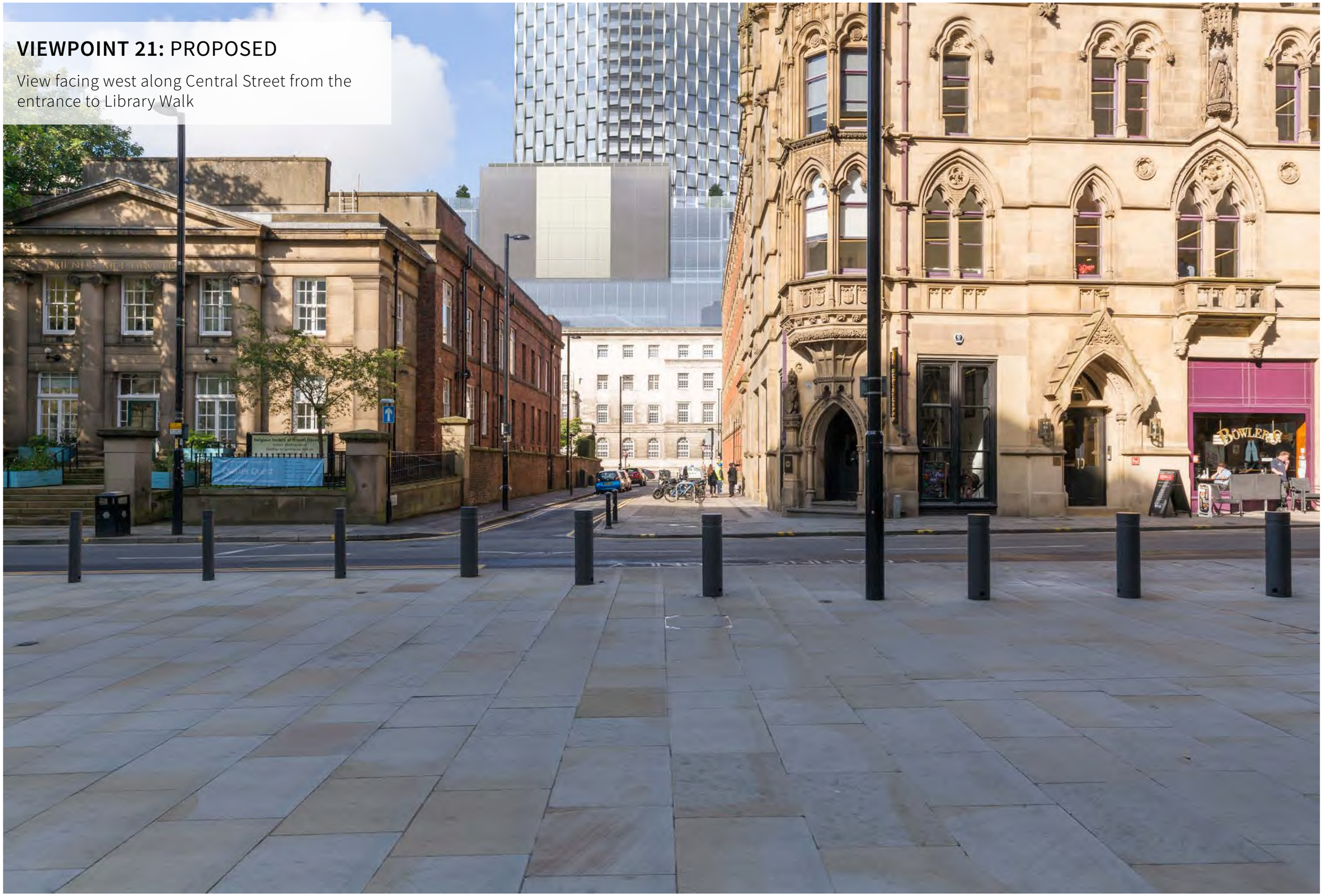
View facing west along Central Street from the entrance to Library Walk



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 21: PROPOSED

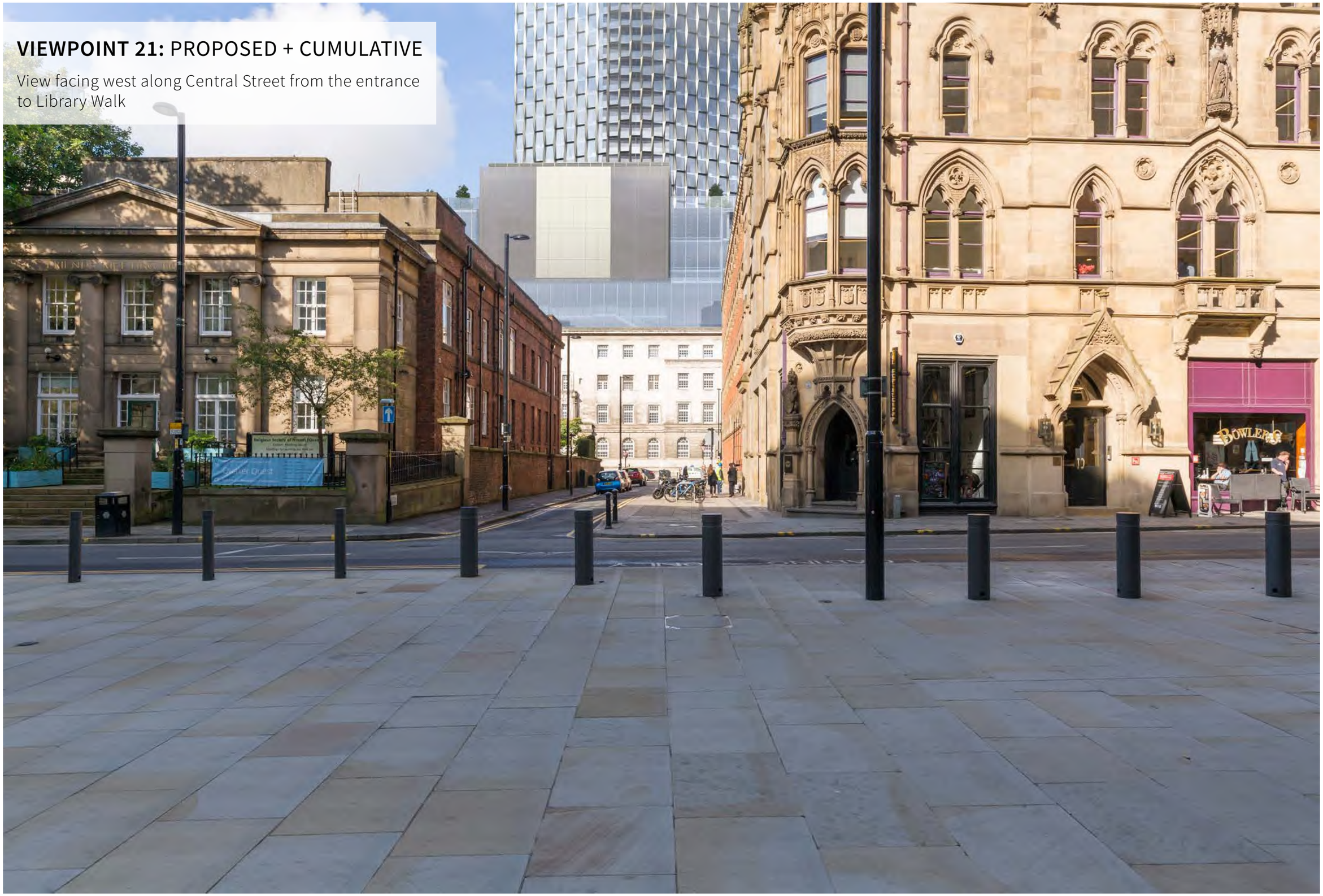
View facing west along Central Street from the entrance to Library Walk



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 21: PROPOSED + CUMULATIVE

View facing west along Central Street from the entrance to Library Walk



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 22: BASELINE

View west from the centre of Library Walk



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 22: PROPOSED

View west from the centre of Library Walk

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 22: PROPOSED + CUMULATIVE

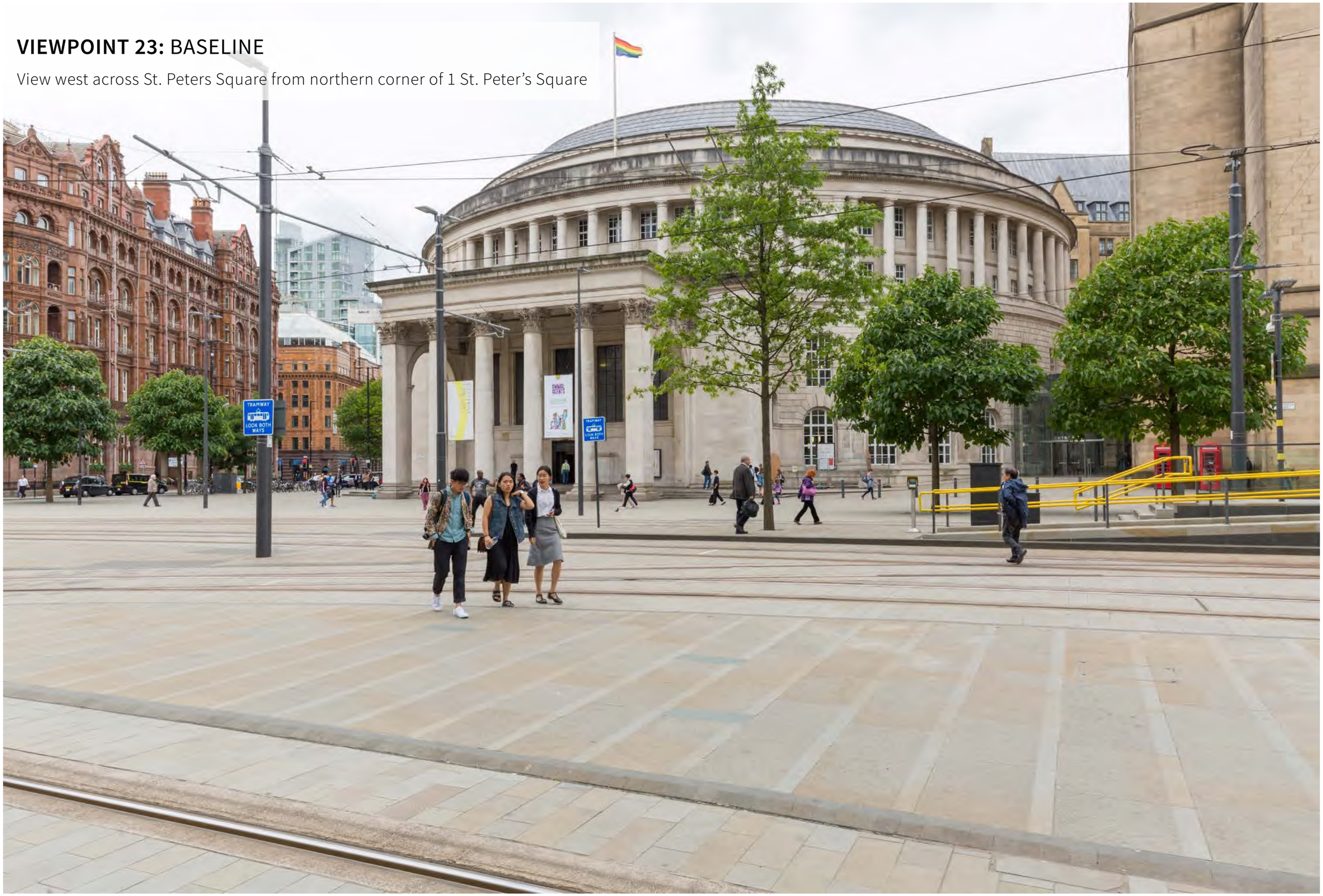
View west from the centre of Library Walk



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 23: BASELINE

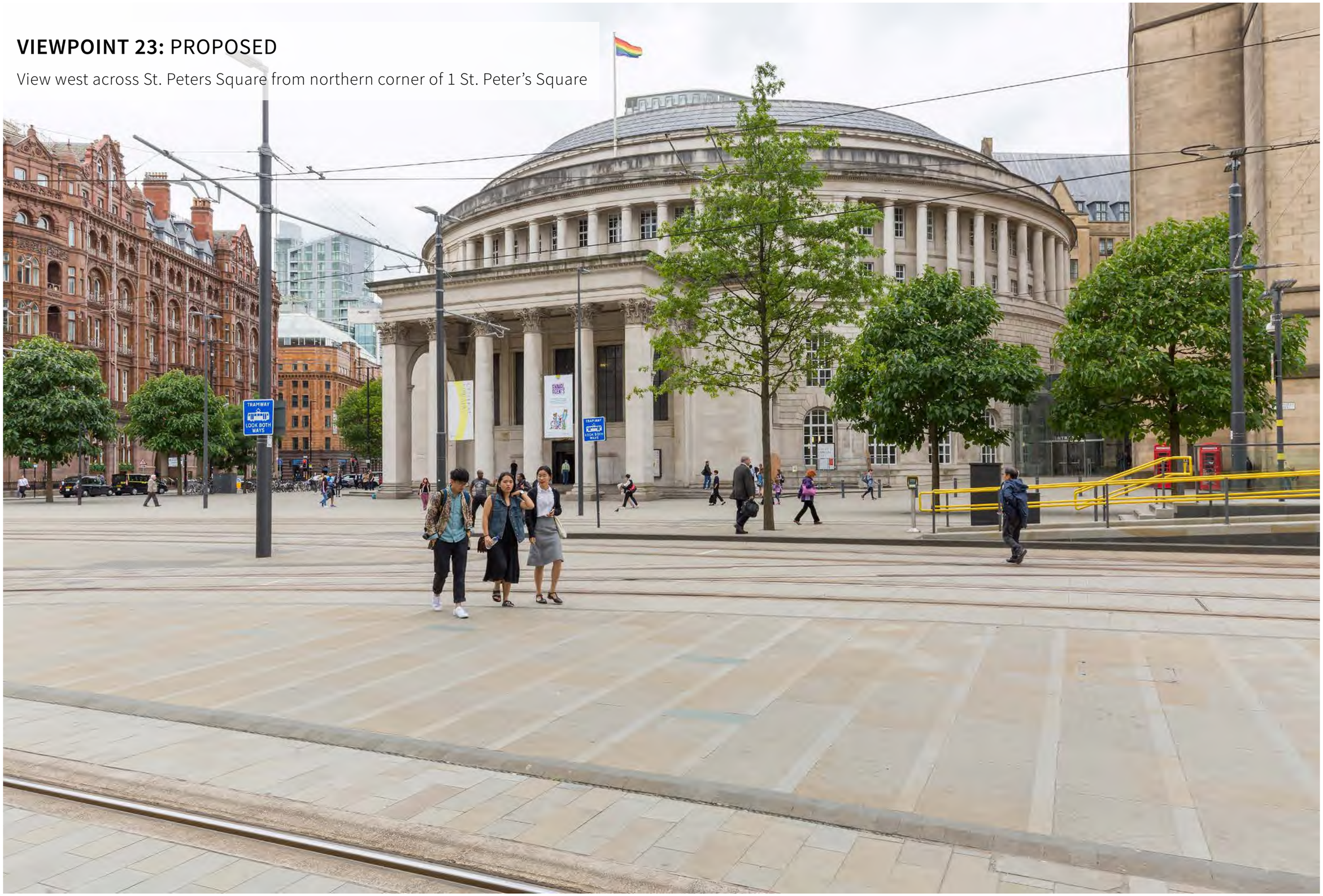
View west across St. Peters Square from northern corner of 1 St. Peter's Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 23: PROPOSED

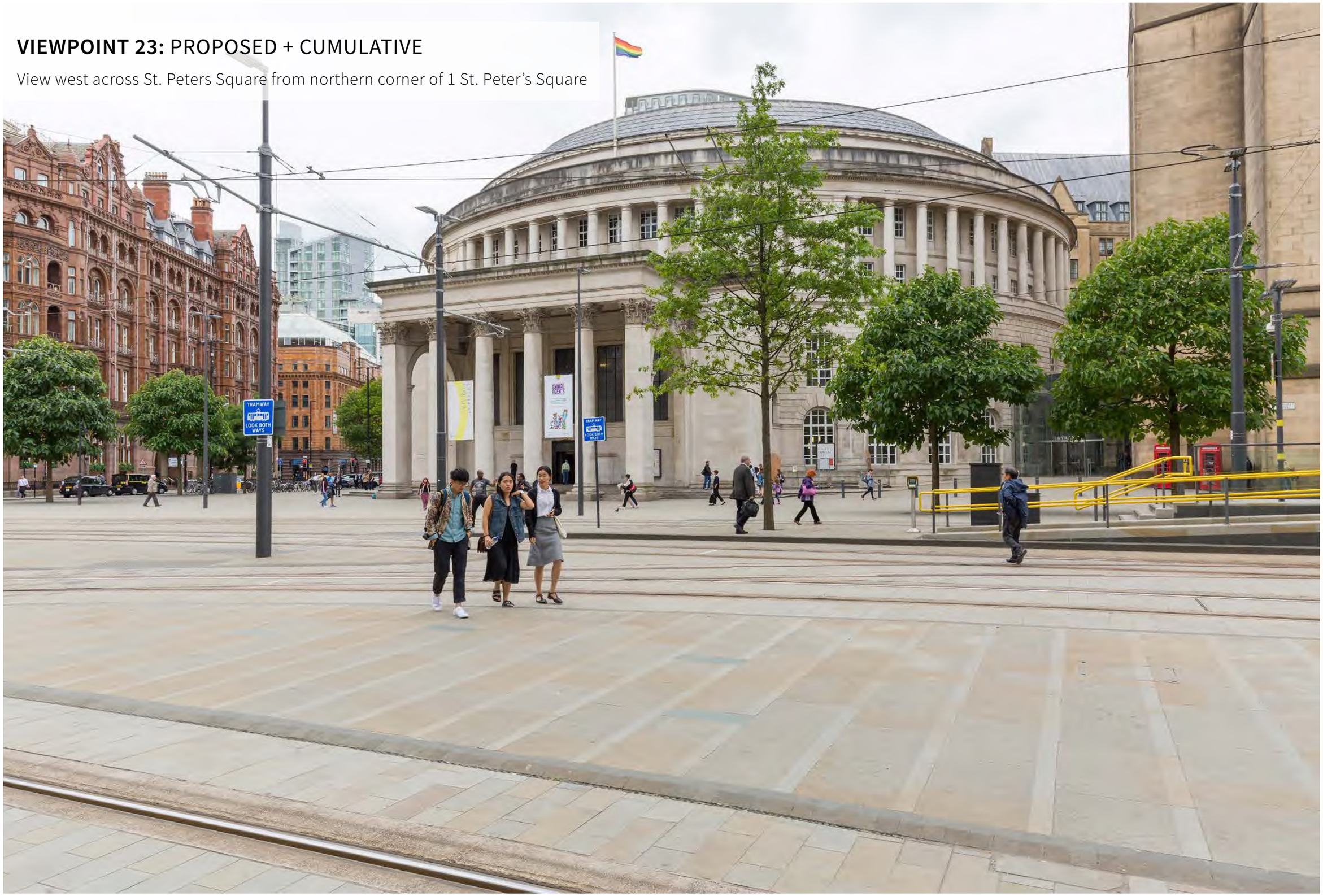
View west across St. Peters Square from northern corner of 1 St. Peter's Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 23: PROPOSED + CUMULATIVE

View west across St. Peters Square from northern corner of 1 St. Peter's Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 24: BASELINE

View south-west along Deansgate from the junction with Wood Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 24: PROPOSED

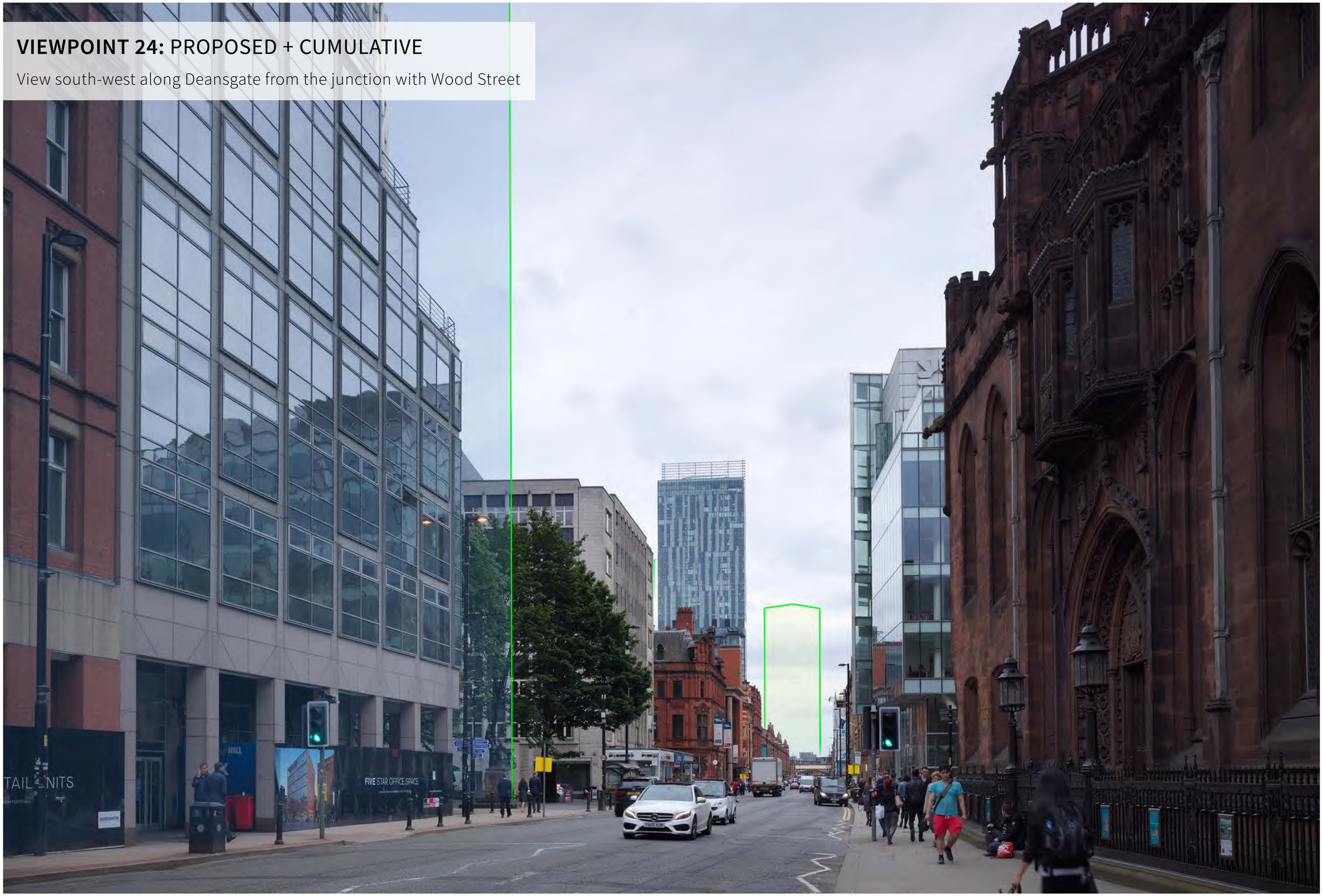
View south-west along Deansgate from the junction with Wood Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 24: PROPOSED + CUMULATIVE

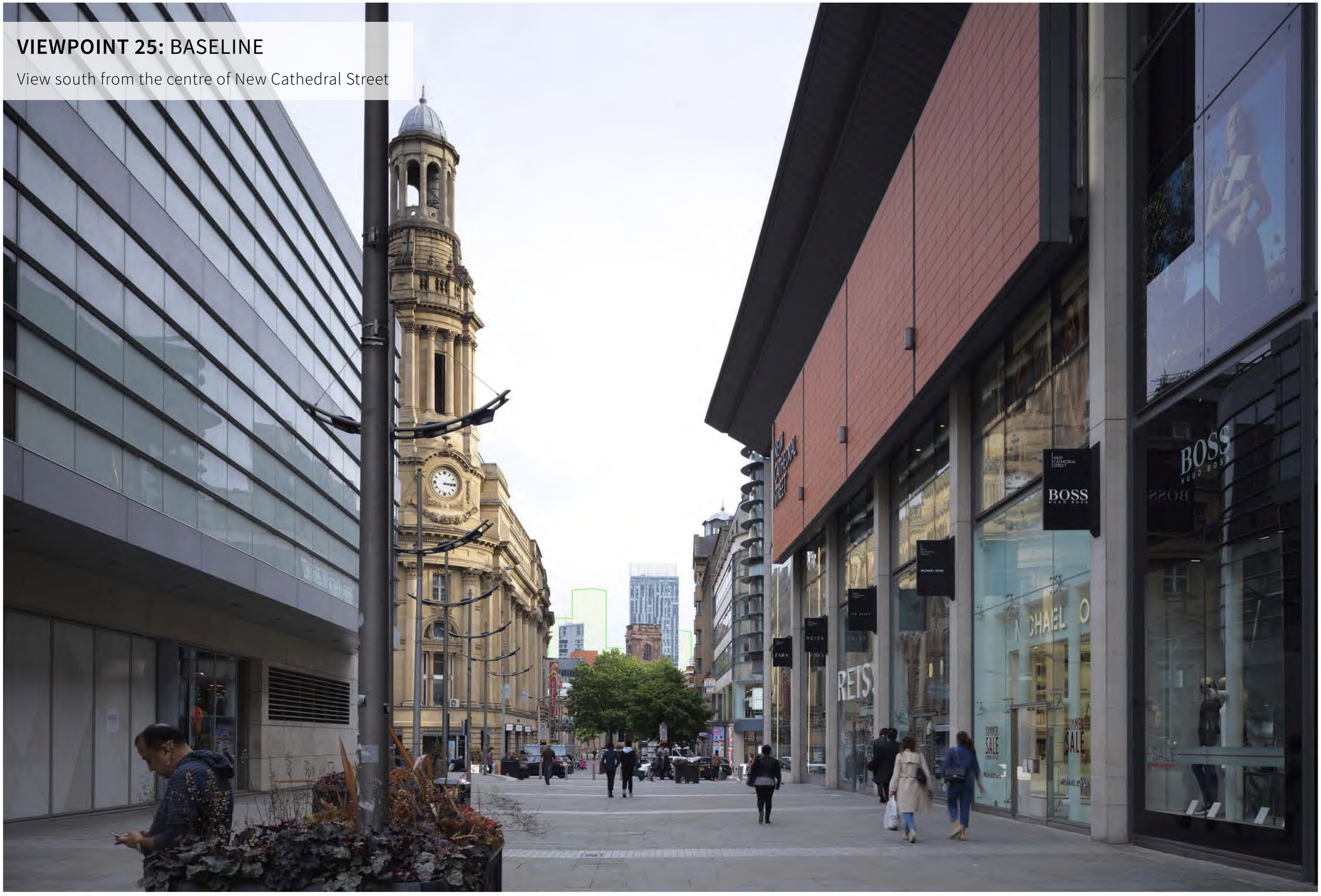
View south-west along Deansgate from the junction with Wood Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 25: BASELINE

View south from the centre of New Cathedral Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 25: PROPOSED

View south from the centre of New Cathedral Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 25: PROPOSED + CUMULATIVE

View south from the centre of New Cathedral Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 26: BASELINE

View north-east from the junction of Liverpool Road and Stone Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 26: PROPOSED

View north-east from the junction of Liverpool Road and Stone Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 26: PROPOSED + CUMULATIVE

View north-east from the junction of Liverpool Road and Stone Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 27: BASELINE

View facing south-west across Albert Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 27: PROPOSED

View facing south-west across Albert Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 27: PROPOSED + CUMULATIVE

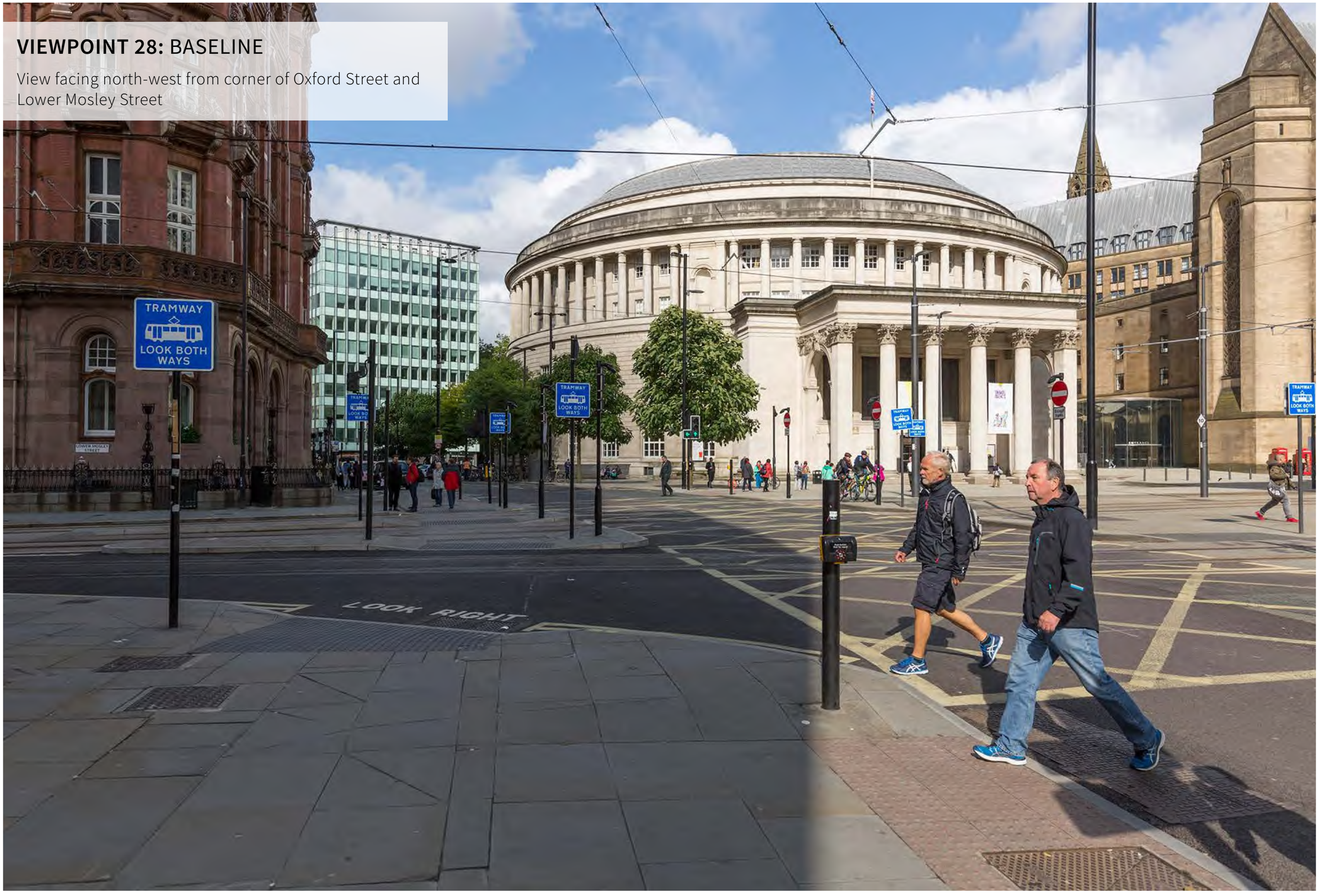
View facing south-west across Albert Square



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 28: BASELINE

View facing north-west from corner of Oxford Street and Lower Mosley Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 28: PROPOSED

View facing north-west from corner of Oxford Street and Lower Mosley Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 28: PROPOSED + CUMULATIVE

View facing north-west from corner of Oxford Street and Lower Mosley Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 29: BASELINE

View facing north-west along Princess Street from the corner with Lower Mosley Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 29: PROPOSED

View facing north-west along Princess Street from the corner with Lower Mosley Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 29: PROPOSED + CUMULATIVE

View facing north-west along Princess Street from the corner with Lower Mosley Street

This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 30: BASELINE

View facing south along Cross Street opposite the junction with south King Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 30: PROPOSED

View facing south along Cross Street opposite the junction with south King Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 30: PROPOSED + CUMULATIVE

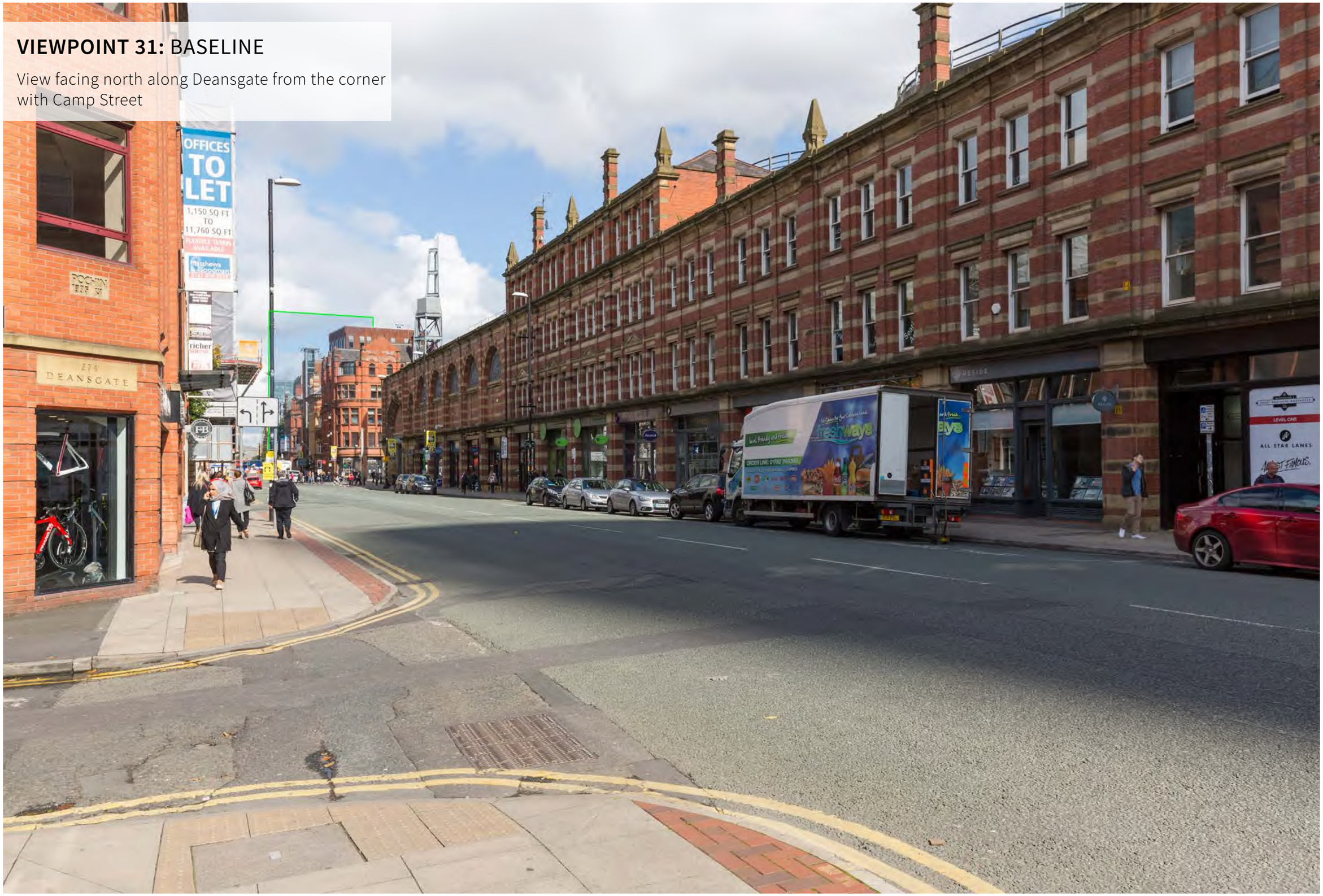
View facing south along Cross Street opposite the junction with south King Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 31: BASELINE

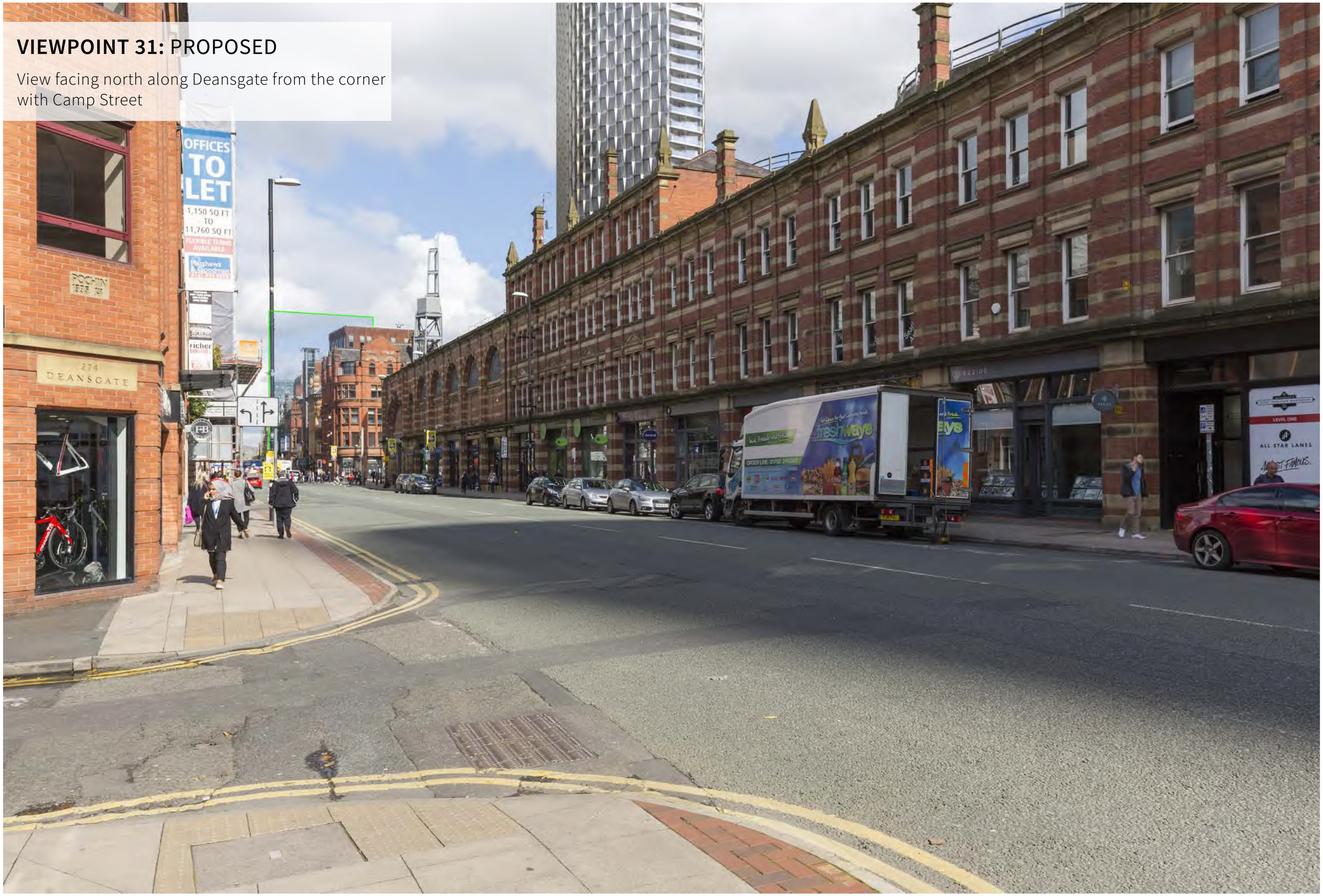
View facing north along Deansgate from the corner with Camp Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 31: PROPOSED

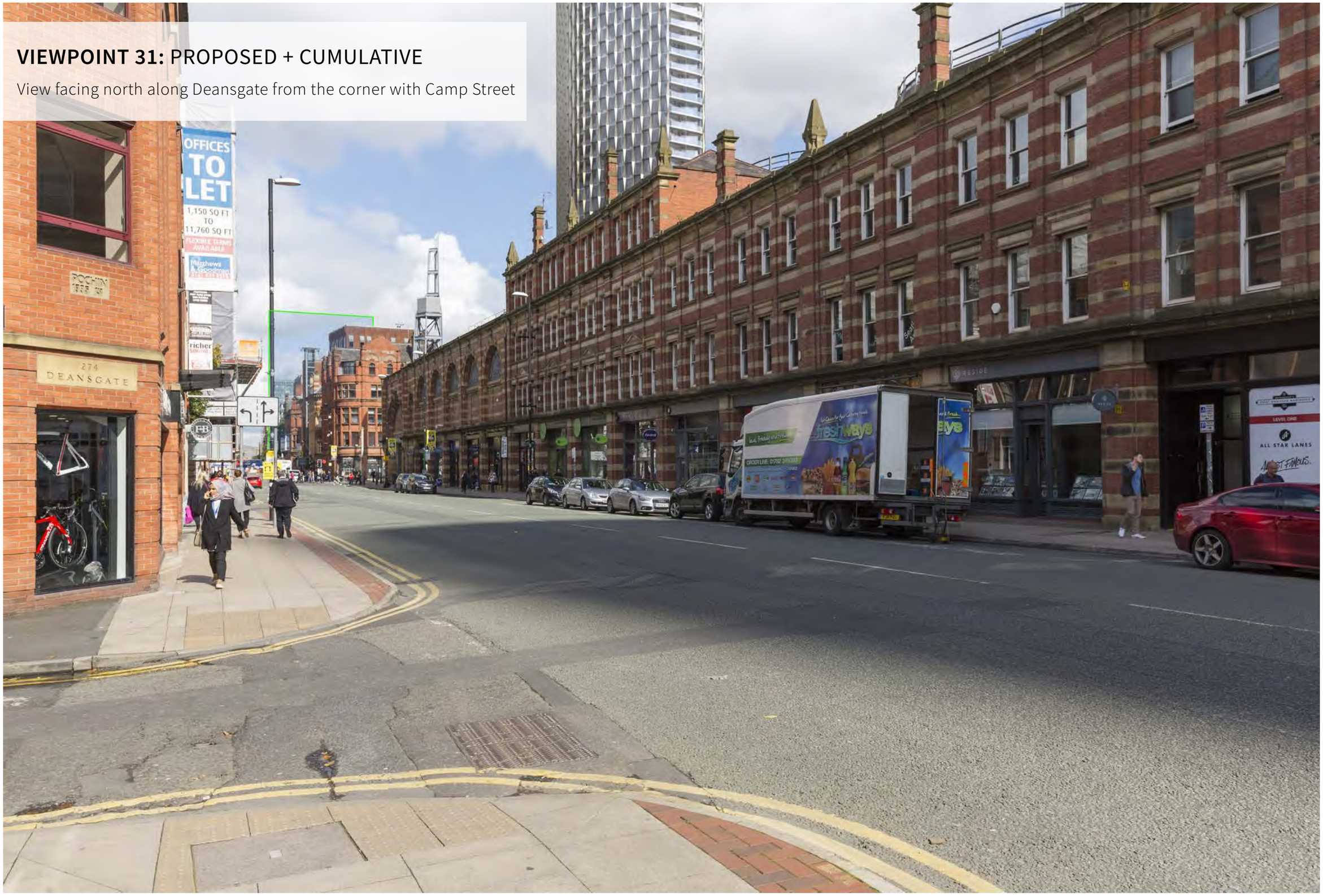
View facing north along Deansgate from the corner with Camp Street



This image dates from the 2017 assessment and had not been updated.

VIEWPOINT 31: PROPOSED + CUMULATIVE

View facing north along Deansgate from the corner with Camp Street



This image dates from the 2017 assessment and had not been updated.

VISUALLY VERIFIED VIEWS METHODOLOGY

Photography

Virtual Planit commissioned Sean Conboy for all of the photography on St Michaels. Sean has worked on many verified projects and has over 25 years of professional experience. The aim with the photography is to create an image similar to that perceived by the human eye. The lens and camera configuration can affect this perception but it is critical to maintain data accuracy especially if the proposed development is a considerable distance from the view position.

The equipment used in this instance was: Hasselblad H5D-60 camera. The angle of view in landscape orientation is 70 degrees. Each scene was photographed using a survey pin or suitable marker to accurately identify the view location. A plumb line was used to ensure that the centre of the camera lens was directly over the surveyed viewing position at a height of 1.65 metres. The metadata of each image records the exact time and date of each image allowing accurate lighting conditions to be recreated in the computer model as required. Further information is also recorded such as the camera, lens, and exposure and aperture settings. All camera data is recorded in a spreadsheet for reference.

Each scene was photographed using a survey pin or suitable marker to accurately identify the view location. A plumb line was used to ensure that the centre of the camera lens was directly over the surveyed viewing position at a height of 1.655m metres.



L5

Viewpoint Co-ordinates			Instrument Height (metres)	Point ID	Horizontal Angle			Vertical Angle		
Easting	Northing	Level			Deg	Min	Sec	Deg	Min	Sec
382593.542	397711.942	29.497	1.655	1	48	42	14	86	01	43
				2	54	47	06	84	53	49
				3	59	33	06	85	53	24
				4	66	48	59	84	07	11
				5	73	10	32	85	55	51
				6	78	50	31	85	21	56
				7	91	34	37	79	43	24
				8	92	52	43	78	45	11

Survey

Virtual Planit have a long standing relationship with Powers and Tiltman, experienced RICS surveyors, who are familiar and experienced with verified work.

In preparation for the surveys, a series of key points were identified in each of the photographs used to verify the shots, particularly on the clearly visible corners of buildings. Care is taken to ensure a good spread of points including points close to the camera, points near the target development, together with points at ground and roof level, and points across the width of the image. A wide spread enables a more thorough and accurate analysis. The surveyor would then add a further series of additional reference points, in order to provide a comprehensive range of point reference across the photograph. It is these 2d points on the photograph that are surveyed to give each a 3 dimensional co-ordinate value.

The points were surveyed by a professional survey team using GPS. The survey points are related back to the Ordnance Survey National Grid - selected as it is the most widely used and also allows captured data to be incorporated into other digital products.

3D model and camera matching.

Virtual Planit were supplied with a digital 3D model of the proposed scheme by the architect. The model is related back to the Ordnance Survey grid and absolute (AOD) heights.

The same 3D model is used as the basis for each of the photographs, and was certified as being correct by the architect.

This 3D model was precisely aligned to the survey information using proprietary 3D modelling and rendering software, using the following information for each of the views.

- Specific details of the camera and lens used.
- The photograph, rotated if necessary to ensure the horizon line is level
- The surveyed viewpoint co-ordinates.
- The surveyed co-ordinates of points on existing buildings or immovable objects within the photograph.

- The 3D model of the proposed scheme.

The information listed above is used to situate the virtual camera in each case, such that the 3D model, survey points and model align exactly with the photograph.

Wirelines and rendering.

A render is a technical term referring to the process of creating a two-dimensional output image from a 3D model. Using the virtual camera described previously, the 3D modelling and rendering software produces a render of the proposed building.
Where the required output is a wireline view and not a fully rendered image, the wireline is created by utilising a basic render; devoid of material, texture and lighting information; but fully representative of the building form, and using tools within the compositing software package (in this case Adobe Photoshop) placing a thin coloured line at the exact edge of the rendered building, defining the building envelope.
Where the required output is fully rendered, the output image from the modelling and rendering software displays the predetermined materials, textures and lighting. All materials specifications, textures and daylighting are applied to model prior to rendering. After rendering the fully rendered building is combined with the photograph in proprietary digital 'paint' software (again Adobe Photoshop) to produce the photomontage image.
In order to achieve the most photorealistic result, colour correction adjustments may be made to the rendered image. For example hue, saturation and brightness values of the rendered image may be adjusted to better match the colour tones of the photograph. For example, poor air quality at the time of photography may necessitate the rendered image to be 'degraded' to ensure that it behaves visually as the other buildings within the photograph. This is an iterative process and is reliant on the skill of the artist and good communication between the artist and the architect to ensure their vision for the material and texture qualities is maintained. The design team then signed off on the appearance of the scheme in the views.
'Masks' are created where the line of sight to the proposed scheme is interrupted by foreground buildings or elements such as lampposts, vehicles and street furniture.

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Appendix 10.1

SITE TERRAIN ADJUSTMENT

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Site Terrain Adjustment

Wind condition at weather station

BREVe32 : An aid to the use of BS6399-2 and EN1991-1-4

Design wind speeds in m/s

Provenance

Report generated by BREVe 3.2.1.5, 21/11/2016 15:16:03
SJ825847 BREVe3 site data for SJ825847
Design annual risk = 0.02000
Shelter effect from obstructions is **NOT** included.
Site altitude = 79.0m.
Topographic increment from internal parameters. Range = 500 m
Season length is all year.
Using UK / Irish direction factors.
Basic wind speeds :
BS*Vb* (1 hour) = 22.0 m/s.
EN*Vb*,map (10 min.) = 22.4 m/s.

BS6399-2 Directional Method - Mean and turbulence wind speeds

SJ825847 BREVe3 site data for SJ825847

Height above ground = 2.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	13.3	12.4	12.5	12.7	12.5	13.7	14.6	15.9	17.1	17.0	16.0	14.1
1s gust *V* (m/s) :	23.1	21.6	21.7	22.0	21.8	23.9	25.3	27.7	29.7	29.5	27.7	24.4
Turbulence *V* (m/s) :	2.85	2.67	2.68	2.72	2.69	2.94	3.12	3.41	3.65	3.62	3.41	3.01

Height above ground = 5.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	16.2	15.2	15.3	15.5	15.3	16.7	17.8	19.4	20.9	20.7	19.5	17.1
1s gust *V* (m/s) :	26.9	25.1	25.3	25.6	25.3	27.8	29.5	32.2	34.6	34.3	32.3	28.4
Turbulence *V* (m/s) :	3.10	2.90	2.91	2.95	2.92	3.20	3.40	3.71	3.97	3.94	3.71	3.27

Height above ground = 10.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	18.5	17.3	17.4	17.6	17.4	19.0	20.2	22.1	23.8	23.6	22.2	19.5
1s gust *V* (m/s) :	29.7	27.8	28.0	28.3	28.0	30.7	32.6	35.6	38.2	37.9	35.7	31.4
Turbulence *V* (m/s) :	3.28	3.06	3.08	3.12	3.09	3.38	3.59	3.92	4.20	4.16	3.92	3.46

Height above ground = 15.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	19.8	18.5	18.6	18.8	18.6	20.4	21.7	23.7	25.5	25.3	23.8	20.9
1s gust *V* (m/s) :	31.4	29.3	29.5	29.9	29.5	32.4	34.3	37.5	40.3	40.0	37.6	33.1
Turbulence *V* (m/s) :	3.37	3.15	3.16	3.21	3.17	3.47	3.69	4.03	4.31	4.28	4.03	3.55

Height above ground = 20.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	20.7	19.4	19.5	19.7	19.5	21.4	22.7	24.8	26.7	26.5	24.9	21.9
1s gust *V* (m/s) :	32.5	30.4	30.5	31.0	30.6	33.5	35.6	38.9	41.8	41.4	39.0	34.3
Turbulence *V* (m/s) :	3.42	3.20	3.22	3.26	3.22	3.53	3.75	4.09	4.38	4.34	4.09	3.61

Height above ground = 30.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	22.1	20.6	20.8	21.0	20.8	22.8	24.2	26.4	28.4	28.2	26.5	23.3
1s gust *V* (m/s) :	34.0	31.8	32.0	32.4	32.0	35.1	37.3	40.7	43.8	43.4	40.8	35.9
Turbulence *V* (m/s) :	3.48	3.25	3.27	3.31	3.27	3.59	3.81	4.16	4.45	4.42	4.16	3.67

Height above ground = 50.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	23.8	22.3	22.4	22.7	22.4	24.6	26.1	28.5	30.7	30.5	28.6	25.2
1s gust *V* (m/s) :	35.9	33.5	33.7	34.2	33.8	37.0	39.3	42.9	46.1	45.7	43.0	37.9
Turbulence *V* (m/s) :	3.50	3.27	3.29	3.33	3.29	3.61	3.83	4.18	4.48	4.44	4.18	3.69

Height above ground = 100.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	26.4	24.7	24.8	25.1	24.8	27.2	28.9	31.6	34.0	33.7	31.7	27.9
1s gust *V* (m/s) :	38.0	35.6	35.8	36.2	35.8	39.3	41.7	45.5	49.0	48.5	45.3	40.2
Turbulence *V* (m/s) :	3.39	3.17	3.19	3.23	3.19	3.50	3.71	4.05	4.34	4.30	3.97	3.58

Height above ground = 102.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	26.5	24.7	24.9	25.2	24.9	27.3	29.0	31.6	34.1	33.8	31.8	27.9
1s gust *V* (m/s) :	38.1	35.6	35.8	36.3	35.9	39.3	41.7	45.6	49.0	48.6	45.4	40.2
Turbulence *V* (m/s) :	3.38	3.16	3.18	3.22	3.19	3.49	3.71	4.05	4.33	4.30	3.95	3.57

Wind condition at the proposed site

BREVe32 : An aid to the use of BS6399-2 and EN1991-1-4

Design wind speeds in m/s

Provenance

Report generated by BREVe 3.2.1.5, 21/11/2016 15:16:49
SJ837980 BREVe3 site data for SJ837980
Design annual risk = 0.02000
Shelter effect from obstructions is **NOT** included.
Site altitude = 59.0m.
Topographic increment from internal parameters. Range = 500 m
Season length is all year.
Using UK / Irish direction factors.
Basic wind speeds :
BS*Vb* (1 hour) = 22.3 m/s.
EN*Vb*,map (10 min.) = 22.5 m/s.

BS6399-2 Directional Method - Mean and turbulence wind speeds

SJ837980 BREVe3 site data for SJ837980

Height above ground = 2.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	9.2	8.5	7.9	7.3	7.9	8.7	9.2	10.1	11.4	11.6	10.6	9.7
1s gust *V* (m/s) :	20.1	18.6	18.1	17.7	18.0	19.8	21.0	23.0	25.3	25.7	23.5	21.1
Turbulence *V* (m/s) :	3.17	2.94	2.95	3.03	2.93	3.21	3.41	3.74	4.05	4.12	3.74	3.33

Height above ground = 5.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	13.6	12.6	11.7	10.9	11.7	12.9	13.7	15.0	16.9	17.1	15.7	14.3
1s gust *V* (m/s) :	25.8	23.9	23.1	22.5	23.0	25.3	26.8	29.4	32.4	33.0	30.1	27.1
Turbulence *V* (m/s) :	3.54	3.28	3.30	3.38	3.27	3.59	3.81	4.18	4.53	4.60	4.18	3.73

Height above ground = 10.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	16.9	15.6	14.6	13.6	14.6	16.1	17.0	18.7	21.0	21.3	19.5	17.8
1s gust *V* (m/s) :	30.0	27.8	26.8	26.2	26.8	29.4	31.2	34.2	37.8	38.4	35.0	31.6
Turbulence *V* (m/s) :	3.82	3.54	3.56	3.65	3.53	3.88	4.11	4.51	4.89	4.97	4.52	4.02

Height above ground = 15.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	18.7	17.3	16.2	15.2	16.3	17.9	19.0	20.9	23.3	23.7	21.6	19.8
1s gust *V* (m/s) :	32.4	30.0	29.0	28.3	28.9	31.8	33.7	37.0	40.8	41.5	37.8	34.2
Turbulence *V* (m/s) :	3.98	3.69	3.71	3.80	3.68	4.04	4.28	4.70	5.09	5.17	4.70	4.19

Height above ground = 20.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	20.0	18.5	17.4	16.3	17.5	19.1	20.3	22.4	25.0	25.4	23.1	21.2
1s gust *V* (m/s) :	34.1	31.6	30.5	29.8	30.5	33.4	35.5	39.0	43.0	43.7	39.7	36.0
Turbulence *V* (m/s) :	4.09	3.79	3.81	3.91	3.78	4.15	4.40	4.82	5.23	5.32	4.83	4.30

Height above ground = 30.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	21.7	20.1	19.0	18.0	19.1	20.9	22.2	24.5	27.3	27.8	25.2	23.1
1s gust *V* (m/s) :	36.1	33.6	32.5	31.9	32.6	35.7	37.9	41.7	45.6	46.6	42.4	38.2
Turbulence *V* (m/s) :	4.18	3.92	3.94	4.04	3.91	4.29	4.55	4.99	5.34	5.47	5.00	4.39

Height above ground = 50.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	23.7	22.0	20.9	20.1	21.1	23.1	24.6	27.2	30.0	30.6	27.6	25.3
1s gust *V* (m/s) :	37.7	35.2	34.4	33.9	34.6	37.9	40.1	44.1	47.9	48.9	44.7	40.0
Turbulence *V* (m/s) :	4.05	3.85	3.91	4.01	3.90	4.32	4.52	4.93	5.18	5.31	4.96	4.26

Height above ground = 100.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	26.2	24.3	23.6	23.1	23.9	25.9	27.7	30.7	33.6	34.3	30.7	28.1
1s gust *V* (m/s) :	39.1	36.6	36.0	35.9	36.3	39.8	42.1	46.5	50.1	50.7	46.4	41.7
Turbulence *V* (m/s) :	3.74	3.57	3.63	3.73	3.63	4.02	4.20	4.57	4.79	4.75	4.57	3.94

Height above ground = 102.0 m

Direction (°N) :	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean *V* (m/s) :	26.3	24.4	23.6	23.2	23.9	26.0	27.8	30.8	33.7	34.4	30.8	28.2
1s gust *V* (m/s) :	39.1	36.6	36.1	36.0	36.4	39.8	42.2	46.5	50.1	50.7	46.4	41.7
Turbulence *V* (m/s) :	3.73	3.56	3.62	3.72	3.62	4.01	4.18	4.56	4.77	4.73	4.55	3.92

Appendix 10.2

CONTOUR PLOTS FOR INDIVIDUAL WIND DIRECTIONS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

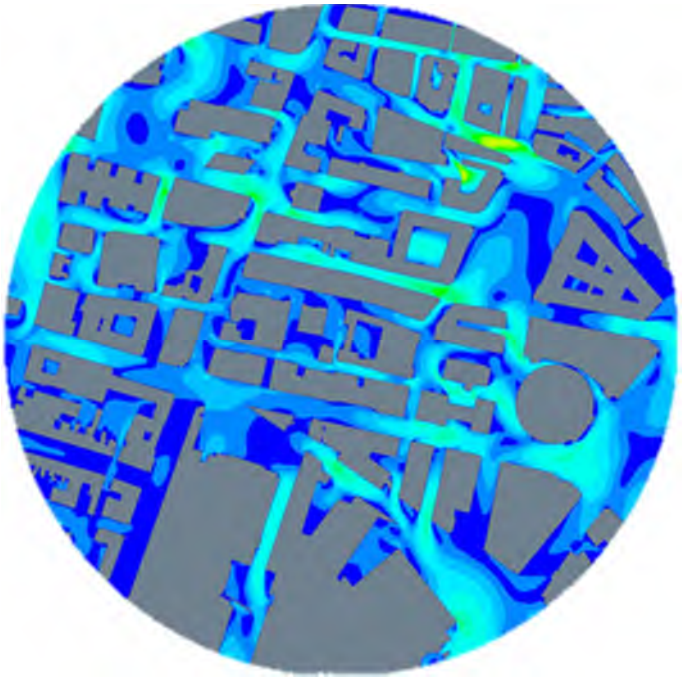
With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

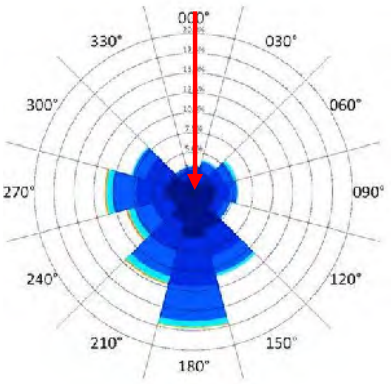
This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Contour Plots for Individual Wind Directions

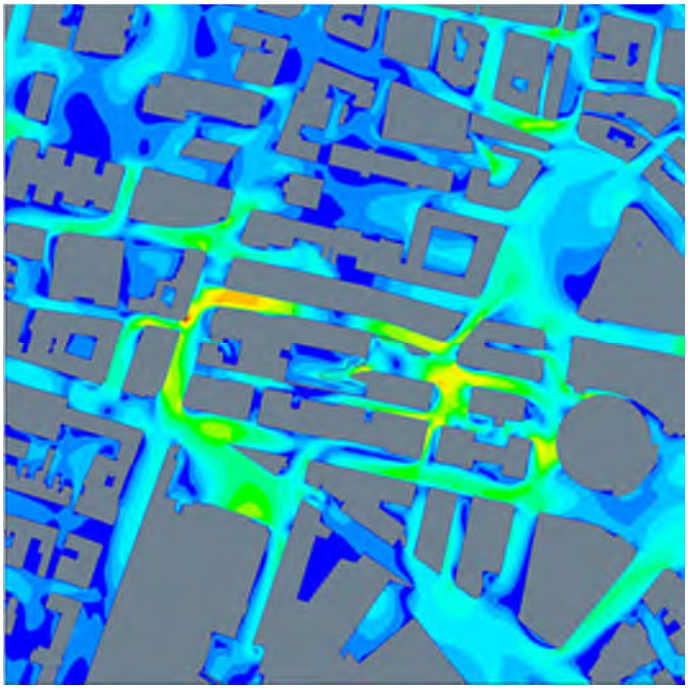
Condition 1: Northerly wind direction (0°)

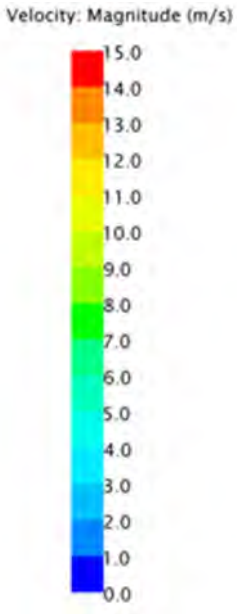
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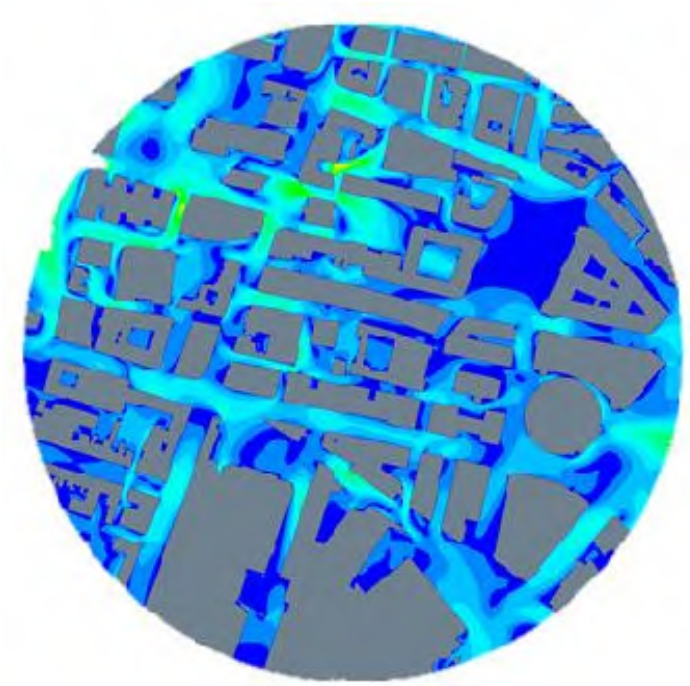
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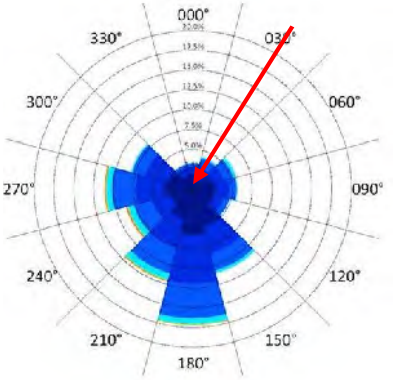




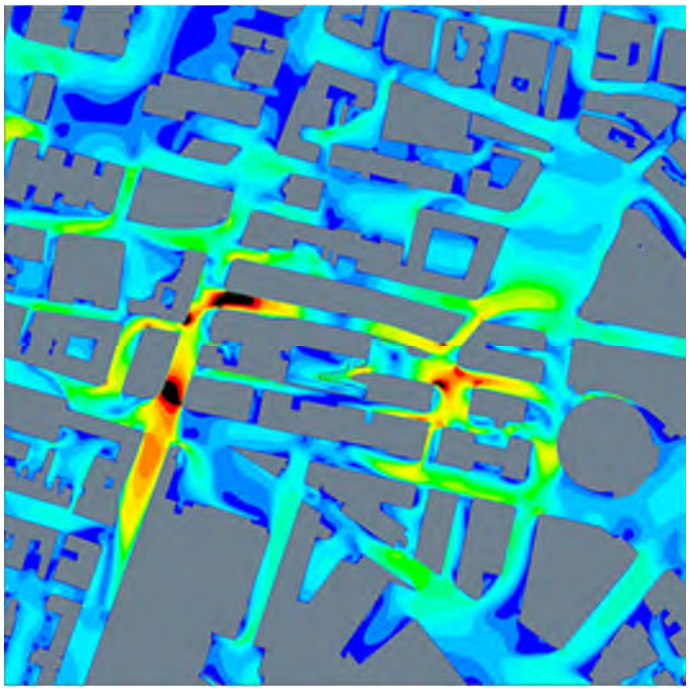
Condition 2: North North-east wind direction (30°)

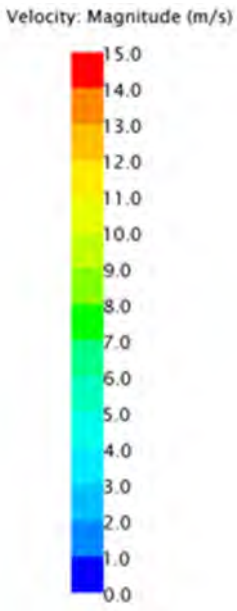
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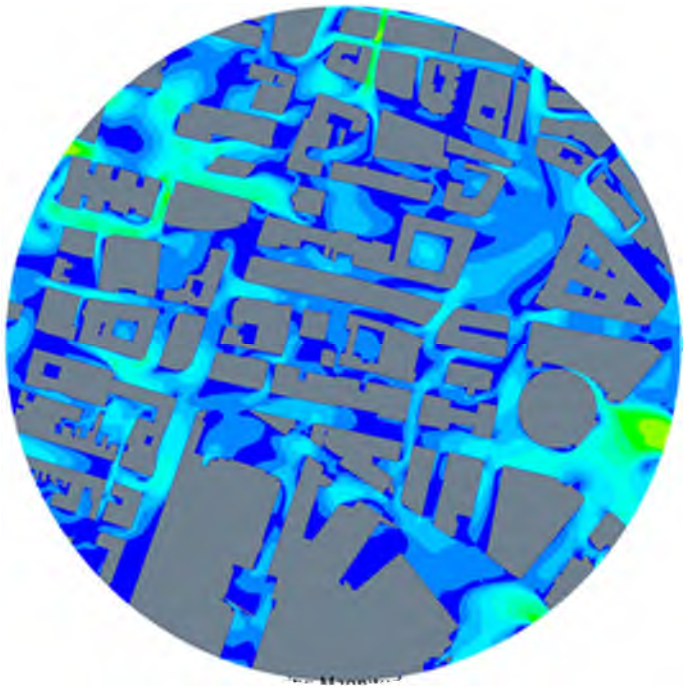
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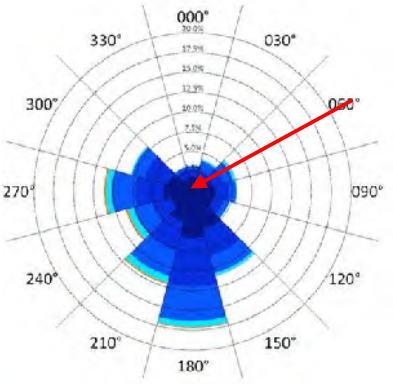




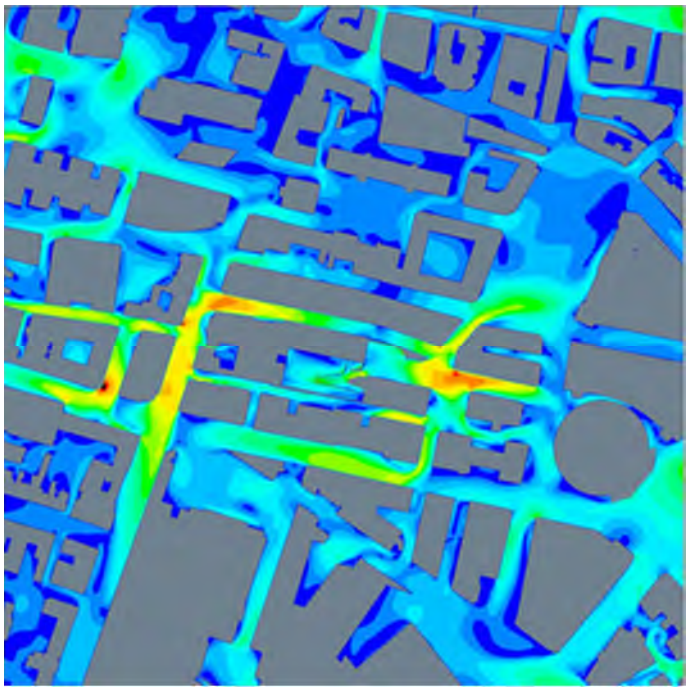
Condition 3: East North-east wind direction (60°)

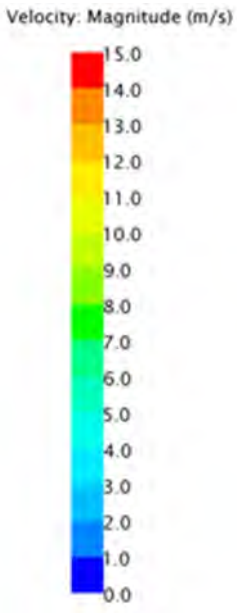
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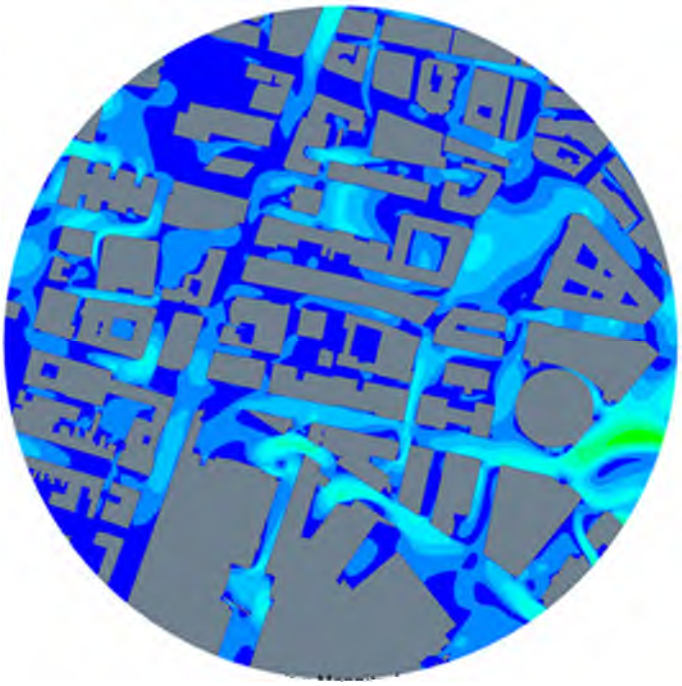
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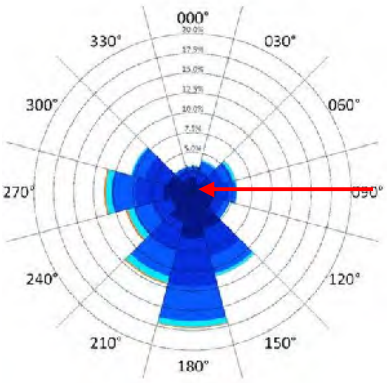




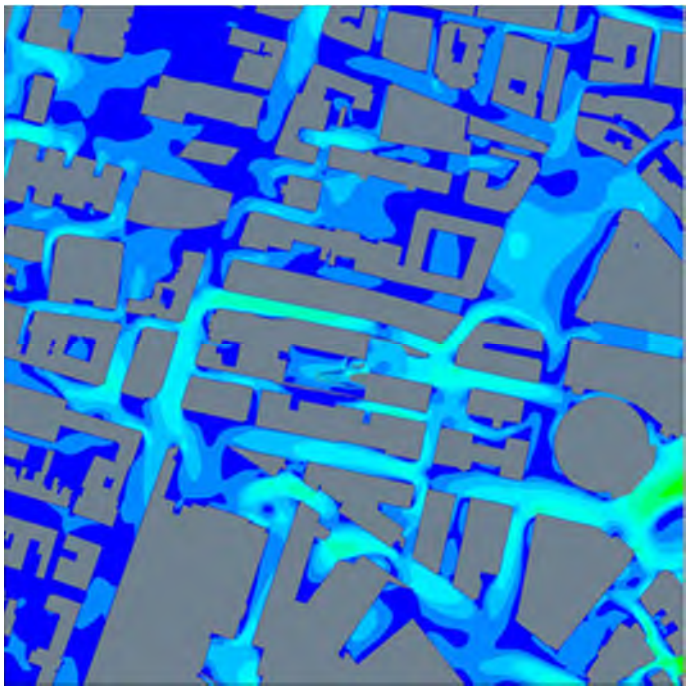
Condition 4: Easterly wind direction (90°)

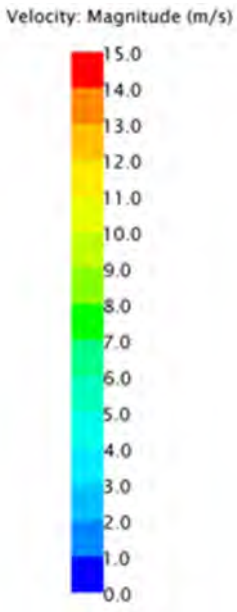
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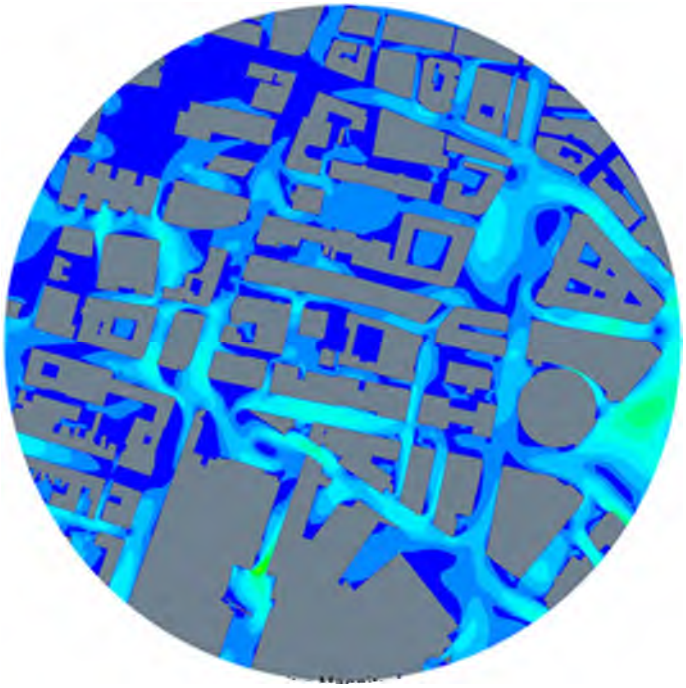
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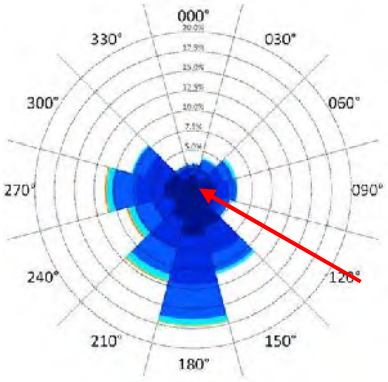




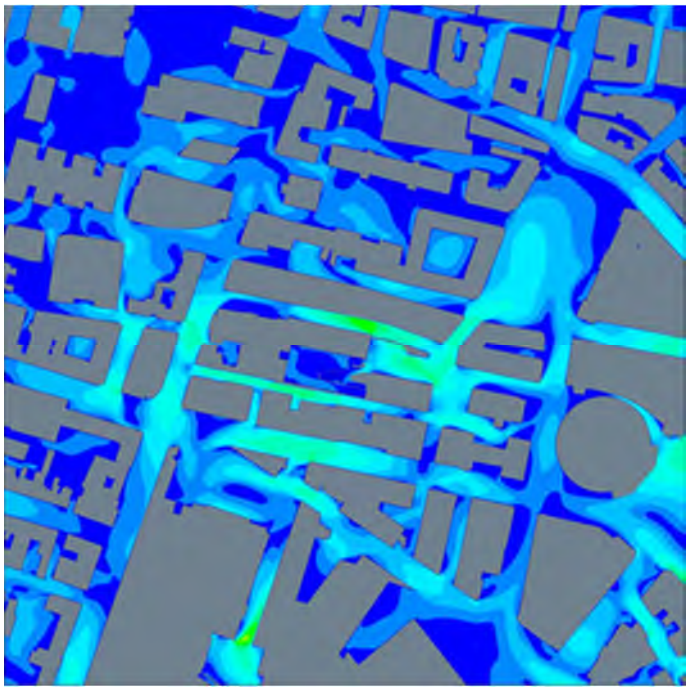
Condition 5: East South-east wind direction (120°)

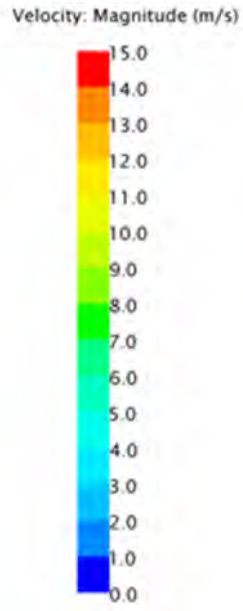
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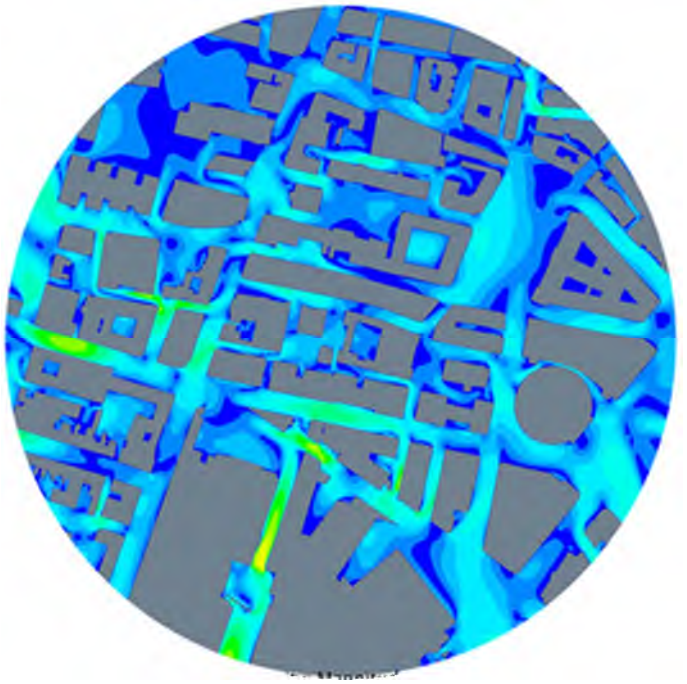
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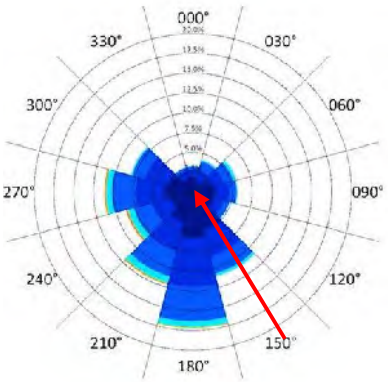




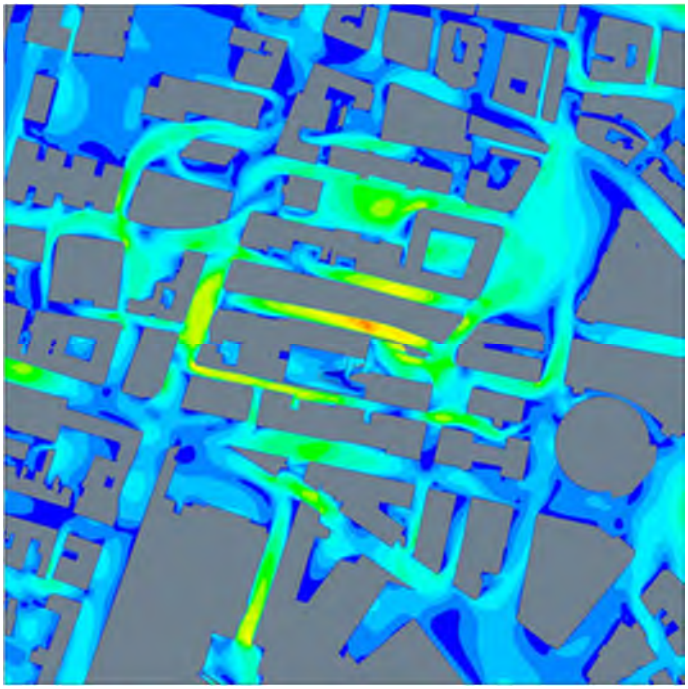
Condition 6: South South-east wind direction (150°)

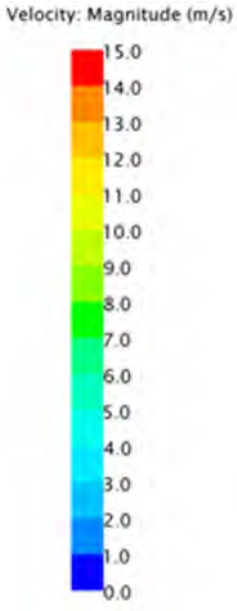
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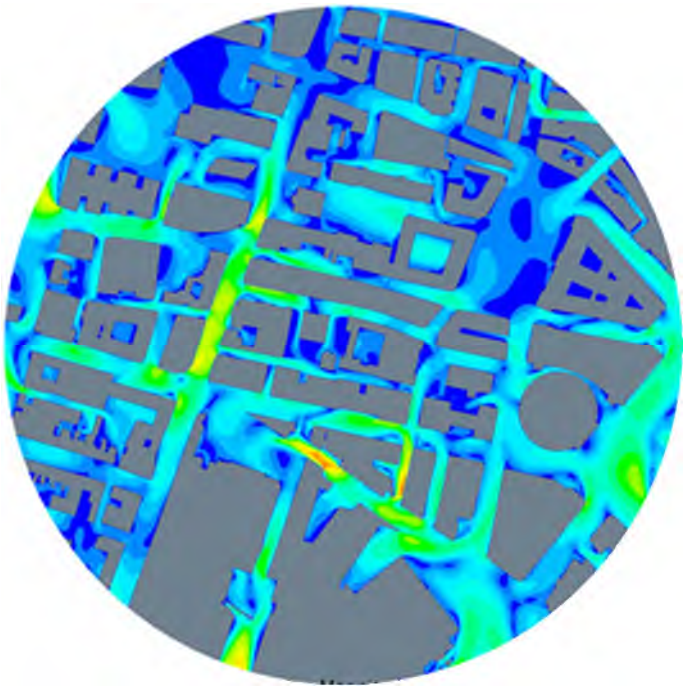
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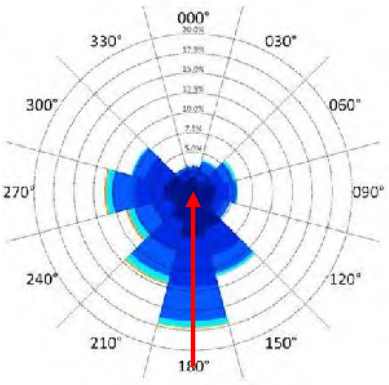




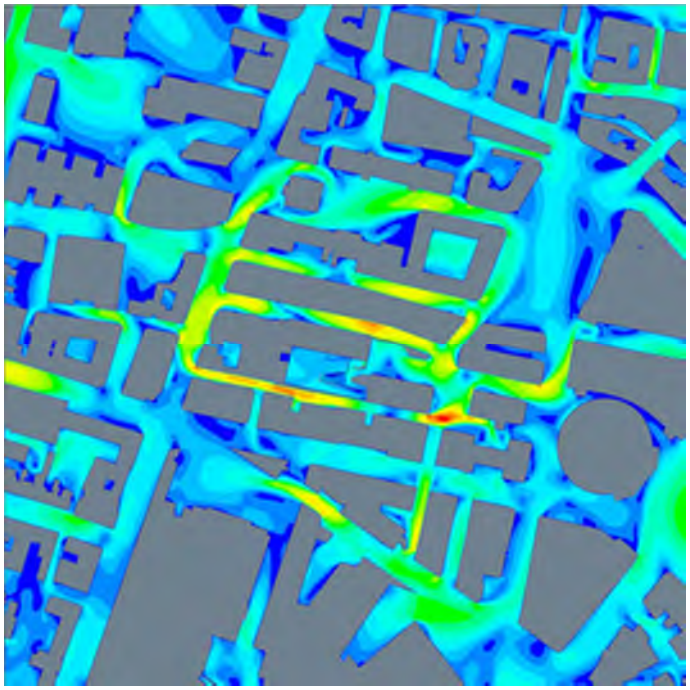
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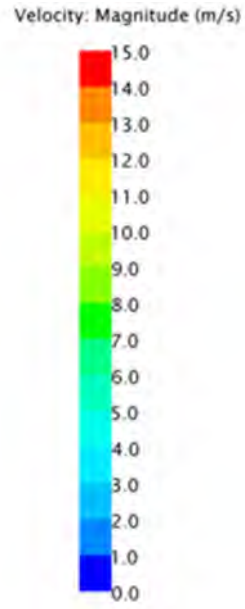
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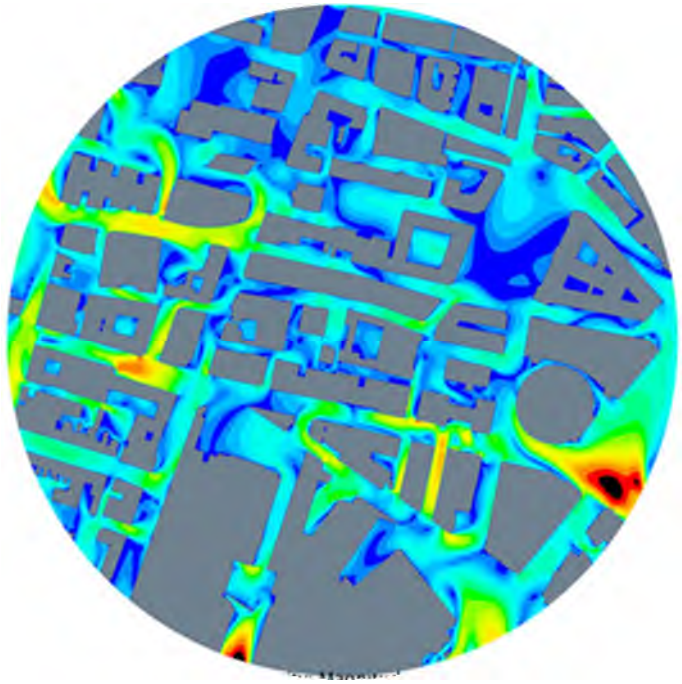
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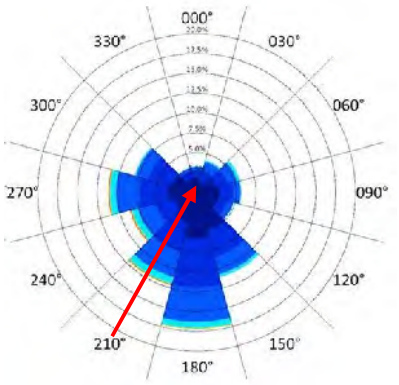




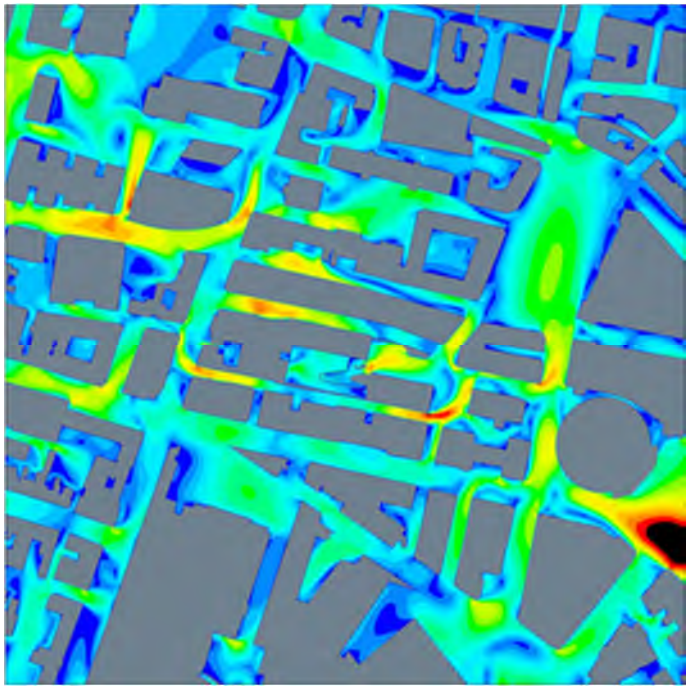
Condition 8: South South-west wind direction (210°)

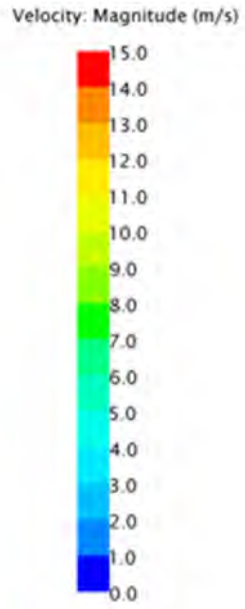
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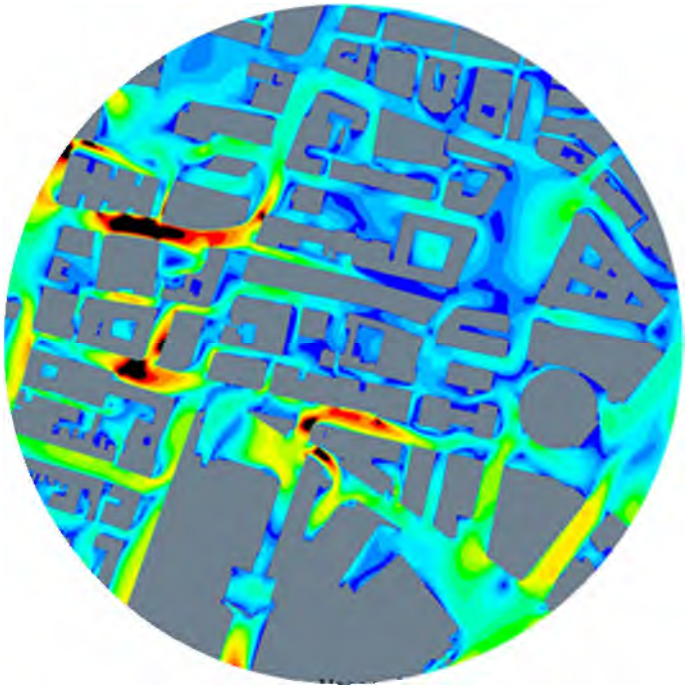
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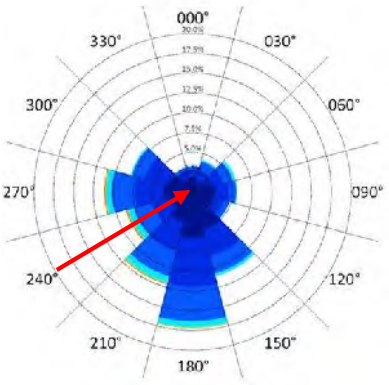




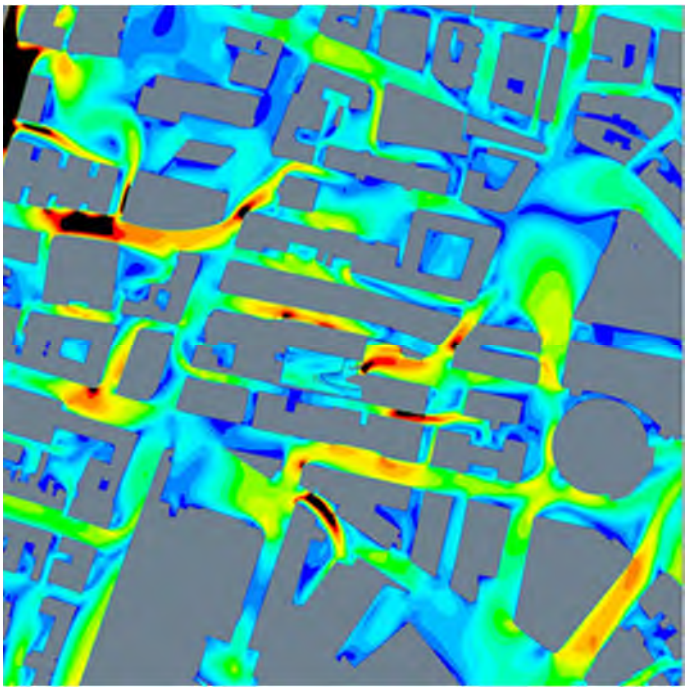
Condition 9: West South-west wind direction (240°)

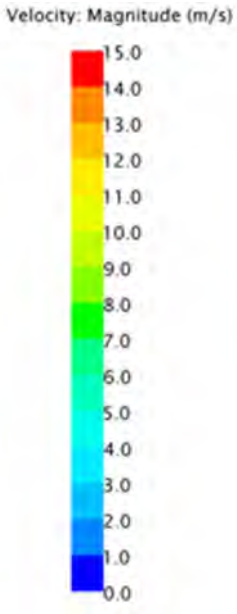
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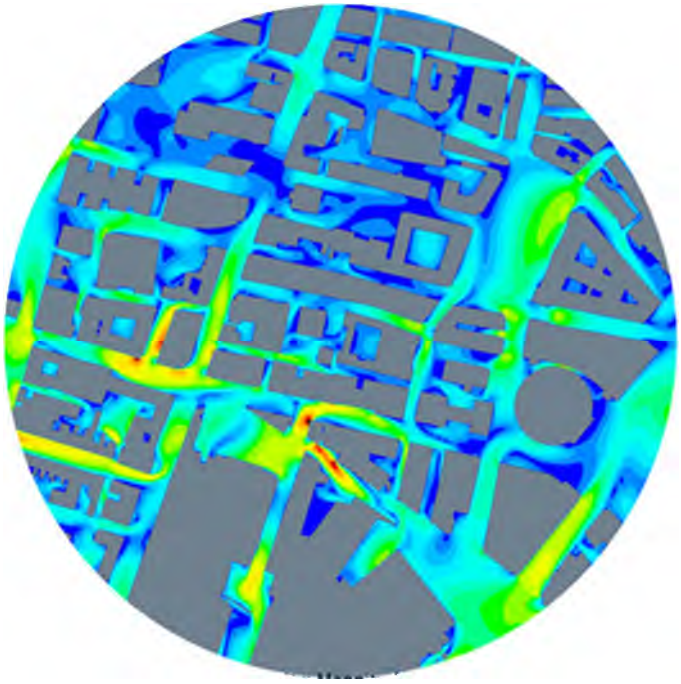
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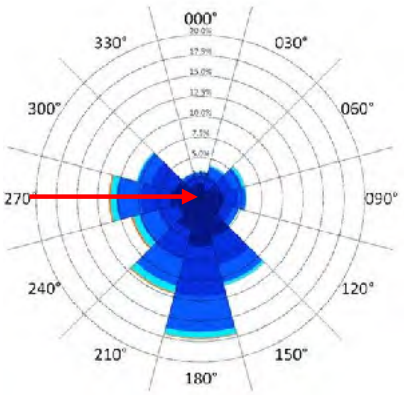




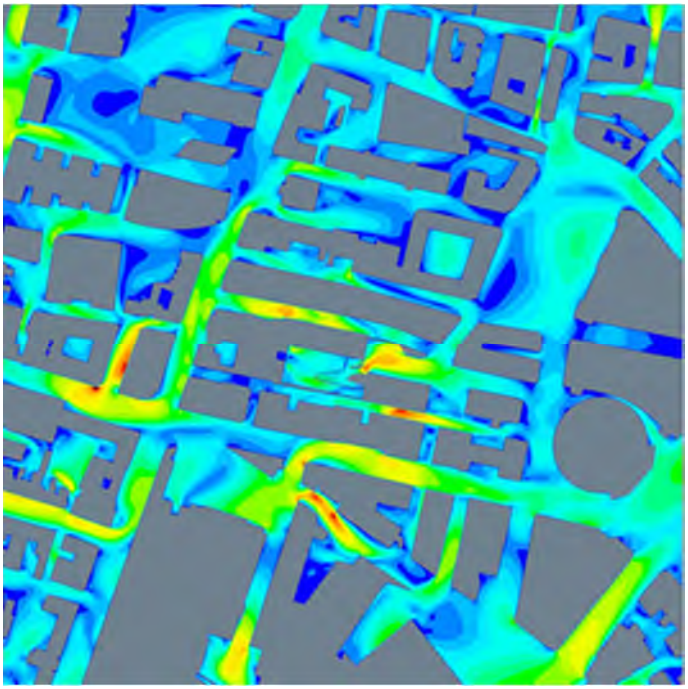
Condition 10: Westerly wind direction (270°)

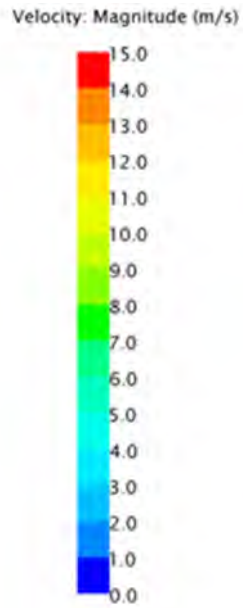
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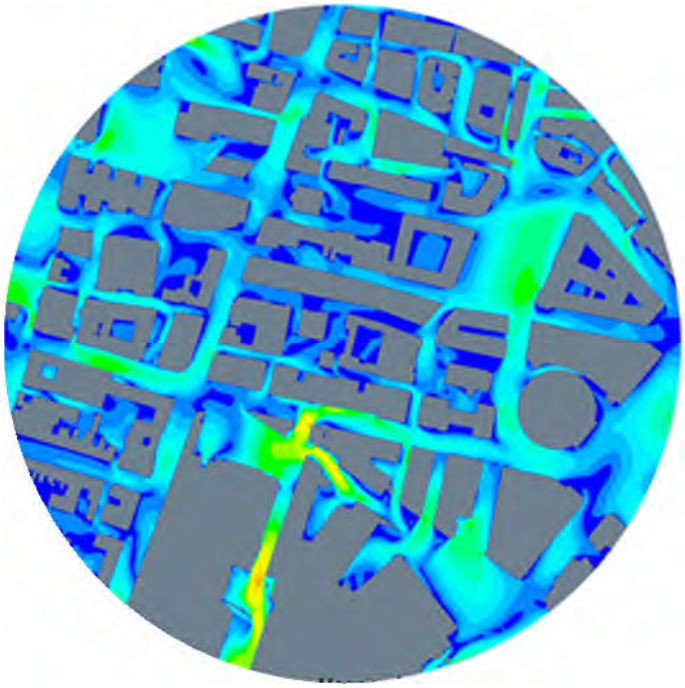
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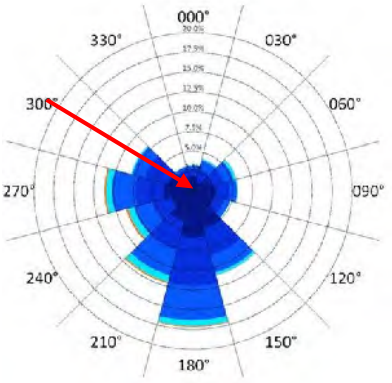




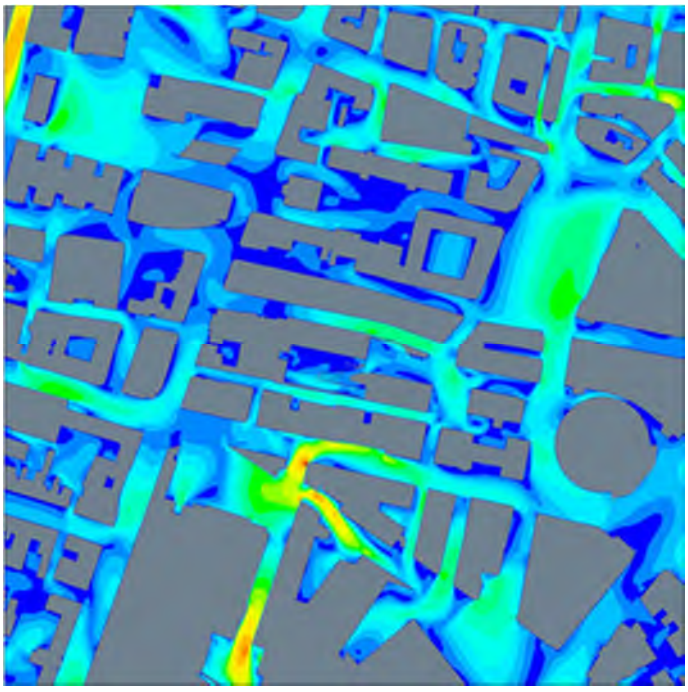
Condition 11: West North-west wind direction (300°)

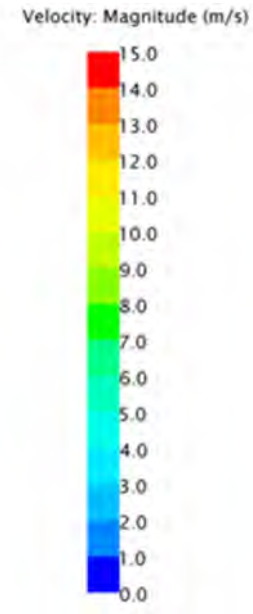
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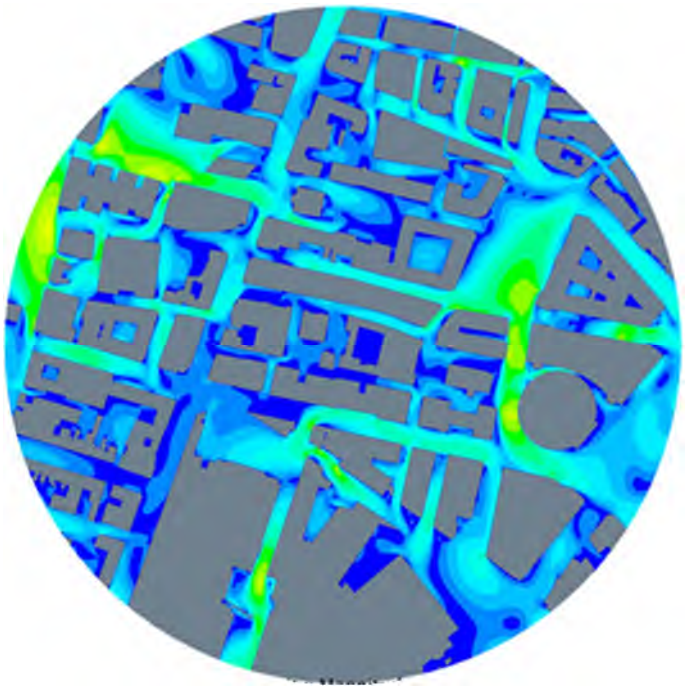
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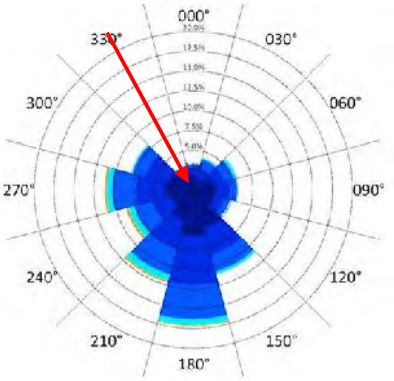




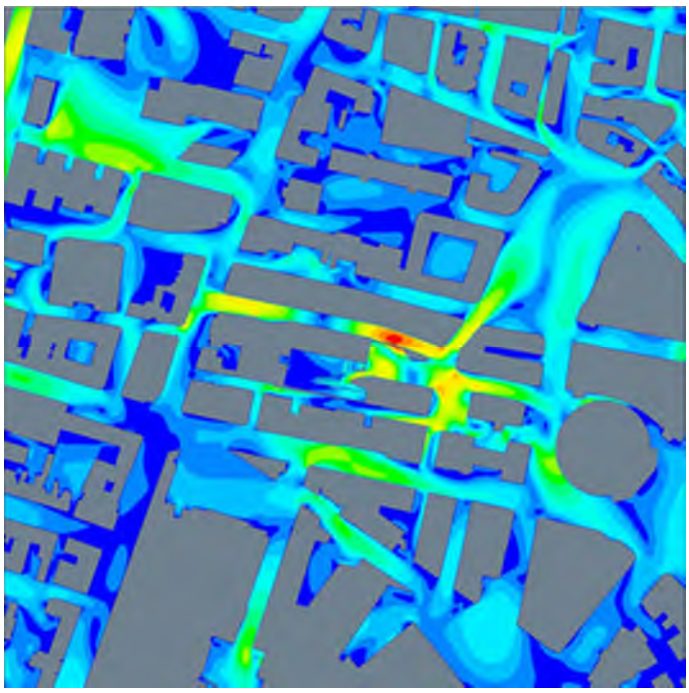
Condition 12: North North-west wind direction (330°)

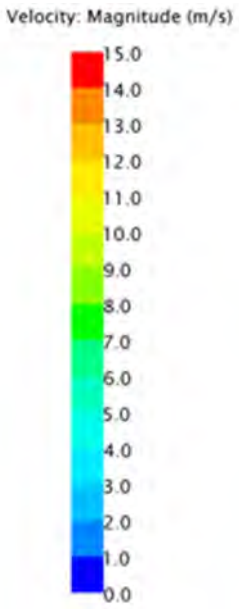
BASELINE





PROPOSED





Appendix 10.3

CONTOUR WIND PLOTS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

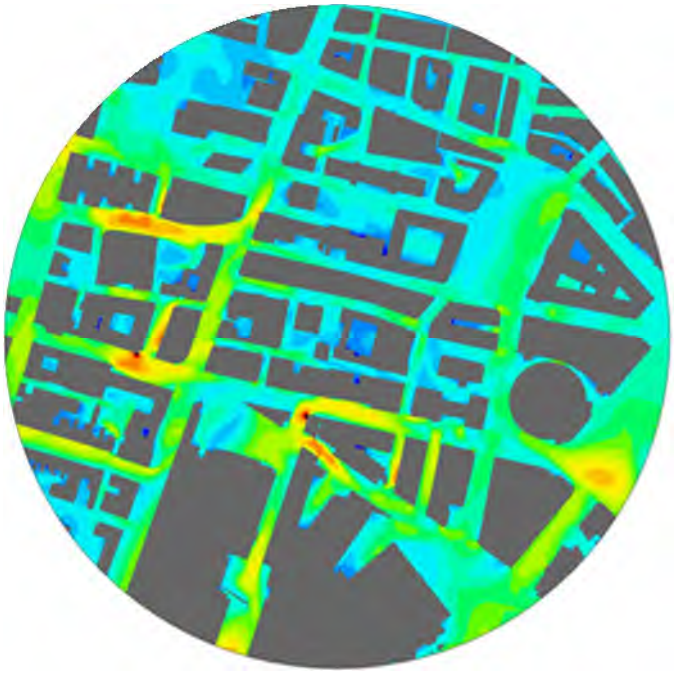
This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Contour Wind Plots

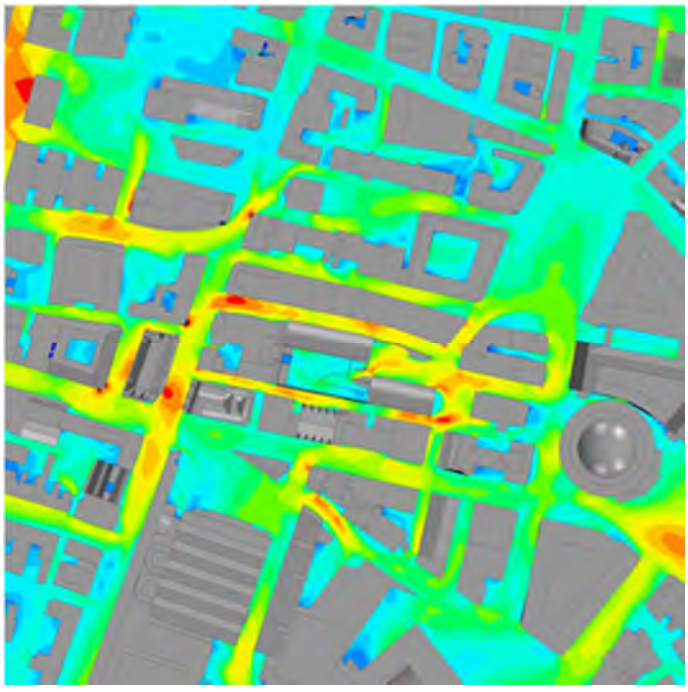
Pedestrian Safety Assessment

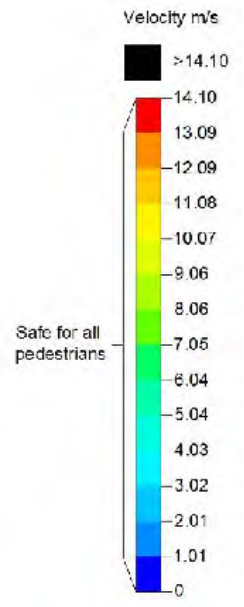
(Wind Speeds likely to be exceeded for 0.01% of the year)

BASELINE



PROPOSED

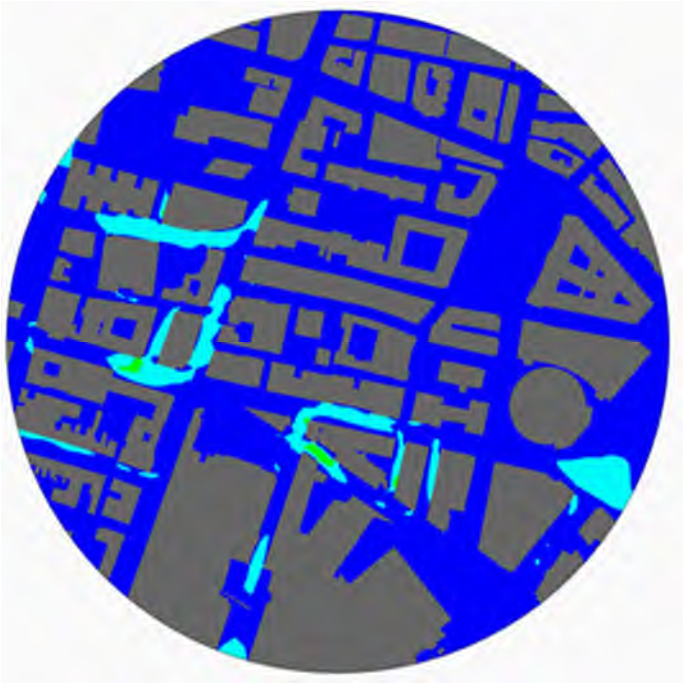




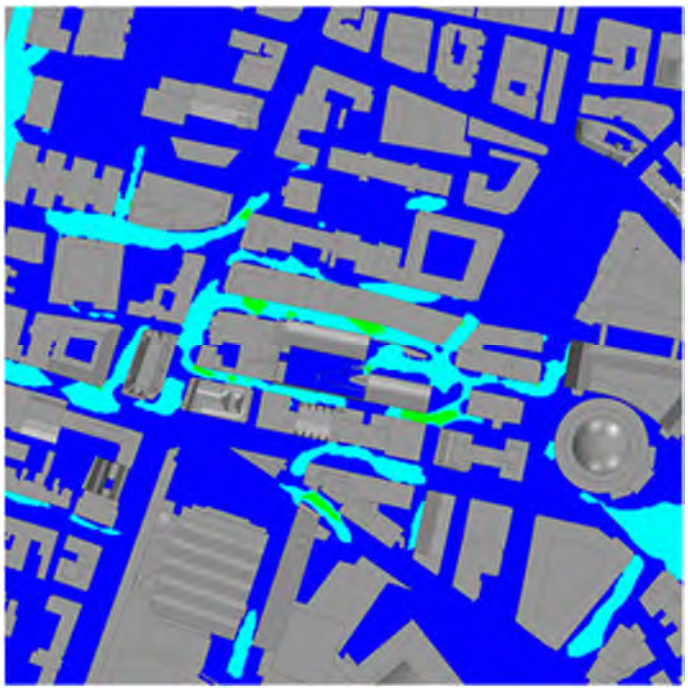
Contour Wind Plots - Seasonal Pedestrian Comfort Assessment

Winter

BASELINE



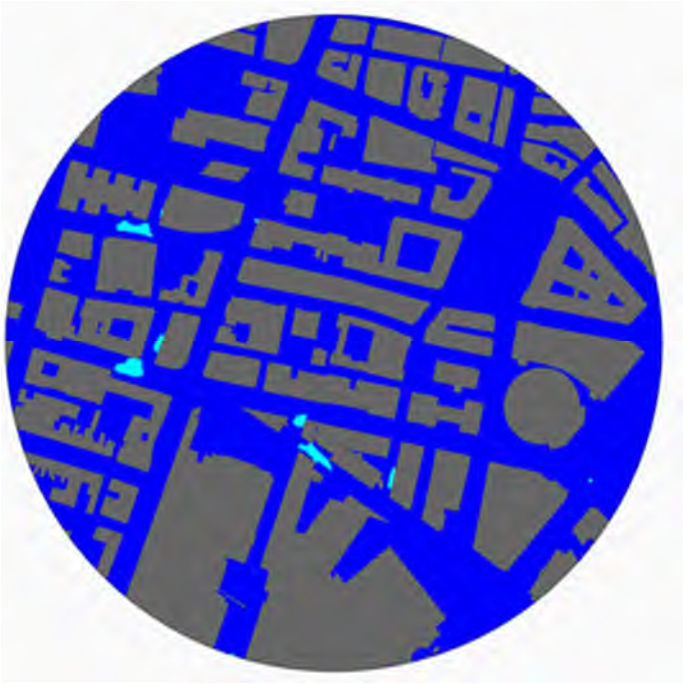
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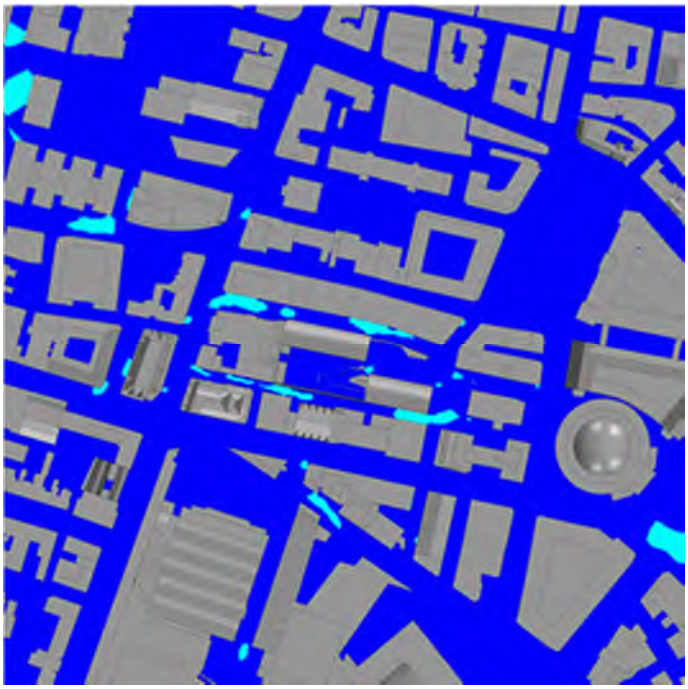


Summer

BASELINE



PROPOSED





Appendix 10.4

CFD TECHNICAL ASSUMPTIONS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

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CFD Technical Assumptions

CFD model
Computational Fluid Dynamics (CFD) solves the Navier Stokes equations governing fluid flow which is mapped out over a computational domain using the physics specific to the problem analysed; velocity, turbulence, pressure etc. The CFD code is solved via CD-adapco's STAR-CCM+ software, version 7.06. This program has been extensively used and widely validated and verified in many fluid driven applications, particularly in environmental wind cases involving atmospheric boundary layers such as this.
Using CFD to investigate the effects of a wind on a site enables a detailed understanding to be gained of the velocity distribution across the whole site. It also enables the local site microclimate to be compared with the annual weather data thus enabling assessments to be made of what activities could be comfortably undertaken at a particular location as a proportion of the year.

The fact that the flow is measured throughout the domain means that the cause of an elevated wind speed can be investigated and mitigation measures proposed that are suitable, for instance canopies or trees.

Boundary conditions
The CFD simulation has been set up in accordance with the COST Action 732 (2007)i detailing best practise guidelines for the CFD modelling of flows in the urban environment.

The CFD fluid domain has a minimum distance of 10 times the height of the tallest building from the extent of the modelled buildings to all inflow and outflow boundaries.
The top of the CFD fluid domain has been modelled as a no slip wall boundary condition with a minimum distance of 6 times the height of the tallest building from the ground.
The blockage ratio of the domain has been kept below 3% as detailed in Cost C14 (2004)ii.

Atmospheric Effects are accounted by the accurate modelling of the Atmospheric Boundary Layer profile as used in STAR-CCM+ by utilising the Zhang (2009)iii model of the expressions for turbulence and velocity.
Surface Roughness is accounted for in these equations by using the roughness parameter zo. This takes into account the effect of upstream buildings on velocity and turbulence formulation.

Meshing
A CFD model requires the fluid domain to be divided into discrete elements or "cells" that are linked together and communicate information between adjacent cells. The size, number and distribution of these cells define the level of accuracy that can be gained from the model.

In this model the domain has been meshed using hexahedral elements. The size of these hexahedral elements have been reduced around the buildings to ensure an adequate number of cells accurately resolve the geometry and flow field.
An inflation layer mesh has been used to increase the mesh density in areas of interest to ensure the flow field has been accurately resolved. This also ensures there is sufficient number of cells between the ground and the velocity slice plane.

Numerical Sub Models
Turbulence Modelling: Turbulent effects have been modelled using the Reynolds Averaged Navier Stokes (RANS) equations. The two equation k-ε RNG turbulence model was used as it is accepted to be accurate for swirling, turbulent flows such as the building immersed in an atmospheric boundary layer in this study.
Discretisation Scheme: Second order discretisation schemes have been used to spatially resolve flow and pressure distribution.

Convergence Criteria: Solutions to the Navier Stokes Equations are achieved using an iterative method to reduce the residual error within the solution, allowing closure of the governing equations for convective, diffusive and source terms. Solution convergence is a measure of the imbalance of the solution of each equation and relates to whether they have been sufficiently solved to an acceptable accuracy or not.

The residual error for this study is calculated using the RMS (root mean square) with a target of 0.0001 at selected locations around the buildings of interest.

The steady state CFD simulation will capture all major flow accelerations on the site that are likely to significantly impact pedestrian safety, it will not calculate velocity fluctuations expected in low speed turbulent wakes. Unsteady numerical modelling can account for this; however, it is computationally and time intensive to do so. Global site gusting is accounted for by running the simulation at higher range wind speeds at the site.

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[i] COST Action 732, (2007) "*Best practice guideline for the CFD simulation of flows in the urban environment."*

[ii] COST Action C14, (2004) *"Recommendations on the use of CFD in wind engineering."*

[iii] Xiaodong Zhang (2009) *"CFD simulation of neutral ABL flows"*

Appendix 11.1

EXTERNAL DAYLIGHT AND SUNLIGHT RECEPTORS

NOTE

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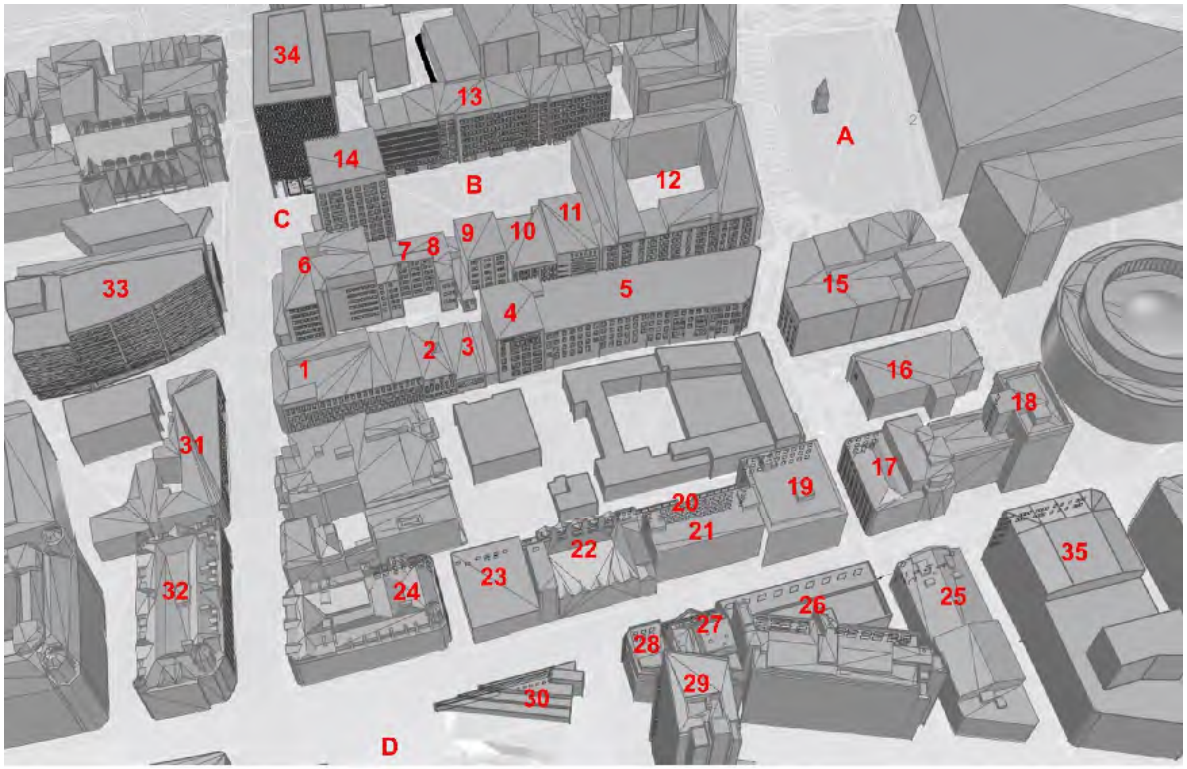
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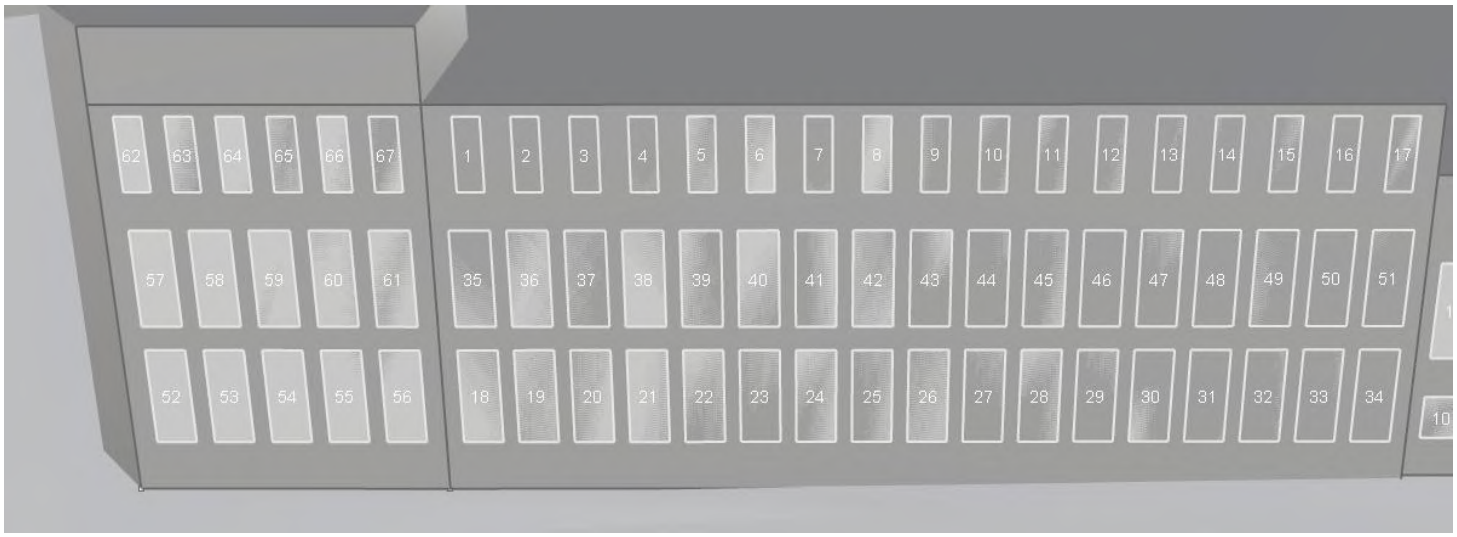
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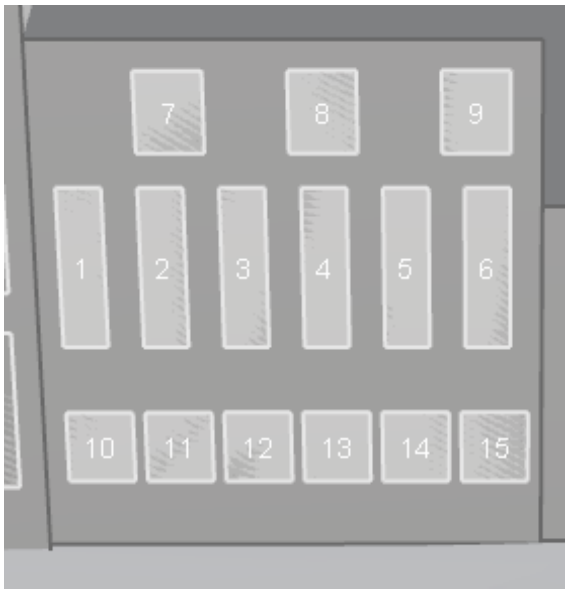

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1 – Elliot House





2 – The Old Nags Head (Pub)



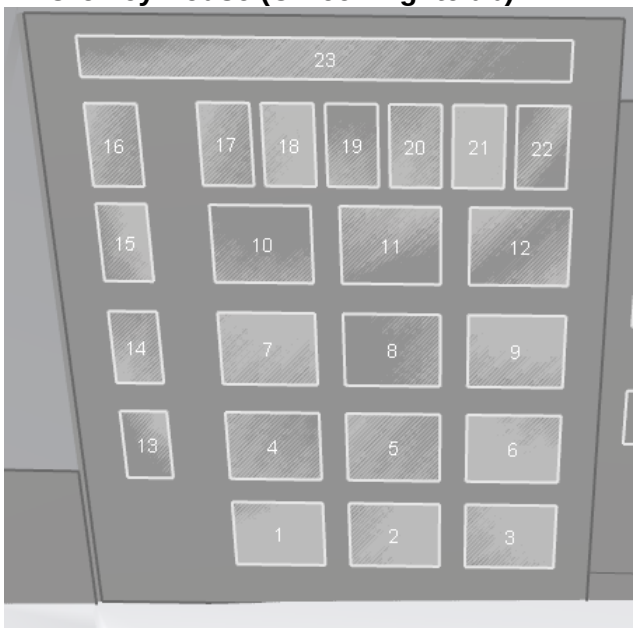


3 - 19 Jackson's Row (offices)





4 - Croxley House (Office+Nightclub)





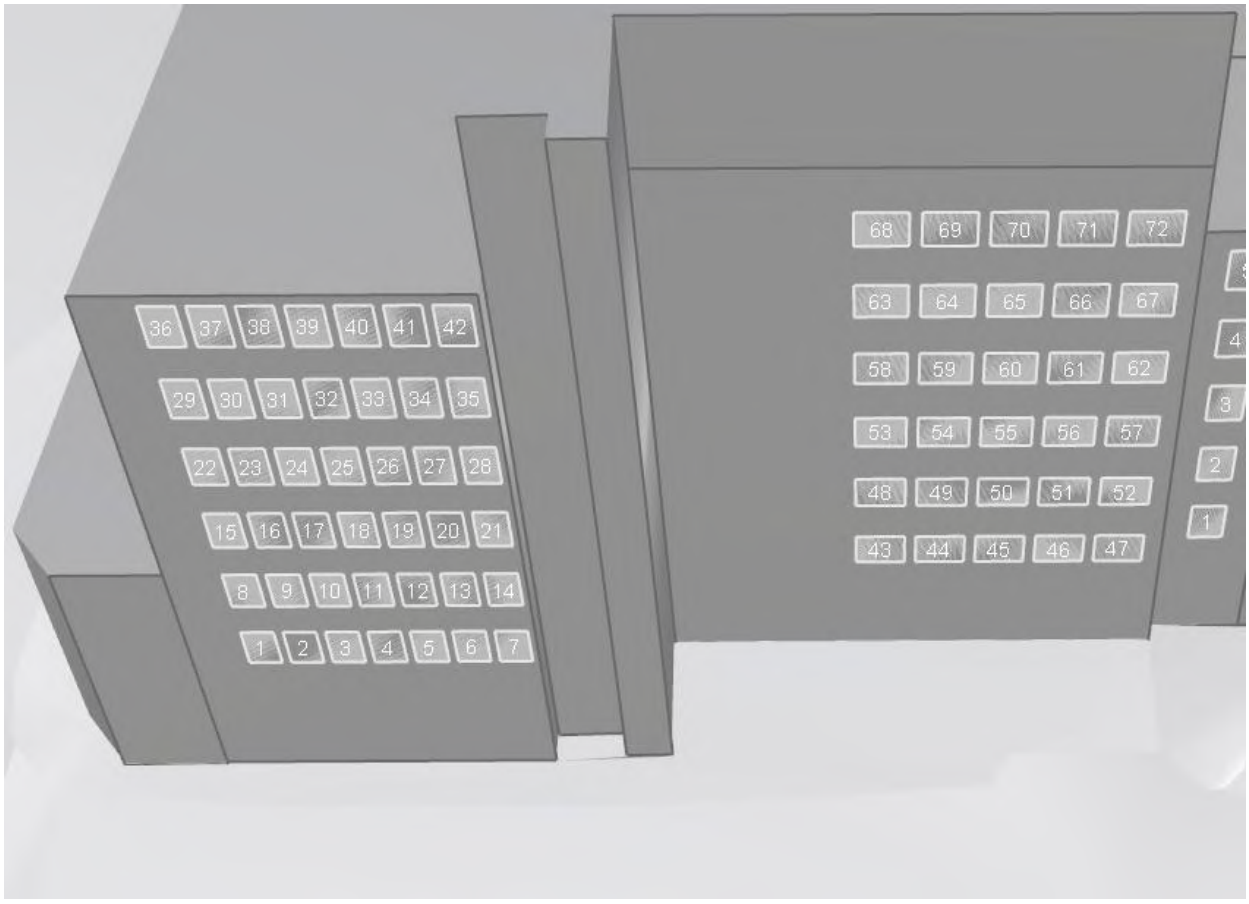
5 - Loyds House (Offices, Restaurant, Offices)





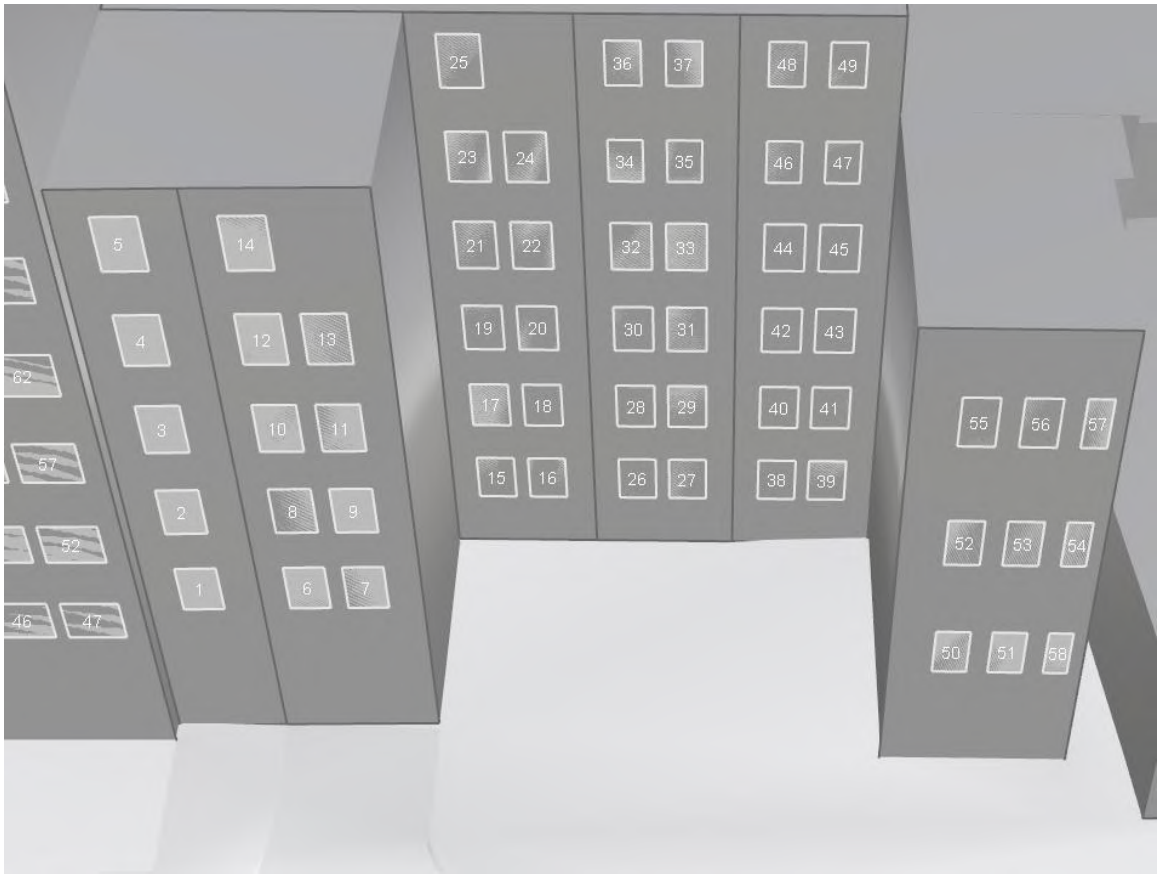
6 -St John's House (Offices)



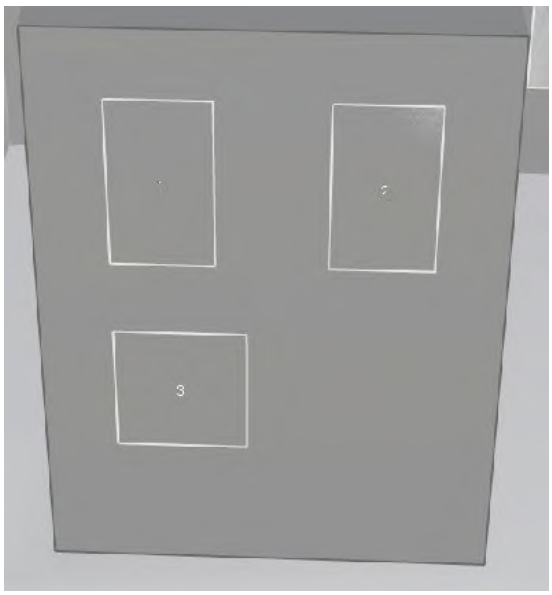


7 - Sovereign House (offices)





8 - The Rising Sun (pub)





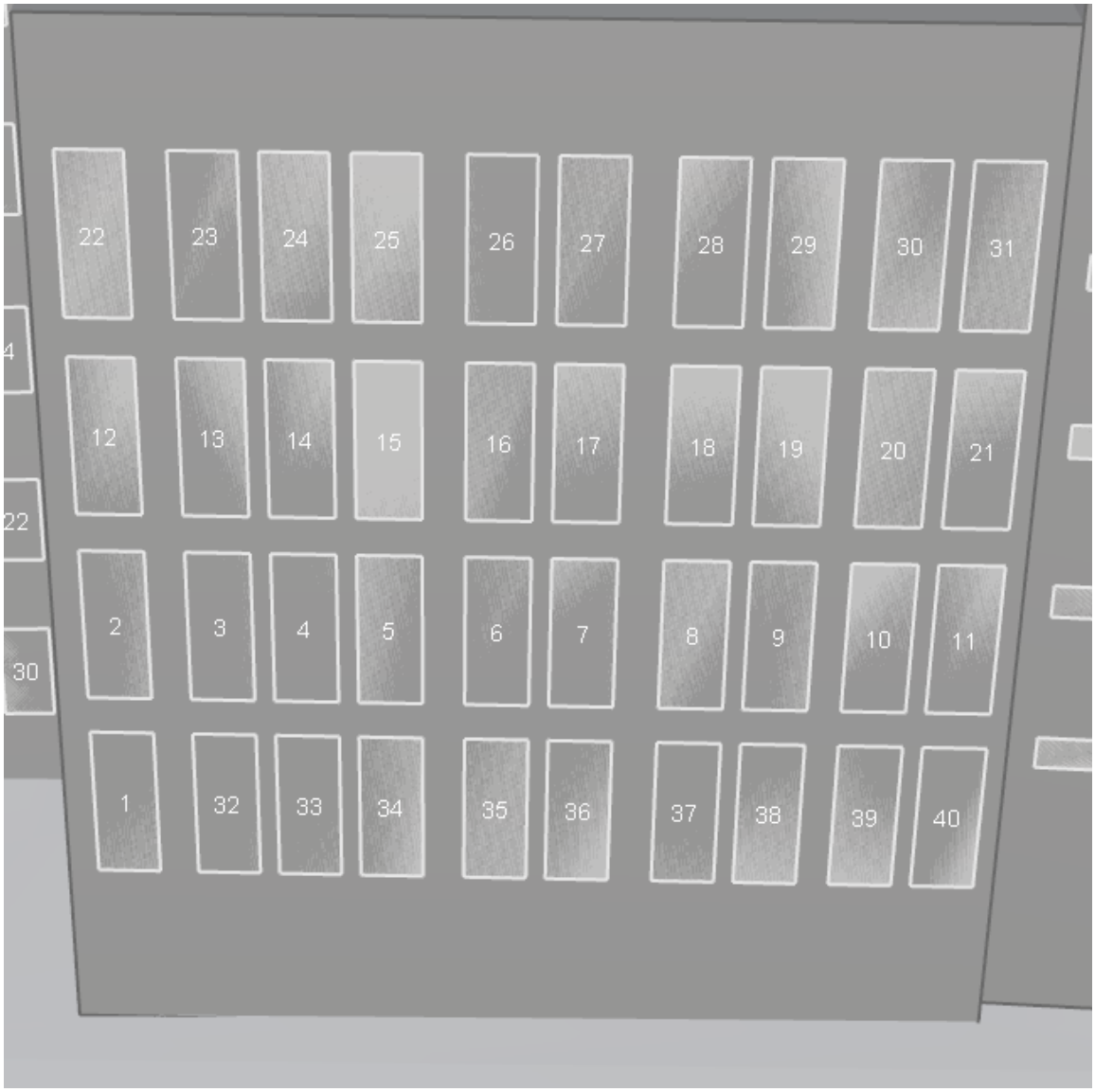
9- Queens Court (offices)





10- Alexandra Buildings (Offices + Commercial GL)



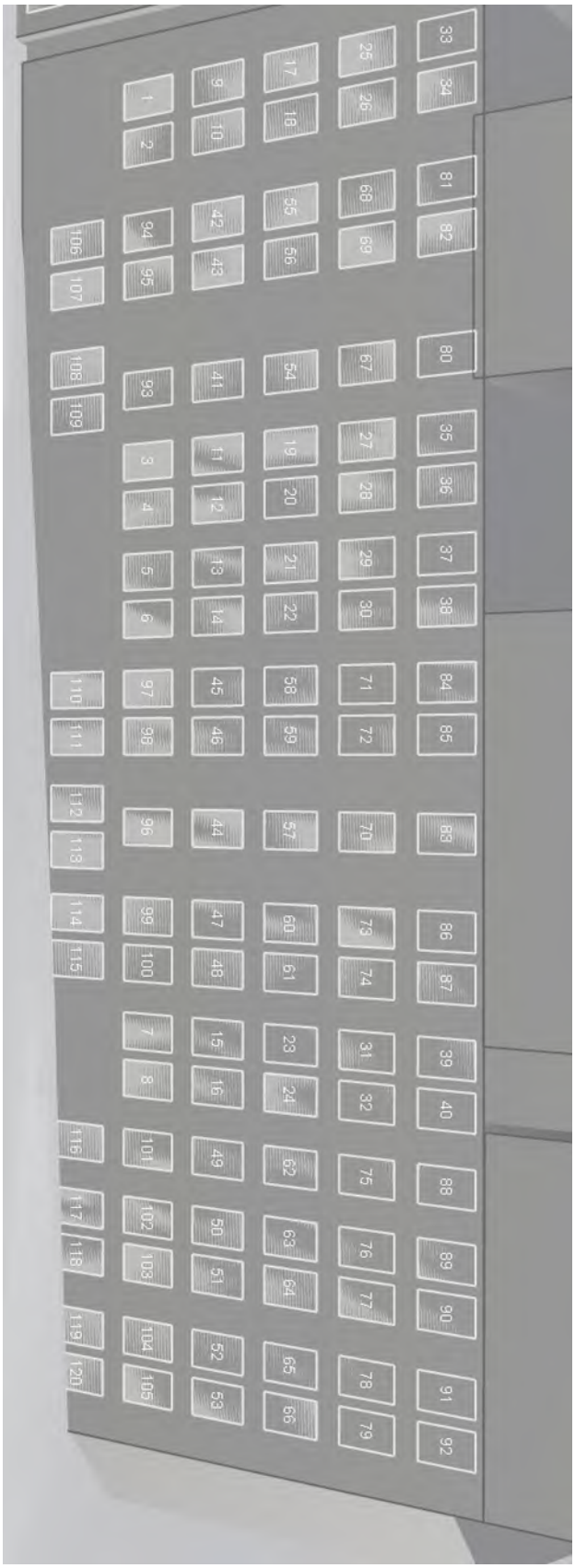


11 - Queens House (Offices+Commercial)





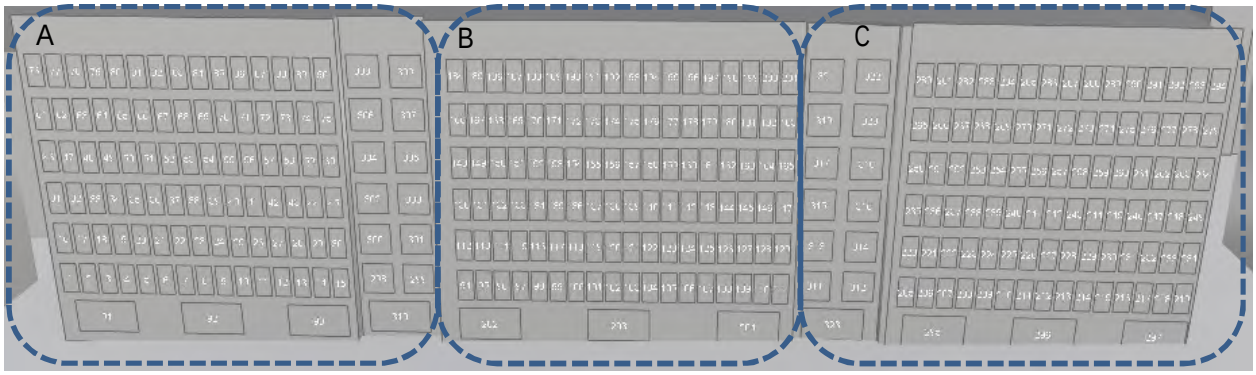
12 - Heron House (Manchester City Council, Restaurants, maybe some residential)

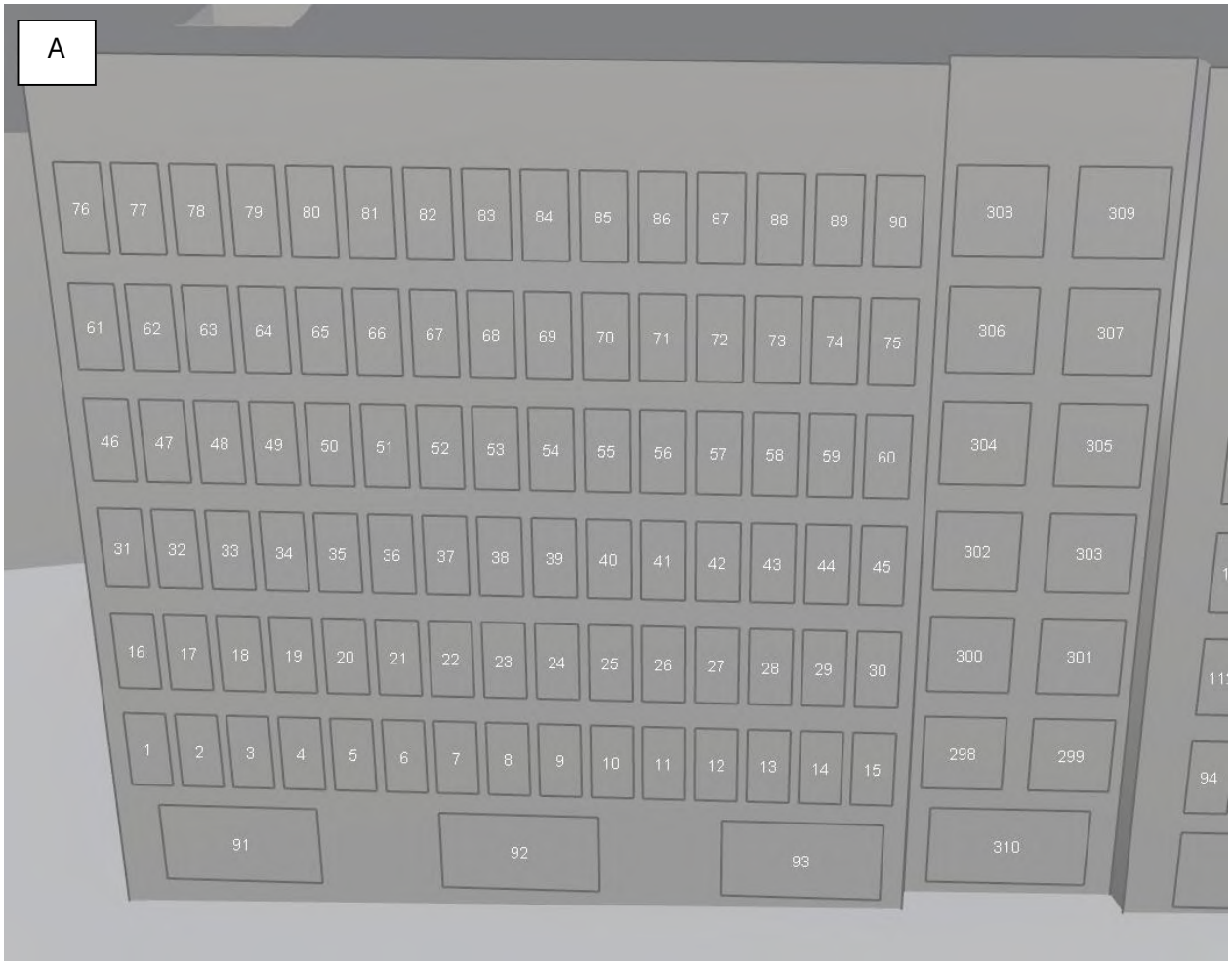




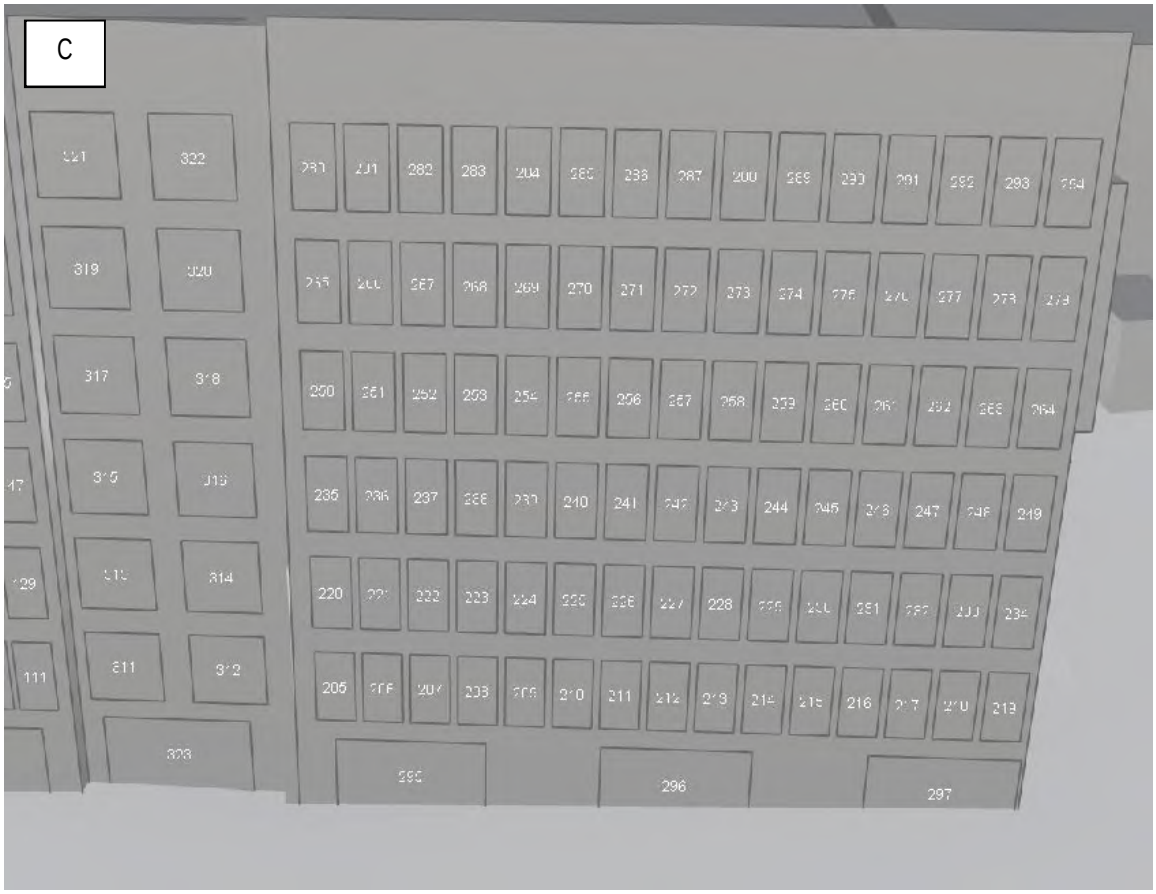
13 - Brazennose House (Commerical+Offices)





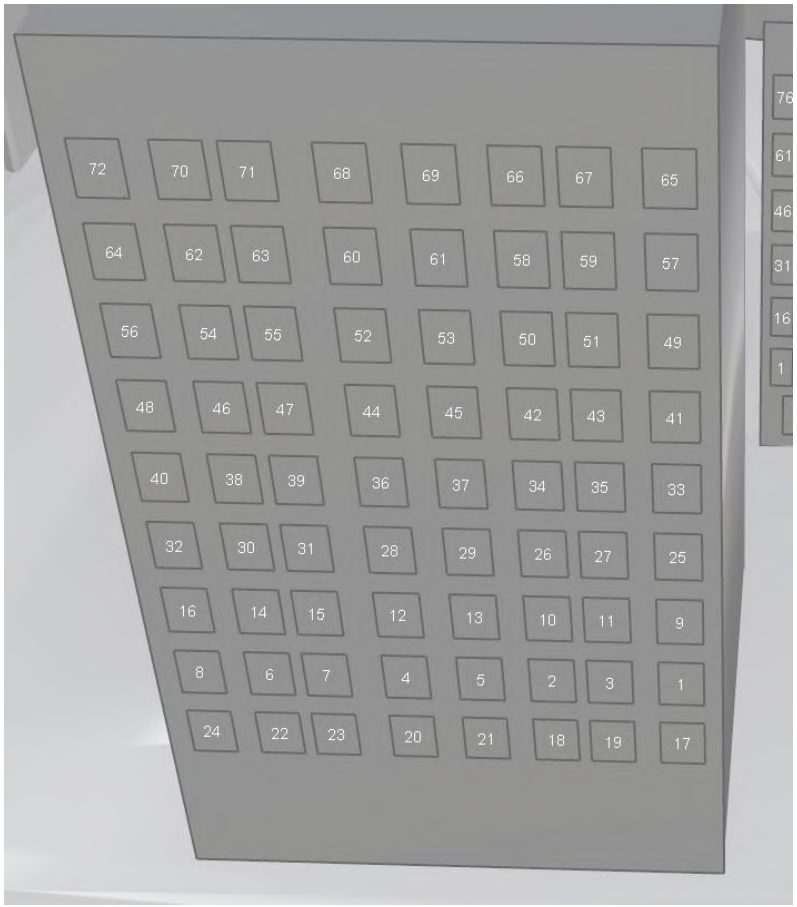



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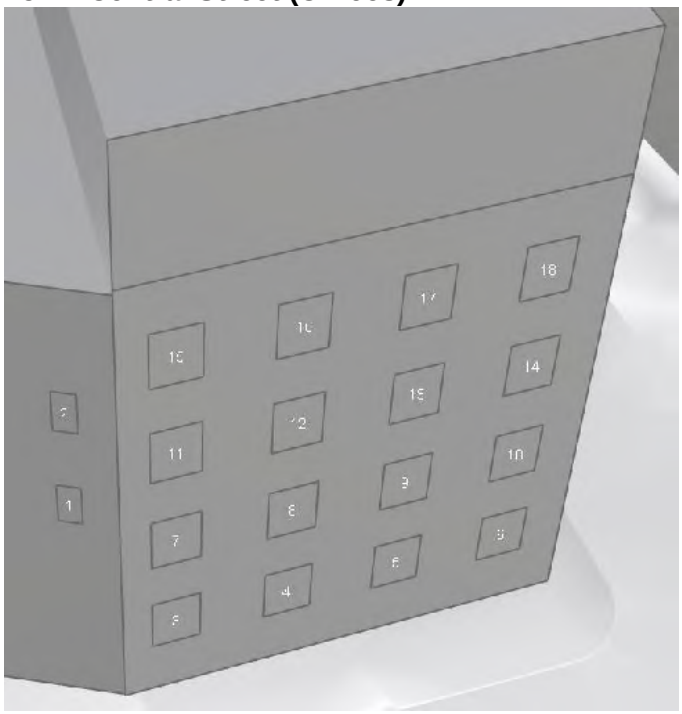

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14 - Centurion house (offices + commercial)



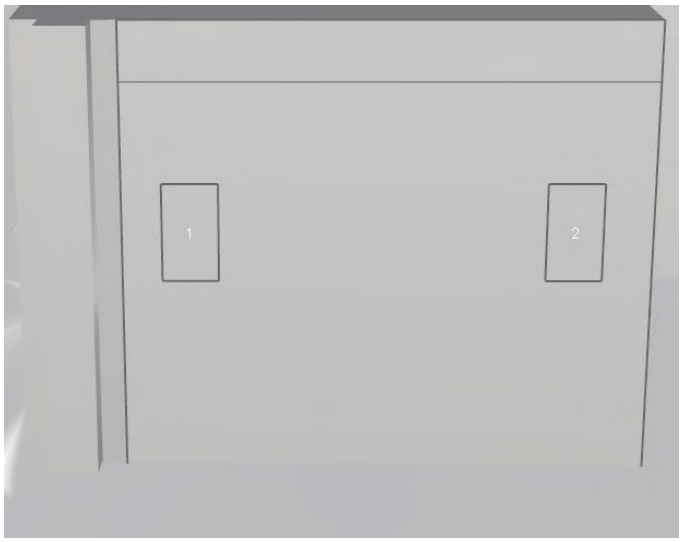


15 - 1 Central Street (Offices)





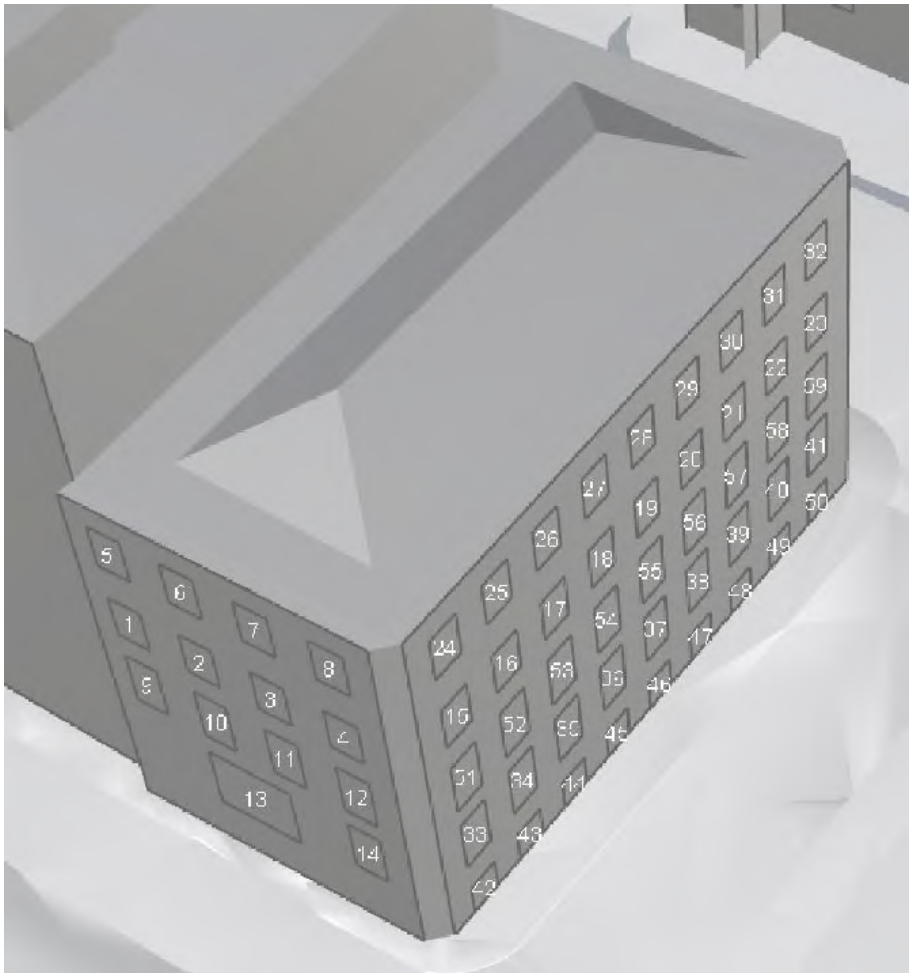
16 - 6 Mount Street (religious building ‘Friends Meeting House’)



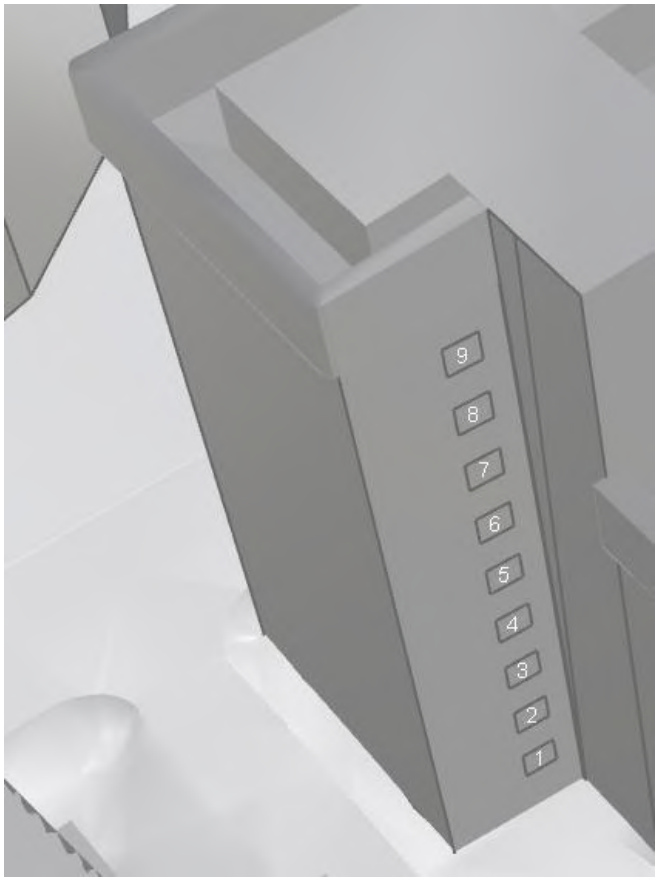


17 - 75 Southmill St (Offices)





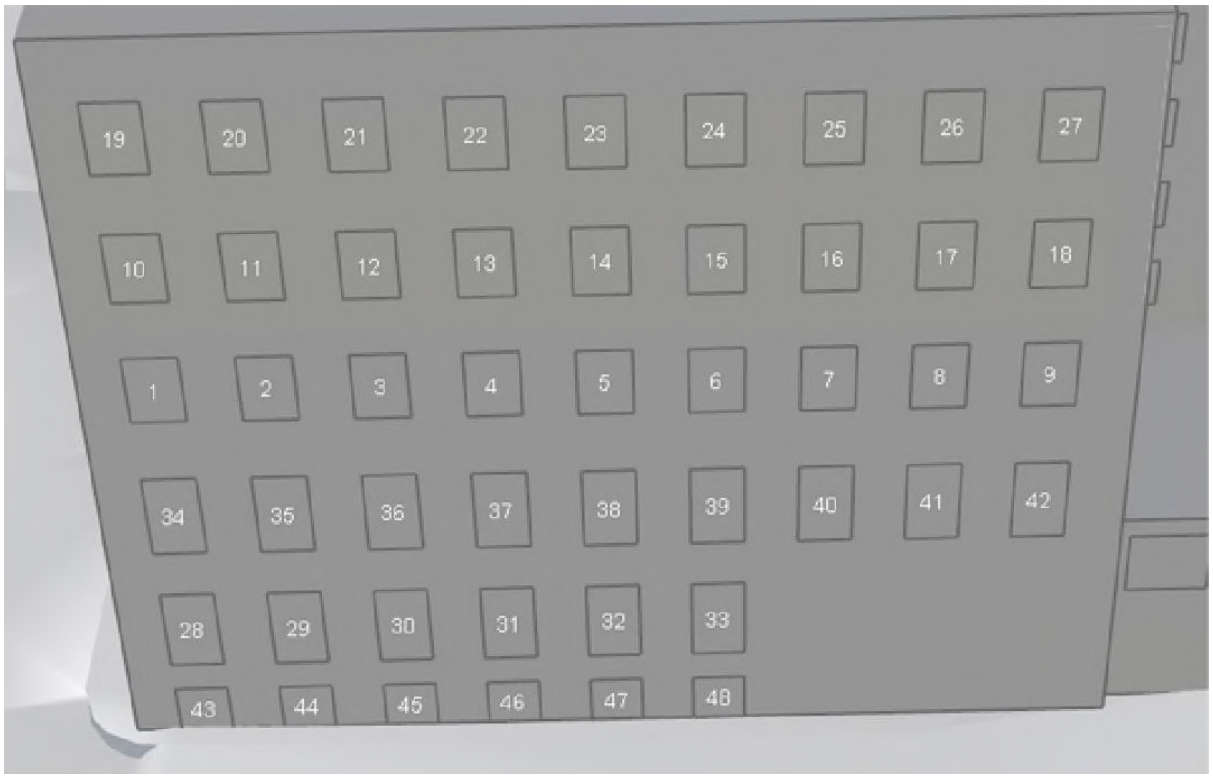
18 - Television House (Offices)





19 - 37 Peter Street (Offices)





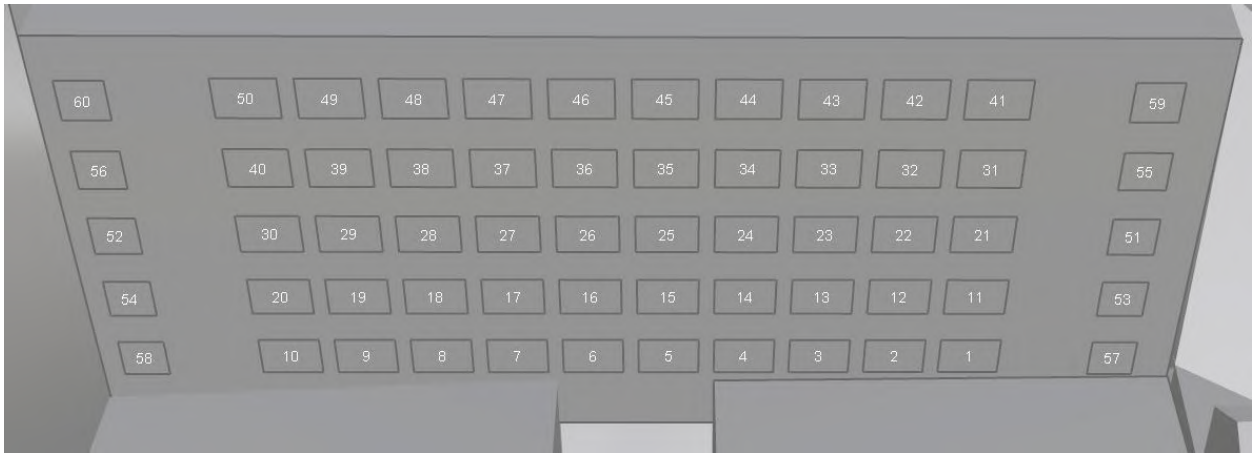
20 - 11-13 Bootle Street





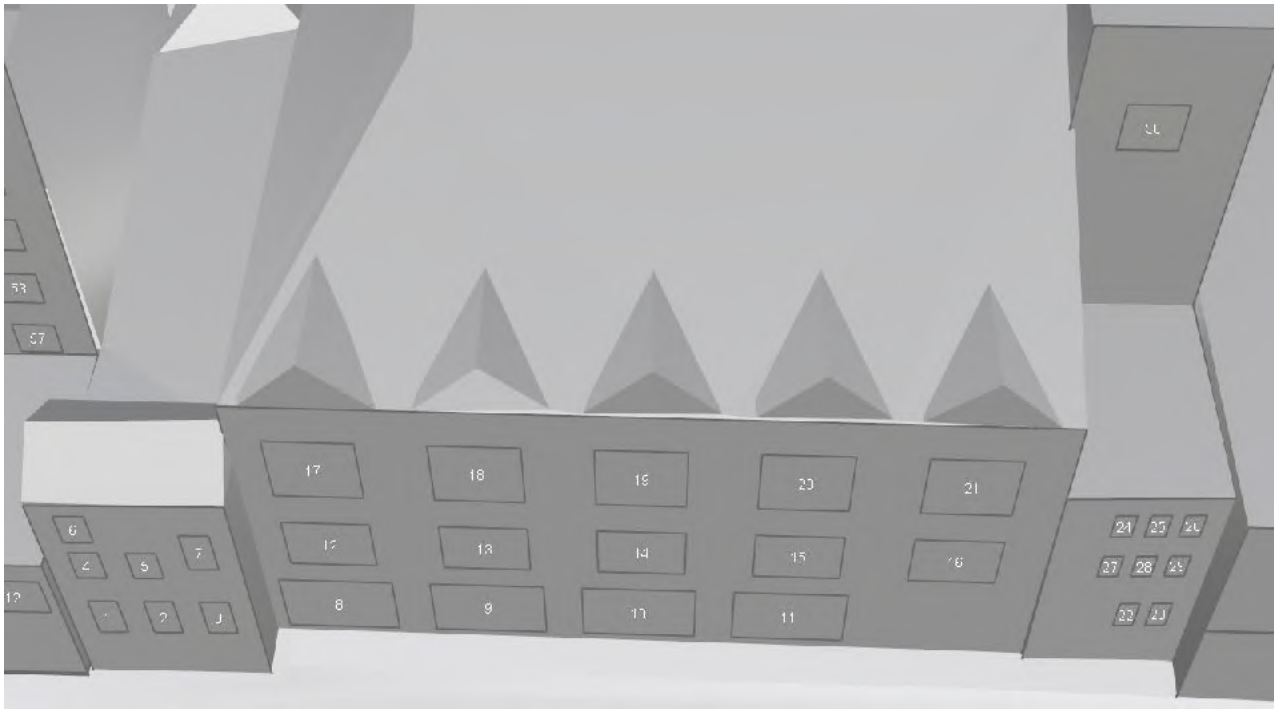
21 - Marron Place Building (office)





22 - Albert hall





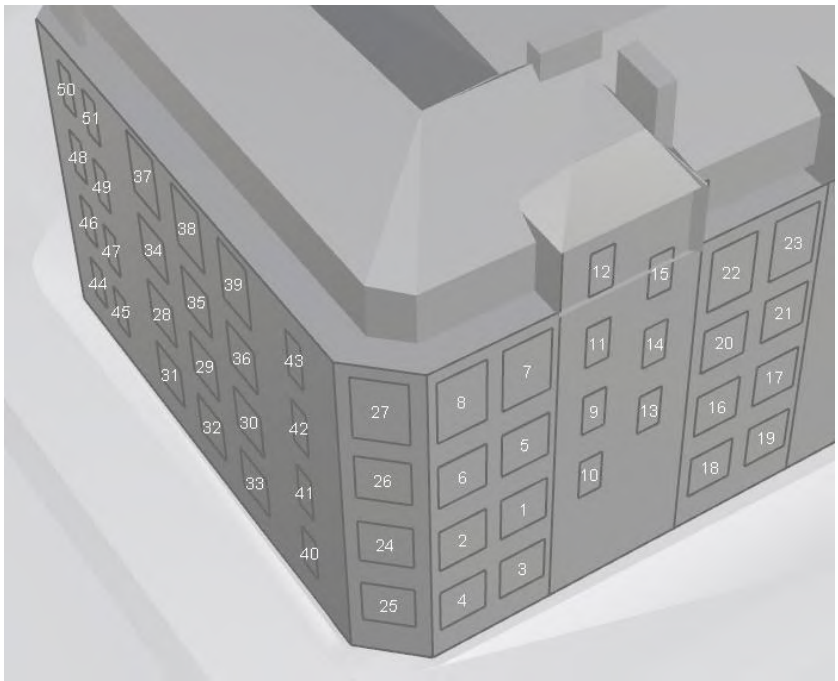
23 - 23 St Peter (covered windows)





24 - 2 Bootle St/Jerusalem Place (offices, Residential)





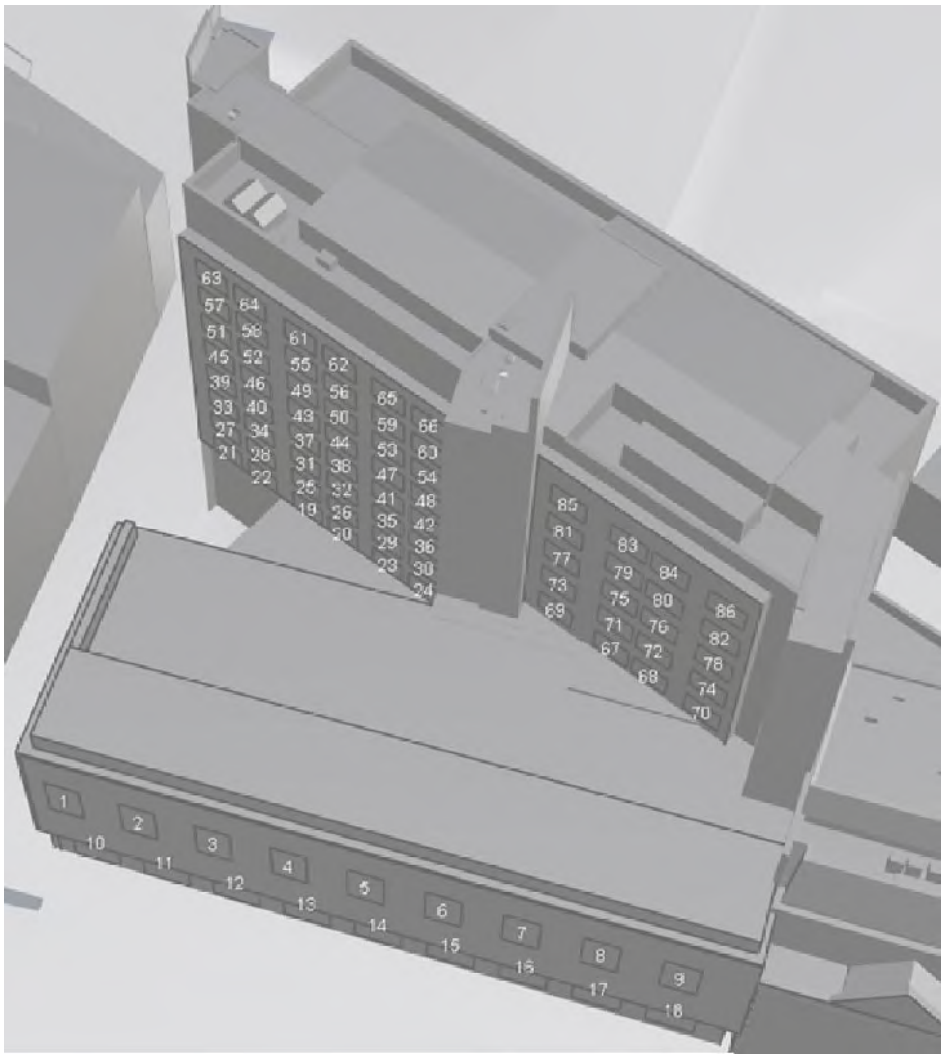
25 - Theatre Royal (Unused Theatre, NightClub)



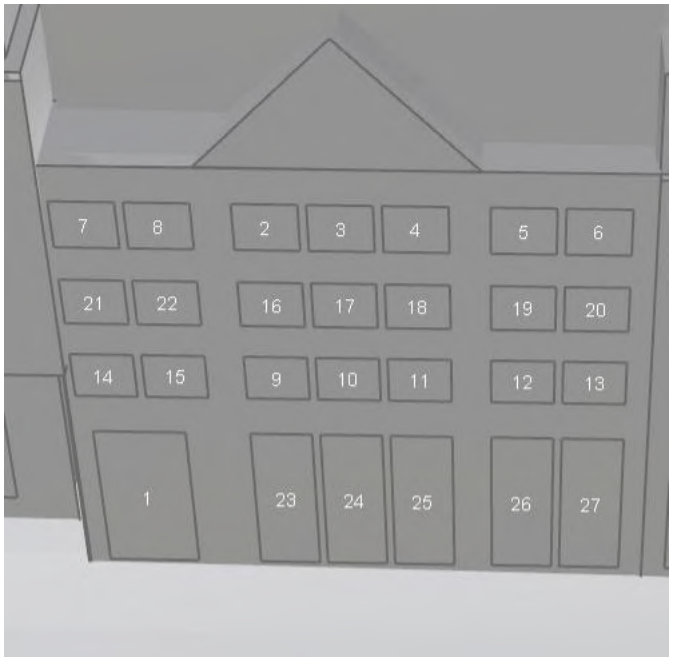


26- Radison Blu Edwardian Manchester (Hotel)



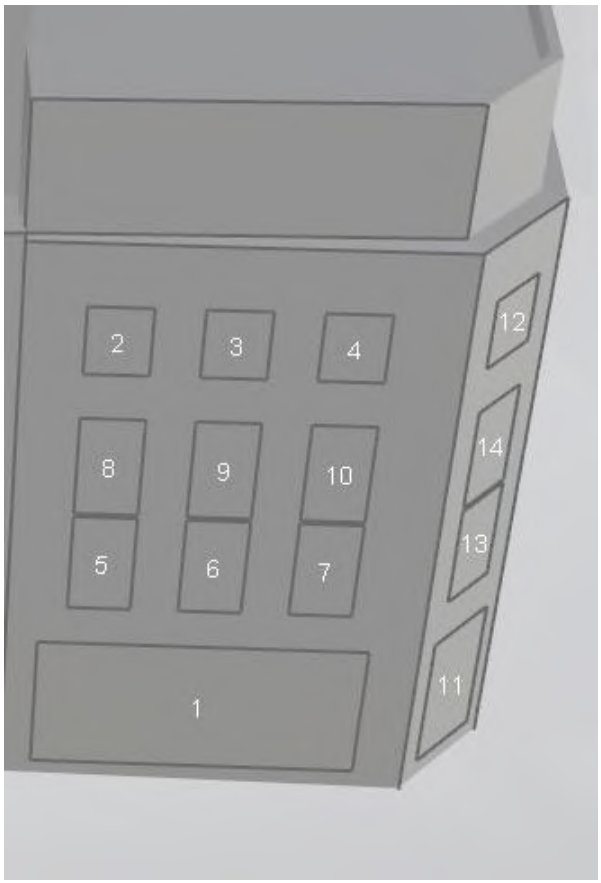


27 - 44 Peter Street (Offices)



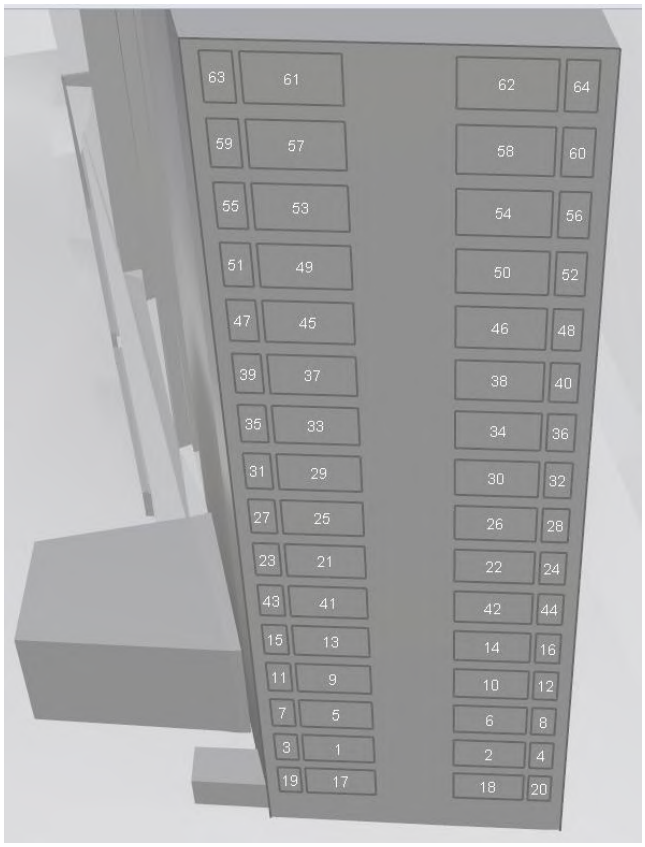


28 -Fourth Church of Christ Scientists





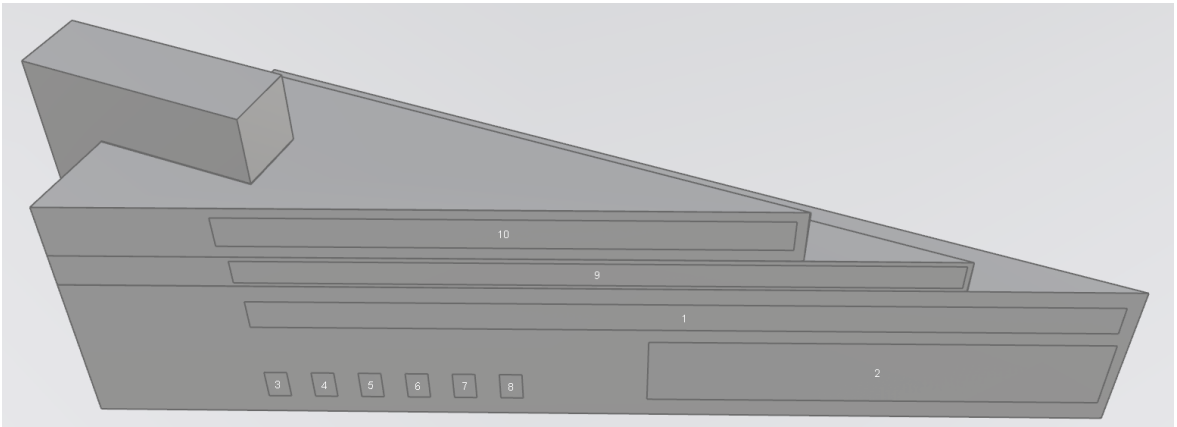
29 - Greath Northern Tower (Residential)





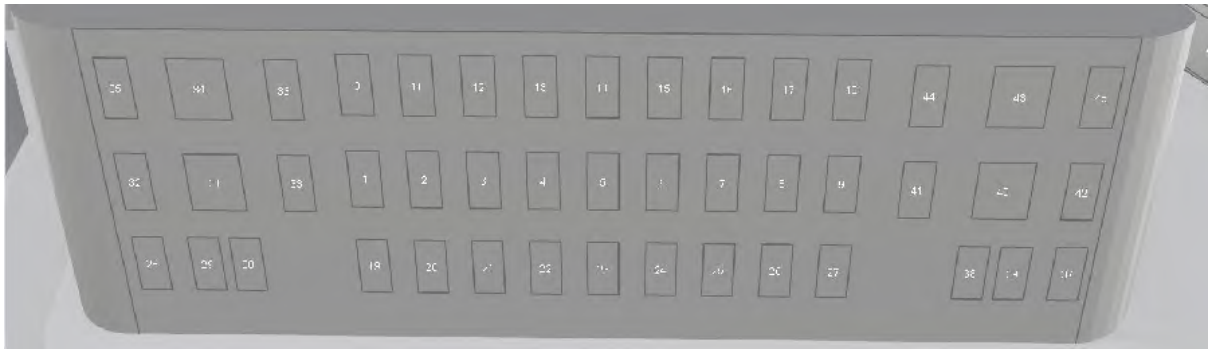
30 - De Kuyper (Commercial)



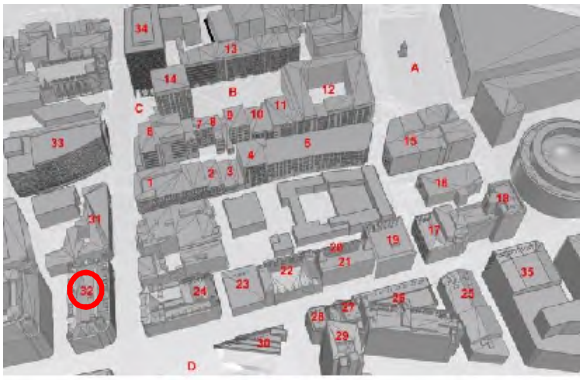


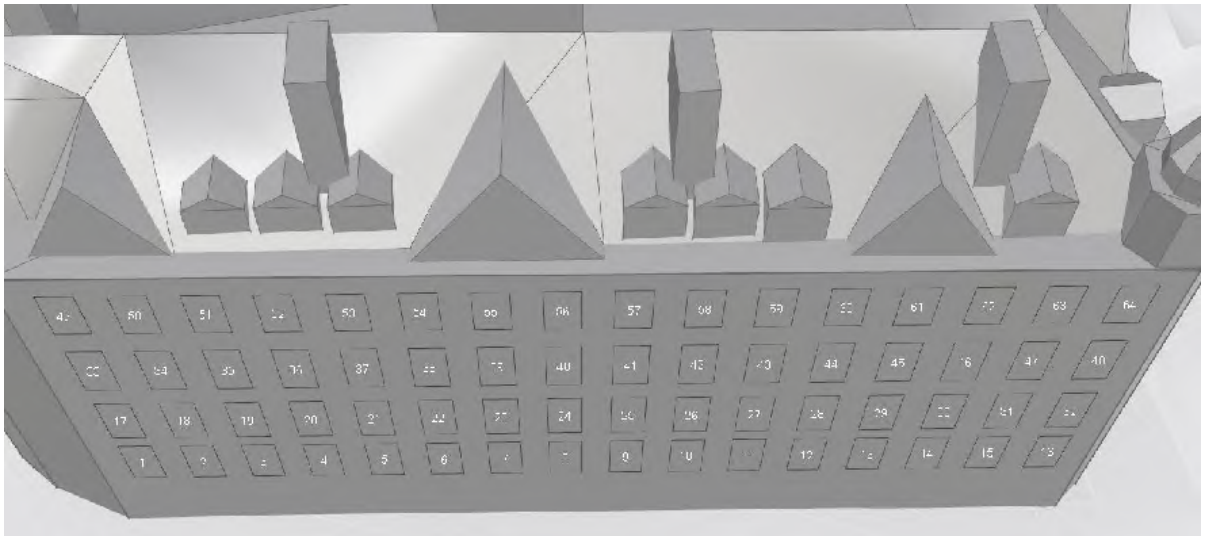
31 - Oddfellows House (offices)





32 - Oddfellows House (offices)





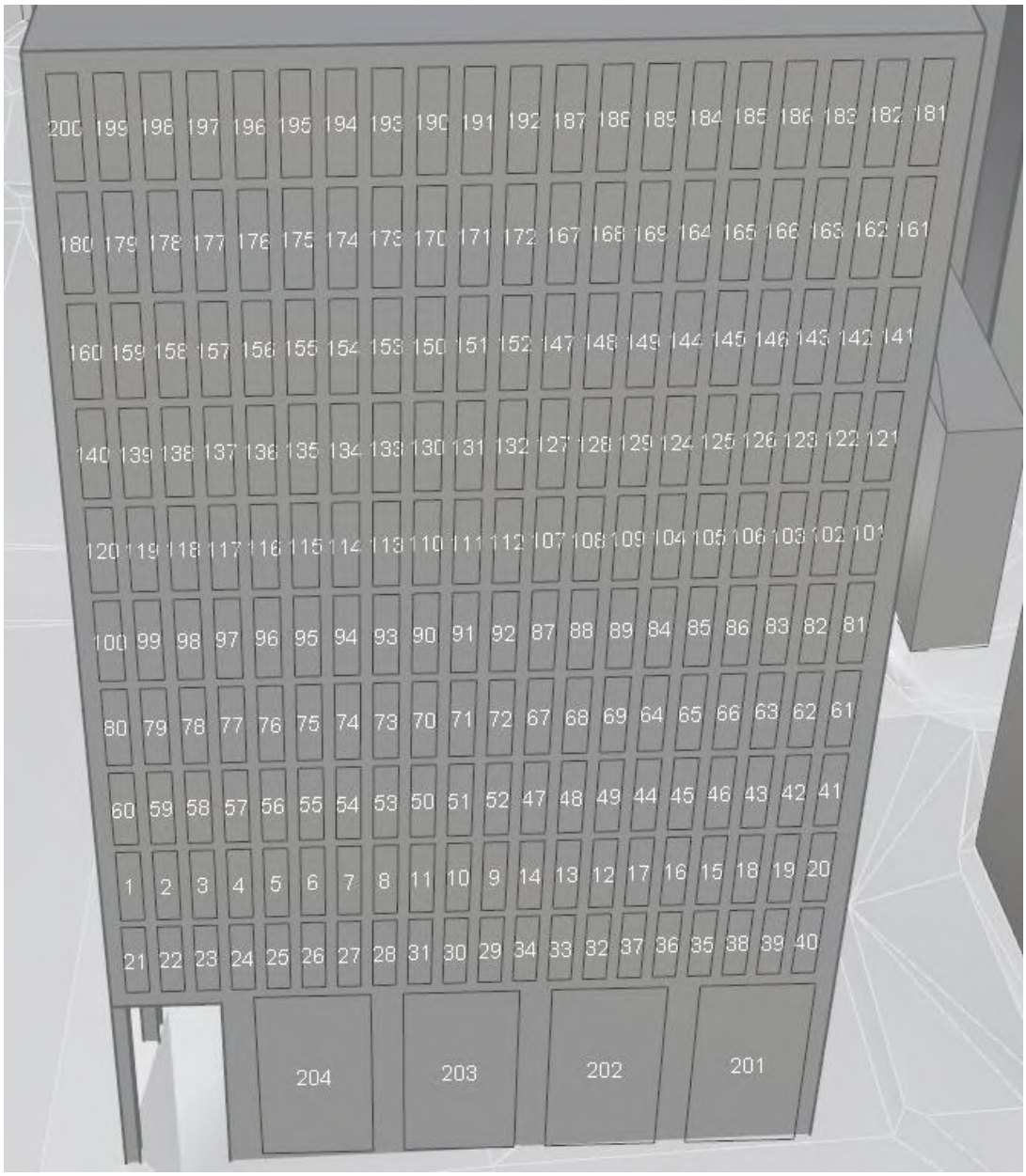
33 - 1 Scott Street (Offices, Commercial)





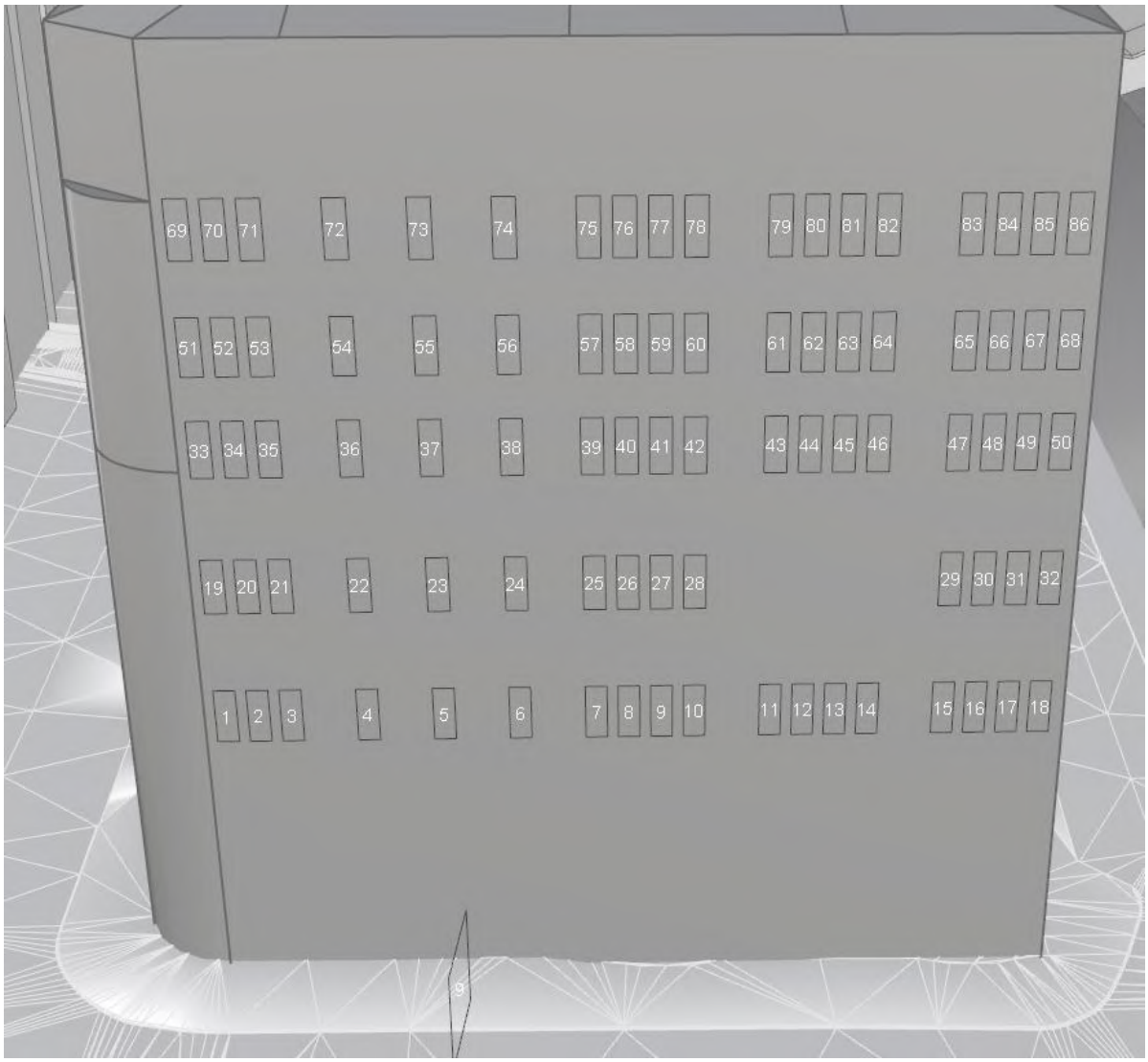
34 – 123 Deansgate (Offices, Commercial)





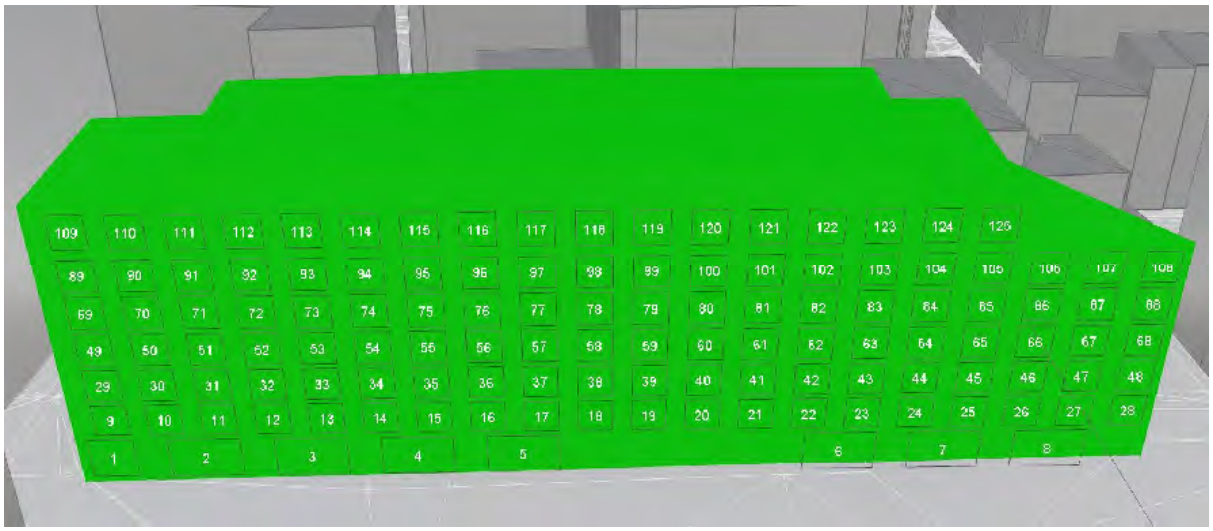
35 – Scottish House (Offices, Commercial)





Consented Building – Brazenoose House, initially receptor 13 (Offices, Commercial)





Appendix 11.2

DETAILED EXTERNAL DAYLIGHT AND SUNLIGHT RESULTS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Table A11.2.1 Detailed Daylight Results

Receptor	Windows No	Baseline (%)	Proposed (%)	Ratio of Impact	BRE Compliance	Magnitude of Impact
Elliot House (Chamber of Commerce)	1	23.3	18.1	0.78	Below	Low
	2	23.1	17.6	0.76	Below	Low
	3	22.8	17.1	0.75	Below	Low
	4	22.9	17.1	0.75	Below	Low
	5	22.9	16.6	0.72	Below	Low
	6	23	16.4	0.71	Below	Low
	7	23.3	16.4	0.7	Below	Low
	8	23.5	16.3	0.69	Below	Medium
	9	23.9	16	0.67	Below	Medium
	10	24.3	16	0.66	Below	Medium
	11	24.7	15.9	0.64	Below	Medium
	12	25.2	15.5	0.62	Below	Medium
	13	26	15.4	0.59	Below	High
	14	26.9	15.1	0.56	Below	High
	15	27.4	15.3	0.56	Below	High
	16	28.5	15.1	0.53	Below	High
	17	29.3	14.7	0.5	Below	High
	18	11.5	8.5	0.74	Below	Low
	19	11.3	8.2	0.73	Below	Low
	20	11	7.7	0.7	Below	Low
	21	11	7.6	0.69	Below	Medium
	22	11.1	7.4	0.67	Below	Medium
	23	11.1	7.3	0.66	Below	Medium
	24	11.2	7.1	0.63	Below	Medium
	25	11.3	7	0.62	Below	Medium
	26	11.7	6.9	0.59	Below	High
	27	12	6.9	0.58	Below	High
	28	12.6	6.9	0.55	Below	High
	29	13.4	6.8	0.51	Below	High
	30	14.1	6.8	0.48	Below	High
	31	15.3	6.6	0.43	Below	High
	32	16.4	6.8	0.41	Below	High
	33	18.2	7.3	0.4	Below	High
	34	19.1	7.4	0.39	Below	High
	35	16.2	12.3	0.76	Below	Low
	36	16.1	11.9	0.74	Below	Low
	37	15.9	11.4	0.72	Below	Low
	38	15.8	11.2	0.71	Below	Low
	39	15.8	10.9	0.69	Below	Medium
	40	15.8	10.7	0.68	Below	Medium

	41	15.9	10.5	0.66	Below	Medium
	42	16.2	10.6	0.65	Below	Medium
	43	16.6	10.3	0.62	Below	Medium
	44	16.9	10.2	0.6	Below	Medium
	45	17.5	10.2	0.58	Below	High
	46	18.4	10	0.54	Below	High
	47	19.4	10.1	0.52	Below	High
	48	20.6	9.9	0.48	Below	High
	49	21.6	10.1	0.47	Below	High
	50	23.3	10.6	0.45	Below	High
	51	24.5	10.5	0.43	Below	High
	52	15.9	13.5	0.85	Above	Negligible
	53	14.6	12.1	0.83	Above	Negligible
	54	13.6	11	0.81	Above	Negligible
	55	12.7	10	0.79	Below	Low
	56	12	9.3	0.78	Below	Low
	57	20.3	17.2	0.85	Above	Negligible
	58	19	15.7	0.83	Above	Negligible
	59	18.2	14.8	0.81	Above	Negligible
	60	17.6	14.1	0.8	Above	Negligible
	61	16.7	13.1	0.78	Below	Low
	62	26.8	22.8	0.85	Above	Negligible
	63	26.2	22	0.84	Above	Negligible
	64	25.3	21	0.83	Above	Negligible
	65	24.6	20.1	0.82	Above	Negligible
	66	24.2	19.5	0.81	Above	Negligible
	67	23.8	19	0.8	Below	Low
The Old Nags Head (Pub)	1	24	8.8	0.37	Below	High
	2	24.4	8.2	0.34	Below	High
	3	25.1	7.8	0.31	Below	High
	4	25.4	7.4	0.29	Below	High
	5	25.3	7.1	0.28	Below	High
	6	25	6.8	0.27	Below	High
	7	28.8	10.4	0.36	Below	High
	8	29.6	9.4	0.32	Below	High
	9	30	8.6	0.29	Below	High
	10	19	6.4	0.34	Below	High
	11	19.3	6	0.31	Below	High
	12	19.5	5.6	0.29	Below	High
	13	19.2	5.5	0.29	Below	High
	14	18.8	5.3	0.28	Below	High
	15	18.2	5.1	0.28	Below	High
19 Jackson's row (office)	1	22.4	5.7	0.25	Below	High

Croxley House (offices+Nightclub)	1	25.3	3.3	0.13	Below	High
	2	25.8	3.1	0.12	Below	High
	3	25.7	2.9	0.11	Below	High
	4	30.8	4.5	0.15	Below	High
	5	31.3	3.9	0.12	Below	High
	6	31.5	3.7	0.12	Below	High
	7	34.1	6.1	0.18	Below	High
	8	34.2	5.5	0.16	Below	High
	9	34.2	5.1	0.15	Below	High
	10	35.8	9	0.25	Below	High
	11	35.7	8.1	0.23	Below	High
	12	35.7	7.4	0.21	Below	High
	13	29.9	5	0.17	Below	High
	14	33.9	7	0.21	Below	High
	15	35.6	9.8	0.28	Below	High
	16	36.7	13.8	0.38	Below	High
	17	36.9	13	0.35	Below	High
	18	37	12.5	0.34	Below	High
	19	36.9	12	0.33	Below	High
	20	36.9	11.7	0.32	Below	High
	21	36.8	11	0.3	Below	High
	22	36.9	10.6	0.29	Below	High
	23	37.5	16.4	0.44	Below	High
Loyds House (Offices, Restaurant, Offices)	1	33.4	3.7	0.11	Below	High
	2	37	9.2	0.25	Below	High
	3	35.5	5.9	0.17	Below	High
	4	31.1	3.3	0.11	Below	High
	5	30.5	3.3	0.11	Below	High
	6	30.1	3.1	0.1	Below	High
	7	29.7	3	0.1	Below	High
	8	29.7	3	0.1	Below	High
	9	34.2	4.2	0.12	Below	High
	10	34.3	4	0.12	Below	High
	11	34.4	4	0.12	Below	High
	12	34.3	3.8	0.11	Below	High
	13	34.4	3.9	0.11	Below	High
	14	34.3	4	0.12	Below	High
	15	35.7	5.9	0.17	Below	High
	16	35.6	5.6	0.16	Below	High
	17	35.6	5.3	0.15	Below	High
	18	35.8	5.1	0.14	Below	High
	19	35.9	5	0.14	Below	High
	20	35.6	5	0.14	Below	High

	21	36.8	8.5	0.23	Below	High
	22	36.7	7.8	0.21	Below	High
	23	36.7	7.4	0.2	Below	High
	24	36.7	7	0.19	Below	High
	25	36.7	6.9	0.19	Below	High
	26	36.7	6.9	0.19	Below	High
	27	29.7	3	0.1	Below	High
	28	29.3	3	0.1	Below	High
	29	29	3	0.1	Below	High
	30	28.4	3.2	0.11	Below	High
	31	27.5	3.3	0.12	Below	High
	32	34.4	3.8	0.11	Below	High
	33	34.3	3.8	0.11	Below	High
	34	34.3	3.8	0.11	Below	High
	35	34.2	4	0.12	Below	High
	36	34	4.1	0.12	Below	High
	37	33.7	4.3	0.13	Below	High
	38	35.8	4.8	0.13	Below	High
	39	35.8	4.7	0.13	Below	High
	40	35.6	4.8	0.13	Below	High
	41	35.6	5	0.14	Below	High
	42	35.5	5.1	0.14	Below	High
	43	35.3	5.4	0.15	Below	High
	44	36.7	6.4	0.17	Below	High
	45	36.7	6.3	0.17	Below	High
	46	36.7	6.4	0.17	Below	High
	47	36.6	6.6	0.18	Below	High
	48	36.5	6.8	0.19	Below	High
	49	36.4	7.1	0.2	Below	High
	50	25.1	3.4	0.14	Below	High
	51	23.9	3.6	0.15	Below	High
	52	22.6	3.7	0.16	Below	High
	53	33.6	4.2	0.12	Below	High
	54	33.3	4.4	0.13	Below	High
	55	32.7	4.6	0.14	Below	High
	56	35.3	5.3	0.15	Below	High
	57	35.3	5.5	0.16	Below	High
	58	35.3	5.7	0.16	Below	High
	59	36.4	6.9	0.19	Below	High
	60	36.5	7.2	0.2	Below	High
	61	36.5	7.5	0.21	Below	High
	62	31.4	6.2	0.2	Below	High
	63	35	7.8	0.22	Below	High

	64	36.2	8	0.22	Below	High
	65	36.1	8.9	0.25	Below	High
	66	36	10.1	0.28	Below	High
	67	36.1	11.3	0.31	Below	High
	68	36.1	12.8	0.35	Below	High
	69	21.3	4.1	0.19	Below	High
	70	20.2	5.6	0.28	Below	High
	71	32.8	5.4	0.16	Below	High
	72	32	7.5	0.23	Below	High
	73	35.1	6.6	0.19	Below	High
	74	34.9	9.4	0.27	Below	High
	75	22.8	7	0.31	Below	High
	76	36.1	14.6	0.4	Below	High
	77	34.1	10.5	0.31	Below	High
	78	19	6.9	0.36	Below	High
	79	18.7	7.5	0.4	Below	High
	80	29.1	9.2	0.32	Below	High
	81	28	10	0.36	Below	High
	82	27	11.4	0.42	Below	High
	83	34.2	12.3	0.36	Below	High
	84	34.1	13.5	0.4	Below	High
	85	33.9	14.9	0.44	Below	High
	86	35.8	16.1	0.45	Below	High
	87	35.7	17.4	0.49	Below	High
	88	35.8	18.9	0.53	Below	High
	89	18.2	9.6	0.53	Below	High
	90	26.8	12.8	0.48	Below	High
	91	33.5	16	0.48	Below	High
	92	17	14.5	0.85	Above	Negligible
	93	22.6	18.6	0.82	Above	Negligible
	94	28.7	23.8	0.83	Above	Negligible
	95	32.9	29	0.88	Above	Negligible
St John's House (offices+Cafe GF)	1	15.2	13.4	0.88	Above	Negligible
	2	14.6	12.9	0.88	Above	Negligible
	3	14.3	12.6	0.88	Above	Negligible
	4	14.1	12.5	0.89	Above	Negligible
	5	14.1	12.4	0.88	Above	Negligible
	6	13.9	12.2	0.88	Above	Negligible
	7	13.9	12.2	0.88	Above	Negligible
	8	19.9	17.2	0.86	Above	Negligible
	9	19.7	16.9	0.86	Above	Negligible
	10	19.5	16.7	0.86	Above	Negligible
	11	19.4	16.6	0.86	Above	Negligible

	12	19.2	16.6	0.86	Above	Negligible
	13	19.1	16.4	0.86	Above	Negligible
	14	19	16.2	0.85	Above	Negligible
	15	27	22.9	0.85	Above	Negligible
	16	26.9	22.6	0.84	Above	Negligible
	17	26.7	22.5	0.84	Above	Negligible
	18	26.7	22.4	0.84	Above	Negligible
	19	26.8	22.6	0.84	Above	Negligible
	20	26.8	22.5	0.84	Above	Negligible
	21	26.8	22.4	0.84	Above	Negligible
	22	34.5	28.9	0.84	Above	Negligible
	23	34.5	28.7	0.83	Above	Negligible
	24	34.6	28.7	0.83	Above	Negligible
	25	34.6	28.7	0.83	Above	Negligible
	26	34.6	28.9	0.84	Above	Negligible
	27	34.6	28.8	0.83	Above	Negligible
	28	34.5	28.5	0.83	Above	Negligible
	29	36.7	30.8	0.84	Above	Negligible
	30	36.7	30.7	0.84	Above	Negligible
	31	36.7	30.7	0.84	Above	Negligible
	32	36.8	30.7	0.83	Above	Negligible
	33	36.8	30.8	0.84	Above	Negligible
	34	36.7	30.6	0.83	Above	Negligible
	35	36.8	30.4	0.83	Above	Negligible
	36	37.5	31.6	0.84	Above	Negligible
	37	37.5	31.5	0.84	Above	Negligible
	38	37.5	31.4	0.84	Above	Negligible
	39	37.5	31.4	0.84	Above	Negligible
	40	37.5	31.5	0.84	Above	Negligible
	41	37.6	31.4	0.84	Above	Negligible
	42	37.6	31.2	0.83	Above	Negligible
	43	17.7	14.1	0.8	Below	Low
	44	18.5	14.9	0.81	Above	Negligible
	45	19.4	15.9	0.82	Above	Negligible
	46	20.1	16.3	0.81	Above	Negligible
	47	20.6	16.8	0.82	Above	Negligible
	48	22.5	17.6	0.78	Below	Low
	49	23.5	18.6	0.79	Below	Low
	50	24.7	19.7	0.8	Below	Low
	51	25.5	20.4	0.8	Below	Low
	52	26.2	21	0.8	Above	Negligible
	53	27.9	21.8	0.78	Below	Low
	54	29.1	22.9	0.79	Below	Low

	55	29.9	23.8	0.8	Below	Low
	56	30.5	24.2	0.79	Below	Low
	57	31	24.8	0.8	Above	Negligible
	58	32	25.6	0.8	Above	Negligible
	59	32.8	26.4	0.8	Above	Negligible
	60	33.3	26.9	0.81	Above	Negligible
	61	33.7	27.2	0.81	Above	Negligible
	62	33.9	27.4	0.81	Above	Negligible
	63	34	27.5	0.81	Above	Negligible
	64	34.7	28.4	0.82	Above	Negligible
	65	35.1	28.8	0.82	Above	Negligible
	66	35.4	29	0.82	Above	Negligible
	67	35.5	29.2	0.82	Above	Negligible
	68	35.3	28.6	0.81	Above	Negligible
	69	36	29.4	0.82	Above	Negligible
	70	36.5	29.9	0.82	Above	Negligible
	71	36.6	29.9	0.82	Above	Negligible
	72	36.9	30.2	0.82	Above	Negligible
Sovereign House (offices)	1	22.2	17.7	0.8	Below	Low
	2	27.7	21.9	0.79	Below	Low
	3	31.8	25.2	0.79	Below	Low
	4	33.9	27.3	0.81	Above	Negligible
	5	35.4	28.7	0.81	Above	Negligible
	6	23.2	18.7	0.81	Above	Negligible
	7	23.4	19	0.81	Above	Negligible
	8	28.6	23	0.8	Above	Negligible
	9	28.9	23.2	0.8	Above	Negligible
	10	32.4	26.3	0.81	Above	Negligible
	11	32.5	26.4	0.81	Above	Negligible
	12	34.3	28.3	0.83	Above	Negligible
	13	34.4	28.3	0.82	Above	Negligible
	14	35.9	29.6	0.82	Above	Negligible
	15	13.3	9.1	0.68	Below	Medium
	16	15.2	11.1	0.73	Below	Low
	17	15.7	10.8	0.69	Below	Medium
	18	17.9	13.1	0.73	Below	Low
	19	17.9	12.5	0.7	Below	Medium
	20	20.6	15.4	0.75	Below	Low
	21	20	14.6	0.73	Below	Low
	22	23.3	18.1	0.78	Below	Low
	23	22.6	17.1	0.76	Below	Low
	24	27.1	21.9	0.81	Above	Negligible
	25	29.2	23.4	0.8	Above	Negligible

	26	17	12.8	0.75	Below	Low
	27	17.1	12.6	0.74	Below	Low
	28	20.2	15.5	0.77	Below	Low
	29	20.3	15.4	0.76	Below	Low
	30	23.5	18.1	0.77	Below	Low
	31	23.6	18.1	0.77	Below	Low
	32	27.1	21.7	0.8	Above	Negligible
	33	27.3	21.7	0.79	Below	Low
	34	30.8	25.4	0.82	Above	Negligible
	35	31.7	26.1	0.82	Above	Negligible
	36	34.5	28.9	0.84	Above	Negligible
	37	35	29.1	0.83	Above	Negligible
	38	15.9	11.3	0.71	Below	Low
	39	13.9	10.8	0.78	Below	Low
	40	18.8	13.6	0.72	Below	Low
	41	16.5	12.8	0.78	Below	Low
	42	21.2	15.8	0.75	Below	Low
	43	18.4	14.3	0.78	Below	Low
	44	24.5	18.9	0.77	Below	Low
	45	20.7	16	0.77	Below	Low
	46	31.2	25.6	0.82	Above	Negligible
	47	27	21.6	0.8	Above	Negligible
	48	35.4	29.5	0.83	Above	Negligible
	49	35.4	29.5	0.83	Above	Negligible
	50	22.4	16.7	0.75	Below	Low
	51	22	16.1	0.73	Below	Low
	52	27.6	21.1	0.76	Below	Low
	53	27.1	20.5	0.76	Below	Low
	54	26.4	19.7	0.75	Below	Low
	55	30.9	24.4	0.79	Below	Low
	56	30.3	23.8	0.79	Below	Low
	57	29.6	23	0.78	Below	Low
	58	21.5	15.5	0.72	Below	Low
The Rising Sun (pub)	1	18.8	13.1	0.7	Below	Medium
	2	18.3	12.7	0.69	Below	Medium
	3	15.3	11	0.72	Below	Low
Queens Court (offices)	1	19.2	14.6	0.76	Below	Low
	2	18.6	14.9	0.8	Above	Negligible
	3	22.5	17.6	0.78	Below	Low
	4	22.1	17.9	0.81	Above	Negligible
	5	26.8	21.6	0.81	Above	Negligible
	6	26.4	21.9	0.83	Above	Negligible
	7	31.7	25.9	0.82	Above	Negligible

	8	31.2	26	0.83	Above	Negligible
	9	10	6.9	0.69	Below	Medium
	10	12.3	9.2	0.75	Below	Low
	11	16.3	14.2	0.87	Above	Negligible
	12	14.7	13.2	0.9	Above	Negligible
	13	19.5	16.8	0.86	Above	Negligible
	14	18	15.8	0.88	Above	Negligible
	15	23.9	20.6	0.86	Above	Negligible
	16	22.6	19.6	0.87	Above	Negligible
	17	29.9	25.4	0.85	Above	Negligible
	18	29.1	24.9	0.86	Above	Negligible
	19	13	11.1	0.85	Above	Negligible
	20	12	10.7	0.89	Above	Negligible
	21	11.9	10.5	0.88	Above	Negligible
	22	10.6	9.1	0.86	Above	Negligible
	23	14.3	12.3	0.86	Above	Negligible
	24	12.6	10.4	0.83	Above	Negligible
	25	18.3	15.4	0.84	Above	Negligible
	26	15.7	12.6	0.8	Above	Negligible
	27	26	22	0.85	Above	Negligible
	28	22.7	18.6	0.82	Above	Negligible
	29	9.9	8.9	0.9	Above	Negligible
	30	8.8	7.8	0.89	Above	Negligible
Alexandra Buildings (Offices + Commercial GL)	1	7.8	7.5	0.96	Above	Negligible
	2	9.9	9.3	0.94	Above	Negligible
	3	9.7	9.1	0.94	Above	Negligible
	4	9.6	9.1	0.95	Above	Negligible
	5	9.6	9.1	0.95	Above	Negligible
	6	9.6	9	0.94	Above	Negligible
	7	9.7	9.1	0.94	Above	Negligible
	8	10	9.3	0.93	Above	Negligible
	9	9.9	9.2	0.93	Above	Negligible
	10	9.9	9.1	0.92	Above	Negligible
	11	10	9	0.9	Above	Negligible
	12	13.2	12	0.91	Above	Negligible
	13	13.1	11.9	0.91	Above	Negligible
	14	13.1	11.8	0.9	Above	Negligible
	15	13.3	12.1	0.91	Above	Negligible
	16	13.5	12.4	0.92	Above	Negligible
	17	13.6	12.4	0.91	Above	Negligible
	18	13.9	12.5	0.9	Above	Negligible
	19	14	12.5	0.89	Above	Negligible
	20	14.1	12.5	0.89	Above	Negligible

	21	14.2	12.5	0.88	Above	Negligible
	22	17.9	15.8	0.88	Above	Negligible
	23	17.9	15.9	0.89	Above	Negligible
	24	18.2	16	0.88	Above	Negligible
	25	18.6	16.4	0.88	Above	Negligible
	26	19	16.9	0.89	Above	Negligible
	27	19.5	17.2	0.88	Above	Negligible
	28	19.9	17.4	0.87	Above	Negligible
	29	20.1	17.5	0.87	Above	Negligible
	30	20.3	17.5	0.86	Above	Negligible
	31	20.6	17.6	0.85	Above	Negligible
	32	7.6	7.3	0.96	Above	Negligible
	33	7.4	7.2	0.97	Above	Negligible
	34	7.4	7.1	0.96	Above	Negligible
	35	7.3	7.1	0.97	Above	Negligible
	36	7.3	7	0.96	Above	Negligible
	37	7.3	7	0.96	Above	Negligible
	38	7.4	7	0.95	Above	Negligible
	39	7.3	6.9	0.95	Above	Negligible
	40	7.4	6.9	0.93	Above	Negligible
Queens House (Offices+Commercial)	1	11	9.7	0.88	Above	Negligible
	2	8.3	7.6	0.92	Above	Negligible
	3	14.7	12.7	0.86	Above	Negligible
	4	19.8	16.7	0.84	Above	Negligible
	5	7.8	7.1	0.91	Above	Negligible
	6	10.4	9.2	0.88	Above	Negligible
	7	6	5.7	0.95	Above	Negligible
	8	14.4	12.4	0.86	Above	Negligible
	9	19.7	16.5	0.84	Above	Negligible
	10	26.9	22	0.82	Above	Negligible
	11	34.6	25.4	0.73	Below	Low
	12	34.7	25.2	0.73	Below	Low
	13	34.8	25.1	0.72	Below	Low
	14	34.8	25.3	0.73	Below	Low
	15	34.9	25.5	0.73	Below	Low
	16	35	25.5	0.73	Below	Low
Heron House (Manchester City Council,Restaurants,maybe some residential)	1	9.6	8.7	0.91	Above	Negligible
	2	9.8	8.9	0.91	Above	Negligible
	3	10.9	9.9	0.91	Above	Negligible
	4	11	10.1	0.92	Above	Negligible
	5	11.3	10.4	0.92	Above	Negligible
	6	11.4	10.5	0.92	Above	Negligible

	7	13.2	12.4	0.94	Above	Negligible
	8	13.5	12.7	0.94	Above	Negligible
	9	13.5	12	0.89	Above	Negligible
	10	13.8	12.3	0.89	Above	Negligible
	11	14.8	13.3	0.9	Above	Negligible
	12	15	13.5	0.9	Above	Negligible
	13	15.2	13.7	0.9	Above	Negligible
	14	15.3	13.8	0.9	Above	Negligible
	15	17.6	16.3	0.93	Above	Negligible
	16	18.1	16.7	0.92	Above	Negligible
	17	19.4	16.8	0.87	Above	Negligible
	18	19.5	17	0.87	Above	Negligible
	19	20.5	18.2	0.89	Above	Negligible
	20	20.7	18.4	0.89	Above	Negligible
	21	21	18.7	0.89	Above	Negligible
	22	21.3	19	0.89	Above	Negligible
	23	23	21.1	0.92	Above	Negligible
	24	23.4	21.5	0.92	Above	Negligible
	25	27.4	22.9	0.84	Above	Negligible
	26	27.7	23.1	0.83	Above	Negligible
	27	28.7	24.2	0.84	Above	Negligible
	28	28.7	24.5	0.85	Above	Negligible
	29	29	24.7	0.85	Above	Negligible
	30	29.1	24.8	0.85	Above	Negligible
	31	29.9	26.6	0.89	Above	Negligible
	32	30	26.8	0.89	Above	Negligible
	33	36.1	26.2	0.73	Below	Low
	34	36.2	26.5	0.73	Below	Low
	35	36.1	27.9	0.77	Above	Negligible
	36	36.2	28.4	0.78	Above	Negligible
	37	36.3	28.7	0.79	Above	Negligible
	38	36.3	28.8	0.79	Above	Negligible
	39	36.1	30.8	0.85	Above	Negligible
	40	36.1	31	0.86	Above	Negligible
	41	14.8	13.1	0.89	Above	Negligible
	42	14.1	12.6	0.89	Above	Negligible
	43	14.4	12.7	0.88	Above	Negligible
	44	16.2	14.8	0.91	Above	Negligible
	45	15.6	14.1	0.9	Above	Negligible
	46	15.9	14.5	0.91	Above	Negligible
	47	16.6	15.3	0.92	Above	Negligible
	48	17.1	15.7	0.92	Above	Negligible
	49	18.9	17.6	0.93	Above	Negligible

	50	19.6	18.4	0.94	Above	Negligible
	51	20.4	19.2	0.94	Above	Negligible
	52	21.4	20.2	0.94	Above	Negligible
	53	22.5	21.3	0.95	Above	Negligible
	54	20.3	17.8	0.88	Above	Negligible
	55	19.9	17.3	0.87	Above	Negligible
	56	19.9	17.5	0.88	Above	Negligible
	57	22	20	0.91	Above	Negligible
	58	21.4	19.1	0.89	Above	Negligible
	59	21.7	19.5	0.9	Above	Negligible
	60	22.5	20.5	0.91	Above	Negligible
	61	22.6	20.6	0.91	Above	Negligible
	62	24.2	22.4	0.93	Above	Negligible
	63	25	23.3	0.93	Above	Negligible
	64	25.5	23.9	0.94	Above	Negligible
	65	26.6	24.9	0.94	Above	Negligible
	66	27.4	25.8	0.94	Above	Negligible
	67	28.4	24	0.85	Above	Negligible
	68	27.9	23.3	0.84	Above	Negligible
	69	28	23.7	0.85	Above	Negligible
	70	29.5	25.6	0.87	Above	Negligible
	71	29.3	25.1	0.86	Above	Negligible
	72	29.3	25.2	0.86	Above	Negligible
	73	29.6	25.8	0.87	Above	Negligible
	74	29.7	26.1	0.88	Above	Negligible
	75	30.4	27.4	0.9	Above	Negligible
	76	30.8	27.9	0.91	Above	Negligible
	77	31.1	28.3	0.91	Above	Negligible
	78	31.7	29	0.91	Above	Negligible
	79	32.4	29.6	0.91	Above	Negligible
	80	36.2	27.5	0.76	Above	Negligible
	81	36.1	27	0.75	Above	Negligible
	82	36.2	27.2	0.75	Above	Negligible
	83	36	29.8	0.83	Above	Negligible
	84	36.1	29.1	0.81	Above	Negligible
	85	36.1	29.3	0.81	Above	Negligible
	86	36.1	30.3	0.84	Above	Negligible
	87	36.1	30.5	0.84	Above	Negligible
	88	36	31.2	0.87	Above	Negligible
	89	36	31.4	0.87	Above	Negligible
	90	35.8	31.5	0.88	Above	Negligible
	91	35.8	31.7	0.89	Above	Negligible
	92	35.9	31.8	0.89	Above	Negligible

	93	10.6	9.7	0.92	Above	Negligible
	94	10.1	9.2	0.91	Above	Negligible
	95	10.2	9.3	0.91	Above	Negligible
	96	12.1	11.2	0.93	Above	Negligible
	97	11.6	10.6	0.91	Above	Negligible
	98	11.7	10.8	0.92	Above	Negligible
	99	12.6	11.8	0.94	Above	Negligible
	100	12.8	12	0.94	Above	Negligible
	101	14.3	13.5	0.94	Above	Negligible
	102	15.1	14.2	0.94	Above	Negligible
	103	15.8	15	0.95	Above	Negligible
	104	17	16.2	0.95	Above	Negligible
	105	18.2	17.5	0.96	Above	Negligible
	106	7.5	7	0.93	Above	Negligible
	107	7.5	7.1	0.95	Above	Negligible
	108	7.7	7.2	0.94	Above	Negligible
	109	7.8	7.3	0.94	Above	Negligible
	110	8.6	8.1	0.94	Above	Negligible
	111	8.8	8.3	0.94	Above	Negligible
	112	9	8.5	0.94	Above	Negligible
	113	9.2	8.7	0.95	Above	Negligible
	114	9.5	9	0.95	Above	Negligible
	115	9.7	9.3	0.96	Above	Negligible
	116	11.3	10.8	0.96	Above	Negligible
	117	11.8	11.3	0.96	Above	Negligible
	118	12.4	11.9	0.96	Above	Negligible
	119	13.5	13	0.96	Above	Negligible
	120	14.7	14.2	0.97	Above	Negligible
Brazennose House (Commerical+Offices)	1	18.8	16.8	0.89	Above	Negligible
	2	19.6	17.5	0.89	Above	Negligible
	3	20	18	0.9	Above	Negligible
	4	20.8	18.7	0.9	Above	Negligible
	5	21.3	19.3	0.91	Above	Negligible
	6	22.1	20	0.9	Above	Negligible
	7	22.5	20.4	0.91	Above	Negligible
	8	23.1	20.9	0.9	Above	Negligible
	9	23.5	21.3	0.91	Above	Negligible
	10	24.2	21.9	0.9	Above	Negligible
	11	24.6	22.3	0.91	Above	Negligible
	12	24.9	22.6	0.91	Above	Negligible
	13	25.5	23.2	0.91	Above	Negligible
	14	25.6	23.4	0.91	Above	Negligible
	15	25.9	23.6	0.91	Above	Negligible

	16	19.8	17.7	0.89	Above	Negligible
	17	20.8	18.6	0.89	Above	Negligible
	18	21.3	19.2	0.9	Above	Negligible
	19	22.2	20.1	0.91	Above	Negligible
	20	22.9	20.7	0.9	Above	Negligible
	21	23.6	21.4	0.91	Above	Negligible
	22	24.1	21.8	0.9	Above	Negligible
	23	24.9	22.5	0.9	Above	Negligible
	24	25.3	22.8	0.9	Above	Negligible
	25	26	23.5	0.9	Above	Negligible
	26	26.5	24	0.91	Above	Negligible
	27	26.7	24.2	0.91	Above	Negligible
	28	27.3	24.9	0.91	Above	Negligible
	29	27.6	25.3	0.92	Above	Negligible
	30	27.9	25.3	0.91	Above	Negligible
	31	21.2	18.8	0.89	Above	Negligible
	32	22.2	19.7	0.89	Above	Negligible
	33	22.7	20.4	0.9	Above	Negligible
	34	23.7	21.4	0.9	Above	Negligible
	35	24.4	22.1	0.91	Above	Negligible
	36	25.3	22.9	0.91	Above	Negligible
	37	25.7	23.3	0.91	Above	Negligible
	38	26.6	24	0.9	Above	Negligible
	39	27.1	24.4	0.9	Above	Negligible
	40	27.8	25	0.9	Above	Negligible
	41	28.1	25.4	0.9	Above	Negligible
	42	28.5	25.8	0.91	Above	Negligible
	43	29.3	26.7	0.91	Above	Negligible
	44	29.6	26.9	0.91	Above	Negligible
	45	30.1	27.1	0.9	Above	Negligible
	46	22.3	19.6	0.88	Above	Negligible
	47	23.3	20.6	0.88	Above	Negligible
	48	24	21.3	0.89	Above	Negligible
	49	25	22.3	0.89	Above	Negligible
	50	25.7	23.2	0.9	Above	Negligible
	51	26.6	23.9	0.9	Above	Negligible
	52	27.2	24.5	0.9	Above	Negligible
	53	28.1	25.3	0.9	Above	Negligible
	54	28.8	25.8	0.9	Above	Negligible
	55	29.4	26.3	0.89	Above	Negligible
	56	30	27.1	0.9	Above	Negligible
	57	30.5	27.5	0.9	Above	Negligible
	58	31.2	28.2	0.9	Above	Negligible

	59	31.4	28.3	0.9	Above	Negligible
	60	31.9	28.5	0.89	Above	Negligible
	61	23.4	20.6	0.88	Above	Negligible
	62	24.6	21.8	0.89	Above	Negligible
	63	25.5	22.7	0.89	Above	Negligible
	64	26.4	23.6	0.89	Above	Negligible
	65	27.4	24.6	0.9	Above	Negligible
	66	28.3	25.4	0.9	Above	Negligible
	67	29	26	0.9	Above	Negligible
	68	30	26.9	0.9	Above	Negligible
	69	30.4	27.3	0.9	Above	Negligible
	70	31.2	28.1	0.9	Above	Negligible
	71	31.7	28.7	0.91	Above	Negligible
	72	32.2	29.2	0.91	Above	Negligible
	73	32.8	29.8	0.91	Above	Negligible
	74	33.1	30	0.91	Above	Negligible
	75	33.6	30.3	0.9	Above	Negligible
	76	24.6	21.9	0.89	Above	Negligible
	77	25.8	23	0.89	Above	Negligible
	78	26.8	23.9	0.89	Above	Negligible
	79	27.6	24.9	0.9	Above	Negligible
	80	28.5	25.9	0.91	Above	Negligible
	81	29.5	26.8	0.91	Above	Negligible
	82	30.3	27.5	0.91	Above	Negligible
	83	31.2	28.2	0.9	Above	Negligible
	84	31.7	28.6	0.9	Above	Negligible
	85	32.5	29.4	0.9	Above	Negligible
	86	32.9	30	0.91	Above	Negligible
	87	33.4	30.4	0.91	Above	Negligible
	88	34.1	31	0.91	Above	Negligible
	89	34.3	31.3	0.91	Above	Negligible
	90	34.7	31.4	0.9	Above	Negligible
	91	18.5	16.6	0.9	Above	Negligible
	92	21.5	19.5	0.91	Above	Negligible
	93	23.5	21.6	0.92	Above	Negligible
	94	26.9	24.9	0.93	Above	Negligible
	95	26.8	24.7	0.92	Above	Negligible
	96	26.9	24.8	0.92	Above	Negligible
	97	26.9	24.6	0.91	Above	Negligible
	98	26.9	24.8	0.92	Above	Negligible
	99	26.9	24.9	0.93	Above	Negligible
	100	27	25	0.93	Above	Negligible
	101	26.8	25	0.93	Above	Negligible

	102	26.7	25	0.94	Above	Negligible
	103	26.7	24.9	0.93	Above	Negligible
	104	26.6	24.6	0.92	Above	Negligible
	105	26.5	24.6	0.93	Above	Negligible
	106	26.3	24.3	0.92	Above	Negligible
	107	26.1	24.1	0.92	Above	Negligible
	108	25.9	23.9	0.92	Above	Negligible
	109	25.7	23.7	0.92	Above	Negligible
	110	25.2	23.3	0.92	Above	Negligible
	111	25	23	0.92	Above	Negligible
	112	29.2	27	0.92	Above	Negligible
	113	29.1	26.7	0.92	Above	Negligible
	114	29.2	26.8	0.92	Above	Negligible
	115	29	26.6	0.92	Above	Negligible
	116	29.1	26.7	0.92	Above	Negligible
	117	29.2	26.9	0.92	Above	Negligible
	118	29.1	27	0.93	Above	Negligible
	119	29.2	27.1	0.93	Above	Negligible
	120	29.1	27.1	0.93	Above	Negligible
	121	29	27	0.93	Above	Negligible
	122	28.9	26.6	0.92	Above	Negligible
	123	28.8	26.7	0.93	Above	Negligible
	124	28.7	26.4	0.92	Above	Negligible
	125	28.6	26.3	0.92	Above	Negligible
	126	28.4	26.1	0.92	Above	Negligible
	127	28.3	26.2	0.93	Above	Negligible
	128	28.1	26	0.93	Above	Negligible
	129	27.8	25.7	0.92	Above	Negligible
	130	31.2	28.7	0.92	Above	Negligible
	131	31.2	28.5	0.91	Above	Negligible
	132	31.2	28.6	0.92	Above	Negligible
	133	31.2	28.5	0.91	Above	Negligible
	134	31.3	28.6	0.91	Above	Negligible
	135	31.5	29	0.92	Above	Negligible
	136	31.5	29.1	0.92	Above	Negligible
	137	31.4	29.2	0.93	Above	Negligible
	138	31.3	29.2	0.93	Above	Negligible
	139	31.2	29	0.93	Above	Negligible
	140	31	28.7	0.93	Above	Negligible
	141	31.1	28.9	0.93	Above	Negligible
	142	30.9	28.6	0.93	Above	Negligible
	143	30.8	28.5	0.93	Above	Negligible
	144	30.6	28.4	0.93	Above	Negligible

	145	30.5	28.4	0.93	Above	Negligible
	146	30.3	28.2	0.93	Above	Negligible
	147	30	27.8	0.93	Above	Negligible
	148	33	30.2	0.92	Above	Negligible
	149	33.1	30	0.91	Above	Negligible
	150	33.3	30.3	0.91	Above	Negligible
	151	33.2	30	0.9	Above	Negligible
	152	33.3	30.2	0.91	Above	Negligible
	153	33.4	30.5	0.91	Above	Negligible
	154	33.5	30.7	0.92	Above	Negligible
	155	33.5	30.9	0.92	Above	Negligible
	156	33.4	31	0.93	Above	Negligible
	157	33.4	30.8	0.92	Above	Negligible
	158	33.4	30.7	0.92	Above	Negligible
	159	33.5	30.8	0.92	Above	Negligible
	160	33.2	30.7	0.92	Above	Negligible
	161	33	30.3	0.92	Above	Negligible
	162	32.9	30.3	0.92	Above	Negligible
	163	32.8	30.4	0.93	Above	Negligible
	164	32.7	30.3	0.93	Above	Negligible
	165	32.4	29.9	0.92	Above	Negligible
	166	34.9	31.9	0.91	Above	Negligible
	167	35	31.8	0.91	Above	Negligible
	168	35	31.8	0.91	Above	Negligible
	169	35.2	31.7	0.9	Above	Negligible
	170	35.2	32	0.91	Above	Negligible
	171	35.4	32.2	0.91	Above	Negligible
	172	35.4	32.2	0.91	Above	Negligible
	173	35.3	32.4	0.92	Above	Negligible
	174	35.4	32.6	0.92	Above	Negligible
	175	35.4	32.4	0.92	Above	Negligible
	176	35.4	32.3	0.91	Above	Negligible
	177	35.2	32.4	0.92	Above	Negligible
	178	35.2	32.2	0.91	Above	Negligible
	179	35.1	32	0.91	Above	Negligible
	180	35.2	32	0.91	Above	Negligible
	181	35.1	32.1	0.91	Above	Negligible
	182	35	32.2	0.92	Above	Negligible
	183	34.8	31.8	0.91	Above	Negligible
	184	36.1	33.1	0.92	Above	Negligible
	185	36.3	33	0.91	Above	Negligible
	186	36.4	33.1	0.91	Above	Negligible
	187	36.5	33.1	0.91	Above	Negligible

	188	36.6	33.3	0.91	Above	Negligible
	189	36.7	33.5	0.91	Above	Negligible
	190	36.8	33.6	0.91	Above	Negligible
	191	36.8	33.8	0.92	Above	Negligible
	192	36.8	33.9	0.92	Above	Negligible
	193	36.9	33.9	0.92	Above	Negligible
	194	36.9	33.6	0.91	Above	Negligible
	195	37	33.8	0.91	Above	Negligible
	196	37	33.7	0.91	Above	Negligible
	197	37	33.5	0.91	Above	Negligible
	198	36.9	33.7	0.91	Above	Negligible
	199	36.9	33.9	0.92	Above	Negligible
	200	36.8	33.9	0.92	Above	Negligible
	201	36.8	33.8	0.92	Above	Negligible
	202	24.8	22.9	0.92	Above	Negligible
	203	24.4	22.8	0.93	Above	Negligible
	204	23	21.2	0.92	Above	Negligible
	205	21.8	20.2	0.93	Above	Negligible
	206	21.2	19.6	0.92	Above	Negligible
	207	20.3	18.7	0.92	Above	Negligible
	208	19.2	17.7	0.92	Above	Negligible
	209	18.2	16.6	0.91	Above	Negligible
	210	17.4	15.7	0.9	Above	Negligible
	211	16.7	15.4	0.92	Above	Negligible
	212	16	15.2	0.95	Above	Negligible
	213	15.6	15.1	0.97	Above	Negligible
	214	15	15	1	Above	Negligible
	215	14.3	14.3	1	Above	Negligible
	216	13.8	13.8	1	Above	Negligible
	217	13.4	13.4	1	Above	Negligible
	218	13.1	13.1	1	Above	Negligible
	219	12.8	12.8	1	Above	Negligible
	220	24.3	22.5	0.93	Above	Negligible
	221	23.7	21.9	0.92	Above	Negligible
	222	23	21.1	0.92	Above	Negligible
	223	21.9	20.1	0.92	Above	Negligible
	224	21.1	19.2	0.91	Above	Negligible
	225	20.3	18.4	0.91	Above	Negligible
	226	19.5	17.9	0.92	Above	Negligible
	227	18.7	17.8	0.95	Above	Negligible
	228	18.4	17.8	0.97	Above	Negligible
	229	17.7	17.6	0.99	Above	Negligible
	230	17.2	17.1	0.99	Above	Negligible

	231	16.8	16.7	0.99	Above	Negligible
	232	16.3	16.2	0.99	Above	Negligible
	233	15.7	15.7	1	Above	Negligible
	234	15.4	15.3	0.99	Above	Negligible
	235	27.3	25.3	0.93	Above	Negligible
	236	26.7	24.7	0.93	Above	Negligible
	237	25.9	23.9	0.92	Above	Negligible
	238	25	23	0.92	Above	Negligible
	239	24.2	22.1	0.91	Above	Negligible
	240	23.4	21.3	0.91	Above	Negligible
	241	22.6	20.8	0.92	Above	Negligible
	242	22	20.7	0.94	Above	Negligible
	243	21.4	20.5	0.96	Above	Negligible
	244	20.9	20.4	0.98	Above	Negligible
	245	20.4	19.9	0.98	Above	Negligible
	246	19.9	19.6	0.98	Above	Negligible
	247	19.7	19.4	0.98	Above	Negligible
	248	19.2	19	0.99	Above	Negligible
	249	18.9	18.6	0.98	Above	Negligible
	250	30.4	28.1	0.92	Above	Negligible
	251	29.9	27.7	0.93	Above	Negligible
	252	29.2	27.1	0.93	Above	Negligible
	253	28.5	26.4	0.93	Above	Negligible
	254	27.8	25.6	0.92	Above	Negligible
	255	27.2	25	0.92	Above	Negligible
	256	26.4	24.4	0.92	Above	Negligible
	257	25.9	24.1	0.93	Above	Negligible
	258	25.4	24.1	0.95	Above	Negligible
	259	25	24.1	0.96	Above	Negligible
	260	24.7	23.7	0.96	Above	Negligible
	261	24.1	23.4	0.97	Above	Negligible
	262	23.9	23.2	0.97	Above	Negligible
	263	23.6	22.9	0.97	Above	Negligible
	264	23.4	22.7	0.97	Above	Negligible
	265	33.4	30.8	0.92	Above	Negligible
	266	33.2	30.6	0.92	Above	Negligible
	267	32.8	30.4	0.93	Above	Negligible
	268	32.5	30	0.92	Above	Negligible
	269	31.9	29.4	0.92	Above	Negligible
	270	31.3	28.8	0.92	Above	Negligible
	271	30.8	28.4	0.92	Above	Negligible
	272	30.2	28	0.93	Above	Negligible
	273	29.8	27.9	0.94	Above	Negligible

	274	29.6	28.1	0.95	Above	Negligible
	275	29.4	28	0.95	Above	Negligible
	276	29.1	27.9	0.96	Above	Negligible
	277	29	27.8	0.96	Above	Negligible
	278	28.6	27.4	0.96	Above	Negligible
	279	28.4	27.2	0.96	Above	Negligible
	280	36.2	33.5	0.93	Above	Negligible
	281	36.2	33.5	0.93	Above	Negligible
	282	36	33.4	0.93	Above	Negligible
	283	35.8	33.1	0.92	Above	Negligible
	284	35.6	32.7	0.92	Above	Negligible
	285	35.4	32.6	0.92	Above	Negligible
	286	35.1	32.5	0.93	Above	Negligible
	287	34.8	32.4	0.93	Above	Negligible
	288	34.5	32.2	0.93	Above	Negligible
	289	34.4	32.3	0.94	Above	Negligible
	290	34.1	32.4	0.95	Above	Negligible
	291	34	32.3	0.95	Above	Negligible
	292	33.9	32.2	0.95	Above	Negligible
	293	33.8	32	0.95	Above	Negligible
	294	33.8	31.8	0.94	Above	Negligible
	295	18.3	17	0.93	Above	Negligible
	296	13.8	13.2	0.96	Above	Negligible
	297	11	11	1	Above	Negligible
	298	25.3	23	0.91	Above	Negligible
	299	24.4	22.4	0.92	Above	Negligible
	300	27.1	24.6	0.91	Above	Negligible
	301	26.3	24	0.91	Above	Negligible
	302	29.1	26.2	0.9	Above	Negligible
	303	28.2	25.5	0.9	Above	Negligible
	304	30.8	27.5	0.89	Above	Negligible
	305	30	26.9	0.9	Above	Negligible
	306	32.3	29	0.9	Above	Negligible
	307	31.6	28.4	0.9	Above	Negligible
	308	33.6	30.4	0.9	Above	Negligible
	309	32.8	29.5	0.9	Above	Negligible
	310	23.4	21.3	0.91	Above	Negligible
	311	23.5	21.5	0.91	Above	Negligible
	312	21.9	20	0.91	Above	Negligible
	313	25.9	23.6	0.91	Above	Negligible
	314	24.3	22.1	0.91	Above	Negligible
	315	28.5	26	0.91	Above	Negligible
	316	26.8	24.4	0.91	Above	Negligible

	317	30.9	28.1	0.91	Above	Negligible
	318	29.4	26.8	0.91	Above	Negligible
	319	33	30	0.91	Above	Negligible
	320	31.9	29	0.91	Above	Negligible
	321	35.2	32	0.91	Above	Negligible
	322	34.4	31.3	0.91	Above	Negligible
	323	21	19.1	0.91	Above	Negligible
Centurion house (offices+Com)	1	19.9	17.8	0.89	Above	Negligible
	2	16.3	15.4	0.94	Above	Negligible
	3	18	16.2	0.9	Above	Negligible
	4	12.7	11.9	0.94	Above	Negligible
	5	14.6	13.6	0.93	Above	Negligible
	6	10	10	1	Above	Negligible
	7	11	11	1	Above	Negligible
	8	9.1	9.1	1	Above	Negligible
	9	26.7	23.2	0.87	Above	Negligible
	10	22.4	20.1	0.9	Above	Negligible
	11	24.3	21.4	0.88	Above	Negligible
	12	17.3	15.6	0.9	Above	Negligible
	13	20.2	17.9	0.89	Above	Negligible
	14	13.1	13.1	1	Above	Negligible
	15	14.6	14.6	1	Above	Negligible
	16	12	12	1	Above	Negligible
	17	13.7	12.7	0.93	Above	Negligible
	18	11.7	11.3	0.97	Above	Negligible
	19	12.6	11.7	0.93	Above	Negligible
	20	9.4	9.1	0.97	Above	Negligible
	21	10.4	10	0.96	Above	Negligible
	22	7.5	7.5	1	Above	Negligible
	23	8.2	8.2	1	Above	Negligible
	24	7	7	1	Above	Negligible
	25	31.1	27	0.87	Above	Negligible
	26	28	24	0.86	Above	Negligible
	27	29.4	25.5	0.87	Above	Negligible
	28	22.3	19.6	0.88	Above	Negligible
	29	25.8	22	0.85	Above	Negligible
	30	17.5	16.8	0.96	Above	Negligible
	31	19.2	18.6	0.97	Above	Negligible
	32	16.2	15.7	0.97	Above	Negligible
	33	34	29.6	0.87	Above	Negligible
	34	31.6	27.3	0.86	Above	Negligible
	35	32.8	28.6	0.87	Above	Negligible
	36	26.7	23.4	0.88	Above	Negligible

	37	29.9	25.6	0.86	Above	Negligible
	38	22.8	21.3	0.93	Above	Negligible
	39	24.1	22.4	0.93	Above	Negligible
	40	21.9	20.5	0.94	Above	Negligible
	41	36.5	32.3	0.88	Above	Negligible
	42	35.2	30.9	0.88	Above	Negligible
	43	36	31.8	0.88	Above	Negligible
	44	32.4	28.8	0.89	Above	Negligible
	45	34.2	30	0.88	Above	Negligible
	46	30.1	27.5	0.91	Above	Negligible
	47	31	28.2	0.91	Above	Negligible
	48	29.3	26.8	0.91	Above	Negligible
	49	38.4	34.2	0.89	Above	Negligible
	50	38.5	34.2	0.89	Above	Negligible
	51	38.4	34.3	0.89	Above	Negligible
	52	37.8	34.1	0.9	Above	Negligible
	53	38.1	34	0.89	Above	Negligible
	54	37.6	34	0.9	Above	Negligible
	55	37.7	34	0.9	Above	Negligible
	56	37.6	33.9	0.9	Above	Negligible
	57	38.9	35	0.9	Above	Negligible
	58	39	34.8	0.89	Above	Negligible
	59	39	35.1	0.9	Above	Negligible
	60	38.9	35.1	0.9	Above	Negligible
	61	39	35	0.9	Above	Negligible
	62	38.8	35.1	0.9	Above	Negligible
	63	38.8	35.1	0.9	Above	Negligible
	64	38.8	35.1	0.9	Above	Negligible
	65	39.2	35.4	0.9	Above	Negligible
	66	39.3	35.2	0.9	Above	Negligible
	67	39.2	35.4	0.9	Above	Negligible
	68	39.1	35.3	0.9	Above	Negligible
	69	39.1	35.3	0.9	Above	Negligible
	70	39.1	35.4	0.91	Above	Negligible
	71	39.1	35.4	0.91	Above	Negligible
	72	39.1	35.4	0.91	Above	Negligible
1 Central Street (Offices)	1	20.3	14.1	0.69	Below	Medium
	2	26.9	20.1	0.75	Below	Low
	3	18.6	11	0.59	Below	High
	4	19.5	12.6	0.65	Below	Medium
	5	19.6	14	0.71	Below	Low
	6	19.1	14.1	0.74	Below	Low
	7	22.9	13.5	0.59	Below	High

	8	24.1	15.1	0.63	Below	Medium
	9	24.7	16.6	0.67	Below	Medium
	10	24.2	16.7	0.69	Below	Medium
	11	27.9	17	0.61	Below	Medium
	12	29.8	18.6	0.62	Below	Medium
	13	30.7	19.6	0.64	Below	Medium
	14	30.9	19.6	0.63	Below	Medium
	15	33.4	21.8	0.65	Below	Medium
	16	34.9	22.6	0.65	Below	Medium
	17	35.7	22.8	0.64	Below	Medium
	18	36.3	22.5	0.62	Below	Medium
6 Mount Str (religious building)	1	29.8	20.5	0.69	Below	Medium
	2	29.9	21.6	0.72	Below	Low
75 Southmill St (Offices)	1	32	27.6	0.86	Above	Negligible
	2	32.5	27.5	0.85	Above	Negligible
	3	32.6	27.1	0.83	Above	Negligible
	4	32.6	26.4	0.81	Above	Negligible
	5	35.1	30.7	0.87	Above	Negligible
	6	35.2	30.2	0.86	Above	Negligible
	7	35.3	29.4	0.83	Above	Negligible
	8	35.5	28.9	0.81	Above	Negligible
	9	27.9	23.7	0.85	Above	Negligible
	10	28.7	24.2	0.84	Above	Negligible
	11	29.1	24.1	0.83	Above	Negligible
	12	28.8	23.9	0.83	Above	Negligible
	13	24.6	20.9	0.85	Above	Negligible
	14	25.1	21.3	0.85	Above	Negligible
	15	20.6	13.5	0.66	Below	Medium
	16	18	13.5	0.75	Below	Low
	17	16.5	13.5	0.82	Above	Negligible
	18	15.4	13.4	0.87	Above	Negligible
	19	15	13.6	0.91	Above	Negligible
	20	14.8	13.7	0.93	Above	Negligible
	21	14.7	13.9	0.95	Above	Negligible
	22	14.9	14.2	0.95	Above	Negligible
	23	16.9	16.3	0.96	Above	Negligible
	24	25.8	17.2	0.67	Below	Medium
	25	23.5	17.5	0.74	Below	Low
	26	22	17.5	0.8	Below	Low
	27	21	17.5	0.83	Above	Negligible
	28	20.5	17.5	0.85	Above	Negligible
	29	20.3	17.7	0.87	Above	Negligible
	30	20.1	17.9	0.89	Above	Negligible

	31	19.7	17.7	0.9	Above	Negligible
	32	21.3	19.5	0.92	Above	Negligible
	33	12.5	8.2	0.66	Below	Medium
	34	10.4	7.9	0.76	Below	Low
	35	9.4	7.8	0.83	Above	Negligible
	36	8.6	7.6	0.88	Above	Negligible
	37	8.5	7.7	0.91	Above	Negligible
	38	8.6	8.1	0.94	Above	Negligible
	39	8.8	8.5	0.97	Above	Negligible
	40	9.3	9.1	0.98	Above	Negligible
	41	11.5	11.4	0.99	Above	Negligible
	42	9.9	6.7	0.68	Below	Medium
	43	8.2	6.3	0.77	Below	Low
	44	7.4	6.2	0.84	Above	Negligible
	45	6.9	6	0.87	Above	Negligible
	46	6.8	6.1	0.9	Above	Negligible
	47	6.9	6.4	0.93	Above	Negligible
	48	7.2	6.9	0.96	Above	Negligible
	49	7.8	7.6	0.97	Above	Negligible
	50	9.8	9.7	0.99	Above	Negligible
	51	15.8	10.4	0.66	Below	Medium
	52	13.4	10.3	0.77	Below	Low
	53	12.3	10.1	0.82	Above	Negligible
	54	11.4	10.1	0.89	Above	Negligible
	55	11.2	10.2	0.91	Above	Negligible
	56	11.1	10.4	0.94	Above	Negligible
	57	11.1	10.7	0.96	Above	Negligible
	58	11.5	11.2	0.97	Above	Negligible
	59	13.9	13.6	0.98	Above	Negligible
Television House (Offices)	1	12.7	9.9	0.78	Below	Low
	2	15	11.8	0.79	Below	Low
	3	17.2	13.7	0.8	Below	Low
	4	19.7	15.7	0.8	Below	Low
	5	21.2	17.1	0.81	Above	Negligible
	6	23	18.6	0.81	Above	Negligible
	7	24.7	20.4	0.83	Above	Negligible
	8	26.8	22.7	0.85	Above	Negligible
	9	27.2	23.4	0.86	Above	Negligible
37 Peter Street (Offices)	1	27.9	17.7	0.63	Below	Medium
	2	25.6	12.7	0.5	Below	High
	3	25.6	9.4	0.37	Below	High
	4	28.2	7.5	0.27	Below	High
	5	30.3	6.3	0.21	Below	High

	6	31.9	5.3	0.17	Below	High
	7	32.9	4.2	0.13	Below	High
	8	33.6	3.3	0.1	Below	High
	9	34	2.6	0.08	Below	High
	10	36	21.5	0.6	Below	High
	11	35.8	16.6	0.46	Below	High
	12	35.7	13	0.36	Below	High
	13	36	10.5	0.29	Below	High
	14	36.2	8.9	0.25	Below	High
	15	36.4	7.2	0.2	Below	High
	16	36.5	5.7	0.16	Below	High
	17	36.6	4.3	0.12	Below	High
	18	36.6	3.4	0.09	Below	High
	19	37.3	24.4	0.65	Below	Medium
	20	37.3	20.8	0.56	Below	High
	21	37.4	17.4	0.47	Below	High
	22	37.4	14.6	0.39	Below	High
	23	37.4	12.3	0.33	Below	High
	24	37.5	10.1	0.27	Below	High
	25	37.6	7.8	0.21	Below	High
	26	37.6	5.5	0.15	Below	High
	27	37.6	4.3	0.11	Below	High
	28	14.6	11.7	0.8	Above	Negligible
	29	11.6	7.9	0.68	Below	Medium
	30	10.2	5.6	0.55	Below	High
	31	9.7	4.2	0.43	Below	High
	32	9.8	3.4	0.35	Below	High
	33	10.1	2.8	0.28	Below	High
	34	19.4	14.1	0.73	Below	Low
	35	16.3	9.8	0.6	Below	Medium
	36	15.3	7.2	0.47	Below	High
	37	15.9	5.5	0.35	Below	High
	38	17	4.6	0.27	Below	High
	39	18	3.9	0.22	Below	High
	40	18.6	3.1	0.17	Below	High
	41	19.2	2.5	0.13	Below	High
	42	19.8	2.1	0.11	Below	High
	43	12.5	10.4	0.83	Above	Negligible
	44	9.4	6.9	0.73	Below	Low
	45	7.8	4.6	0.59	Below	High
	46	7.1	3.4	0.48	Below	High
	47	6.8	2.7	0.4	Below	High
	48	7	2.2	0.31	Below	High

11-13 Bootle Street	1	15.1	1.2	0.08	Below	High
	2	16.9	1.5	0.09	Below	High
	3	18.3	1.4	0.08	Below	High
	4	19.6	1.3	0.07	Below	High
	5	20.3	1.2	0.06	Below	High
	6	21.1	1.2	0.06	Below	High
	7	23.7	1.6	0.07	Below	High
	8	24	3.5	0.15	Below	High
	9	24.2	6	0.25	Below	High
	10	24.3	6.8	0.28	Below	High
	11	24.5	7.2	0.29	Below	High
	12	24.8	7.5	0.3	Below	High
	13	16.6	2.9	0.17	Below	High
Marron Place Building (office)	1	32.4	10.6	0.33	Below	High
	2	32.8	10	0.3	Below	High
	3	32.9	8.8	0.27	Below	High
	4	32.7	7.7	0.24	Below	High
	5	32.3	6.9	0.21	Below	High
	6	31.7	5.9	0.19	Below	High
	7	31.1	5.6	0.18	Below	High
	8	30	5.2	0.17	Below	High
	9	28.3	4.8	0.17	Below	High
	10	26.1	4.1	0.16	Below	High
	11	34.8	12.1	0.35	Below	High
	12	34.9	11.1	0.32	Below	High
	13	34.8	9.7	0.28	Below	High
	14	34.8	8.5	0.24	Below	High
	15	34.6	7.7	0.22	Below	High
	16	34.3	6.6	0.19	Below	High
	17	33.8	6.2	0.18	Below	High
	18	32.9	5.8	0.18	Below	High
	19	31.4	5.5	0.18	Below	High
	20	29.2	4.9	0.17	Below	High
	21	36	13.7	0.38	Below	High
	22	36	12.6	0.35	Below	High
	23	36	11.1	0.31	Below	High
	24	35.9	9.8	0.27	Below	High
	25	35.7	8.8	0.25	Below	High
	26	35.4	7.9	0.22	Below	High
	27	35.1	7.5	0.21	Below	High
	28	34.3	7.2	0.21	Below	High
	29	33.2	6.8	0.2	Below	High
	30	31.1	6.1	0.2	Below	High

	31	36.8	14.7	0.4	Below	High
	32	36.8	13.7	0.37	Below	High
	33	36.7	12.2	0.33	Below	High
	34	36.7	10.9	0.3	Below	High
	35	36.5	9.9	0.27	Below	High
	36	36.4	9	0.25	Below	High
	37	36	8.6	0.24	Below	High
	38	35.2	8.5	0.24	Below	High
	39	34.4	8.1	0.24	Below	High
	40	32.5	7.6	0.23	Below	High
	41	37.5	16.4	0.44	Below	High
	42	37.5	15.4	0.41	Below	High
	43	37.5	13.8	0.37	Below	High
	44	37.4	12.3	0.33	Below	High
	45	37.3	11.5	0.31	Below	High
	46	37.3	10.6	0.28	Below	High
	47	37	10.4	0.28	Below	High
	48	36.7	10.4	0.28	Below	High
	49	36	10.1	0.28	Below	High
	50	34.6	9.8	0.28	Below	High
	51	36	14.3	0.4	Below	High
	52	22.5	4.2	0.19	Below	High
	53	34.2	12.8	0.37	Below	High
	54	21.3	3.3	0.15	Below	High
	55	36.8	15.9	0.43	Below	High
	56	23.4	5.2	0.22	Below	High
	57	29.1	11	0.38	Below	High
	58	19.4	2.8	0.14	Below	High
	59	37.5	17.3	0.46	Below	High
	60	25.7	7.2	0.28	Below	High
Albert hall	1	21.5	7.3	0.34	Below	High
	2	22	7.4	0.34	Below	High
	3	22.3	7.6	0.34	Below	High
	4	29.9	8.5	0.28	Below	High
	5	30.1	8.8	0.29	Below	High
	6	33.8	9.5	0.28	Below	High
	7	32.3	9.5	0.29	Below	High
	8	18.1	6.9	0.38	Below	High
	9	17.9	6.8	0.38	Below	High
	10	19.5	6.4	0.33	Below	High
	11	23.1	6.2	0.27	Below	High
	12	26.7	8.6	0.32	Below	High
	13	28.6	8.4	0.29	Below	High

	14	29.1	8.1	0.28	Below	High
	15	30.1	7.7	0.26	Below	High
	16	30.4	5.2	0.17	Below	High
	17	33.4	11	0.33	Below	High
	18	34.1	10.8	0.32	Below	High
	19	34	10.6	0.31	Below	High
	20	33.6	10	0.3	Below	High
	21	33.4	6.7	0.2	Below	High
	22	26	2.2	0.08	Below	High
	23	23.4	1.6	0.07	Below	High
	24	31.8	5	0.16	Below	High
	25	30.6	4.5	0.15	Below	High
	26	27	3.3	0.12	Below	High
	27	29.5	3.5	0.12	Below	High
	28	28	2.9	0.1	Below	High
	29	25.1	2	0.08	Below	High
	30	36.9	20.7	0.56	Below	High
23 St Peter (covered windows)	1	22.1	2.4	0.11	Below	High
	2	20.9	3	0.14	Below	High
	3	24.8	2.4	0.1	Below	High
	4	23.8	2.7	0.11	Below	High
	5	22.5	3.5	0.16	Below	High
	6	21	4.8	0.23	Below	High
	7	13.7	3.8	0.28	Below	High
	8	17.3	4.2	0.24	Below	High
2 Bootle St/Jerusalem Place (offices, Rest, residential?)	1	7.9	5.5	0.7	Below	Medium
	2	7.8	4.9	0.63	Below	Medium
	3	6.1	4.2	0.69	Below	Medium
	4	6	3.7	0.62	Below	Medium
	5	11.5	8	0.7	Below	Medium
	6	11.1	7.2	0.65	Below	Medium
	7	17.8	12.7	0.71	Below	Low
	8	17.5	11.8	0.67	Below	Medium
	9	12.4	9.6	0.77	Below	Low
	10	9	7	0.78	Below	Low
	11	18.2	14	0.77	Below	Low
	12	27.8	22	0.79	Below	Low
	13	12.4	10.2	0.82	Above	Negligible
	14	17	13.9	0.82	Above	Negligible
	15	23.5	19.1	0.81	Above	Negligible
	16	13.8	12	0.87	Above	Negligible
	17	15.4	13.7	0.89	Above	Negligible
	18	10.8	9.4	0.87	Above	Negligible

	19	11.8	10.6	0.9	Above	Negligible
	20	17.8	15.4	0.87	Above	Negligible
	21	20.4	18	0.88	Above	Negligible
	22	23.8	20.3	0.85	Above	Negligible
	23	26	22.3	0.86	Above	Negligible
	24	14.4	5.1	0.35	Below	High
	25	11.4	3.1	0.27	Below	High
	26	19.2	8.4	0.44	Below	High
	27	24.9	11.9	0.48	Below	High
	28	17.1	12.4	0.73	Below	Low
	29	16.7	11.9	0.71	Below	Low
	30	16.2	11.1	0.69	Below	Medium
	31	9.8	7.2	0.73	Below	Low
	32	9.5	6.9	0.73	Below	Low
	33	9.4	6.4	0.68	Below	Medium
	34	27.2	19.4	0.71	Below	Low
	35	27.1	19	0.7	Below	Low
	36	26.9	18.2	0.68	Below	Medium
	37	31.1	21.4	0.69	Below	Medium
	38	31.5	20.9	0.66	Below	Medium
	39	31.7	20.4	0.64	Below	Medium
	40	10.2	5.8	0.57	Below	High
	41	16.3	10.2	0.63	Below	Medium
	42	26.2	16.9	0.65	Below	Medium
	43	31.3	19.3	0.62	Below	Medium
	44	10.8	8.4	0.78	Below	Low
	45	10.1	7.6	0.75	Below	Low
	46	17.7	13.6	0.77	Below	Low
	47	17.4	13	0.75	Below	Low
	48	27.5	21	0.76	Below	Low
	49	27.6	20.5	0.74	Below	Low
	50	30.8	23.4	0.76	Below	Low
	51	30.9	22.7	0.73	Below	Low
Theatre Royal (Unused Theatre, NightClub)	1	20.9	19.3	0.92	Above	Negligible
	2	30.4	27.8	0.91	Above	Negligible
	3	16.2	15.7	0.97	Above	Negligible
	4	24.8	23.1	0.93	Above	Negligible
	5	15.9	14.7	0.92	Above	Negligible
	6	16	15.7	0.98	Above	Negligible
	7	19.4	17.3	0.89	Above	Negligible
	8	20.2	19.7	0.98	Above	Negligible
	9	21.8	19.7	0.9	Above	Negligible
	10	21.6	19.3	0.89	Above	Negligible

	11	11.1	8.9	0.8	Above	Negligible
	12	10.4	8.7	0.84	Above	Negligible
	13	10	10	1	Above	Negligible
	14	9.2	9.2	1	Above	Negligible
Radison Blu Edwardian Manchester (Hotel)	1	29.3	26.9	0.92	Above	Negligible
	2	27.9	25.1	0.9	Above	Negligible
	3	27.4	24.2	0.88	Above	Negligible
	4	27.5	23.9	0.87	Above	Negligible
	5	28.2	23.8	0.84	Above	Negligible
	6	29.1	24.1	0.83	Above	Negligible
	7	30	24.6	0.82	Above	Negligible
	8	30.8	24.9	0.81	Above	Negligible
	9	31.3	25	0.8	Below	Low
	10	15.1	13.6	0.9	Above	Negligible
	11	13	11.3	0.87	Above	Negligible
	12	12.4	10.4	0.84	Above	Negligible
	13	12.4	10.4	0.84	Above	Negligible
	14	12.7	10.4	0.82	Above	Negligible
	15	13.3	10.9	0.82	Above	Negligible
	16	13.9	11.5	0.83	Above	Negligible
	17	14.5	11.7	0.81	Above	Negligible
	18	14.7	11.7	0.8	Below	Low
	19	19.3	18.7	0.97	Above	Negligible
	20	16.9	16.5	0.98	Above	Negligible
	21	25.5	24.6	0.96	Above	Negligible
	22	22.7	22	0.97	Above	Negligible
	23	13	12.9	0.99	Above	Negligible
	24	9.3	9.3	1	Above	Negligible
	25	25.9	24.7	0.95	Above	Negligible
	26	23.8	22.8	0.96	Above	Negligible
	27	29.9	28.6	0.96	Above	Negligible
	28	28.2	27	0.96	Above	Negligible
	29	20.1	19.6	0.98	Above	Negligible
	30	15.6	15.6	1	Above	Negligible
	31	33	30.9	0.94	Above	Negligible
	32	32.5	30.6	0.94	Above	Negligible
	33	33.9	31.7	0.94	Above	Negligible
	34	33.5	31.2	0.93	Above	Negligible
	35	30.3	29.2	0.96	Above	Negligible
	36	26.5	26.5	1	Above	Negligible
	37	36	33.2	0.92	Above	Negligible
	38	35.9	33	0.92	Above	Negligible
	39	36	33.5	0.93	Above	Negligible

	40	36	33.4	0.93	Above	Negligible
	41	34.8	32.4	0.93	Above	Negligible
	42	31.6	30.5	0.97	Above	Negligible
	43	37	34.3	0.93	Above	Negligible
	44	36.8	33.9	0.92	Above	Negligible
	45	37.1	34.7	0.94	Above	Negligible
	46	37.1	34.6	0.93	Above	Negligible
	47	35.7	33.4	0.94	Above	Negligible
	48	32.4	31.3	0.97	Above	Negligible
	49	37.8	35.3	0.93	Above	Negligible
	50	37.6	35	0.93	Above	Negligible
	51	37.7	35.5	0.94	Above	Negligible
	52	37.8	35.5	0.94	Above	Negligible
	53	36.4	34.4	0.95	Above	Negligible
	54	33.1	32.3	0.98	Above	Negligible
	55	38.3	36	0.94	Above	Negligible
	56	38	35.6	0.94	Above	Negligible
	57	38.4	36.4	0.95	Above	Negligible
	58	38.5	36.3	0.94	Above	Negligible
	59	36.8	35	0.95	Above	Negligible
	60	33.5	32.8	0.98	Above	Negligible
	61	38.9	36.8	0.95	Above	Negligible
	62	38.6	36.4	0.94	Above	Negligible
	63	39.1	37.2	0.95	Above	Negligible
	64	39	37	0.95	Above	Negligible
	65	37.5	35.9	0.96	Above	Negligible
	66	34	33.6	0.99	Above	Negligible
	67	36.6	32.2	0.88	Above	Negligible
	68	36.5	31.9	0.87	Above	Negligible
	69	34.8	30.5	0.88	Above	Negligible
	70	35.2	30.7	0.87	Above	Negligible
	71	37.7	33.6	0.89	Above	Negligible
	72	37.5	33.3	0.89	Above	Negligible
	73	35.6	31.8	0.89	Above	Negligible
	74	36.2	31.7	0.88	Above	Negligible
	75	38.2	34.6	0.91	Above	Negligible
	76	38	34.3	0.9	Above	Negligible
	77	36.2	32.8	0.91	Above	Negligible
	78	36.7	32.6	0.89	Above	Negligible
	79	38.4	35.2	0.92	Above	Negligible
	80	38.4	34.9	0.91	Above	Negligible
	81	36.4	33.3	0.91	Above	Negligible
	82	37.1	33.5	0.9	Above	Negligible

	83	38.9	36	0.93	Above	Negligible
	84	38.9	35.8	0.92	Above	Negligible
	85	36.8	33.9	0.92	Above	Negligible
	86	37.7	34.4	0.91	Above	Negligible
44 Peter Street (Offices?)	1	19	15.4	0.81	Above	Negligible
	2	32	25.4	0.79	Below	Low
	3	32.4	25.4	0.78	Below	Low
	4	32.8	25.8	0.79	Below	Low
	5	33.4	26.4	0.79	Below	Low
	6	33.7	26.4	0.78	Below	Low
	7	31	24.5	0.79	Below	Low
	8	31.7	25.2	0.79	Below	Low
	9	25.5	20.7	0.81	Above	Negligible
	10	26.2	20.9	0.8	Below	Low
	11	26.8	21.6	0.81	Above	Negligible
	12	27.3	22.4	0.82	Above	Negligible
	13	27.6	22.5	0.82	Above	Negligible
	14	23.9	19.7	0.82	Above	Negligible
	15	24.8	20.2	0.81	Above	Negligible
	16	28.8	23.4	0.81	Above	Negligible
	17	29.3	23.5	0.8	Above	Negligible
	18	30	24.1	0.8	Above	Negligible
	19	30.7	24.8	0.81	Above	Negligible
	20	31	24.7	0.8	Below	Low
	21	27.2	22.4	0.82	Above	Negligible
	22	28.1	22.9	0.81	Above	Negligible
	23	19.7	16.1	0.82	Above	Negligible
	24	20	16.2	0.81	Above	Negligible
	25	20.6	16.9	0.82	Above	Negligible
	26	20.7	17.4	0.84	Above	Negligible
	27	20.9	17.5	0.84	Above	Negligible
Fourth Church of Christ Scientists	1	20	17.2	0.86	Above	Negligible
	2	33.1	26.5	0.8	Above	Negligible
	3	33.2	26.2	0.79	Below	Low
	4	33.4	26.4	0.79	Below	Low
	5	25.6	21.4	0.84	Above	Negligible
	6	25.7	21.4	0.83	Above	Negligible
	7	25.7	21.2	0.82	Above	Negligible
	8	29.2	24.2	0.83	Above	Negligible
	9	29.2	24.1	0.83	Above	Negligible
	10	29.1	24.1	0.83	Above	Negligible
	11	23.7	21.2	0.89	Above	Negligible
	12	35	29.8	0.85	Above	Negligible

	13	29	25.2	0.87	Above	Negligible
	14	32.1	27.7	0.86	Above	Negligible
De Kuyper (Commercial)	1	24.8	20.3	0.82	Above	Negligible
	2	20.7	17.1	0.83	Above	Negligible
	3	19.1	17.1	0.9	Above	Negligible
	4	19.2	17	0.89	Above	Negligible
	5	19.4	16.8	0.87	Above	Negligible
	6	19.5	16.7	0.86	Above	Negligible
	7	19.7	16.7	0.85	Above	Negligible
	8	19.8	16.7	0.84	Above	Negligible
	9	27.8	22.2	0.8	Below	Low
	10	30	23.9	0.8	Below	Low
Greath Northern Tower (Residential)	1	10.8	10.1	0.94	Above	Negligible
	2	14.3	13.1	0.92	Above	Negligible
	3	9.8	9.1	0.93	Above	Negligible
	4	16	13.8	0.86	Above	Negligible
	5	13.6	12.5	0.92	Above	Negligible
	6	17.3	15.5	0.9	Above	Negligible
	7	12.4	11.4	0.92	Above	Negligible
	8	19.2	16.5	0.86	Above	Negligible
	9	16.7	15.2	0.91	Above	Negligible
	10	20.9	18.5	0.89	Above	Negligible
	11	15.4	13.8	0.9	Above	Negligible
	12	22.9	19.8	0.86	Above	Negligible
	13	21.1	19	0.9	Above	Negligible
	14	25.7	22.6	0.88	Above	Negligible
	15	19.3	17.2	0.89	Above	Negligible
	16	27.5	24.2	0.88	Above	Negligible
	17	9	8.6	0.96	Above	Negligible
	18	11.8	11	0.93	Above	Negligible
	19	8.1	7.7	0.95	Above	Negligible
	20	13.4	11.5	0.86	Above	Negligible
	21	28.9	26.1	0.9	Above	Negligible
	22	33.2	29.1	0.88	Above	Negligible
	23	27.2	24.5	0.9	Above	Negligible
	24	34.4	30.1	0.88	Above	Negligible
	25	31.9	28.6	0.9	Above	Negligible
	26	35.2	31.1	0.88	Above	Negligible
	27	30.5	27.4	0.9	Above	Negligible
	28	36.2	32	0.88	Above	Negligible
	29	33.9	30.6	0.9	Above	Negligible
	30	36.5	32.5	0.89	Above	Negligible
	31	32.6	29.4	0.9	Above	Negligible

	32	37	33.1	0.89	Above	Negligible
	33	35.7	32.6	0.91	Above	Negligible
	34	37.5	33.8	0.9	Above	Negligible
	35	35	32	0.91	Above	Negligible
	36	37.7	34.1	0.9	Above	Negligible
	37	37.5	34.7	0.93	Above	Negligible
	38	38.5	35.2	0.91	Above	Negligible
	39	37.1	34.3	0.92	Above	Negligible
	40	38.6	35.3	0.91	Above	Negligible
	41	25.4	22.7	0.89	Above	Negligible
	42	30.2	26.7	0.88	Above	Negligible
	43	23.4	20.8	0.89	Above	Negligible
	44	31.4	27.8	0.89	Above	Negligible
	45	38.8	36.2	0.93	Above	Negligible
	46	39.1	36	0.92	Above	Negligible
	47	38.8	36.2	0.93	Above	Negligible
	48	39.3	36.1	0.92	Above	Negligible
	49	39.5	36.8	0.93	Above	Negligible
	50	39.5	36.4	0.92	Above	Negligible
	51	39.5	36.9	0.93	Above	Negligible
	52	39.5	36.4	0.92	Above	Negligible
	53	39.6	36.9	0.93	Above	Negligible
	54	39.6	36.5	0.92	Above	Negligible
	55	39.6	37.1	0.94	Above	Negligible
	56	39.6	36.5	0.92	Above	Negligible
	57	39.6	37.1	0.94	Above	Negligible
	58	39.6	36.6	0.92	Above	Negligible
	59	39.6	37.1	0.94	Above	Negligible
	60	39.6	36.5	0.92	Above	Negligible
	61	39.6	37.2	0.94	Above	Negligible
	62	39.6	36.7	0.93	Above	Negligible
	63	39.6	37.2	0.94	Above	Negligible
	64	39.6	36.5	0.92	Above	Negligible
Oddfellows House (offices)	1	26.7	21.8	0.82	Above	Negligible
	2	26.9	21.7	0.81	Above	Negligible
	3	26.9	21.6	0.8	Above	Negligible
	4	26.8	21.4	0.8	Below	Low
	5	26.8	21.2	0.79	Below	Low
	6	26.7	20.9	0.78	Below	Low
	7	26.2	20.2	0.77	Below	Low
	8	25.6	20.1	0.79	Below	Low
	9	24.9	20.1	0.81	Above	Negligible
	10	30.7	24.5	0.8	Below	Low

	11	31.2	24.8	0.79	Below	Low
	12	31.4	24.8	0.79	Below	Low
	13	31.3	24.8	0.79	Below	Low
	14	31.2	24.8	0.79	Below	Low
	15	31.3	24.5	0.78	Below	Low
	16	31.1	24.1	0.77	Below	Low
	17	30.7	24.2	0.79	Below	Low
	18	30.7	24.4	0.79	Below	Low
	19	22.2	18.8	0.85	Above	Negligible
	20	22.7	19	0.84	Above	Negligible
	21	22.8	18.6	0.82	Above	Negligible
	22	22.6	18.3	0.81	Above	Negligible
	23	22.7	17.9	0.79	Below	Low
	24	22.3	17.5	0.78	Below	Low
	25	21.4	16.3	0.76	Below	Low
	26	20.6	16	0.78	Below	Low
	27	20.1	16.2	0.81	Above	Negligible
	28	20.3	17.6	0.87	Above	Negligible
	29	20.6	17.5	0.85	Above	Negligible
	30	20.9	17.7	0.85	Above	Negligible
	31	25	20.5	0.82	Above	Negligible
	32	24.5	20.6	0.84	Above	Negligible
	33	25.6	20.9	0.82	Above	Negligible
	34	29.4	23.5	0.8	Below	Low
	35	28.9	23.4	0.81	Above	Negligible
	36	30.1	23.9	0.79	Below	Low
	37	19.6	17.4	0.89	Above	Negligible
	38	19.2	16.5	0.86	Above	Negligible
	39	19.2	16.6	0.86	Above	Negligible
	40	23.9	20	0.84	Above	Negligible
	41	24.1	19.9	0.83	Above	Negligible
	42	24.2	20.7	0.86	Above	Negligible
	43	29.5	23.9	0.81	Above	Negligible
	44	29.9	24.3	0.81	Above	Negligible
	45	29.7	24.8	0.84	Above	Negligible
oddfellows House (offices 2)	1	23.5	20.7	0.88	Above	Negligible
	2	23.3	20.2	0.87	Above	Negligible
	3	23.4	19.8	0.85	Above	Negligible
	4	23.6	19.5	0.83	Above	Negligible
	5	23.7	19.1	0.81	Above	Negligible
	6	23.7	18.7	0.79	Below	Low
	7	24.1	19	0.79	Below	Low
	8	24.2	19.5	0.81	Above	Negligible

	9	23.9	19.6	0.82	Above	Negligible
	10	23.6	19.8	0.84	Above	Negligible
	11	22.8	19.1	0.84	Above	Negligible
	12	22.6	18.7	0.83	Above	Negligible
	13	22.4	18.5	0.83	Above	Negligible
	14	22	18.3	0.83	Above	Negligible
	15	21.8	18	0.83	Above	Negligible
	16	21.7	18.1	0.83	Above	Negligible
	17	27.2	23.5	0.86	Above	Negligible
	18	27.1	23.1	0.85	Above	Negligible
	19	27.2	22.9	0.84	Above	Negligible
	20	27.3	22.4	0.82	Above	Negligible
	21	27.4	22.2	0.81	Above	Negligible
	22	27.8	22.1	0.79	Below	Low
	23	28.2	22.1	0.78	Below	Low
	24	28.1	22.4	0.8	Below	Low
	25	28.2	22.6	0.8	Above	Negligible
	26	27.9	22.5	0.81	Above	Negligible
	27	27.4	22.2	0.81	Above	Negligible
	28	27	21.6	0.8	Above	Negligible
	29	26.8	21.4	0.8	Below	Low
	30	26.4	21.1	0.8	Below	Low
	31	26.2	20.9	0.8	Below	Low
	32	25.9	20.9	0.81	Above	Negligible
	33	30.6	26.1	0.85	Above	Negligible
	34	30.6	26	0.85	Above	Negligible
	35	30.7	25.6	0.83	Above	Negligible
	36	31	25.3	0.82	Above	Negligible
	37	31.4	25.6	0.82	Above	Negligible
	38	31.6	25.4	0.8	Above	Negligible
	39	32.1	25.3	0.79	Below	Low
	40	32.2	25.3	0.79	Below	Low
	41	32.3	25.4	0.79	Below	Low
	42	32.3	25.2	0.78	Below	Low
	43	32	25.1	0.78	Below	Low
	44	31.9	24.6	0.77	Below	Low
	45	31.6	24.5	0.78	Below	Low
	46	31.4	24.6	0.78	Below	Low
	47	31	24.2	0.78	Below	Low
	48	30.5	24	0.79	Below	Low
	49	34.4	28.9	0.84	Above	Negligible
	50	34.2	28.7	0.84	Above	Negligible
	51	34.3	28.3	0.83	Above	Negligible

	52	34.4	28.1	0.82	Above	Negligible
	53	34.5	28.2	0.82	Above	Negligible
	54	34.5	27.9	0.81	Above	Negligible
	55	34.7	27.6	0.8	Above	Negligible
	56	34.7	27.6	0.8	Above	Negligible
	57	34.7	27.4	0.79	Above	Negligible
	58	34.8	27.2	0.78	Above	Negligible
	59	34.8	27.4	0.79	Above	Negligible
	60	34.8	26.8	0.77	Below	Low
	61	34.4	26.4	0.77	Below	Low
	62	34.2	26.5	0.77	Below	Low
	63	34	26.4	0.78	Below	Low
	64	33.8	26.1	0.77	Below	Low
1 Scott Street (Offices, Commercial)	1	18.9	16.6	0.88	Above	Negligible
	2	15.5	13.7	0.88	Above	Negligible
	3	22.3	19.7	0.88	Above	Negligible
	4	26.2	23	0.88	Above	Negligible
	5	30.1	26.9	0.89	Above	Negligible
	6	33.1	29.7	0.9	Above	Negligible
	7	35.8	32.4	0.91	Above	Negligible
	8	37.1	33.8	0.91	Above	Negligible
	9	8.2	6.4	0.78	Below	Low
	10	0	0		Below	High
	11	8.8	8.4	0.95	Above	Negligible
	12	0.8	0.8	1	Above	Negligible
	13	17.9	15.3	0.85	Above	Negligible
	14	4.9	4	0.82	Above	Negligible
	15	33.4	29.1	0.87	Above	Negligible
	16	29.8	26.2	0.88	Above	Negligible
	17	35.6	30.9	0.87	Above	Negligible
	18	36.9	32.3	0.88	Above	Negligible
	19	37.7	33.1	0.88	Above	Negligible
	20	38.4	33.8	0.88	Above	Negligible
	21	38.8	34.3	0.88	Above	Negligible
	22	32.8	29.4	0.9	Above	Negligible
	23	26.9	23.9	0.89	Above	Negligible
	24	35.5	31.9	0.9	Above	Negligible
	25	36.6	33	0.9	Above	Negligible
	26	37.6	34.1	0.91	Above	Negligible
	27	38.2	34.7	0.91	Above	Negligible
	28	38.6	35.1	0.91	Above	Negligible
	29	29.9	27.3	0.91	Above	Negligible
	30	21.3	19.3	0.91	Above	Negligible

	31	34.2	31.4	0.92	Above	Negligible
	32	35.8	33	0.92	Above	Negligible
	33	36.9	34.2	0.93	Above	Negligible
	34	37.8	35.1	0.93	Above	Negligible
	35	38.1	35.5	0.93	Above	Negligible
	36	26.9	25.3	0.94	Above	Negligible
	37	20.6	19.4	0.94	Above	Negligible
	38	30.8	29.1	0.94	Above	Negligible
	39	33.8	32	0.95	Above	Negligible
	40	36.1	34.4	0.95	Above	Negligible
	41	37.7	36	0.95	Above	Negligible
	42	24.7	22.8	0.92	Above	Negligible
	43	22.7	21	0.93	Above	Negligible
	44	26.6	24.5	0.92	Above	Negligible
	45	28.7	26.4	0.92	Above	Negligible
123 Deansgate	1	26.5	25.6	0.97	Above	Negligible
	2	25.9	25.3	0.98	Above	Negligible
	3	25.6	25.1	0.98	Above	Negligible
	4	24.9	24.9	1	Above	Negligible
	5	24.5	24.5	1	Above	Negligible
	6	23.5	23.5	1	Above	Negligible
	7	22.8	22.8	1	Above	Negligible
	8	22.2	22.2	1	Above	Negligible
	9	20.1	20.1	1	Above	Negligible
	10	21	21	1	Above	Negligible
	11	21.5	21.5	1	Above	Negligible
	12	16.1	16.1	1	Above	Negligible
	13	17.5	17.5	1	Above	Negligible
	14	18.7	18.7	1	Above	Negligible
	15	13	13	1	Above	Negligible
	16	13.7	13.7	1	Above	Negligible
	17	14.8	14.8	1	Above	Negligible
	18	12.2	12.2	1	Above	Negligible
	19	11.5	11.5	1	Above	Negligible
	20	11.2	11.2	1	Above	Negligible
	21	24.3	23.7	0.98	Above	Negligible
	22	23.8	23.4	0.98	Above	Negligible
	23	23.4	23.1	0.99	Above	Negligible
	24	23	22.9	1	Above	Negligible
	25	22.7	22.7	1	Above	Negligible
	26	21.7	21.7	1	Above	Negligible
	27	21.2	21.2	1	Above	Negligible
	28	20.7	20.7	1	Above	Negligible

	29	18.7	18.7	1	Above	Negligible
	30	19.5	19.5	1	Above	Negligible
	31	19.9	19.9	1	Above	Negligible
	32	15	15	1	Above	Negligible
	33	16.3	16.3	1	Above	Negligible
	34	17.4	17.4	1	Above	Negligible
	35	12.1	12.1	1	Above	Negligible
	36	12.8	12.8	1	Above	Negligible
	37	13.7	13.7	1	Above	Negligible
	38	11.2	11.2	1	Above	Negligible
	39	10.5	10.5	1	Above	Negligible
	40	10.2	10.2	1	Above	Negligible
	41	12.3	12.3	1	Above	Negligible
	42	12.8	12.8	1	Above	Negligible
	43	13.4	13.4	1	Above	Negligible
	44	16.1	16.1	1	Above	Negligible
	45	15	15	1	Above	Negligible
	46	14.2	14.2	1	Above	Negligible
	47	20.2	20.2	1	Above	Negligible
	48	19	19	1	Above	Negligible
	49	17.6	17.6	1	Above	Negligible
	50	23.1	23.1	1	Above	Negligible
	51	22.6	22.6	1	Above	Negligible
	52	21.8	21.8	1	Above	Negligible
	53	24	24	1	Above	Negligible
	54	24.5	24.5	1	Above	Negligible
	55	25.3	25.3	1	Above	Negligible
	56	26	26	1	Above	Negligible
	57	26.7	26.5	0.99	Above	Negligible
	58	27.4	26.7	0.97	Above	Negligible
	59	27.8	27	0.97	Above	Negligible
	60	28.4	27.4	0.96	Above	Negligible
	61	14.1	14.1	1	Above	Negligible
	62	14.4	14.4	1	Above	Negligible
	63	15	15	1	Above	Negligible
	64	17.8	17.8	1	Above	Negligible
	65	16.7	16.7	1	Above	Negligible
	66	15.9	15.9	1	Above	Negligible
	67	22.1	22.1	1	Above	Negligible
	68	20.9	20.9	1	Above	Negligible
	69	19.3	19.3	1	Above	Negligible
	70	25.3	25.3	1	Above	Negligible
	71	24.8	24.8	1	Above	Negligible

	72	23.8	23.8	1	Above	Negligible
	73	26.1	26.1	1	Above	Negligible
	74	26.7	26.7	1	Above	Negligible
	75	27.4	27.4	1	Above	Negligible
	76	28.1	27.9	0.99	Above	Negligible
	77	28.7	28.2	0.98	Above	Negligible
	78	29.4	28.5	0.97	Above	Negligible
	79	29.7	28.9	0.97	Above	Negligible
	80	30.3	29.2	0.96	Above	Negligible
	81	16.5	16.5	1	Above	Negligible
	82	16.8	16.8	1	Above	Negligible
	83	17.4	17.4	1	Above	Negligible
	84	20.1	20.1	1	Above	Negligible
	85	19	19	1	Above	Negligible
	86	18.2	18.2	1	Above	Negligible
	87	24.2	24.2	1	Above	Negligible
	88	22.9	22.9	1	Above	Negligible
	89	21.6	21.6	1	Above	Negligible
	90	27.5	27.5	1	Above	Negligible
	91	26.8	26.8	1	Above	Negligible
	92	25.7	25.7	1	Above	Negligible
	93	28.3	28.3	1	Above	Negligible
	94	28.9	28.9	1	Above	Negligible
	95	29.8	29.5	0.99	Above	Negligible
	96	30.6	30	0.98	Above	Negligible
	97	30.9	30.2	0.98	Above	Negligible
	98	31.5	30.5	0.97	Above	Negligible
	99	31.9	30.7	0.96	Above	Negligible
	100	32.5	31	0.95	Above	Negligible
	101	20.4	20.4	1	Above	Negligible
	102	20.8	20.8	1	Above	Negligible
	103	21.4	21.4	1	Above	Negligible
	104	23.7	23.7	1	Above	Negligible
	105	22.7	22.7	1	Above	Negligible
	106	21.9	21.9	1	Above	Negligible
	107	27.3	27.3	1	Above	Negligible
	108	26.2	26.2	1	Above	Negligible
	109	25	25	1	Above	Negligible
	110	30.2	30.2	1	Above	Negligible
	111	29.5	29.5	1	Above	Negligible
	112	28.8	28.8	1	Above	Negligible
	113	31.1	31	1	Above	Negligible
	114	31.6	31.2	0.99	Above	Negligible

	115	32.4	31.7	0.98	Above	Negligible
	116	32.8	31.9	0.97	Above	Negligible
	117	33.3	32.2	0.97	Above	Negligible
	118	33.8	32.5	0.96	Above	Negligible
	119	34.1	32.7	0.96	Above	Negligible
	120	34.5	33	0.96	Above	Negligible
	121	26.1	25.5	0.98	Above	Negligible
	122	26.5	26	0.98	Above	Negligible
	123	26.9	26.4	0.98	Above	Negligible
	124	28.5	27.9	0.98	Above	Negligible
	125	27.8	27.1	0.97	Above	Negligible
	126	27.3	26.7	0.98	Above	Negligible
	127	31.1	30.4	0.98	Above	Negligible
	128	30.2	29.6	0.98	Above	Negligible
	129	29.4	28.7	0.98	Above	Negligible
	130	33.4	32.8	0.98	Above	Negligible
	131	32.8	32.1	0.98	Above	Negligible
	132	32.1	31.4	0.98	Above	Negligible
	133	34	33.3	0.98	Above	Negligible
	134	34.5	33.6	0.97	Above	Negligible
	135	35	33.7	0.96	Above	Negligible
	136	35.4	34	0.96	Above	Negligible
	137	35.6	34.2	0.96	Above	Negligible
	138	35.9	34.4	0.96	Above	Negligible
	139	36.1	34.5	0.96	Above	Negligible
	140	36.4	34.7	0.95	Above	Negligible
	141	33.7	32	0.95	Above	Negligible
	142	33.8	32.3	0.96	Above	Negligible
	143	34.1	32.6	0.96	Above	Negligible
	144	34.8	33.1	0.95	Above	Negligible
	145	34.4	32.8	0.95	Above	Negligible
	146	34.2	32.7	0.96	Above	Negligible
	147	35.9	34.2	0.95	Above	Negligible
	148	35.5	33.9	0.95	Above	Negligible
	149	35.1	33.4	0.95	Above	Negligible
	150	37	35.6	0.96	Above	Negligible
	151	36.6	35.1	0.96	Above	Negligible
	152	36.4	34.8	0.96	Above	Negligible
	153	37.1	35.8	0.96	Above	Negligible
	154	37.4	35.8	0.96	Above	Negligible
	155	37.6	35.8	0.95	Above	Negligible
	156	37.7	36	0.95	Above	Negligible
	157	37.8	36	0.95	Above	Negligible

	158	37.9	36	0.95	Above	Negligible
	159	37.9	36	0.95	Above	Negligible
	160	38	36.1	0.95	Above	Negligible
	161	39.5	37.1	0.94	Above	Negligible
	162	39.5	37.2	0.94	Above	Negligible
	163	39.5	37.4	0.95	Above	Negligible
	164	39.4	37.1	0.94	Above	Negligible
	165	39.4	37.3	0.95	Above	Negligible
	166	39.5	37.4	0.95	Above	Negligible
	167	39.4	37.4	0.95	Above	Negligible
	168	39.4	37.4	0.95	Above	Negligible
	169	39.4	37.2	0.94	Above	Negligible
	170	39.4	37.5	0.95	Above	Negligible
	171	39.4	37.3	0.95	Above	Negligible
	172	39.4	37.3	0.95	Above	Negligible
	173	39.4	37.6	0.95	Above	Negligible
	174	39.4	37.5	0.95	Above	Negligible
	175	39.4	37.4	0.95	Above	Negligible
	176	39.4	37.4	0.95	Above	Negligible
	177	39.3	37.4	0.95	Above	Negligible
	178	39.3	37.4	0.95	Above	Negligible
	179	39.3	37.3	0.95	Above	Negligible
	180	39.3	37.3	0.95	Above	Negligible
	181	39.5	37.2	0.94	Above	Negligible
	182	39.5	37.4	0.95	Above	Negligible
	183	39.5	37.6	0.95	Above	Negligible
	184	39.5	37.3	0.94	Above	Negligible
	185	39.5	37.4	0.95	Above	Negligible
	186	39.5	37.6	0.95	Above	Negligible
	187	39.4	37.5	0.95	Above	Negligible
	188	39.4	37.5	0.95	Above	Negligible
	189	39.5	37.4	0.95	Above	Negligible
	190	39.4	37.6	0.95	Above	Negligible
	191	39.4	37.4	0.95	Above	Negligible
	192	39.4	37.4	0.95	Above	Negligible
	193	39.4	37.7	0.96	Above	Negligible
	194	39.4	37.6	0.95	Above	Negligible
	195	39.4	37.6	0.95	Above	Negligible
	196	39.4	37.6	0.95	Above	Negligible
	197	39.4	37.5	0.95	Above	Negligible
	198	39.4	37.5	0.95	Above	Negligible
	199	39.4	37.4	0.95	Above	Negligible
	200	39.4	37.5	0.95	Above	Negligible

	201	9.2	9.2	1	Above	Negligible
	202	12.5	12.5	1	Above	Negligible
	203	16.8	16.8	1	Above	Negligible
	204	18.8	18.8	1	Above	Negligible
Scottish House	1	22.2	21.3	0.96	Above	Negligible
	2	21.9	21	0.96	Above	Negligible
	3	21.5	20.5	0.95	Above	Negligible
	4	21.2	20.1	0.95	Above	Negligible
	5	20.7	19.7	0.95	Above	Negligible
	6	20.6	19.6	0.95	Above	Negligible
	7	20.6	19.5	0.95	Above	Negligible
	8	20.5	19.3	0.94	Above	Negligible
	9	20.5	19.4	0.95	Above	Negligible
	10	20.6	19.4	0.94	Above	Negligible
	11	20.7	19.3	0.93	Above	Negligible
	12	20.8	19.5	0.94	Above	Negligible
	13	21	19.6	0.93	Above	Negligible
	14	21.2	19.8	0.93	Above	Negligible
	15	21.4	19.9	0.93	Above	Negligible
	16	21.5	20	0.93	Above	Negligible
	17	21.6	20	0.93	Above	Negligible
	18	21.7	20.1	0.93	Above	Negligible
	19	25.2	24.1	0.96	Above	Negligible
	20	25	23.8	0.95	Above	Negligible
	21	24.6	23.4	0.95	Above	Negligible
	22	24.2	23.1	0.95	Above	Negligible
	23	24.1	23	0.95	Above	Negligible
	24	24.2	23	0.95	Above	Negligible
	25	24.3	23.1	0.95	Above	Negligible
	26	24.2	23	0.95	Above	Negligible
	27	24.6	23.3	0.95	Above	Negligible
	28	24.7	23.4	0.95	Above	Negligible
	29	25.9	24.2	0.93	Above	Negligible
	30	26	24.2	0.93	Above	Negligible
	31	26.2	24.3	0.93	Above	Negligible
	32	26.4	24.4	0.92	Above	Negligible
	33	28.9	27.5	0.95	Above	Negligible
	34	28.8	27.5	0.95	Above	Negligible
	35	28.4	27.1	0.95	Above	Negligible
	36	28.5	27.1	0.95	Above	Negligible
	37	28.4	26.9	0.95	Above	Negligible
	38	28.5	27.1	0.95	Above	Negligible
	39	28.8	27.2	0.94	Above	Negligible

	40	28.7	27.1	0.94	Above	Negligible
	41	28.8	27.1	0.94	Above	Negligible
	42	29	27.3	0.94	Above	Negligible
	43	29.4	27.6	0.94	Above	Negligible
	44	29.6	27.8	0.94	Above	Negligible
	45	30	28.1	0.94	Above	Negligible
	46	30.2	28.3	0.94	Above	Negligible
	47	30.6	28.4	0.93	Above	Negligible
	48	30.9	28.7	0.93	Above	Negligible
	49	31	28.7	0.93	Above	Negligible
	50	31.2	28.8	0.92	Above	Negligible
	51	31.6	30.1	0.95	Above	Negligible
	52	31.4	29.9	0.95	Above	Negligible
	53	31.1	29.6	0.95	Above	Negligible
	54	31.2	29.7	0.95	Above	Negligible
	55	31.3	29.6	0.95	Above	Negligible
	56	31.7	30	0.95	Above	Negligible
	57	32.1	30.3	0.94	Above	Negligible
	58	32	30.2	0.94	Above	Negligible
	59	32.2	30.4	0.94	Above	Negligible
	60	32.4	30.5	0.94	Above	Negligible
	61	33	30.9	0.94	Above	Negligible
	62	33	30.9	0.94	Above	Negligible
	63	33.4	31.3	0.94	Above	Negligible
	64	33.6	31.6	0.94	Above	Negligible
	65	34.1	31.9	0.94	Above	Negligible
	66	34.3	32	0.93	Above	Negligible
	67	34.4	32.1	0.93	Above	Negligible
	68	34.6	32.2	0.93	Above	Negligible
	69	34.2	32.8	0.96	Above	Negligible
	70	34.2	32.8	0.96	Above	Negligible
	71	34.1	32.6	0.96	Above	Negligible
	72	34.1	32.5	0.95	Above	Negligible
	73	34.2	32.7	0.96	Above	Negligible
	74	34.3	32.8	0.96	Above	Negligible
	75	34.7	33.1	0.95	Above	Negligible
	76	34.8	33.2	0.95	Above	Negligible
	77	35	33.3	0.95	Above	Negligible
	78	35.1	33.4	0.95	Above	Negligible
	79	35.5	33.7	0.95	Above	Negligible
	80	35.7	33.8	0.95	Above	Negligible
	81	35.8	33.9	0.95	Above	Negligible
	82	36.1	34.1	0.94	Above	Negligible

	83	36.4	34.3	0.94	Above	Negligible
	84	36.5	34.4	0.94	Above	Negligible
	85	36.7	34.5	0.94	Above	Negligible
	86	36.9	34.6	0.94	Above	Negligible

Receptor	Windows No	APSH Baseline (%)	APSH Proposed (%)	APSH Ratio of Impact	WPSH Baseline (%)	WPSH Proposed (%)	WPSH Ratio of Impact	Absolute Reduction (%)	BRE Compliance	Magnitude of Impact
Elliot House (Chamber of Commerce)	1	49.2	35.4	0.72	8	4	0.5	13.8	Below	High
	2	48.9	34.6	0.71	7.7	3.7	0.48	14.3	Below	High
	3	48.6	33.6	0.69	7.4	3.2	0.43	15	Below	High
	4	48.8	33.5	0.69	7.7	3.1	0.4	15.3	Below	High
	5	48.9	33.1	0.68	7.9	3	0.38	15.8	Below	High
	6	49	32.4	0.66	8.1	2.9	0.36	16.6	Below	High
	7	49.5	32.3	0.65	8.5	2.7	0.32	17.2	Below	High
	8	50.1	32.6	0.65	9.1	2.9	0.32	17.5	Below	High
	9	50.6	32.6	0.64	9.7	3	0.31	18	Below	High
	10	51.7	32.7	0.63	10.9	2.9	0.27	19	Below	High
	11	52.3	32.7	0.63	11.5	2.8	0.24	19.6	Below	High
	12	53.7	32.8	0.61	12.8	2.6	0.2	20.9	Below	High
	13	55.1	33	0.6	14.3	2.7	0.19	22.1	Below	High
	14	57.2	33.5	0.59	16.5	3.3	0.2	23.7	Below	High
	15	58.1	34.2	0.59	17.1	3.4	0.2	23.9	Below	High
	16	59.9	33.5	0.56	18.8	3.5	0.19	26.4	Below	High
	17	61.7	32.2	0.52	19.3	2.8	0.15	29.5	Below	High
	18	30.2	20.6	0.68	1.2	0.2	0.17	9.6	Below	High
	19	29.6	19.3	0.65	1.3	0.2	0.15	10.3	Below	High
	20	28.9	18.3	0.63	1.2	0.2	0.17	10.6	Below	High
	21	28.8	18.3	0.64	1.2	0.2	0.17	10.5	Below	High
	22	28.9	17.9	0.62	1.4	0.2	0.14	11	Below	High
	23	29	17.6	0.61	1.7	0.2	0.12	11.4	Below	High
	24	29.1	17.3	0.59	2	0.2	0.1	11.8	Below	High
	25	28.9	17	0.59	2.2	0.2	0.09	11.9	Below	High
	26	29.5	17.3	0.59	2.4	0.1	0.04	12.2	Below	High
	27	30.1	17.3	0.57	2.6	0.1	0.04	12.8	Below	High
	28	31.1	17.4	0.56	3.2	0	0	13.7	Below	High
	29	32	17.9	0.56	3.8	0	0	14.1	Below	High
	30	33.4	18	0.54	4.5	0	0	15.4	Below	High
	31	35.5	19	0.54	5.9	0	0	16.5	Below	High
	32	36	19.6	0.54	6.3	0	0	16.4	Below	High
	33	38.6	19.4	0.5	7.5	0	0	19.2	Below	High
	34	38.8	17.8	0.46	7.6	0.6	0.08	21	Below	High
	35	38.5	26.9	0.7	2.3	0.6	0.26	11.6	Below	High
	36	38.3	26.2	0.68	2.5	0.7	0.28	12.1	Below	High
	37	38	25.4	0.67	2.5	0.5	0.2	12.6	Below	High
	38	38.4	25.6	0.67	2.7	0.5	0.19	12.8	Below	High
	39	37.8	24.7	0.65	2.9	0.4	0.14	13.1	Below	High
	40	37.7	23.9	0.63	3.1	0.4	0.13	13.8	Below	High
	41	38.2	24	0.63	3.4	0.4	0.12	14.2	Below	High

	42	38.4	23.7	0.62	4	0.3	0.08	14.7	Below	High
	43	39.2	24.1	0.61	4.4	0.3	0.07	15.1	Below	High
	44	39.9	24.1	0.6	5.2	0.3	0.06	15.8	Below	High
	45	41.3	24.4	0.59	6.1	0.3	0.05	16.9	Below	High
	46	43	24.5	0.57	7.7	0.3	0.04	18.5	Below	High
	47	44.5	24.5	0.55	9.2	0.2	0.02	20	Below	High
	48	48	25.6	0.53	11.8	0.2	0.02	22.4	Below	High
	49	48.2	25.8	0.54	12.2	0.5	0.04	22.4	Below	High
	50	50.4	26.3	0.52	14.2	1.1	0.08	24.1	Below	High
	51	50.9	24.6	0.48	14.4	0.9	0.06	26.3	Below	High
	52	34.5	26	0.75	3.4	2.8	0.82	8.5	Below	Low
	53	31.7	23.4	0.74	2	1.4	0.7	8.3	Below	Low
	54	31.9	23.6	0.74	1.6	0.9	0.56	8.3	Below	High
	55	30.7	22.5	0.73	1.3	0.6	0.46	8.2	Below	High
	56	29.9	21.1	0.71	1.1	0.2	0.18	8.8	Below	High
	57	44.9	34.3	0.76	6.1	4.7	0.77	10.6	Below	Low
	58	42.1	31.6	0.75	4.5	3	0.67	10.5	Below	Mediu m
	59	41.2	30.8	0.75	3.7	2.2	0.59	10.4	Below	High
	60	39.8	29.5	0.74	2.9	1.4	0.48	10.3	Below	High
	61	39.3	29	0.74	2.5	1.1	0.44	10.3	Below	High
	62	55.6	43.1	0.78	13.4	10.2	0.76	12.5	Above	Negligib le
	63	52.8	40.2	0.76	11.7	8.4	0.72	12.6	Above	Negligib le
	64	51.8	39.2	0.76	10.8	7.4	0.69	12.6	Above	Negligib le
	65	50.7	38.1	0.75	9.8	6.2	0.63	12.6	Above	Negligib le
	66	50.5	37.6	0.74	9.4	5.6	0.6	12.9	Above	Negligib le
	67	49.7	36.8	0.74	8.5	4.7	0.55	12.9	Below	High
The Old Nags Head (Pub)	1	47.8	22.2	0.46	12.5	0.5	0.04	25.6	Below	High
	2	48.9	20.5	0.42	12.8	0	0	28.4	Below	High
	3	50.2	20.5	0.41	13.5	0	0	29.7	Below	High
	4	49.8	20.9	0.42	13	0	0	28.9	Below	High
	5	48.8	20.9	0.43	12	0	0	27.9	Below	High
	6	48.2	21.5	0.45	11	0	0	26.7	Below	High
	7	59.7	26	0.44	20	0.8	0.04	33.7	Below	High
	8	59.8	25.2	0.42	20.5	0.2	0.01	34.6	Below	High
	9	60.8	26.8	0.44	21.1	0.2	0.01	34	Below	High
	10	38.5	16.9	0.44	7.2	0	0	21.6	Below	High
	11	38.9	15.1	0.39	7.1	0	0	23.8	Below	High
	12	39.5	14.1	0.36	7.1	0	0	25.4	Below	High
	13	40.4	16.9	0.42	6.7	0	0	23.5	Below	High
	14	38.8	15.9	0.41	4.9	0	0	22.9	Below	High
	15	37	14	0.38	3.4	0	0	23	Below	High

19 Jackson's row (office)	1	44.8	17	0.38	7.7	0	0	27.8	Below	High
Croxley House (offices+Nightclub)	1	51.7	10.5	0.2	13.3	0.2	0.02	41.2	Below	High
	2	50.9	10.7	0.21	12.6	0.3	0.02	40.2	Below	High
	3	49.5	10.2	0.21	11.1	0.3	0.03	39.3	Below	High
	4	62.4	15.8	0.25	22.5	0.3	0.01	46.6	Below	High
	5	62.3	14.9	0.24	22.3	0.3	0.01	47.4	Below	High
	6	63.1	11.3	0.18	22.9	0.5	0.02	51.8	Below	High
	7	70.9	20.9	0.29	29.7	0.3	0.01	50	Below	High
	8	70.1	18.4	0.26	28.8	0.3	0.01	51.7	Below	High
	9	70.2	16	0.23	29	0.5	0.02	54.2	Below	High
	10	74.3	26	0.35	32.3	0.7	0.02	48.3	Below	High
	11	73.8	22.8	0.31	31.8	0.8	0.03	51	Below	High
	12	74	21.7	0.29	32.2	0.8	0.02	52.3	Below	High
	13	60.5	19.3	0.32	20.3	0.2	0.01	41.2	Below	High
	14	70.3	22.7	0.32	28.9	0.2	0.01	47.6	Below	High
	15	73.8	29.1	0.39	31.6	1.1	0.03	44.7	Below	High
	16	76.5	36.7	0.48	33.8	6.9	0.2	39.8	Above	Negligible
	17	76.6	32.2	0.42	34.2	4.3	0.13	44.4	Below	High
	18	76.7	31	0.4	34.3	3.7	0.11	45.7	Below	High
	19	76.4	29.7	0.39	34	3	0.09	46.7	Below	High
	20	76.5	28.2	0.37	34.2	2.5	0.07	48.3	Below	High
	21	76.6	27.8	0.36	34.1	2.4	0.07	48.8	Below	High
	22	76.6	27.9	0.36	34	2	0.06	48.7	Below	High
	23	78.8	37.6	0.48	35.9	9.8	0.27	41.2	Above	Negligible
Loyds House (Offices, Restaurant, Offices)	1	68	11	0.16	27.3	0.6	0.02	57	Below	High
	2	75.8	26.5	0.35	33.5	1.5	0.04	49.3	Below	High
	3	72.6	19.8	0.27	30.9	0.7	0.02	52.8	Below	High
	4	61.3	10.3	0.17	21	0.5	0.02	51	Below	High
	5	59.4	10.5	0.18	19.2	0.6	0.03	48.9	Below	High
	6	58.2	10.6	0.18	18	0.6	0.03	47.6	Below	High
	7	57.3	10.6	0.18	17.1	0.6	0.04	46.7	Below	High
	8	56.6	10.2	0.18	16.6	0.7	0.04	46.4	Below	High
	9	70.8	14.2	0.2	29.6	0.8	0.03	56.6	Below	High
	10	70.4	13.3	0.19	29.3	0.8	0.03	57.1	Below	High
	11	70.7	12	0.17	29.7	0.8	0.03	58.7	Below	High
	12	70.8	11.8	0.17	29.9	0.9	0.03	59	Below	High
	13	70	11.3	0.16	29.2	0.9	0.03	58.7	Below	High
	14	69.8	11	0.16	29.1	1	0.03	58.8	Below	High
	15	73	19.6	0.27	31.3	0.8	0.03	53.4	Below	High
	16	72.8	18.8	0.26	31	1	0.03	54	Below	High
	17	73.3	17.2	0.23	31.5	1.1	0.03	56.1	Below	High

	18	73.3	15.8	0.22	31.7	1.3	0.04	57.5	Below	High
	19	73.1	14.2	0.19	31.8	1.2	0.04	58.9	Below	High
	20	73.3	13.6	0.19	32.1	1.2	0.04	59.7	Below	High
	21	75.8	24.5	0.32	33.5	1.4	0.04	51.3	Below	High
	22	75.9	23.8	0.31	33.5	1.6	0.05	52.1	Below	High
	23	76	22.5	0.3	33.6	1.7	0.05	53.5	Below	High
	24	75.8	21.5	0.28	33.5	1.7	0.05	54.3	Below	High
	25	76.1	21.1	0.28	33.6	1.9	0.06	55	Below	High
	26	76	20	0.26	34	1.9	0.06	56	Below	High
	27	55.7	9.8	0.18	16.1	0.6	0.04	45.9	Below	High
	28	55	9.6	0.17	15.4	0.5	0.03	45.4	Below	High
	29	54.1	9.5	0.18	14.4	0.5	0.03	44.6	Below	High
	30	53.2	9.2	0.17	13.4	0.5	0.04	44	Below	High
	31	52	9	0.17	12.2	0.5	0.04	43	Below	High
	32	70	10.9	0.16	29.6	1	0.03	59.1	Below	High
	33	70.2	11	0.16	29.8	1.1	0.04	59.2	Below	High
	34	70.3	11.1	0.16	30	1.2	0.04	59.2	Below	High
	35	70.7	10.9	0.15	30.3	1.4	0.05	59.8	Below	High
	36	70.2	11	0.16	29.8	1.4	0.05	59.2	Below	High
	37	69.7	11.5	0.16	29.3	1.6	0.05	58.2	Below	High
	38	73.1	13.7	0.19	32	1.3	0.04	59.4	Below	High
	39	73.4	13.7	0.19	32.1	1.3	0.04	59.7	Below	High
	40	73.7	14	0.19	32.4	1.6	0.05	59.7	Below	High
	41	74.1	14.2	0.19	32.7	2	0.06	59.9	Below	High
	42	73.8	15	0.2	31.8	2.4	0.08	58.8	Below	High
	43	73.1	15.2	0.21	31.3	2.6	0.08	57.9	Below	High
	44	75.7	19.5	0.26	33.7	1.9	0.06	56.2	Below	High
	45	76.9	19.4	0.25	33.8	1.8	0.05	57.5	Below	High
	46	77.1	19.4	0.25	34	2.1	0.06	57.7	Below	High
	47	77.2	19.2	0.25	34.1	2.3	0.07	58	Below	High
	48	76.1	19.7	0.26	33	2.8	0.08	56.4	Below	High
	49	75.2	20.1	0.27	32.8	3.6	0.11	55.1	Below	High
	50	47.6	9.5	0.2	8	0.6	0.08	38.1	Below	High
	51	46.3	10.3	0.22	6.6	0.7	0.11	36	Below	High
	52	45	11.1	0.25	5.4	0.7	0.13	33.9	Below	High
	53	68.4	12	0.18	27.9	1.7	0.06	56.4	Below	High
	54	68.2	12.9	0.19	27.2	1.5	0.06	55.3	Below	High
	55	66.3	13.9	0.21	25	1.6	0.06	52.4	Below	High
	56	72.4	15.2	0.21	30.7	2.8	0.09	57.2	Below	High
	57	72.2	15.8	0.22	30.5	2.9	0.1	56.4	Below	High
	58	71.9	16.9	0.24	30.2	3.3	0.11	55	Below	High
	59	74.5	19.7	0.26	32.5	3.9	0.12	54.8	Below	High
	60	74.2	19.3	0.26	32.2	4	0.12	54.9	Below	High

	61	74	20.4	0.28	32	4.7	0.15	53.6	Below	High
	62	62.6	17	0.27	21.5	1.8	0.08	45.6	Below	High
	63	71.4	20	0.28	29.7	4.4	0.15	51.4	Below	High
	64	73.7	21.5	0.29	31.8	5.8	0.18	52.2	Below	High
	65	73.2	21.6	0.3	31.3	6.1	0.19	51.6	Below	High
	66	73.7	24	0.33	31.8	7.1	0.22	49.7	Below	High
	67	73.7	25.6	0.35	31.8	8.4	0.26	48.1	Above	Negligible
	68	73.6	27.1	0.37	31.8	9	0.28	46.5	Above	Negligible
	69	43.6	11.9	0.27	4	0.7	0.18	31.7	Below	High
	70	41	14.7	0.36	3	0.8	0.27	26.3	Below	High
	71	64.9	14.7	0.23	23.5	2	0.09	50.2	Below	High
	72	61.5	17.8	0.29	20.5	2.6	0.13	43.7	Below	High
	73	71.2	17.5	0.25	29.5	3.9	0.13	53.7	Below	High
	74	70.3	20.5	0.29	28.7	5	0.17	49.8	Below	High
	75	44.6	17.6	0.39	5.5	1.1	0.2	27	Below	High
	76	73.4	30.2	0.41	31.6	10.7	0.34	43.2	Above	Negligible
	77	68.3	23.5	0.34	27.1	4.7	0.17	44.8	Below	High
	78	38.5	16.8	0.44	2.1	1.5	0.71	21.7	Below	High
	79	37.8	17.1	0.45	2.3	1.7	0.74	20.7	Below	High
	80	54.9	20.2	0.37	14.3	2.1	0.15	34.7	Below	High
	81	53.6	22.4	0.42	13.6	2.9	0.21	31.2	Below	High
	82	51.7	23	0.44	12.2	4.2	0.34	28.7	Below	High
	83	68.5	24.8	0.36	27.4	5.7	0.21	43.7	Below	High
	84	67.8	27.9	0.41	26.8	6.3	0.24	39.9	Above	Negligible
	85	66.5	28.8	0.43	25.5	7.3	0.29	37.7	Above	Negligible
	86	73.2	32.9	0.45	31.3	11.9	0.38	40.3	Above	Negligible
	87	72.9	35.3	0.48	31.1	12.2	0.39	37.6	Above	Negligible
	88	71.5	36.3	0.51	29.6	13.1	0.44	35.2	Above	Negligible
	89	35.4	17.3	0.49	4.1	3.6	0.88	18.1	Below	High
	90	50.9	24.2	0.48	12.1	5.3	0.44	26.7	Below	High
	91	65.9	31.1	0.47	25.1	8.6	0.34	34.8	Above	Negligible
	92	28.8	18.4	0.64	6.8	6.2	0.91	10.4	Below	Medium
	93	41.1	25.9	0.63	13.6	8.1	0.6	15.2	Above	Negligible
	94	59.5	39.8	0.67	22.4	10.3	0.46	19.7	Above	Negligible
	95	68.4	48.9	0.71	26.6	14.1	0.53	19.5	Above	Negligible
St John's House (offices+Cafe GF)	1	37.2	32.4	0.87	1.5	1.5	1	4.8	Above	Negligible
	2	36.4	31.8	0.87	1.2	1.2	1	4.6	Above	Negligible

	3	36	31.5	0.88	1.3	1.3	1	4.5	Above	Negligible
	4	35.8	31.5	0.88	1.3	1.3	1	4.3	Above	Negligible
	5	35.9	31.8	0.89	1.2	1.2	1	4.1	Above	Negligible
	6	35.8	31.8	0.89	1.2	1.2	1	4	Above	Negligible
	7	35.4	31.7	0.9	1.2	1.2	1	3.7	Above	Negligible
	8	44.5	38.2	0.86	3.7	2.9	0.78	6.3	Below	Low
	9	43.8	37.4	0.85	3.4	2.6	0.76	6.4	Below	Low
	10	43.7	37.4	0.86	3.4	2.5	0.74	6.3	Below	Low
	11	43.9	37.7	0.86	3.5	2.6	0.74	6.2	Below	Low
	12	43.8	37.8	0.86	3.4	2.4	0.71	6	Below	Low
	13	43.4	37.5	0.86	3.2	2.2	0.69	5.9	Below	Medium
	14	43.4	37.7	0.87	3.3	2.3	0.7	5.7	Below	Medium
	15	54.1	46.1	0.85	12.4	9.3	0.75	8	Above	Negligible
	16	54	45.8	0.85	12.2	9.2	0.75	8.2	Above	Negligible
	17	54.1	45.7	0.84	12.3	9.3	0.76	8.4	Above	Negligible
	18	54	45.8	0.85	12	9.1	0.76	8.2	Above	Negligible
	19	54.2	46	0.85	12.1	9	0.74	8.2	Above	Negligible
	20	54.3	46	0.85	12.1	8.7	0.72	8.3	Above	Negligible
	21	54.8	46.2	0.84	12.4	8.6	0.69	8.6	Above	Negligible
	22	71.9	59.3	0.82	29.7	21.8	0.73	12.6	Above	Negligible
	23	72.1	59.2	0.82	29.9	21.9	0.73	12.9	Above	Negligible
	24	72	58.9	0.82	30	21.8	0.73	13.1	Above	Negligible
	25	72.3	58.8	0.81	30.1	21.9	0.73	13.5	Above	Negligible
	26	72.6	59.1	0.81	30.3	22	0.73	13.5	Above	Negligible
	27	72.8	59.5	0.82	30.4	22	0.72	13.3	Above	Negligible
	28	73.1	59.9	0.82	30.5	22.1	0.72	13.2	Above	Negligible
	29	75.9	63.2	0.83	32.8	24.4	0.74	12.7	Above	Negligible
	30	75.6	62.7	0.83	32.9	24.5	0.74	12.9	Above	Negligible
	31	75.5	62.3	0.83	33.1	24.5	0.74	13.2	Above	Negligible
	32	75.6	62.3	0.82	33.2	24.6	0.74	13.3	Above	Negligible
	33	75.8	61.9	0.82	33.3	24.5	0.74	13.9	Above	Negligible
	34	76.1	62.2	0.82	33.5	24.5	0.73	13.9	Above	Negligible

	35	76.3	62.6	0.82	33.5	24.5	0.73	13.7	Above	Negligible
	36	77.6	65.3	0.84	33.9	25.8	0.76	12.3	Above	Negligible
	37	77	64.5	0.84	34	25.7	0.76	12.5	Above	Negligible
	38	77	64.3	0.84	34.1	25.7	0.75	12.7	Above	Negligible
	39	77.2	64.3	0.83	34.2	25.7	0.75	12.9	Above	Negligible
	40	77.3	64.2	0.83	34.2	25.6	0.75	13.1	Above	Negligible
	41	77.6	64	0.82	34.4	25.6	0.74	13.6	Above	Negligible
	42	77.8	64.2	0.83	34.4	25.5	0.74	13.6	Above	Negligible
	43	33.5	28.7	0.86	3.8	2.6	0.68	4.8	Below	Medium
	44	35	30.9	0.88	4.1	2.9	0.71	4.1	Below	Low
	45	36.9	32.1	0.87	4.2	2.6	0.62	4.8	Below	Medium
	46	38.7	33.4	0.86	4.5	2.9	0.64	5.3	Below	Medium
	47	39.7	33.7	0.85	4.8	2.9	0.6	6	Below	Medium
	48	40.8	34.1	0.84	8.8	5.7	0.65	6.7	Above	Negligible
	49	42.5	36	0.85	9.2	5.7	0.62	6.5	Above	Negligible
	50	45.3	37.8	0.83	10.4	6	0.58	7.5	Above	Negligible
	51	47.6	39.4	0.83	11.3	6.7	0.59	8.2	Above	Negligible
	52	48.2	39.9	0.83	11.1	6.8	0.61	8.3	Above	Negligible
	53	51.2	41.5	0.81	19	12.8	0.67	9.7	Above	Negligible
	54	52.9	43.2	0.82	19.4	12.7	0.65	9.7	Above	Negligible
	55	55.8	45.8	0.82	20.5	13.6	0.66	10	Above	Negligible
	56	57.7	47.5	0.82	21	14.2	0.68	10.2	Above	Negligible
	57	59	48.4	0.82	21.2	14.5	0.68	10.6	Above	Negligible
	58	59.3	49.5	0.83	27.1	20.8	0.77	9.8	Above	Negligible
	59	60.9	51.2	0.84	27.4	20.7	0.76	9.7	Above	Negligible
	60	62.7	52.6	0.84	27.4	20.2	0.74	10.1	Above	Negligible
	61	63.7	53.7	0.84	26.9	20.3	0.75	10	Above	Negligible
	62	65.4	54.8	0.84	27.3	20.5	0.75	10.6	Above	Negligible
	63	63.1	52.8	0.84	30.9	24.1	0.78	10.3	Above	Negligible
	64	64.7	54.8	0.85	31.2	24.3	0.78	9.9	Above	Negligible
	65	66.8	56.9	0.85	31.5	24.5	0.78	9.9	Above	Negligible

	66	68.2	58.3	0.85	31.4	24.8	0.79	9.9	Above	Negligible
	67	69.4	59.2	0.85	31.3	24.8	0.79	10.2	Above	Negligible
	68	65.2	53.8	0.83	33	25.1	0.76	11.4	Above	Negligible
	69	67.2	56	0.83	33.7	25.5	0.76	11.2	Above	Negligible
	70	70.1	59	0.84	34.1	25.9	0.76	11.1	Above	Negligible
	71	71.1	60	0.84	34.3	26.5	0.77	11.1	Above	Negligible
	72	72.5	60.8	0.84	34.4	26.3	0.76	11.7	Above	Negligible
Sovereign House (offices)	1	41	34.1	0.83	7	4.6	0.66	6.9	Below	Medium
	2	51.7	41.4	0.8	15.4	9.6	0.62	10.3	Above	Negligible
	3	59.3	49	0.83	22.6	16.4	0.73	10.3	Above	Negligible
	4	64.4	54.4	0.84	27.6	21.4	0.78	10	Above	Negligible
	5	68.4	58.7	0.86	31.2	25	0.8	9.7	Above	Negligible
	6	41.6	34.6	0.83	7.3	4.5	0.62	7	Below	Medium
	7	41.8	34.7	0.83	7.3	4.4	0.6	7.1	Below	Medium
	8	52.2	42.5	0.81	14.8	9.2	0.62	9.7	Above	Negligible
	9	52.6	43.1	0.82	15	9.8	0.65	9.5	Above	Negligible
	10	59.8	49.7	0.83	21.7	15.9	0.73	10.1	Above	Negligible
	11	60.2	50.8	0.84	21.5	16.3	0.76	9.4	Above	Negligible
	12	65.3	55	0.84	27.2	21	0.77	10.3	Above	Negligible
	13	65.7	56	0.85	26.7	21.2	0.79	9.7	Above	Negligible
	14	70.1	59	0.84	31.2	24.2	0.78	11.1	Above	Negligible
	15	20.5	13.1	0.64	6.6	3.4	0.52	7.4	Below	High
	16	20.8	13.8	0.66	7	4.1	0.59	7	Below	High
	17	25.9	17.7	0.68	9.5	5.5	0.58	8.2	Below	High
	18	26.2	18.3	0.7	10.5	6.8	0.65	7.9	Below	Medium
	19	30.5	23.2	0.76	11.8	8.8	0.75	7.3	Below	Low
	20	32.9	25.2	0.77	13.5	10	0.74	7.7	Above	Negligible
	21	36.2	29	0.8	14	10.9	0.78	7.2	Above	Negligible
	22	38.6	31.3	0.81	16.7	13.5	0.81	7.3	Above	Negligible
	23	40.3	33	0.82	17.6	14.3	0.81	7.3	Above	Negligible
	24	47.7	40.3	0.84	20.8	17.6	0.85	7.4	Above	Negligible
	25	52.4	43.7	0.83	23.2	18.6	0.8	8.7	Above	Negligible

	26	23.8	16.7	0.7	7	4	0.57	7.1	Below	High
	27	22.3	14.5	0.65	7.2	3.6	0.5	7.8	Below	High
	28	27.8	19.4	0.7	11	6.7	0.61	8.4	Below	Mediu m
	29	27.8	19.1	0.69	10.7	6.2	0.58	8.7	Below	High
	30	34.4	25.7	0.75	14.6	10	0.68	8.7	Above	Negligib le
	31	33.4	24.2	0.72	13.8	8.8	0.64	9.2	Below	Mediu m
	32	42.3	34	0.8	17.9	13.7	0.77	8.3	Above	Negligib le
	33	44.4	35.5	0.8	17.4	12.6	0.72	8.9	Above	Negligib le
	34	54.9	46.5	0.85	23.9	19.7	0.82	8.4	Above	Negligib le
	35	55.6	46.6	0.84	24.1	19.2	0.8	9	Above	Negligib le
	36	63.2	54.4	0.86	29.6	25	0.84	8.8	Above	Negligib le
	37	65.5	55.9	0.85	30.2	24.8	0.82	9.6	Above	Negligib le
	38	24.6	16.4	0.67	7.7	3.7	0.48	8.2	Below	High
	39	18.4	16.3	0.89	4.9	2.9	0.59	2.1	Above	Negligib le
	40	27.8	19.1	0.69	10.6	6.1	0.58	8.7	Below	High
	41	22.1	19.1	0.86	8.1	5.3	0.65	3	Above	Negligib le
	42	30.8	22.1	0.72	13.6	8.7	0.64	8.7	Below	Mediu m
	43	26.2	22.3	0.85	10.4	7.8	0.75	3.9	Above	Negligib le
	44	37.2	28.6	0.77	16	11	0.69	8.6	Above	Negligib le
	45	33	27.2	0.82	13	9.9	0.76	5.8	Above	Negligib le
	46	54.5	45.8	0.84	21.4	16.3	0.76	8.7	Above	Negligib le
	47	44.4	37.3	0.84	17	12.9	0.76	7.1	Above	Negligib le
	48	66.5	57.3	0.86	30.7	25	0.81	9.2	Above	Negligib le
	49	67.8	59.5	0.88	31	25.7	0.83	8.3	Above	Negligib le
	50	43.2	34.8	0.81	8.8	3.7	0.42	8.4	Below	High
	51	42.2	33	0.78	8	2.3	0.29	9.2	Below	High
	52	53.2	44.2	0.83	14.5	8.8	0.61	9	Above	Negligib le
	53	51.8	41.9	0.81	13.5	7.1	0.53	9.9	Above	Negligib le
	54	53.3	43.9	0.82	13.1	6.8	0.52	9.4	Above	Negligib le
	55	59.8	50.9	0.85	19.5	13.7	0.7	8.9	Above	Negligib le
	56	59.4	49.7	0.84	18.8	12.4	0.66	9.7	Above	Negligib le
	57	60.3	51	0.85	17.5	11.3	0.65	9.3	Above	Negligib le
	58	42.3	33.7	0.8	7.7	2.2	0.29	8.6	Below	High

The Rising Sun (pub)	1	38.3	30.5	0.8	7.3	2.6	0.36	7.8	Below	High
	2	37.5	28.1	0.75	8.1	2.8	0.35	9.4	Below	High
	3	30.6	25.7	0.84	2.7	1	0.37	4.9	Below	High
Queens Court (offices)	1	32	23.8	0.74	8.3	4.3	0.52	8.2	Below	High
	2	31.5	24.7	0.78	7.3	4.3	0.59	6.8	Below	High
	3	38.1	30	0.79	10.1	6.2	0.61	8.1	Above	Negligible
	4	36.9	30	0.81	8.9	5.9	0.66	6.9	Above	Negligible
	5	48.4	40.6	0.84	14	10.4	0.74	7.8	Above	Negligible
	6	48.2	41.5	0.86	12.2	9.6	0.79	6.7	Above	Negligible
	7	61.8	53.4	0.86	21.3	17.1	0.8	8.4	Above	Negligible
	8	60.9	53.1	0.87	20.5	16.8	0.82	7.8	Above	Negligible
	9	15.2	9.3	0.61	1.7	0	0	5.9	Below	High
	10	17.8	12.5	0.7	2.2	0.6	0.27	5.3	Below	High
	11	25.7	21.8	0.85	4.7	3.8	0.81	3.9	Above	Negligible
	12	25.5	22.3	0.87	3.7	3.6	0.97	3.2	Above	Negligible
	13	32.8	28.5	0.87	5.8	5.2	0.9	4.3	Above	Negligible
	14	30.3	26.5	0.87	4.6	4.5	0.98	3.8	Above	Negligible
	15	44.5	39.5	0.89	9.4	8.5	0.9	5	Above	Negligible
	16	42.1	37.4	0.89	7.7	7.2	0.94	4.7	Above	Negligible
	17	58.2	51.7	0.89	17.8	15.3	0.86	6.5	Above	Negligible
	18	57.1	50.4	0.88	16.6	14.1	0.85	6.7	Above	Negligible
	19	21	17.6	0.84	3	2	0.67	3.4	Above	Negligible
	20	20.9	18.1	0.87	2.3	2	0.87	2.8	Above	Negligible
	21	21.1	18	0.85	2.6	2.6	1	3.1	Above	Negligible
	22	19.5	16.4	0.84	2.3	2.3	1	3.1	Above	Negligible
	23	25.8	22	0.85	3.1	3.1	1	3.8	Above	Negligible
	24	25.2	21.3	0.85	2.9	2.9	1	3.9	Above	Negligible
	25	33.2	28.2	0.85	5.2	4.6	0.88	5	Above	Negligible
	26	29.5	24.5	0.83	4.6	4.1	0.89	5	Above	Negligible
	27	48.4	42.3	0.87	11.7	10	0.85	6.1	Above	Negligible
	28	40.9	34.5	0.84	9.3	7.4	0.8	6.4	Above	Negligible
	29	17.8	15.3	0.86	1.7	1.6	0.94	2.5	Above	Negligible
	30	16.3	13.8	0.85	1.5	1.5	1	2.5	Above	Negligib

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Alexandra Buildings (Offices + Commercial GL)	1	19.3	19.3	1	0.3	0.3	1	0	Above	Negligible
	2	26.3	25.4	0.97	0.5	0.5	1	0.9	Above	Negligible
	3	25.8	24.9	0.97	0.5	0.5	1	0.9	Above	Negligible
	4	25.8	25	0.97	0.5	0.5	1	0.8	Above	Negligible
	5	26	25.1	0.97	0.5	0.5	1	0.9	Above	Negligible
	6	25.2	23.9	0.95	0.5	0.5	1	1.3	Above	Negligible
	7	24.7	23.5	0.95	0.5	0.5	1	1.2	Above	Negligible
	8	25.4	24.1	0.95	0.5	0.5	1	1.3	Above	Negligible
	9	25.1	24.4	0.97	0.5	0.5	1	0.7	Above	Negligible
	10	24.8	24.6	0.99	0.5	0.5	1	0.2	Above	Negligible
	11	25.9	24.4	0.94	0.6	0.6	1	1.5	Above	Negligible
	12	35	32.6	0.93	1.4	1.4	1	2.4	Above	Negligible
	13	34.4	31.8	0.92	1.4	1.4	1	2.6	Above	Negligible
	14	33.9	30.9	0.91	1.4	1.4	1	3	Above	Negligible
	15	34.4	31.3	0.91	1.4	1.4	1	3.1	Above	Negligible
	16	33.8	30.2	0.89	1.4	1.4	1	3.6	Above	Negligible
	17	34	30.6	0.9	1.4	1.4	1	3.4	Above	Negligible
	18	34.2	31.4	0.92	1.4	1.4	1	2.8	Above	Negligible
	19	34	31.6	0.93	1.4	1.4	1	2.4	Above	Negligible
	20	34.1	31.7	0.93	1.4	1.4	1	2.4	Above	Negligible
	21	34.4	31.5	0.92	1.4	1.4	1	2.9	Above	Negligible
	22	43.1	38.6	0.9	4	4	1	4.5	Above	Negligible
	23	42.8	37.9	0.89	4.4	4.4	1	4.9	Above	Negligible
	24	42.9	38.2	0.89	4.7	4.7	1	4.7	Above	Negligible
	25	43.5	38.9	0.89	5	5	1	4.6	Above	Negligible
	26	42.9	38	0.89	4.9	4.9	1	4.9	Above	Negligible
	27	43.7	39.3	0.9	5.1	5.1	1	4.4	Above	Negligible
	28	43.3	39.5	0.91	5.2	5.2	1	3.8	Above	Negligible
	29	43	39.7	0.92	5.2	5.2	1	3.3	Above	Negligible
	30	43.9	39.7	0.9	5.3	5.2	0.98	4.2	Above	Negligible

	31	43.6	39.4	0.9	5.3	5.3	1	4.2	Above	Negligible
	32	18.8	18.8	1	0.3	0.3	1	0	Above	Negligible
	33	18.8	18.8	1	0.3	0.3	1	0	Above	Negligible
	34	19.3	19.3	1	0.3	0.3	1	0	Above	Negligible
	35	18.9	18.9	1	0.3	0.3	1	0	Above	Negligible
	36	18.6	18.6	1	0.3	0.3	1	0	Above	Negligible
	37	18.3	18.1	0.99	0.3	0.3	1	0.2	Above	Negligible
	38	18	17.9	0.99	0.3	0.3	1	0.1	Above	Negligible
	39	17.8	17.8	1	0.3	0.3	1	0	Above	Negligible
	40	17.6	17.6	1	0.4	0.4	1	0	Above	Negligible
Queens House (Offices+Commercial)	1	27.7	25.7	0.93	0.7	0.7	1	2	Above	Negligible
	2	20.8	20	0.96	0.5	0.5	1	0.8	Above	Negligible
	3	34.6	31.6	0.91	1.5	1.5	1	3	Above	Negligible
	4	43.4	38.6	0.89	4.5	4.5	1	4.8	Above	Negligible
	5	18.6	18.5	0.99	0.4	0.4	1	0.1	Above	Negligible
	6	27	25.1	0.93	0.6	0.6	1	1.9	Above	Negligible
	7	13.6	13.6	1	0.2	0.2	1	0	Above	Negligible
	8	34.4	30.6	0.89	1.3	1.3	1	3.8	Above	Negligible
	9	43.3	37.4	0.86	4	4	1	5.9	Above	Negligible
	10	54.7	46.2	0.84	13	11.1	0.85	8.5	Above	Negligible
	11	72.2	54.4	0.75	29.4	17.8	0.61	17.8	Above	Negligible
	12	72.8	54.5	0.75	30	18.1	0.6	18.3	Above	Negligible
	13	73	54.5	0.75	30.3	18.3	0.6	18.5	Above	Negligible
	14	73.4	54.7	0.75	30.7	18.7	0.61	18.7	Above	Negligible
	15	73.7	54.5	0.74	31	18.7	0.6	19.2	Above	Negligible
	16	74.3	54.6	0.73	31.3	18.8	0.6	19.7	Above	Negligible
Heron House (Manchester City Council,Restaurants,maybe some residential)	1	26.5	23.7	0.89	0.8	0.8	1	2.8	Above	Negligible
	2	26.1	23.1	0.89	0.8	0.8	1	3	Above	Negligible
	3	28.2	26.2	0.93	1	1	1	2	Above	Negligible
	4	28.4	26.6	0.94	1	1	1	1.8	Above	Negligible

	5	28.6	26.8	0.94	0.9	0.9	1	1.8	Above	Negligible
	6	28.9	27	0.93	1	1	1	1.9	Above	Negligible
	7	32.1	28.7	0.89	2.2	2.2	1	3.4	Above	Negligible
	8	32.2	28.7	0.89	2.1	2.1	1	3.5	Above	Negligible
	9	34.6	29.5	0.85	1.5	1.5	1	5.1	Above	Negligible
	10	34.1	29	0.85	1.5	1.5	1	5.1	Above	Negligible
	11	35.7	32.8	0.92	1.8	1.8	1	2.9	Above	Negligible
	12	35.9	32.8	0.91	1.9	1.9	1	3.1	Above	Negligible
	13	36	32.7	0.91	1.9	1.9	1	3.3	Above	Negligible
	14	36.3	32.8	0.9	1.9	1.9	1	3.5	Above	Negligible
	15	39.3	34.4	0.88	3.6	3.6	1	4.9	Above	Negligible
	16	39.8	34.7	0.87	4	4	1	5.1	Above	Negligible
	17	43.6	37	0.85	4	4	1	6.6	Above	Negligible
	18	43.3	36.9	0.85	4.1	4.1	1	6.4	Above	Negligible
	19	44.4	39.6	0.89	4.9	4.9	1	4.8	Above	Negligible
	20	44.7	39.7	0.89	5.1	5.1	1	5	Above	Negligible
	21	44.9	39.7	0.88	5.3	5.3	1	5.2	Above	Negligible
	22	45	39.6	0.88	5.4	5.4	1	5.4	Above	Negligible
	23	47.9	41.8	0.87	7.8	7.8	1	6.1	Above	Negligible
	24	48.8	42.8	0.88	8.7	8.7	1	6	Above	Negligible
	25	56.3	46.8	0.83	13.9	12.1	0.87	9.5	Above	Negligible
	26	56	46.4	0.83	14	12.1	0.86	9.6	Above	Negligible
	27	56.8	48.8	0.86	15.3	13.1	0.86	8	Above	Negligible
	28	56.9	48.8	0.86	15.5	13.3	0.86	8.1	Above	Negligible
	29	57.2	48.9	0.85	15.7	13.5	0.86	8.3	Above	Negligible
	30	57.5	49.2	0.86	16	13.9	0.87	8.3	Above	Negligible
	31	59.7	51.2	0.86	18.1	16.4	0.91	8.5	Above	Negligible
	32	60.8	52.3	0.86	19.2	17.6	0.92	8.5	Above	Negligible
	33	76.3	54.9	0.72	33.1	19.5	0.59	21.4	Above	Negligible
	34	75.7	54.8	0.72	33.2	20	0.6	20.9	Above	Negligible
	35	74.6	57.8	0.77	32.5	21.5	0.66	16.8	Above	Negligib

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	36	74.5	57.7	0.77	32.5	21.6	0.66	16.8	Above	Negligible
	37	74.5	58.1	0.78	32.4	22.2	0.69	16.4	Above	Negligible
	38	74.4	58.6	0.79	32.4	22.8	0.7	15.8	Above	Negligible
	39	75.2	60.4	0.8	33	24.9	0.75	14.8	Above	Negligible
	40	74.9	60.2	0.8	32.7	24.9	0.76	14.7	Above	Negligible
	41	35.4	31.7	0.9	1.7	1.7	1	3.7	Above	Negligible
	42	34.4	29.4	0.85	1.5	1.5	1	5	Above	Negligible
	43	34.6	30.1	0.87	1.5	1.5	1	4.5	Above	Negligible
	44	37.5	33.3	0.89	2.5	2.5	1	4.2	Above	Negligible
	45	36.7	33	0.9	2.1	2.1	1	3.7	Above	Negligible
	46	37	33.2	0.9	2.3	2.3	1	3.8	Above	Negligible
	47	38	33.5	0.88	2.7	2.7	1	4.5	Above	Negligible
	48	38.6	34	0.88	3.1	3.1	1	4.6	Above	Negligible
	49	40.9	35.6	0.87	4.9	4.9	1	5.3	Above	Negligible
	50	41.7	36.1	0.87	5.4	5.4	1	5.6	Above	Negligible
	51	42.8	37.1	0.87	6.2	6.2	1	5.7	Above	Negligible
	52	43.4	37.8	0.87	6.5	6.5	1	5.6	Above	Negligible
	53	45.9	40.4	0.88	8.3	8.3	1	5.5	Above	Negligible
	54	44.3	39	0.88	4.8	4.8	1	5.3	Above	Negligible
	55	43.8	37.6	0.86	4.3	4.3	1	6.2	Above	Negligible
	56	44	38	0.86	4.5	4.5	1	6	Above	Negligible
	57	46	40.1	0.87	6.2	6.2	1	5.9	Above	Negligible
	58	45.2	39.6	0.88	5.5	5.5	1	5.6	Above	Negligible
	59	45.5	39.7	0.87	5.8	5.8	1	5.8	Above	Negligible
	60	46.8	40.7	0.87	6.9	6.9	1	6.1	Above	Negligible
	61	47.1	41.1	0.87	7.1	7.1	1	6	Above	Negligible
	62	49.9	43.8	0.88	9.7	9.7	1	6.1	Above	Negligible
	63	51	44.6	0.87	10.7	10.7	1	6.4	Above	Negligible
	64	52.3	45.7	0.87	11.8	11.8	1	6.6	Above	Negligible
	65	53.2	46.6	0.88	12.5	12.5	1	6.6	Above	Negligible

	66	55.2	49.8	0.9	14.2	14.2	1	5.4	Above	Negligible
	67	56.6	48.3	0.85	15	12.8	0.85	8.3	Above	Negligible
	68	56.3	46.9	0.83	14.4	12.3	0.85	9.4	Above	Negligible
	69	56.3	47.2	0.84	14.5	12.3	0.85	9.1	Above	Negligible
	70	58.2	49.8	0.86	16.7	14.9	0.89	8.4	Above	Negligible
	71	57.7	49.2	0.85	16.2	14.1	0.87	8.5	Above	Negligible
	72	57.7	49.1	0.85	16.2	14.1	0.87	8.6	Above	Negligible
	73	58.8	50.4	0.86	17.3	15.6	0.9	8.4	Above	Negligible
	74	59	50.5	0.86	17.4	15.6	0.9	8.5	Above	Negligible
	75	61.4	52.7	0.86	19.7	18	0.91	8.7	Above	Negligible
	76	62.6	53.6	0.86	20.8	19.2	0.92	9	Above	Negligible
	77	63.5	54.4	0.86	21.6	20.1	0.93	9.1	Above	Negligible
	78	64.7	56.9	0.88	22.7	21.1	0.93	7.8	Above	Negligible
	79	66.5	59	0.89	24.2	22.7	0.94	7.5	Above	Negligible
	80	75.1	58.2	0.77	32.6	21.3	0.65	16.9	Above	Negligible
	81	75.7	55.9	0.74	33.4	20.7	0.62	19.8	Above	Negligible
	82	75.3	57.1	0.76	32.9	21.3	0.65	18.2	Above	Negligible
	83	74.7	59.1	0.79	32.6	23.6	0.72	15.6	Above	Negligible
	84	74.4	58.9	0.79	32.4	23.2	0.72	15.5	Above	Negligible
	85	74.4	58.8	0.79	32.4	23.3	0.72	15.6	Above	Negligible
	86	75	59.6	0.79	32.7	24	0.73	15.4	Above	Negligible
	87	75.2	60	0.8	32.9	24.4	0.74	15.2	Above	Negligible
	88	74.9	59.9	0.8	32.6	24.7	0.76	15	Above	Negligible
	89	74.8	59.6	0.8	32.6	24.6	0.75	15.2	Above	Negligible
	90	74.9	60.4	0.81	32.6	24.7	0.76	14.5	Above	Negligible
	91	75.3	61.4	0.82	32.8	24.9	0.76	13.9	Above	Negligible
	92	75	62.3	0.83	32.3	25.3	0.78	12.7	Above	Negligible
	93	27.7	25	0.9	1	1	1	2.7	Above	Negligible
	94	26.6	23.4	0.88	0.9	0.9	1	3.2	Above	Negligible
	95	26.8	23.6	0.88	0.9	0.9	1	3.2	Above	Negligible
	96	30.5	27.9	0.91	1.6	1.6	1	2.6	Above	Negligib

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	97	29.5	27.4	0.93	1.3	1.3	1	2.1	Above	Negligible
	98	29.8	27.5	0.92	1.4	1.4	1	2.3	Above	Negligible
	99	30.7	27.8	0.91	1.4	1.4	1	2.9	Above	Negligible
	100	31.6	28.5	0.9	1.9	1.9	1	3.1	Above	Negligible
	101	33.7	29.9	0.89	2.7	2.7	1	3.8	Above	Negligible
	102	34	29.7	0.87	2.8	2.8	1	4.3	Above	Negligible
	103	35.4	30.7	0.87	3.2	3.2	1	4.7	Above	Negligible
	104	36	31.3	0.87	3.4	3.4	1	4.7	Above	Negligible
	105	38.5	33.8	0.88	4.8	4.8	1	4.7	Above	Negligible
	106	17.1	17.1	1	0.8	0.8	1	0	Above	Negligible
	107	17.5	17.5	1	0.8	0.8	1	0	Above	Negligible
	108	17.9	17.9	1	0.6	0.6	1	0	Above	Negligible
	109	18.2	18.2	1	0.6	0.6	1	0	Above	Negligible
	110	21.9	21.1	0.96	0.7	0.7	1	0.8	Above	Negligible
	111	22.3	21.5	0.96	0.8	0.8	1	0.8	Above	Negligible
	112	22.7	21.7	0.96	0.8	0.8	1	1	Above	Negligible
	113	22.9	21.9	0.96	0.7	0.7	1	1	Above	Negligible
	114	23.7	22.5	0.95	0.5	0.5	1	1.2	Above	Negligible
	115	24.4	23	0.94	0.8	0.8	1	1.4	Above	Negligible
	116	26.8	24.6	0.92	1.1	1.1	1	2.2	Above	Negligible
	117	26.8	24	0.9	1.1	1.1	1	2.8	Above	Negligible
	118	28.7	25.6	0.89	1.4	1.4	1	3.1	Above	Negligible
	119	29.2	26	0.89	1.5	1.5	1	3.2	Above	Negligible
	120	31.2	27.9	0.89	3	3	1	3.3	Above	Negligible
Brazennose House (Commerical+Offices)	1	39.7	36.8	0.93	13.9	11.2	0.81	2.9	Above	Negligible
	2	39.9	37	0.93	14.3	11.5	0.8	2.9	Above	Negligible
	3	41.2	38.5	0.93	14.9	12.2	0.82	2.7	Above	Negligible
	4	43.8	41.3	0.94	15.4	12.9	0.84	2.5	Above	Negligible
	5	43.4	41.2	0.95	15.2	13	0.86	2.2	Above	Negligible
	6	43.3	41.8	0.97	15.3	13.8	0.9	1.5	Above	Negligible

	7	43.2	41.5	0.96	15.2	13.6	0.89	1.7	Above	Negligible
	8	43	41.3	0.96	15.2	13.5	0.89	1.7	Above	Negligible
	9	43	40.9	0.95	15.3	13.3	0.87	2.1	Above	Negligible
	10	44.5	42.2	0.95	16.1	14	0.87	2.3	Above	Negligible
	11	46.8	44	0.94	16.7	14.2	0.85	2.8	Above	Negligible
	12	48.3	45	0.93	17	14	0.82	3.3	Above	Negligible
	13	48.2	44.6	0.93	16.7	13.5	0.81	3.6	Above	Negligible
	14	47.2	43.5	0.92	15.9	12.6	0.79	3.7	Above	Negligible
	15	46.8	42.9	0.92	15.5	12.5	0.81	3.9	Above	Negligible
	16	44.2	41.3	0.93	17.8	15.1	0.85	2.9	Above	Negligible
	17	44.5	41.6	0.93	18.5	15.5	0.84	2.9	Above	Negligible
	18	46.1	43.1	0.93	18.7	15.7	0.84	3	Above	Negligible
	19	47.8	45	0.94	19.1	16.2	0.85	2.8	Above	Negligible
	20	47.4	44.7	0.94	18.8	16.1	0.86	2.7	Above	Negligible
	21	48	45.8	0.95	19.6	17.4	0.89	2.2	Above	Negligible
	22	48	45.7	0.95	19.8	17.4	0.88	2.3	Above	Negligible
	23	48.1	45.5	0.95	20	17.4	0.87	2.6	Above	Negligible
	24	49.3	46.5	0.94	20.7	18	0.87	2.8	Above	Negligible
	25	51.1	48.1	0.94	21.1	18.2	0.86	3	Above	Negligible
	26	52.7	49.4	0.94	21.1	18.2	0.86	3.3	Above	Negligible
	27	52.9	49.4	0.93	21	17.9	0.85	3.5	Above	Negligible
	28	52.7	49	0.93	21	17.5	0.83	3.7	Above	Negligible
	29	52.8	48.4	0.92	21.2	17.1	0.81	4.4	Above	Negligible
	30	53	48.1	0.91	21.5	17.3	0.8	4.9	Above	Negligible
	31	45.5	42.6	0.94	18.6	15.9	0.85	2.9	Above	Negligible
	32	45.8	42.8	0.93	19.3	16.4	0.85	3	Above	Negligible
	33	48.6	45.6	0.94	20	17	0.85	3	Above	Negligible
	34	49.6	46.8	0.94	20.5	17.7	0.86	2.8	Above	Negligible
	35	49.4	46.7	0.95	20.5	17.8	0.87	2.7	Above	Negligible
	36	50.5	48.3	0.96	21.8	19.7	0.9	2.2	Above	Negligible
	37	51	48.7	0.95	22.5	20.1	0.89	2.3	Above	Negligib

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	38	51.8	49.3	0.95	23.1	20.5	0.89	2.5	Above	Negligible
	39	53.9	51.1	0.95	23.6	20.9	0.89	2.8	Above	Negligible
	40	55.6	52.6	0.95	24	21.2	0.88	3	Above	Negligible
	41	56.3	53.1	0.94	24.1	21.2	0.88	3.2	Above	Negligible
	42	56.2	52.7	0.94	24.1	20.9	0.87	3.5	Above	Negligible
	43	56.2	52.5	0.93	24.3	20.9	0.86	3.7	Above	Negligible
	44	56.6	52.2	0.92	24.8	20.7	0.83	4.4	Above	Negligible
	45	57.8	52.9	0.92	25.1	21	0.84	4.9	Above	Negligible
	46	46.8	44	0.94	19.7	16.9	0.86	2.8	Above	Negligible
	47	47.7	44.7	0.94	20.3	17.4	0.86	3	Above	Negligible
	48	51	48	0.94	21	18	0.86	3	Above	Negligible
	49	50.8	47.9	0.94	21.5	18.6	0.87	2.9	Above	Negligible
	50	50.6	47.9	0.95	21.5	18.8	0.87	2.7	Above	Negligible
	51	51.6	49.5	0.96	22.8	20.6	0.9	2.1	Above	Negligible
	52	52.2	49.8	0.95	23.5	21.1	0.9	2.4	Above	Negligible
	53	54.5	52	0.95	24	21.5	0.9	2.5	Above	Negligible
	54	56.5	53.7	0.95	24.5	21.8	0.89	2.8	Above	Negligible
	55	57.2	54.2	0.95	25	22.2	0.89	3	Above	Negligible
	56	57.3	54.2	0.95	25.1	22.2	0.88	3.1	Above	Negligible
	57	57.4	54	0.94	25.4	22.2	0.87	3.4	Above	Negligible
	58	58.2	54.5	0.94	25.6	22.2	0.87	3.7	Above	Negligible
	59	59.8	55.4	0.93	26.3	22.3	0.85	4.4	Above	Negligible
	60	60.5	55.7	0.92	26.6	22.5	0.85	4.8	Above	Negligible
	61	48.5	45.6	0.94	21.2	18.4	0.87	2.9	Above	Negligible
	62	50.5	47.5	0.94	21.8	18.9	0.87	3	Above	Negligible
	63	53.1	50.1	0.94	22.7	19.7	0.87	3	Above	Negligible
	64	53.4	50.5	0.95	23.2	20.3	0.88	2.9	Above	Negligible
	65	53.1	50.5	0.95	23.2	20.5	0.88	2.6	Above	Negligible
	66	54.2	52.1	0.96	24.5	22.4	0.91	2.1	Above	Negligible
	67	56.7	54.4	0.96	25.1	22.7	0.9	2.3	Above	Negligible

	68	58.8	56.2	0.96	25.6	23.1	0.9	2.6	Above	Negligible
	69	59.2	56.5	0.95	26	23.3	0.9	2.7	Above	Negligible
	70	59.7	56.7	0.95	26.5	23.7	0.89	3	Above	Negligible
	71	59.8	56.6	0.95	26.7	23.7	0.89	3.2	Above	Negligible
	72	61.5	58.1	0.94	27	23.8	0.88	3.4	Above	Negligible
	73	62.3	58.6	0.94	27.3	23.8	0.87	3.7	Above	Negligible
	74	63.1	58.8	0.93	27.6	23.6	0.86	4.3	Above	Negligible
	75	64	59.3	0.93	28.1	24	0.85	4.7	Above	Negligible
	76	52.5	49.7	0.95	21.7	19	0.88	2.8	Above	Negligible
	77	55	52	0.95	22.2	19.3	0.87	3	Above	Negligible
	78	56.7	53.7	0.95	23.4	20.4	0.87	3	Above	Negligible
	79	56.7	53.8	0.95	23.6	20.7	0.88	2.9	Above	Negligible
	80	56.5	53.8	0.95	23.6	20.9	0.89	2.7	Above	Negligible
	81	59	56.8	0.96	25	22.8	0.91	2.2	Above	Negligible
	82	61.5	59.2	0.96	26.1	23.8	0.91	2.3	Above	Negligible
	83	62	59.4	0.96	26.5	24	0.91	2.6	Above	Negligible
	84	62.5	59.8	0.96	27.1	24.5	0.9	2.7	Above	Negligible
	85	63.3	60.3	0.95	27.7	24.9	0.9	3	Above	Negligible
	86	64.4	61.3	0.95	28.2	25.2	0.89	3.1	Above	Negligible
	87	65.4	62.1	0.95	28.6	25.5	0.89	3.3	Above	Negligible
	88	66.3	62.7	0.95	29	25.6	0.88	3.6	Above	Negligible
	89	67.3	63	0.94	29.4	25.4	0.86	4.3	Above	Negligible
	90	69	64.3	0.93	30.2	26.1	0.86	4.7	Above	Negligible
	91	35.4	33.3	0.94	10.5	8.4	0.8	2.1	Above	Negligible
	92	39.1	37.8	0.97	11.7	10.4	0.89	1.3	Above	Negligible
	93	43.5	40.3	0.93	12.5	9.7	0.78	3.2	Above	Negligible
	94	49.1	46.2	0.94	14.8	13.2	0.89	2.9	Above	Negligible
	95	49.5	46.7	0.94	14.9	13.4	0.9	2.8	Above	Negligible
	96	49.2	46.3	0.94	14.5	12.9	0.89	2.9	Above	Negligible
	97	48.5	45.5	0.94	14	12.2	0.87	3	Above	Negligible
	98	48.3	45.3	0.94	13.9	12.1	0.87	3	Above	Negligib

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	99	48	45.1	0.94	13.8	11.9	0.86	2.9	Above	Negligible
	100	47.7	44.9	0.94	13.6	11.6	0.85	2.8	Above	Negligible
	101	46.9	44.4	0.95	12.8	11	0.86	2.5	Above	Negligible
	102	47.2	45.1	0.96	12.5	10.7	0.86	2.1	Above	Negligible
	103	47.6	45.4	0.95	12.4	10.6	0.85	2.2	Above	Negligible
	104	47.8	45.9	0.96	12.3	10.7	0.87	1.9	Above	Negligible
	105	47.7	46.7	0.98	11.9	10.8	0.91	1	Above	Negligible
	106	47.2	46.1	0.98	11.2	10.1	0.9	1.1	Above	Negligible
	107	47.3	46.1	0.97	11.2	10	0.89	1.2	Above	Negligible
	108	47.3	45.9	0.97	11	9.6	0.87	1.4	Above	Negligible
	109	48	46.3	0.96	11.3	9.8	0.87	1.7	Above	Negligible
	110	47.3	45.4	0.96	10.5	8.7	0.83	1.9	Above	Negligible
	111	47.1	44.8	0.95	10.1	8	0.79	2.3	Above	Negligible
	112	55.3	51.7	0.93	20.3	18	0.89	3.6	Above	Negligible
	113	54.8	51	0.93	19.9	17.4	0.87	3.8	Above	Negligible
	114	54.5	50.7	0.93	19.7	17.2	0.87	3.8	Above	Negligible
	115	54.2	50.6	0.93	19.5	17.1	0.88	3.6	Above	Negligible
	116	53.9	50.5	0.94	19.4	17	0.88	3.4	Above	Negligible
	117	53.8	50.6	0.94	18.7	16.3	0.87	3.2	Above	Negligible
	118	53.6	50.6	0.94	18	15.7	0.87	3	Above	Negligible
	119	53.4	50.7	0.95	17.5	15.2	0.87	2.7	Above	Negligible
	120	53.4	50.9	0.95	17.2	15	0.87	2.5	Above	Negligible
	121	53.7	51.1	0.95	17.2	15	0.87	2.6	Above	Negligible
	122	53.7	51.4	0.96	17	15	0.88	2.3	Above	Negligible
	123	53.7	52.1	0.97	16.6	15	0.9	1.6	Above	Negligible
	124	53.5	51.6	0.96	16.2	14.2	0.88	1.9	Above	Negligible
	125	53.3	51.2	0.96	15.7	13.6	0.87	2.1	Above	Negligible
	126	53.2	50.9	0.96	15.4	13.1	0.85	2.3	Above	Negligible
	127	53.1	50.6	0.95	15	12.6	0.84	2.5	Above	Negligible
	128	53.2	50.5	0.95	15.1	12.5	0.83	2.7	Above	Negligible

	129	53.3	50.4	0.95	15.3	12.6	0.82	2.9	Above	Negligible
	130	59.8	56.3	0.94	24.7	22.4	0.91	3.5	Above	Negligible
	131	59.7	56	0.94	24.7	22.1	0.89	3.7	Above	Negligible
	132	60.1	56.2	0.94	24.5	21.7	0.89	3.9	Above	Negligible
	133	60.5	56.6	0.94	24.5	21.5	0.88	3.9	Above	Negligible
	134	60.8	57	0.94	24.4	21.4	0.88	3.8	Above	Negligible
	135	61.1	57.3	0.94	24.5	21.4	0.87	3.8	Above	Negligible
	136	60.9	57.4	0.94	24	20.9	0.87	3.5	Above	Negligible
	137	60.8	57.2	0.94	23.8	20.6	0.87	3.6	Above	Negligible
	138	60.9	57.4	0.94	23.6	20.5	0.87	3.5	Above	Negligible
	139	60.9	57.5	0.94	23.5	20.3	0.86	3.4	Above	Negligible
	140	60.5	57.2	0.95	22.8	19.8	0.87	3.3	Above	Negligible
	141	60.4	57.8	0.96	22.4	19.8	0.88	2.6	Above	Negligible
	142	60.3	57.5	0.95	22	19.2	0.87	2.8	Above	Negligible
	143	60	57	0.95	21.5	18.5	0.86	3	Above	Negligible
	144	59.8	56.6	0.95	21.2	18	0.85	3.2	Above	Negligible
	145	59.4	56	0.94	20.9	17.6	0.84	3.4	Above	Negligible
	146	59.1	55.6	0.94	20.6	17.2	0.83	3.5	Above	Negligible
	147	59	55.2	0.94	20.4	16.8	0.82	3.8	Above	Negligible
	148	64.9	61.5	0.95	28.4	26	0.92	3.4	Above	Negligible
	149	65.3	61.7	0.94	28.4	25.8	0.91	3.6	Above	Negligible
	150	65.3	61.5	0.94	28.2	25.3	0.9	3.8	Above	Negligible
	151	65.3	61.6	0.94	27.9	25	0.9	3.7	Above	Negligible
	152	65.3	61.6	0.94	27.7	24.7	0.89	3.7	Above	Negligible
	153	65.3	61.7	0.94	27.5	24.5	0.89	3.6	Above	Negligible
	154	65.4	61.9	0.95	27.5	24.3	0.88	3.5	Above	Negligible
	155	65.7	62.2	0.95	27.6	24.4	0.88	3.5	Above	Negligible
	156	66	62.5	0.95	27.6	24.5	0.89	3.5	Above	Negligible
	157	66.1	62.7	0.95	27.6	24.5	0.89	3.4	Above	Negligible
	158	66.2	63	0.95	27.5	24.5	0.89	3.2	Above	Negligible
	159	66.1	63.5	0.96	27.3	24.7	0.9	2.6	Above	Negligib

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	160	66	63.2	0.96	27.2	24.3	0.89	2.8	Above	Negligible
	161	65.9	63	0.96	27	24	0.89	2.9	Above	Negligible
	162	65.6	62.4	0.95	26.6	23.4	0.88	3.2	Above	Negligible
	163	64.9	61.5	0.95	25.8	22.5	0.87	3.4	Above	Negligible
	164	64.4	60.8	0.94	25.3	21.9	0.87	3.6	Above	Negligible
	165	64	60.2	0.94	24.9	21.2	0.85	3.8	Above	Negligible
	166	67.9	64.7	0.95	29.9	27.5	0.92	3.2	Above	Negligible
	167	68.2	64.7	0.95	30	27.4	0.91	3.5	Above	Negligible
	168	68.4	64.8	0.95	30	27.1	0.9	3.6	Above	Negligible
	169	68.6	65	0.95	30	27.1	0.9	3.6	Above	Negligible
	170	68.8	65.2	0.95	30	27	0.9	3.6	Above	Negligible
	171	68.9	65.5	0.95	30.1	27	0.9	3.4	Above	Negligible
	172	69.5	66	0.95	30.5	27.4	0.9	3.5	Above	Negligible
	173	69.9	66.4	0.95	30.8	27.6	0.9	3.5	Above	Negligible
	174	70.2	66.8	0.95	31	27.8	0.9	3.4	Above	Negligible
	175	70.3	66.9	0.95	31	27.8	0.9	3.4	Above	Negligible
	176	70.2	67	0.95	30.8	27.8	0.9	3.2	Above	Negligible
	177	70	67.4	0.96	30.4	27.8	0.91	2.6	Above	Negligible
	178	69.6	66.8	0.96	30	27.2	0.91	2.8	Above	Negligible
	179	69.4	66.4	0.96	29.7	26.7	0.9	3	Above	Negligible
	180	69.2	66	0.95	29.5	26.3	0.89	3.2	Above	Negligible
	181	68.9	65.6	0.95	29.3	26	0.89	3.3	Above	Negligible
	182	68.8	65.3	0.95	29.1	25.7	0.88	3.5	Above	Negligible
	183	68.8	65	0.94	29	25.4	0.88	3.8	Above	Negligible
	184	71.6	68.5	0.96	32.3	30	0.93	3.1	Above	Negligible
	185	71.9	68.6	0.95	32.4	29.8	0.92	3.3	Above	Negligible
	186	72.1	68.6	0.95	32.5	29.6	0.91	3.5	Above	Negligible
	187	72.2	68.8	0.95	32.6	29.6	0.91	3.4	Above	Negligible
	188	72.5	69.2	0.95	32.7	29.7	0.91	3.3	Above	Negligible
	189	72.5	69.1	0.95	32.6	29.5	0.9	3.4	Above	Negligible

	190	72.9	69.5	0.95	33	29.9	0.91	3.4	Above	Negligible
	191	73.1	69.7	0.95	33.1	30	0.91	3.4	Above	Negligible
	192	73.2	69.8	0.95	33.1	29.9	0.9	3.4	Above	Negligible
	193	73.2	69.9	0.95	33.1	30	0.91	3.3	Above	Negligible
	194	73.2	70	0.96	33	30	0.91	3.2	Above	Negligible
	195	73.3	70.7	0.96	33	30.4	0.92	2.6	Above	Negligible
	196	73.2	70.4	0.96	32.9	30.1	0.91	2.8	Above	Negligible
	197	73.3	70.3	0.96	32.9	29.9	0.91	3	Above	Negligible
	198	73.5	70.3	0.96	33	29.8	0.9	3.2	Above	Negligible
	199	73.7	70.3	0.95	33	29.7	0.9	3.4	Above	Negligible
	200	73.9	70.3	0.95	33	29.6	0.9	3.6	Above	Negligible
	201	73.9	70.1	0.95	33.1	29.5	0.89	3.8	Above	Negligible
	202	44.6	42	0.94	10.9	9.8	0.9	2.6	Above	Negligible
	203	42.1	40.2	0.95	8.8	7.4	0.84	1.9	Above	Negligible
	204	42.4	41.3	0.97	7.5	6.5	0.87	1.1	Above	Negligible
	205	43.2	40.3	0.93	7.6	5.8	0.76	2.9	Above	Negligible
	206	42.6	39.9	0.94	7.4	6	0.81	2.7	Above	Negligible
	207	40.9	38.1	0.93	6.2	4.8	0.77	2.8	Above	Negligible
	208	40	37.3	0.93	5.8	4.5	0.78	2.7	Above	Negligible
	209	38.1	35.3	0.93	4.8	3.5	0.73	2.8	Above	Negligible
	210	37.2	34.5	0.93	4.4	3.1	0.7	2.7	Above	Negligible
	211	36.4	34	0.93	3.8	2.9	0.76	2.4	Above	Negligible
	212	35.4	34.1	0.96	3	2.8	0.93	1.3	Above	Negligible
	213	34.7	34.2	0.99	3	2.8	0.93	0.5	Above	Negligible
	214	34	34	1	2.7	2.7	1	0	Above	Negligible
	215	33.3	33.3	1	2.3	2.3	1	0	Above	Negligible
	216	32.4	32.4	1	1.8	1.8	1	0	Above	Negligible
	217	31.6	31.6	1	1.7	1.7	1	0	Above	Negligible
	218	29.8	29.8	1	1.5	1.5	1	0	Above	Negligible
	219	29.1	29.1	1	1.2	1.2	1	0	Above	Negligible
	220	48.3	45.1	0.93	10.2	8	0.78	3.2	Above	Negligib

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	221	48.3	44.6	0.92	10.5	8	0.76	3.7	Above	Negligible
	222	46.7	43.3	0.93	9.1	6.9	0.76	3.4	Above	Negligible
	223	45.5	42.2	0.93	7.8	5.9	0.76	3.3	Above	Negligible
	224	44.3	41.1	0.93	6.7	5	0.75	3.2	Above	Negligible
	225	42.9	39.9	0.93	5.9	4.3	0.73	3	Above	Negligible
	226	41.5	38.8	0.93	5.4	4.1	0.76	2.7	Above	Negligible
	227	40.1	38.6	0.96	4.3	3.9	0.91	1.5	Above	Negligible
	228	39.4	38.4	0.97	4.2	3.9	0.93	1	Above	Negligible
	229	38.8	38.2	0.98	3.8	3.8	1	0.6	Above	Negligible
	230	37.8	37.5	0.99	3.1	3.1	1	0.3	Above	Negligible
	231	36.8	36.8	1	2.5	2.5	1	0	Above	Negligible
	232	36.2	36.2	1	2.4	2.4	1	0	Above	Negligible
	233	35.7	35.7	1	2	2	1	0	Above	Negligible
	234	35	35	1	1.7	1.7	1	0	Above	Negligible
	235	54.2	50.6	0.93	14.9	12.3	0.83	3.6	Above	Negligible
	236	54.1	50.3	0.93	14.7	12.1	0.82	3.8	Above	Negligible
	237	52	48.2	0.93	12.6	10	0.79	3.8	Above	Negligible
	238	50.9	47	0.92	11.4	8.8	0.77	3.9	Above	Negligible
	239	49.8	46.2	0.93	10.2	7.9	0.77	3.6	Above	Negligible
	240	48.3	44.7	0.93	8.7	6.4	0.74	3.6	Above	Negligible
	241	47.3	44.1	0.93	7.9	6	0.76	3.2	Above	Negligible
	242	46.6	44.2	0.95	7.1	6	0.85	2.4	Above	Negligible
	243	46	44.3	0.96	6.5	6	0.92	1.7	Above	Negligible
	244	45	43.8	0.97	5.9	5.8	0.98	1.2	Above	Negligible
	245	43.3	42.7	0.99	5.2	5.2	1	0.6	Above	Negligible
	246	42.5	41.9	0.99	4.7	4.7	1	0.6	Above	Negligible
	247	41.8	41.2	0.99	4.1	4.1	1	0.6	Above	Negligible
	248	41.3	40.9	0.99	3.7	3.7	1	0.4	Above	Negligible
	249	40.8	40.4	0.99	3.4	3.4	1	0.4	Above	Negligible
	250	60.3	55.8	0.93	20.5	17	0.83	4.5	Above	Negligible

	251	59.9	55.4	0.92	20	16.6	0.83	4.5	Above	Negligible
	252	58.5	54.1	0.92	18.5	15.2	0.82	4.4	Above	Negligible
	253	57.5	53.1	0.92	17.5	14.2	0.81	4.4	Above	Negligible
	254	56.5	52.5	0.93	16.4	13.5	0.82	4	Above	Negligible
	255	54.9	50.9	0.93	14.7	11.9	0.81	4	Above	Negligible
	256	53.5	49.9	0.93	13.2	10.9	0.83	3.6	Above	Negligible
	257	53.1	49.9	0.94	12.7	10.7	0.84	3.2	Above	Negligible
	258	51.9	49.5	0.95	11.4	10.2	0.89	2.4	Above	Negligible
	259	51.2	49.6	0.97	10.6	10.1	0.95	1.6	Above	Negligible
	260	50.6	49.2	0.97	10	9.6	0.96	1.4	Above	Negligible
	261	50.4	49	0.97	9.6	9.3	0.97	1.4	Above	Negligible
	262	49.7	48.6	0.98	9	8.9	0.99	1.1	Above	Negligible
	263	48.7	47.8	0.98	8.5	8.3	0.98	0.9	Above	Negligible
	264	47	46.2	0.98	7.6	7.5	0.99	0.8	Above	Negligible
	265	66.5	61.9	0.93	26.2	22.6	0.86	4.6	Above	Negligible
	266	66.1	61.4	0.93	25.7	22	0.86	4.7	Above	Negligible
	267	65.6	60.8	0.93	25.2	21.5	0.85	4.8	Above	Negligible
	268	65.6	60.8	0.93	25.1	21.3	0.85	4.8	Above	Negligible
	269	64.5	59.6	0.92	23.9	20.1	0.84	4.9	Above	Negligible
	270	63.6	58.6	0.92	22.9	19.1	0.83	5	Above	Negligible
	271	63.4	58.5	0.92	22.7	18.9	0.83	4.9	Above	Negligible
	272	62	57.1	0.92	21.2	17.4	0.82	4.9	Above	Negligible
	273	60.3	56.5	0.94	19.4	16.6	0.86	3.8	Above	Negligible
	274	59.4	56.6	0.95	18.4	16.5	0.9	2.8	Above	Negligible
	275	58.8	56.6	0.96	17.6	16.4	0.93	2.2	Above	Negligible
	276	58.2	56.4	0.97	16.9	16	0.95	1.8	Above	Negligible
	277	57.5	55.9	0.97	16.3	15.5	0.95	1.6	Above	Negligible
	278	57.2	55.7	0.97	16	15.1	0.94	1.5	Above	Negligible
	279	56.7	55.2	0.97	15.6	14.7	0.94	1.5	Above	Negligible
	280	74.4	69.9	0.94	33.4	29.8	0.89	4.5	Above	Negligible
	281	74.8	70	0.94	33.7	30	0.89	4.8	Above	Negligib

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	282	74.8	70.1	0.94	33.7	30	0.89	4.7	Above	Negligible
	283	74.9	70.1	0.94	33.7	30	0.89	4.8	Above	Negligible
	284	75	70.2	0.94	33.9	30.1	0.89	4.8	Above	Negligible
	285	75	70.2	0.94	33.9	30.1	0.89	4.8	Above	Negligible
	286	75.1	70.3	0.94	33.9	30.1	0.89	4.8	Above	Negligible
	287	74.4	69.6	0.94	33.2	29.4	0.89	4.8	Above	Negligible
	288	74	69.3	0.94	32.8	29	0.88	4.7	Above	Negligible
	289	74	69.4	0.94	32.7	28.9	0.88	4.6	Above	Negligible
	290	72.9	69.4	0.95	31.6	28.9	0.91	3.5	Above	Negligible
	291	72.4	69.6	0.96	31	28.9	0.93	2.8	Above	Negligible
	292	72	69.6	0.97	30.6	28.8	0.94	2.4	Above	Negligible
	293	72	69.8	0.97	30.5	28.7	0.94	2.2	Above	Negligible
	294	72.3	70.3	0.97	29.8	28	0.94	2	Above	Negligible
	295	36.3	33.9	0.93	4.8	3.7	0.77	2.4	Above	Negligible
	296	31.1	30.2	0.97	2.1	2.1	1	0.9	Above	Negligible
	297	26	26	1	1.2	1.2	1	0	Above	Negligible
	298	39.3	35.5	0.9	15.6	12.9	0.83	3.8	Above	Negligible
	299	36.8	33.6	0.91	15.3	13.4	0.88	3.2	Above	Negligible
	300	46.2	41	0.89	21.5	17.4	0.81	5.2	Above	Negligible
	301	43	38.8	0.9	20.5	17.5	0.85	4.2	Above	Negligible
	302	50	44.8	0.9	24.1	20	0.83	5.2	Above	Negligible
	303	46.1	42	0.91	22.8	19.8	0.87	4.1	Above	Negligible
	304	53.3	48.2	0.9	26.5	22.4	0.85	5.1	Above	Negligible
	305	49.5	45.5	0.92	25.4	22.4	0.88	4	Above	Negligible
	306	55.7	50.7	0.91	28.1	24	0.85	5	Above	Negligible
	307	52.2	48.4	0.93	26.4	23.4	0.89	3.8	Above	Negligible
	308	59.5	54.6	0.92	30.2	26.1	0.86	4.9	Above	Negligible
	309	55.1	51.3	0.93	27.9	24.9	0.89	3.8	Above	Negligible
	310	33.9	30.8	0.91	11.2	9.4	0.84	3.1	Above	Negligible
	311	40	37.8	0.94	9.8	7.8	0.8	2.2	Above	Negligible

	312	36.6	34	0.93	7.8	5.8	0.74	2.6	Above	Negligible
	313	44.9	41.7	0.93	13.7	10.7	0.78	3.2	Above	Negligible
	314	41.1	38.2	0.93	10.8	8.4	0.78	2.9	Above	Negligible
	315	51.5	47.4	0.92	20.3	16.4	0.81	4.1	Above	Negligible
	316	47.2	44	0.93	16.1	13.3	0.83	3.2	Above	Negligible
	317	55.4	51.3	0.93	24.2	20.3	0.84	4.1	Above	Negligible
	318	53.2	49.4	0.93	21.5	18.2	0.85	3.8	Above	Negligible
	319	59.1	55	0.93	27.9	24	0.86	4.1	Above	Negligible
	320	57.5	53.7	0.93	25.2	21.9	0.87	3.8	Above	Negligible
	321	63.8	59.7	0.94	32.7	28.8	0.88	4.1	Above	Negligible
	322	63.1	59.3	0.94	30.3	27	0.89	3.8	Above	Negligible
	323	35.6	33.6	0.94	6.7	5	0.75	2	Above	Negligible
Centurion house (offices+Com)	1	38.6	35	0.91	7	5.7	0.81	3.6	Above	Negligible
	2	32.3	30.1	0.93	5.3	5.3	1	2.2	Above	Negligible
	3	34.3	30.7	0.9	6.6	5.2	0.79	3.6	Above	Negligible
	4	26.3	24.8	0.94	3.9	3.9	1	1.5	Above	Negligible
	5	27.3	25.2	0.92	4.3	4.2	0.98	2.1	Above	Negligible
	6	22.1	22.1	1	3	3	1	0	Above	Negligible
	7	23.8	23.8	1	3.4	3.4	1	0	Above	Negligible
	8	22.9	22.9	1	2.6	2.6	1	0	Above	Negligible
	9	55.4	48.4	0.87	19.5	14.7	0.75	7	Above	Negligible
	10	47.9	43.8	0.91	15.7	13.6	0.87	4.1	Above	Negligible
	11	50.7	43.8	0.86	18	13.3	0.74	6.9	Above	Negligible
	12	38.3	35.9	0.94	9.8	8.7	0.89	2.4	Above	Negligible
	13	41.7	37.8	0.91	12.2	10.2	0.84	3.9	Above	Negligible
	14	31.5	31.5	1	6	6	1	0	Above	Negligible
	15	34.5	34.5	1	7.4	7.4	1	0	Above	Negligible
	16	31.5	31.5	1	4.7	4.7	1	0	Above	Negligible
	17	26.7	24.5	0.92	1.3	1.3	1	2.2	Above	Negligible
	18	23.8	22.6	0.95	1.5	1.5	1	1.2	Above	Negligible
	19	25	22.7	0.91	1.4	1.4	1	2.3	Above	Negligib

										le
	20	20.3	19.5	0.96	1.3	1.3	1	0.8	Above	Negligible
	21	21.5	20.5	0.95	1.4	1.4	1	1	Above	Negligible
	22	16.8	16.8	1	1.2	1.2	1	0	Above	Negligible
	23	17.4	17.4	1	1.1	1.1	1	0	Above	Negligible
	24	17	17	1	1.1	1.1	1	0	Above	Negligible
	25	64.2	57.7	0.9	26.1	21.5	0.82	6.5	Above	Negligible
	26	59.5	53	0.89	23.3	18.8	0.81	6.5	Above	Negligible
	27	61	54.5	0.89	23.7	19.2	0.81	6.5	Above	Negligible
	28	51	47.1	0.92	17.2	14.6	0.85	3.9	Above	Negligible
	29	56.1	49.9	0.89	21.3	16.9	0.79	6.2	Above	Negligible
	30	43.6	43	0.99	10.4	10	0.96	0.6	Above	Negligible
	31	46.2	45.1	0.98	12.8	12.1	0.95	1.1	Above	Negligible
	32	41	40.6	0.99	7.3	6.8	0.93	0.4	Above	Negligible
	33	68.5	62.5	0.91	27.7	23.5	0.85	6	Above	Negligible
	34	63.9	57.9	0.91	24	19.9	0.83	6	Above	Negligible
	35	65.7	59.6	0.91	25.8	21.6	0.84	6.1	Above	Negligible
	36	58.1	54.1	0.93	18.3	15.7	0.86	4	Above	Negligible
	37	61.9	55.9	0.9	22.1	17.8	0.81	6	Above	Negligible
	38	52.7	51.2	0.97	13.1	12.3	0.94	1.5	Above	Negligible
	39	53.8	51.9	0.96	14.5	13.7	0.94	1.9	Above	Negligible
	40	51.4	49.8	0.97	11	9.8	0.89	1.6	Above	Negligible
	41	73.7	67.8	0.92	31.2	27.1	0.87	5.9	Above	Negligible
	42	69.8	64	0.92	28.2	24.1	0.85	5.8	Above	Negligible
	43	72	66.1	0.92	30.3	26.1	0.86	5.9	Above	Negligible
	44	66	62	0.94	24.5	21.9	0.89	4	Above	Negligible
	45	68.3	62.6	0.92	26.7	22.6	0.85	5.7	Above	Negligible
	46	63.2	60.8	0.96	21.6	19.7	0.91	2.4	Above	Negligible
	47	63.8	61.1	0.96	22.3	20.6	0.92	2.7	Above	Negligible
	48	62.4	59.9	0.96	19.9	17.8	0.89	2.5	Above	Negligible
	49	79.1	73.4	0.93	36.3	32.2	0.89	5.7	Above	Negligible

	50	78	72.2	0.93	36	31.9	0.89	5.8	Above	Negligible
	51	78.3	72.5	0.93	36.2	32.1	0.89	5.8	Above	Negligible
	52	77.8	73.1	0.94	36	32.4	0.9	4.7	Above	Negligible
	53	77.9	72.3	0.93	36	31.8	0.88	5.6	Above	Negligible
	54	78.1	73.7	0.94	36	32.1	0.89	4.4	Above	Negligible
	55	77.9	73.3	0.94	36	32.3	0.9	4.6	Above	Negligible
	56	78.8	74.3	0.94	35.8	31.6	0.88	4.5	Above	Negligible
	57	80.1	74.5	0.93	36.9	32.8	0.89	5.6	Above	Negligible
	58	79.1	73.5	0.93	36.8	32.7	0.89	5.6	Above	Negligible
	59	79.4	73.7	0.93	36.9	32.8	0.89	5.7	Above	Negligible
	60	79	74.4	0.94	36.7	33.2	0.9	4.6	Above	Negligible
	61	79	73.5	0.93	36.7	32.6	0.89	5.5	Above	Negligible
	62	79.1	74.8	0.95	36.7	32.7	0.89	4.3	Above	Negligible
	63	79	74.6	0.94	36.8	33.1	0.9	4.4	Above	Negligible
	64	79.9	75.4	0.94	36.5	32.2	0.88	4.5	Above	Negligible
	65	80.9	75.4	0.93	37.4	33.3	0.89	5.5	Above	Negligible
	66	80	74.5	0.93	37.4	33.3	0.89	5.5	Above	Negligible
	67	80.1	74.6	0.93	37.4	33.3	0.89	5.5	Above	Negligible
	68	79.8	75.3	0.94	37.2	33.7	0.91	4.5	Above	Negligible
	69	79.8	74.5	0.93	37.2	33.1	0.89	5.3	Above	Negligible
	70	80.1	75.8	0.95	37.3	33.3	0.89	4.3	Above	Negligible
	71	79.8	75.5	0.95	37.2	33.5	0.9	4.3	Above	Negligible
	72	81	76.6	0.95	37.3	33.1	0.89	4.4	Above	Negligible
1 Central Street (Offices)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-

	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
6 Mount Str (religious building)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
75 Southmill St (Offices)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
	28	-	-	-	-	-	-	-	-	-
	29	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-	-	-
	31	-	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-	-
	33	-	-	-	-	-	-	-	-	-
	34	-	-	-	-	-	-	-	-	-

	35	-	-	-	-	-	-	-	-	-
	36	-	-	-	-	-	-	-	-	-
	37	-	-	-	-	-	-	-	-	-
	38	-	-	-	-	-	-	-	-	-
	39	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-
	41	-	-	-	-	-	-	-	-	-
	42	-	-	-	-	-	-	-	-	-
	43	-	-	-	-	-	-	-	-	-
	44	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-
	46	-	-	-	-	-	-	-	-	-
	47	-	-	-	-	-	-	-	-	-
	48	-	-	-	-	-	-	-	-	-
	49	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-
	51	-	-	-	-	-	-	-	-	-
	52	-	-	-	-	-	-	-	-	-
	53	-	-	-	-	-	-	-	-	-
	54	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-
	56	-	-	-	-	-	-	-	-	-
	57	-	-	-	-	-	-	-	-	-
	58	-	-	-	-	-	-	-	-	-
	59	-	-	-	-	-	-	-	-	-
Television House (Offices)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
37 Peter Street (Offices)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-

	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
	28	-	-	-	-	-	-	-	-	-
	29	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-	-	-
	31	-	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-	-
	33	-	-	-	-	-	-	-	-	-
	34	-	-	-	-	-	-	-	-	-
	35	-	-	-	-	-	-	-	-	-
	36	-	-	-	-	-	-	-	-	-
	37	-	-	-	-	-	-	-	-	-
	38	-	-	-	-	-	-	-	-	-
	39	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-
	41	-	-	-	-	-	-	-	-	-
	42	-	-	-	-	-	-	-	-	-
	43	-	-	-	-	-	-	-	-	-
	44	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-
	46	-	-	-	-	-	-	-	-	-
	47	-	-	-	-	-	-	-	-	-
	48	-	-	-	-	-	-	-	-	-
11-13 Bootle Street	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-

	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
Marron Place Building (office)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
	28	-	-	-	-	-	-	-	-	-
	29	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-	-	-
	31	-	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-	-
	33	-	-	-	-	-	-	-	-	-
	34	-	-	-	-	-	-	-	-	-

	35	-	-	-	-	-	-	-	-	-
	36	-	-	-	-	-	-	-	-	-
	37	-	-	-	-	-	-	-	-	-
	38	-	-	-	-	-	-	-	-	-
	39	-	-	-	-	-	-	-	-	-
	40	-	-	-	-	-	-	-	-	-
	41	-	-	-	-	-	-	-	-	-
	42	-	-	-	-	-	-	-	-	-
	43	-	-	-	-	-	-	-	-	-
	44	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-
	46	-	-	-	-	-	-	-	-	-
	47	-	-	-	-	-	-	-	-	-
	48	-	-	-	-	-	-	-	-	-
	49	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-
	51	-	-	-	-	-	-	-	-	-
	52	-	-	-	-	-	-	-	-	-
	53	-	-	-	-	-	-	-	-	-
	54	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-
	56	-	-	-	-	-	-	-	-	-
	57	-	-	-	-	-	-	-	-	-
	58	-	-	-	-	-	-	-	-	-
	59	-	-	-	-	-	-	-	-	-
	60	-	-	-	-	-	-	-	-	-
Albert hall	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-

	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
	28	-	-	-	-	-	-	-	-	-
	29	-	-	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-	-	-
23 St Peter (covered windows)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
2 Bootle St/Jerusalem Place (offices, Rest, residential?)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-

	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
	28	20.9	20.9	1	6.3	6.3	1	0	Above	Negligible
	29	20.6	20.6	1	6.1	6.1	1	0	Above	Negligible
	30	20.4	20.4	1	6	6	1	0	Above	Negligible
	31	15.7	15.7	1	5.9	5.9	1	0	Above	Negligible
	32	15.1	15.1	1	5.4	5.4	1	0	Above	Negligible
	33	14.8	14.8	1	5.2	5.2	1	0	Above	Negligible
	34	31.7	30.6	0.97	8.6	8.6	1	1.1	Above	Negligible
	35	32.1	31.1	0.97	8.5	8.5	1	1	Above	Negligible
	36	32	31.1	0.97	8.6	8.6	1	0.9	Above	Negligible
	37	38.4	33.9	0.88	10	10	1	4.5	Above	Negligible
	38	39.2	34.8	0.89	9.9	9.9	1	4.4	Above	Negligible
	39	40	34.9	0.87	10.1	10.1	1	5.1	Above	Negligible
	40	14.3	14.3	1	5	5	1	0	Above	Negligible
	41	20.6	20	0.97	5.8	5.8	1	0.6	Above	Negligible
	42	33.4	30.4	0.91	8.4	8.4	1	3	Above	Negligible
	43	40.3	34.2	0.85	10.4	10.4	1	6.1	Above	Negligible
	44	16	16	1	5.8	5.8	1	0	Above	Negligible
	45	15.5	15.5	1	5.6	5.6	1	0	Above	Negligible
	46	22.3	22.3	1	7.5	7.5	1	0	Above	Negligible
	47	21.3	21.3	1	6.6	6.6	1	0	Above	Negligible
	48	32.1	30.8	0.96	9.5	9.5	1	1.3	Above	Negligible
	49	31.3	30	0.96	9.1	9.1	1	1.3	Above	Negligible
	50	39.2	35.6	0.91	11.8	11.8	1	3.6	Above	Negligible
	51	38.9	34.5	0.89	10.8	10.8	1	4.4	Above	Negligible
Theatre Royal (Unused Theatre, NightClub)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-

	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	3	3	1	0.1	0.1	1	0	Above	Negligible
	14	3	3	1	0.1	0.1	1	0	Above	Negligible
Radison Blu Edwardian Manchester (Hotel)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
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	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
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	23	-	-	-	-	-	-	-	-	-
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	30	-	-	-	-	-	-	-	-	-
	31	-	-	-	-	-	-	-	-	-

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	33	-	-	-	-	-	-	-	-	-
	34	-	-	-	-	-	-	-	-	-
	35	-	-	-	-	-	-	-	-	-
	36	-	-	-	-	-	-	-	-	-
	37	-	-	-	-	-	-	-	-	-
	38	-	-	-	-	-	-	-	-	-
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	41	-	-	-	-	-	-	-	-	-
	42	-	-	-	-	-	-	-	-	-
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	44	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-
	46	-	-	-	-	-	-	-	-	-
	47	-	-	-	-	-	-	-	-	-
	48	-	-	-	-	-	-	-	-	-
	49	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-
	51	-	-	-	-	-	-	-	-	-
	52	-	-	-	-	-	-	-	-	-
	53	-	-	-	-	-	-	-	-	-
	54	-	-	-	-	-	-	-	-	-
	55	-	-	-	-	-	-	-	-	-
	56	-	-	-	-	-	-	-	-	-
	57	-	-	-	-	-	-	-	-	-
	58	-	-	-	-	-	-	-	-	-
	59	-	-	-	-	-	-	-	-	-
	60	-	-	-	-	-	-	-	-	-
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	62	-	-	-	-	-	-	-	-	-
	63	-	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-	-
	65	-	-	-	-	-	-	-	-	-
	66	-	-	-	-	-	-	-	-	-
	67	-	-	-	-	-	-	-	-	-
	68	-	-	-	-	-	-	-	-	-
	69	-	-	-	-	-	-	-	-	-
	70	-	-	-	-	-	-	-	-	-
	71	-	-	-	-	-	-	-	-	-
	72	-	-	-	-	-	-	-	-	-
	73	-	-	-	-	-	-	-	-	-
	74	-	-	-	-	-	-	-	-	-

	75	-	-	-	-	-	-	-	-	-
	76	-	-	-	-	-	-	-	-	-
	77	-	-	-	-	-	-	-	-	-
	78	-	-	-	-	-	-	-	-	-
	79	-	-	-	-	-	-	-	-	-
	80	-	-	-	-	-	-	-	-	-
	81	-	-	-	-	-	-	-	-	-
	82	-	-	-	-	-	-	-	-	-
	83	-	-	-	-	-	-	-	-	-
	84	-	-	-	-	-	-	-	-	-
	85	-	-	-	-	-	-	-	-	-
	86	-	-	-	-	-	-	-	-	-
44 Peter Street (Offices)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-	-	-
	19	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-	-	-
	23	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-
	25	-	-	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-	-	-
Fourth Church of Christ Scientists	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-

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	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-	-	-
	14	-	-	-	-	-	-	-	-	-
De Kuyper (Commercial)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-
Greath Northern Tower (Residential)	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
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	35	-	-	-	-	-	-	-	-	-
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	42	-	-	-	-	-	-	-	-	-
	43	-	-	-	-	-	-	-	-	-
	44	-	-	-	-	-	-	-	-	-
	45	-	-	-	-	-	-	-	-	-
	46	-	-	-	-	-	-	-	-	-
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	49	-	-	-	-	-	-	-	-	-
	50	-	-	-	-	-	-	-	-	-
	51	-	-	-	-	-	-	-	-	-
	52	-	-	-	-	-	-	-	-	-
	53	-	-	-	-	-	-	-	-	-
	54	-	-	-	-	-	-	-	-	-
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	56	-	-	-	-	-	-	-	-	-
	57	-	-	-	-	-	-	-	-	-
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	61	-	-	-	-	-	-	-	-	-
	62	-	-	-	-	-	-	-	-	-
	63	-	-	-	-	-	-	-	-	-
	64	-	-	-	-	-	-	-	-	-
Oddfellows House (offices)	1	34.8	28.5	0.82	11.6	11.5	0.99	6.3	Above	Negligible
	2	36	29.2	0.81	12.1	12	0.99	6.8	Above	Negligib

										le
	3	36.2	28.5	0.79	11.8	11.6	0.98	7.7	Above	Negligible
	4	36.1	28.1	0.78	11.7	11.4	0.97	8	Above	Negligible
	5	34	25.5	0.75	11.8	11.3	0.96	8.5	Above	Negligible
	6	33.1	23.7	0.72	11.5	10.4	0.9	9.4	Below	Low
	7	33	23.3	0.71	11.8	10.2	0.86	9.7	Below	Low
	8	31.8	22.7	0.71	11.8	10.5	0.89	9.1	Below	Low
	9	31.8	23.6	0.74	11.9	10.8	0.91	8.2	Below	Low
	10	42.3	33.9	0.8	13.6	13.1	0.96	8.4	Above	Negligible
	11	42.6	34.5	0.81	14.2	13.5	0.95	8.1	Above	Negligible
	12	42.6	34.3	0.81	14.7	13.8	0.94	8.3	Above	Negligible
	13	42.7	33.4	0.78	14.8	13.3	0.9	9.3	Above	Negligible
	14	42.7	32.5	0.76	14.8	12.9	0.87	10.2	Above	Negligible
	15	42.2	31.5	0.75	15.1	12.6	0.83	10.7	Above	Negligible
	16	42	30.9	0.74	15.1	12.3	0.81	11.1	Above	Negligible
	17	42.5	31.5	0.74	15.7	12.9	0.82	11	Above	Negligible
	18	43.2	33.3	0.77	16.4	14	0.85	9.9	Above	Negligible
	19	29.7	24.9	0.84	9.3	9.3	1	4.8	Above	Negligible
	20	31.5	26.1	0.83	9.7	9.7	1	5.4	Above	Negligible
	21	30.8	25.1	0.81	9	8.9	0.99	5.7	Above	Negligible
	22	30.1	23.6	0.78	9.5	9.2	0.97	6.5	Below	Low
	23	29.8	22.3	0.75	9.5	9.2	0.97	7.5	Below	Low
	24	28.5	20.2	0.71	9	8.6	0.96	8.3	Below	Low
	25	26.8	18	0.67	9	8.5	0.94	8.8	Below	Medium
	26	26.1	17.9	0.69	9.2	8.6	0.93	8.2	Below	Medium
	27	25.8	18.9	0.73	9.6	9.1	0.95	6.9	Below	Low
	28	24.5	23.3	0.95	9.9	9.9	1	1.2	Above	Negligible
	29	26.4	23.9	0.91	9.9	9.9	1	2.5	Above	Negligible
	30	25.4	22.5	0.89	9.7	9.7	1	2.9	Above	Negligible
	31	33.6	28.1	0.84	12.8	12.8	1	5.5	Above	Negligible
	32	32.4	27.4	0.85	12.8	12.8	1	5	Above	Negligible
	33	35.4	29	0.82	11.9	11.9	1	6.4	Above	Negligible
	34	40.2	32.1	0.8	13.8	13.7	0.99	8.1	Above	Negligible

	35	41.1	34	0.83	15	15	1	7.1	Above	Negligible
	36	39.8	31.6	0.79	13.2	12.8	0.97	8.2	Above	Negligible
	37	25.5	21.2	0.83	8.8	8.7	0.99	4.3	Above	Negligible
	38	24.3	19.2	0.79	9.2	8.7	0.95	5.1	Below	Low
	39	24	19.3	0.8	9	8.6	0.96	4.7	Above	Negligible
	40	30.4	23.7	0.78	11.2	10.5	0.94	6.7	Below	Low
	41	31.2	23.6	0.76	11.9	10.9	0.92	7.6	Below	Low
	42	31.8	25.5	0.8	10.9	10.3	0.94	6.3	Above	Negligible
	43	40.5	31.8	0.79	16.2	13.7	0.85	8.7	Above	Negligible
	44	41	31.8	0.78	16	13.6	0.85	9.2	Above	Negligible
	45	40.7	32.2	0.79	16.3	13.8	0.85	8.5	Above	Negligible
oddfellows House (offices)	1	33.4	33.4	1	15.4	15.4	1	0	Above	Negligible
	2	30.3	30.3	1	14.5	14.5	1	0	Above	Negligible
	3	32.8	31.6	0.96	14.2	14.2	1	1.2	Above	Negligible
	4	30.4	29.5	0.97	13.1	13.1	1	0.9	Above	Negligible
	5	31.1	29	0.93	12.8	12.8	1	2.1	Above	Negligible
	6	32.9	29	0.88	11.8	11.8	1	3.9	Above	Negligible
	7	33.5	28.4	0.85	12	12	1	5.1	Above	Negligible
	8	31.8	29	0.91	11.2	11.1	0.99	2.8	Above	Negligible
	9	31.2	29	0.93	11	10.8	0.98	2.2	Above	Negligible
	10	30.5	28.2	0.92	10.3	10.3	1	2.3	Above	Negligible
	11	28.6	26.2	0.92	9.3	9.3	1	2.4	Above	Negligible
	12	29	27	0.93	10.1	10.1	1	2	Above	Negligible
	13	29.1	27.2	0.93	10.5	10.5	1	1.9	Above	Negligible
	14	28.5	26	0.91	9.8	9.8	1	2.5	Above	Negligible
	15	28.7	25.3	0.88	10	10	1	3.4	Above	Negligible
	16	28.1	25.2	0.9	10.4	10.4	1	2.9	Above	Negligible
	17	38.2	37.1	0.97	16.2	16.2	1	1.1	Above	Negligible
	18	35.9	34.7	0.97	15	15	1	1.2	Above	Negligible
	19	36	34.4	0.96	14.8	14.8	1	1.6	Above	Negligible
	20	37.5	34.3	0.91	14.4	14.4	1	3.2	Above	Negligible
	21	36.9	33.2	0.9	13.9	13.9	1	3.7	Above	Negligib

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	22	37.1	32.1	0.87	12.9	12.9	1	5	Above	Negligible
	23	37.2	32.2	0.87	13.1	13.1	1	5	Above	Negligible
	24	37.5	31.8	0.85	13.2	13.2	1	5.7	Above	Negligible
	25	36.6	31.8	0.87	12.8	12.6	0.98	4.8	Above	Negligible
	26	35.8	31.3	0.87	12.5	12.5	1	4.5	Above	Negligible
	27	35.9	31.1	0.87	12.7	12.7	1	4.8	Above	Negligible
	28	35	29.9	0.85	12.2	12.2	1	5.1	Above	Negligible
	29	35.8	30.1	0.84	12.9	12.9	1	5.7	Above	Negligible
	30	34	29.5	0.87	12.7	12.7	1	4.5	Above	Negligible
	31	33.2	28.3	0.85	12.4	12.4	1	4.9	Above	Negligible
	32	33.3	28	0.84	12.5	12.5	1	5.3	Above	Negligible
	33	43.8	40.3	0.92	17.2	17.2	1	3.5	Above	Negligible
	34	42.1	38.5	0.91	16.5	16.5	1	3.6	Above	Negligible
	35	42.5	37.9	0.89	16.1	16.1	1	4.6	Above	Negligible
	36	42.6	37	0.87	15.9	15.9	1	5.6	Above	Negligible
	37	42.2	36.6	0.87	15.5	15.5	1	5.6	Above	Negligible
	38	42.2	35.9	0.85	15.3	15.3	1	6.3	Above	Negligible
	39	43.1	35.6	0.83	15.3	15.3	1	7.5	Above	Negligible
	40	43.2	35.1	0.81	15.4	15.3	0.99	8.1	Above	Negligible
	41	43.8	35.1	0.8	16.1	15.9	0.99	8.7	Above	Negligible
	42	43.9	35	0.8	16.2	16.2	1	8.9	Above	Negligible
	43	43.1	35.2	0.82	16.2	16.2	1	7.9	Above	Negligible
	44	41.7	34.7	0.83	16.5	16.5	1	7	Above	Negligible
	45	41.8	34.5	0.83	16.6	16.6	1	7.3	Above	Negligible
	46	41.8	34	0.81	16.8	16.8	1	7.8	Above	Negligible
	47	41.2	33	0.8	17	16.9	0.99	8.2	Above	Negligible
	48	39.2	32.4	0.83	17.1	16.9	0.99	6.8	Above	Negligible
	49	50	44.5	0.89	19.2	19.2	1	5.5	Above	Negligible
	50	48.8	43.2	0.89	18	18	1	5.6	Above	Negligible
	51	48.8	43	0.88	18	18	1	5.8	Above	Negligible

	52	49.1	43	0.88	18.1	18.1	1	6.1	Above	Negligible
	53	49.7	43	0.87	18.3	18.3	1	6.7	Above	Negligible
	54	49.5	42.3	0.85	18.5	18.5	1	7.2	Above	Negligible
	55	49.3	41.4	0.84	18.9	18.9	1	7.9	Above	Negligible
	56	49	40.4	0.82	19	19	1	8.6	Above	Negligible
	57	48.3	39	0.81	19	18.7	0.98	9.3	Above	Negligible
	58	48.5	38.5	0.79	19.2	18.7	0.97	10	Above	Negligible
	59	48.5	38.8	0.8	19.1	18.5	0.97	9.7	Above	Negligible
	60	48.5	39	0.8	19.2	18.5	0.96	9.5	Above	Negligible
	61	47.5	38.8	0.82	19.1	18.3	0.96	8.7	Above	Negligible
	62	46.6	37.8	0.81	18.9	18.3	0.97	8.8	Above	Negligible
	63	46	36.2	0.79	19.2	18.7	0.97	9.8	Above	Negligible
	64	46.6	36.6	0.79	19.6	19	0.97	10	Above	Negligible
1 Scott Street (Offices, Commercial)	1	27.2	24	0.88	10.8	8.9	0.82	3.2	Above	Negligible
	2	22.1	20.2	0.91	8.4	7.3	0.87	1.9	Above	Negligible
	3	33.3	27.9	0.84	13.8	9.7	0.7	5.4	Above	Negligible
	4	37	31.6	0.85	14.9	10.8	0.72	5.4	Above	Negligible
	5	41.1	34.9	0.85	17.3	12.4	0.72	6.2	Above	Negligible
	6	45.2	38.1	0.84	20.3	14.4	0.71	7.1	Above	Negligible
	7	48.8	41.4	0.85	22.4	16.3	0.73	7.4	Above	Negligible
	8	51	43.7	0.86	23.3	17.2	0.74	7.3	Above	Negligible
	9	15.8	12.3	0.78	2.2	1.2	0.55	3.5	Above	Negligible
	10	0.6	0.4	0.67	0.2	0	0	0.2	Above	Negligible
	11	28	27.2	0.97	1.6	1.6	1	0.8	Above	Negligible
	12	2.7	2.7	1	0.6	0.6	1	0	Above	Negligible
	13	32.4	28.5	0.88	7	5.6	0.8	3.9	Above	Negligible
	14	7.6	6	0.79	7.6	6	0.79	1.6	Above	Negligible
	15	65.5	58.2	0.89	26.3	21.4	0.81	7.3	Above	Negligible
	16	54.9	49.5	0.9	17.9	15.1	0.84	5.4	Above	Negligible
	17	69.6	60.9	0.88	29.2	22.8	0.78	8.7	Above	Negligible
	18	72.4	64	0.88	31.2	24.8	0.79	8.4	Above	Negligib

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	19	75.3	66.7	0.89	33.5	26.8	0.8	8.6	Above	Negligible
	20	78.6	70.2	0.89	35.6	29	0.81	8.4	Above	Negligible
	21	80.4	72.3	0.9	36.5	30	0.82	8.1	Above	Negligible
	22	65.8	58.8	0.89	25	20.5	0.82	7	Above	Negligible
	23	52.1	46.8	0.9	12.9	10.2	0.79	5.3	Above	Negligible
	24	70.6	62.3	0.88	28.8	22.7	0.79	8.3	Above	Negligible
	25	73.6	65.4	0.89	31.1	24.9	0.8	8.2	Above	Negligible
	26	76.5	68.4	0.89	33.9	27.7	0.82	8.1	Above	Negligible
	27	78.6	70.8	0.9	36	29.8	0.83	7.8	Above	Negligible
	28	79.6	72	0.9	36.9	30.7	0.83	7.6	Above	Negligible
	29	61	55.9	0.92	19.3	15.8	0.82	5.1	Above	Negligible
	30	45.6	42.1	0.92	5.7	4.2	0.74	3.5	Above	Negligible
	31	69.7	62.6	0.9	26.5	21	0.79	7.1	Above	Negligible
	32	72.6	65.7	0.9	28.7	23.2	0.81	6.9	Above	Negligible
	33	75.8	68.9	0.91	31.8	26.3	0.83	6.9	Above	Negligible
	34	78.9	72	0.91	34.9	29.4	0.84	6.9	Above	Negligible
	35	81	74.1	0.91	37	31.4	0.85	6.9	Above	Negligible
	36	57	52.7	0.92	16.7	14	0.84	4.3	Above	Negligible
	37	44.7	41.8	0.94	6.4	5.2	0.81	2.9	Above	Negligible
	38	63.7	58.4	0.92	21.1	17.4	0.82	5.3	Above	Negligible
	39	68.1	62.8	0.92	24.9	21.1	0.85	5.3	Above	Negligible
	40	74.1	68.7	0.93	30.8	27	0.88	5.4	Above	Negligible
	41	79.9	74.5	0.93	36.5	32.5	0.89	5.4	Above	Negligible
	42	33.1	30	0.91	12.5	10.2	0.82	3.1	Above	Negligible
	43	31.5	28.7	0.91	11.3	9.4	0.83	2.8	Above	Negligible
	44	35.3	31.6	0.9	14.4	11.2	0.78	3.7	Above	Negligible
	45	38.8	33.6	0.87	17.2	12.5	0.73	5.2	Above	Negligible
123 Deansgate	1	53.6	52.6	0.98	14.3	13.3	0.93	1	Above	Negligible
	2	52.3	51.1	0.98	14.3	13	0.91	1.2	Above	Negligible
	3	52.5	51.1	0.97	14.9	13.5	0.91	1.4	Above	Negligible

	4	51.5	51.3	1	13.9	13.8	0.99	0.2	Above	Negligible
	5	51.3	51.3	1	13.7	13.7	1	0	Above	Negligible
	6	50.9	50.9	1	13.4	13.4	1	0	Above	Negligible
	7	48.7	48.7	1	12.2	12.2	1	0	Above	Negligible
	8	46.9	46.9	1	11.7	11.7	1	0	Above	Negligible
	9	44.8	44.8	1	11.2	11.2	1	0	Above	Negligible
	10	45.1	45.1	1	11.5	11.5	1	0	Above	Negligible
	11	45	45	1	11.4	11.4	1	0	Above	Negligible
	12	38.4	38.4	1	9.1	9.1	1	0	Above	Negligible
	13	41.2	41.2	1	10.5	10.5	1	0	Above	Negligible
	14	44.4	44.4	1	11.1	11.1	1	0	Above	Negligible
	15	34	34	1	6.4	6.4	1	0	Above	Negligible
	16	35.1	35.1	1	6.8	6.8	1	0	Above	Negligible
	17	37.5	37.5	1	8.2	8.2	1	0	Above	Negligible
	18	32.6	32.6	1	6.1	6.1	1	0	Above	Negligible
	19	32.9	32.9	1	6.4	6.4	1	0	Above	Negligible
	20	33	33	1	7	7	1	0	Above	Negligible
	21	48.6	47.8	0.98	11.8	11	0.93	0.8	Above	Negligible
	22	47.2	46.3	0.98	11.6	10.7	0.92	0.9	Above	Negligible
	23	47.3	46.2	0.98	12	10.9	0.91	1.1	Above	Negligible
	24	46.3	46.3	1	11.2	11.2	1	0	Above	Negligible
	25	45.6	45.6	1	10.8	10.8	1	0	Above	Negligible
	26	45.7	45.7	1	11	11	1	0	Above	Negligible
	27	44	44	1	10.7	10.7	1	0	Above	Negligible
	28	41.9	41.9	1	9.7	9.7	1	0	Above	Negligible
	29	40.1	40.1	1	8.8	8.8	1	0	Above	Negligible
	30	40.2	40.2	1	9	9	1	0	Above	Negligible
	31	40.4	40.4	1	9.2	9.2	1	0	Above	Negligible
	32	35.2	35.2	1	7.7	7.7	1	0	Above	Negligible
	33	36.9	36.9	1	8.1	8.1	1	0	Above	Negligible
	34	39.6	39.6	1	8.5	8.5	1	0	Above	Negligib

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	35	31.5	31.5	1	5.3	5.3	1	0	Above	Negligible
	36	32.4	32.4	1	5.5	5.5	1	0	Above	Negligible
	37	34.8	34.8	1	7.1	7.1	1	0	Above	Negligible
	38	30	30	1	4.8	4.8	1	0	Above	Negligible
	39	30.2	30.2	1	5	5	1	0	Above	Negligible
	40	30.4	30.4	1	5.6	5.6	1	0	Above	Negligible
	41	36.5	36.5	1	8.8	8.8	1	0	Above	Negligible
	42	36.3	36.3	1	8.2	8.2	1	0	Above	Negligible
	43	36	36	1	7.8	7.8	1	0	Above	Negligible
	44	40.6	40.6	1	9.3	9.3	1	0	Above	Negligible
	45	38	38	1	7.9	7.9	1	0	Above	Negligible
	46	37.1	37.1	1	7.8	7.8	1	0	Above	Negligible
	47	48.6	48.6	1	12.9	12.9	1	0	Above	Negligible
	48	45.3	45.3	1	12.2	12.2	1	0	Above	Negligible
	49	41.8	41.8	1	10.2	10.2	1	0	Above	Negligible
	50	50.8	50.8	1	14.7	14.7	1	0	Above	Negligible
	51	51.2	51.2	1	15.1	15.1	1	0	Above	Negligible
	52	50.2	50.2	1	14.2	14.2	1	0	Above	Negligible
	53	51.4	51.4	1	14.3	14.3	1	0	Above	Negligible
	54	53.2	53.2	1	14.6	14.6	1	0	Above	Negligible
	55	54.5	54.5	1	15.6	15.6	1	0	Above	Negligible
	56	55	54.9	1	16.2	16	0.99	0.1	Above	Negligible
	57	55.5	55.1	0.99	16.7	16.3	0.98	0.4	Above	Negligible
	58	56.6	55.2	0.98	17.6	16.2	0.92	1.4	Above	Negligible
	59	56.7	55.5	0.98	17	15.7	0.92	1.2	Above	Negligible
	60	57.9	57	0.98	16.8	15.9	0.95	0.9	Above	Negligible
	61	41.8	41.8	1	9.5	9.5	1	0	Above	Negligible
	62	41.9	41.9	1	9.2	9.2	1	0	Above	Negligible
	63	41.8	41.8	1	8.9	8.9	1	0	Above	Negligible
	64	45.9	45.9	1	10.7	10.7	1	0	Above	Negligible

	65	43.1	43.1	1	9.2	9.2	1	0	Above	Negligible
	66	41.6	41.6	1	8.8	8.8	1	0	Above	Negligible
	67	52	52	1	14.2	14.2	1	0	Above	Negligible
	68	49.3	49.3	1	13.4	13.4	1	0	Above	Negligible
	69	47	47	1	11.5	11.5	1	0	Above	Negligible
	70	54.5	54.5	1	16.2	16.2	1	0	Above	Negligible
	71	54.9	54.9	1	16.6	16.6	1	0	Above	Negligible
	72	53.9	53.9	1	15.6	15.6	1	0	Above	Negligible
	73	55.1	55.1	1	15.7	15.7	1	0	Above	Negligible
	74	56.6	56.6	1	16.5	16.5	1	0	Above	Negligible
	75	57.4	57.3	1	17.1	17	0.99	0.1	Above	Negligible
	76	57.9	57.6	0.99	17.6	17.3	0.98	0.3	Above	Negligible
	77	58.4	57.9	0.99	18.1	17.6	0.97	0.5	Above	Negligible
	78	60	58.6	0.98	19	17.6	0.93	1.4	Above	Negligible
	79	60.1	58.9	0.98	18.4	17.2	0.93	1.2	Above	Negligible
	80	61.3	60.3	0.98	18.7	17.7	0.95	1	Above	Negligible
	81	46.8	46.8	1	10.5	10.5	1	0	Above	Negligible
	82	46.6	46.6	1	10	10	1	0	Above	Negligible
	83	46.8	46.8	1	10	10	1	0	Above	Negligible
	84	50.5	50.5	1	12	12	1	0	Above	Negligible
	85	47.8	47.8	1	10.5	10.5	1	0	Above	Negligible
	86	46.7	46.7	1	9.9	9.9	1	0	Above	Negligible
	87	56	56	1	15.8	15.8	1	0	Above	Negligible
	88	53.8	53.8	1	14.9	14.9	1	0	Above	Negligible
	89	51.9	51.9	1	13	13	1	0	Above	Negligible
	90	58.6	58.6	1	17.9	17.9	1	0	Above	Negligible
	91	58.9	58.9	1	18.2	18.2	1	0	Above	Negligible
	92	57.8	57.8	1	17.2	17.2	1	0	Above	Negligible
	93	59.7	59.7	1	18.1	18.1	1	0	Above	Negligible
	94	60.2	60.1	1	18.3	18.2	0.99	0.1	Above	Negligible
	95	60.9	60.5	0.99	18.9	18.6	0.98	0.4	Above	Negligib

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	96	61.2	60.7	0.99	19.2	18.7	0.97	0.5	Above	Negligible
	97	62.1	61.3	0.99	19.8	19	0.96	0.8	Above	Negligible
	98	63.4	62	0.98	20.8	19.4	0.93	1.4	Above	Negligible
	99	63.6	62.3	0.98	20.8	19.4	0.93	1.3	Above	Negligible
	100	64.7	63.2	0.98	21.2	19.7	0.93	1.5	Above	Negligible
	101	52.3	52.3	1	11.4	11.4	1	0	Above	Negligible
	102	51.9	51.9	1	10.9	10.9	1	0	Above	Negligible
	103	52.5	52.5	1	11	11	1	0	Above	Negligible
	104	55.5	55.4	1	13.4	13.4	1	0.1	Above	Negligible
	105	53.4	53.4	1	11.8	11.8	1	0	Above	Negligible
	106	52.5	52.5	1	11.1	11.1	1	0	Above	Negligible
	107	60.1	60.1	1	17.5	17.5	1	0	Above	Negligible
	108	58.8	58.8	1	16.5	16.5	1	0	Above	Negligible
	109	56.8	56.8	1	14.4	14.4	1	0	Above	Negligible
	110	63	63	1	20.2	20.2	1	0	Above	Negligible
	111	63.1	63.1	1	20.3	20.3	1	0	Above	Negligible
	112	62	62	1	19.2	19.2	1	0	Above	Negligible
	113	63.9	63.8	1	21	21	1	0.1	Above	Negligible
	114	64.5	64.1	0.99	21.6	21.2	0.98	0.4	Above	Negligible
	115	65.2	64.5	0.99	22.3	21.6	0.97	0.7	Above	Negligible
	116	66.1	65.1	0.98	23.2	22.2	0.96	1	Above	Negligible
	117	67.4	65.8	0.98	24.5	22.9	0.93	1.6	Above	Negligible
	118	67.8	66.1	0.97	24.9	23.2	0.93	1.7	Above	Negligible
	119	68.3	66.4	0.97	25.2	23.4	0.93	1.9	Above	Negligible
	120	69.3	67.4	0.97	25.6	23.7	0.93	1.9	Above	Negligible
	121	60.3	59.2	0.98	16.5	15.5	0.94	1.1	Above	Negligible
	122	59.7	58.6	0.98	16.4	15.4	0.94	1.1	Above	Negligible
	123	60	58.9	0.98	16.9	15.9	0.94	1.1	Above	Negligible
	124	62.2	61.3	0.99	19.2	18.3	0.95	0.9	Above	Negligible
	125	60.7	59.7	0.98	17.7	16.8	0.95	1	Above	Negligible

	126	59.9	58.8	0.98	16.8	15.9	0.95	1.1	Above	Negligible
	127	65.9	65.3	0.99	22.9	22.3	0.97	0.6	Above	Negligible
	128	65.2	64.7	0.99	22.3	21.7	0.97	0.5	Above	Negligible
	129	63.1	62.5	0.99	20.2	19.5	0.97	0.6	Above	Negligible
	130	68.6	68.1	0.99	25.7	25.2	0.98	0.5	Above	Negligible
	131	68.5	67.9	0.99	25.6	25	0.98	0.6	Above	Negligible
	132	67.1	66.5	0.99	24.2	23.6	0.98	0.6	Above	Negligible
	133	69	68.5	0.99	26.1	25.6	0.98	0.5	Above	Negligible
	134	69.9	68.8	0.98	27	26	0.96	1.1	Above	Negligible
	135	71	69.3	0.98	28.1	26.4	0.94	1.7	Above	Negligible
	136	71.2	69.2	0.97	28.4	26.4	0.93	2	Above	Negligible
	137	71.7	69.4	0.97	28.8	26.5	0.92	2.3	Above	Negligible
	138	72.2	69.8	0.97	29.2	26.8	0.92	2.4	Above	Negligible
	139	73	70.3	0.96	29.9	27.3	0.91	2.7	Above	Negligible
	140	74.8	72.1	0.96	31	28.3	0.91	2.7	Above	Negligible
	141	74.9	70.8	0.95	31.2	27.1	0.87	4.1	Above	Negligible
	142	74.5	70.5	0.95	31.2	27.2	0.87	4	Above	Negligible
	143	74.7	70.7	0.95	31.6	27.6	0.87	4	Above	Negligible
	144	76.1	73	0.96	33.2	30	0.9	3.1	Above	Negligible
	145	75	71.1	0.95	32	28.1	0.88	3.9	Above	Negligible
	146	74.5	70.5	0.95	31.5	27.5	0.87	4	Above	Negligible
	147	77.9	75.5	0.97	35	32.6	0.93	2.4	Above	Negligible
	148	77.7	75.2	0.97	34.8	32.2	0.93	2.5	Above	Negligible
	149	76.4	73.7	0.96	33.4	30.7	0.92	2.7	Above	Negligible
	150	78.3	76.3	0.97	35.4	33.4	0.94	2	Above	Negligible
	151	78.5	76.4	0.97	35.6	33.5	0.94	2.1	Above	Negligible
	152	78.4	76.2	0.97	35.5	33.3	0.94	2.2	Above	Negligible
	153	78.1	76.3	0.98	35.2	33.4	0.95	1.8	Above	Negligible
	154	78.2	76.4	0.98	35.3	33.5	0.95	1.8	Above	Negligible
	155	78.2	76	0.97	35.4	33.1	0.94	2.2	Above	Negligible
	156	78.2	75.8	0.97	35.4	32.9	0.93	2.4	Above	Negligib

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	157	78.3	75.7	0.97	35.4	32.8	0.93	2.6	Above	Negligible
	158	78.3	75.7	0.97	35.4	32.8	0.93	2.6	Above	Negligible
	159	78.5	75.8	0.97	35.4	32.8	0.93	2.7	Above	Negligible
	160	79.3	76.7	0.97	35.6	32.9	0.92	2.6	Above	Negligible
	161	81.7	77.8	0.95	38	34	0.89	3.9	Above	Negligible
	162	80.8	76.9	0.95	37.5	33.6	0.9	3.9	Above	Negligible
	163	80.6	76.7	0.95	37.5	33.6	0.9	3.9	Above	Negligible
	164	80.3	77.4	0.96	37.4	34.4	0.92	2.9	Above	Negligible
	165	80.4	76.6	0.95	37.4	33.6	0.9	3.8	Above	Negligible
	166	80.5	76.6	0.95	37.4	33.6	0.9	3.9	Above	Negligible
	167	80.3	78	0.97	37.3	35	0.94	2.3	Above	Negligible
	168	80.3	77.8	0.97	37.3	34.9	0.94	2.5	Above	Negligible
	169	80.3	77.7	0.97	37.4	34.7	0.93	2.6	Above	Negligible
	170	80.2	78.3	0.98	37.3	35.4	0.95	1.9	Above	Negligible
	171	80.2	78.2	0.98	37.3	35.3	0.95	2	Above	Negligible
	172	80.2	78.1	0.97	37.3	35.2	0.94	2.1	Above	Negligible
	173	80.3	78.5	0.98	37.4	35.6	0.95	1.8	Above	Negligible
	174	80.2	78.6	0.98	37.3	35.7	0.96	1.6	Above	Negligible
	175	80.3	78.2	0.97	37.4	35.3	0.94	2.1	Above	Negligible
	176	80.3	78	0.97	37.4	35.1	0.94	2.3	Above	Negligible
	177	80.4	77.9	0.97	37.5	35	0.93	2.5	Above	Negligible
	178	80.4	77.9	0.97	37.5	34.9	0.93	2.5	Above	Negligible
	179	80.5	77.9	0.97	37.5	34.9	0.93	2.6	Above	Negligible
	180	81.3	78.7	0.97	37.5	34.9	0.93	2.6	Above	Negligible
	181	81.8	78	0.95	38.1	34.3	0.9	3.8	Above	Negligible
	182	80.9	77.2	0.95	37.7	33.9	0.9	3.7	Above	Negligible
	183	80.7	77	0.95	37.6	33.9	0.9	3.7	Above	Negligible
	184	80.6	77.8	0.97	37.5	34.7	0.93	2.8	Above	Negligible
	185	80.6	77	0.96	37.5	33.9	0.9	3.6	Above	Negligible
	186	80.6	76.9	0.95	37.5	33.9	0.9	3.7	Above	Negligible

	187	80.5	78.3	0.97	37.5	35.2	0.94	2.2	Above	Negligible
	188	80.5	78.1	0.97	37.5	35.1	0.94	2.4	Above	Negligible
	189	80.5	78	0.97	37.5	34.9	0.93	2.5	Above	Negligible
	190	80.5	78.7	0.98	37.5	35.6	0.95	1.8	Above	Negligible
	191	80.5	78.5	0.98	37.5	35.5	0.95	2	Above	Negligible
	192	80.5	78.4	0.97	37.5	35.4	0.94	2.1	Above	Negligible
	193	80.6	78.8	0.98	37.5	35.8	0.95	1.8	Above	Negligible
	194	80.6	79	0.98	37.5	35.9	0.96	1.6	Above	Negligible
	195	80.6	78.5	0.97	37.5	35.5	0.95	2.1	Above	Negligible
	196	80.6	78.3	0.97	37.5	35.2	0.94	2.3	Above	Negligible
	197	80.6	78.2	0.97	37.5	35.1	0.94	2.4	Above	Negligible
	198	80.6	78.1	0.97	37.5	35	0.93	2.5	Above	Negligible
	199	80.8	78.2	0.97	37.5	35	0.93	2.6	Above	Negligible
	200	81.5	78.9	0.97	37.5	35	0.93	2.6	Above	Negligible
	201	26.7	26.7	1	3.1	3.1	1	0	Above	Negligible
	202	30.9	30.9	1	5.1	5.1	1	0	Above	Negligible
	203	34.9	34.9	1	6.3	6.3	1	0	Above	Negligible
	204	38.5	38.5	1	7.8	7.8	1	0	Above	Negligible
Scottish House	1	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-
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	11	-	-	-	-	-	-	-	-	-
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	18	-	-	-	-	-	-	-	-	-

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	20	-	-	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-	-	-
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	69	-	-	-	-	-	-	-	-	-
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	72	-	-	-	-	-	-	-	-	-
	73	-	-	-	-	-	-	-	-	-
	74	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	-	-	-	-	-
	76	-	-	-	-	-	-	-	-	-
	77	-	-	-	-	-	-	-	-	-
	78	-	-	-	-	-	-	-	-	-
	79	-	-	-	-	-	-	-	-	-
	80	-	-	-	-	-	-	-	-	-
	81	-	-	-	-	-	-	-	-	-
	82	-	-	-	-	-	-	-	-	-
	83	-	-	-	-	-	-	-	-	-
	84	-	-	-	-	-	-	-	-	-
	85	-	-	-	-	-	-	-	-	-
	86	-	-	-	-	-	-	-	-	-

Appendix 11.3

DETAILED INTERNAL DAYLIGHT AND SUNLIGHT RESULTS

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

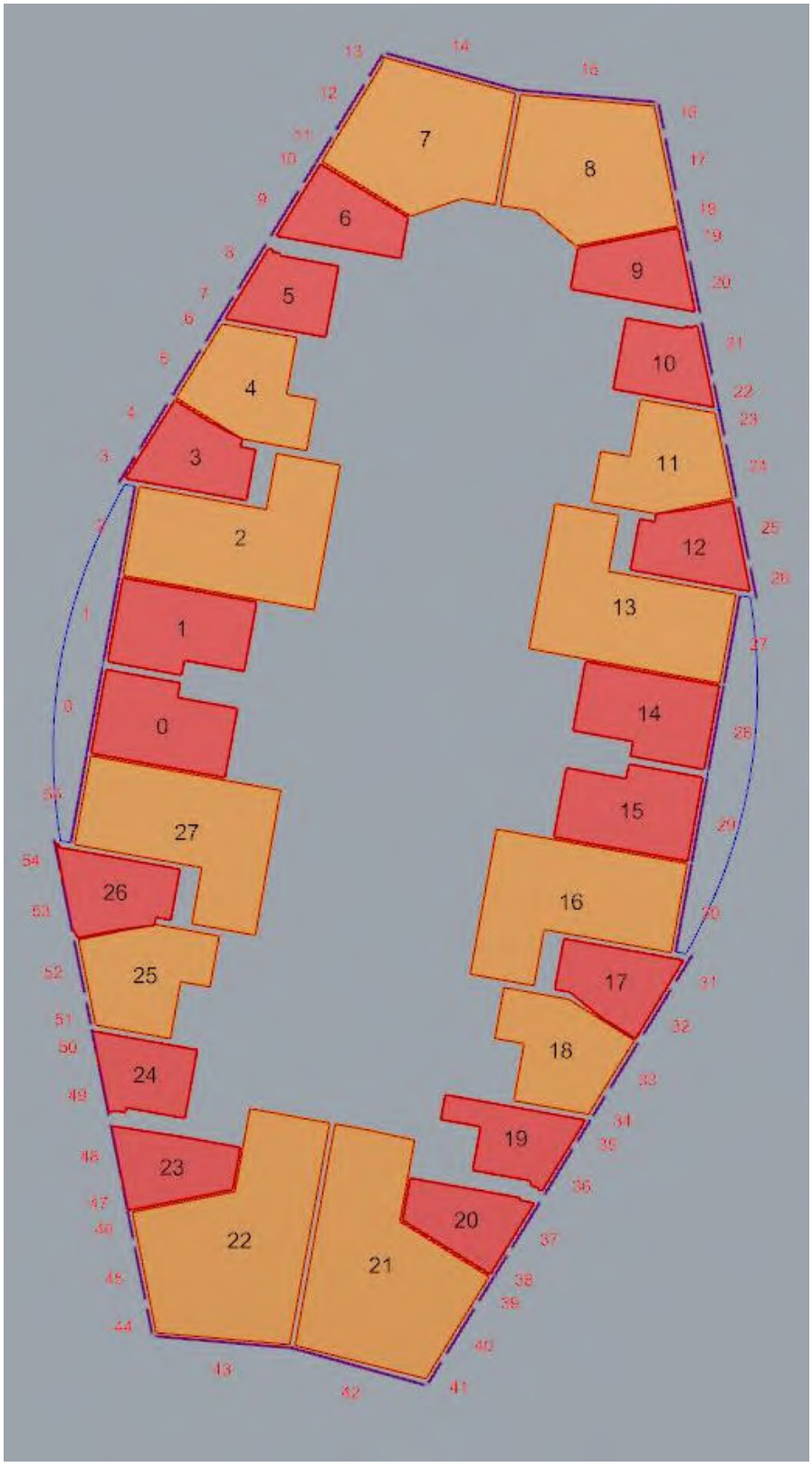
Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

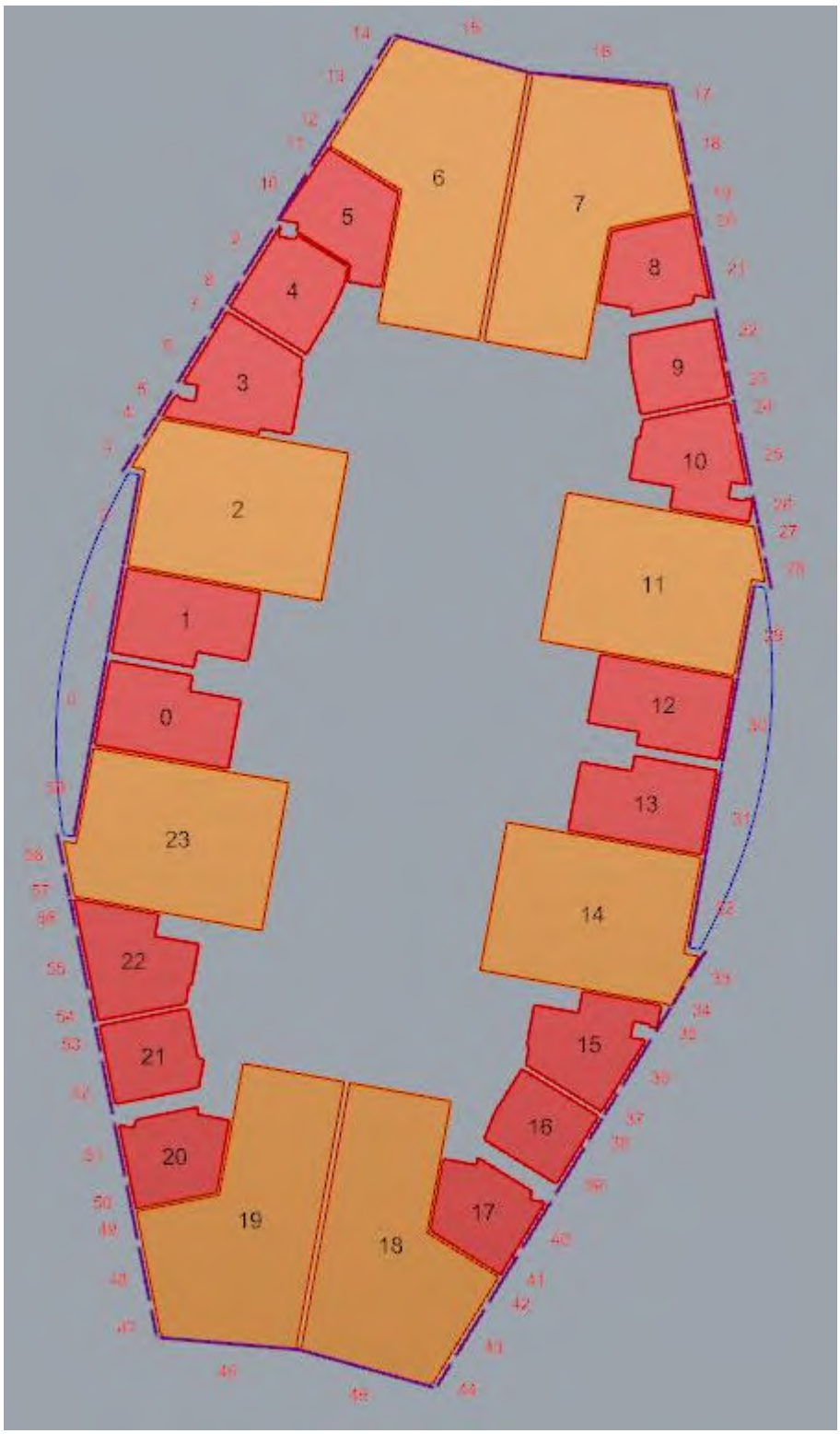
This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Windows and rooms reference number

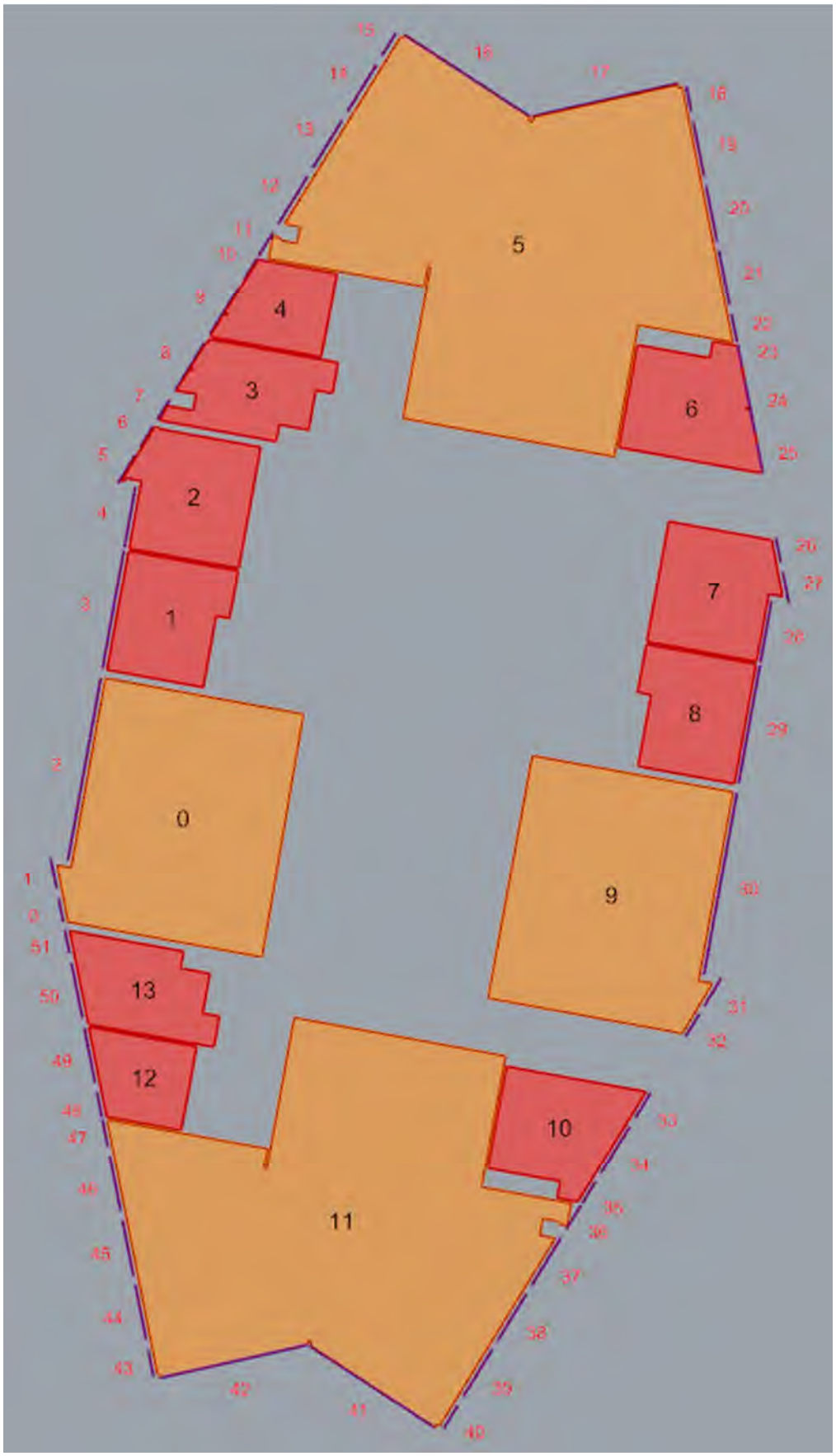
19th- 25th floor



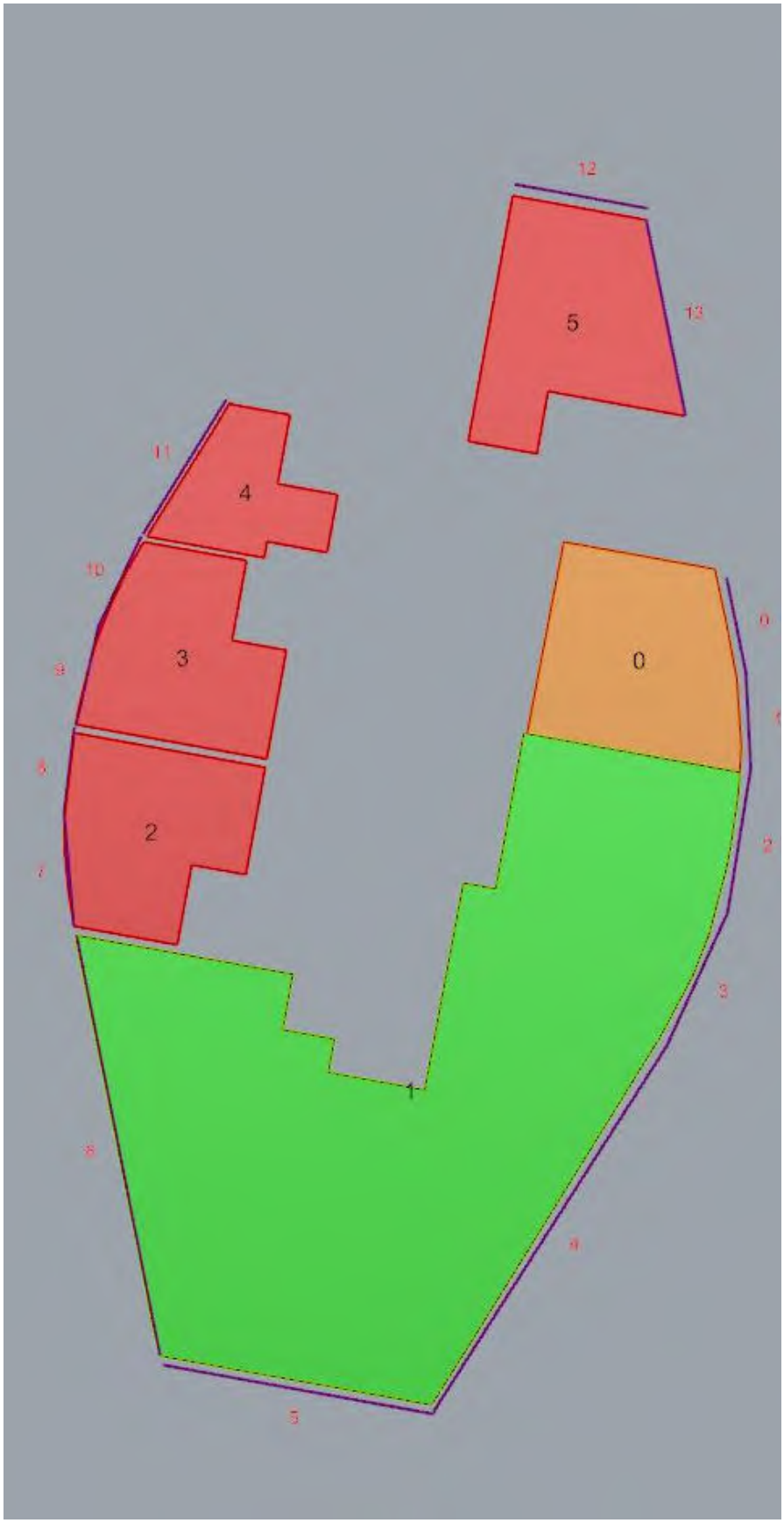
26h- 35th floor



36^{h}- 37th floor



38th floor



Floor	Room	Window	VSC	ADF	Target	BRE	APSH	WPSH	BRE	Orientation	BRE	Orientation
Number	Number	Number	%	%	%	Compliance	%	%	Compliance Window	Window	Compliance Room	Room
19	0	0	18.9	3	2	Above						
19	1	1	19	3	2	Above						
19	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
19	3	3	34.7	5.7	1	Above						
19		4	35.1									
19	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
19		6	33.8				17	1	Below	North Facing		
19	5	7	33.8	6	1	Above						
19		8	35									
19	6	9	35.2	5.4	1	Above						
19		10	33									
19	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
19		12	35.2				23	3	Below	North Facing		
19		13	33.7				17	1	Below	North Facing		
19		14	22.9				6	1	Below	North Facing		
19	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
19		16	33.6				25	4	Below	North Facing		
19		17	35				33	7	Above	North Facing		
19		18	33.7				33	7	Above	North Facing		
19	9	19	32.8	5.3	1	Above						
19		20	35									
19	10	21	34.9	6	1	Above						
19		22	33.7									
19	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
19		24	34.9				33	7	Above	North Facing		
19	12	25	35	5.8	1	Above						
19		26	34.7									
19	13	27	22.6	2.1	2	Above	28	7	Above		Above	
19	14	28	19	3	2	Above						
19	15	29	19	3	2	Above						
19	16	30	22.9	2.1	2	Above	30	8	Above		Above	
19	17	31	34.7	5.9	1	Above						
19		32	35.1									
19	18	33	35.1	3.9	2	Above	56	19	Above		Above	

19		34	33.8				55	19	Above			
19	19	35	34.2	5	1	Above						
19		36	35.1									
19	20	37	35.1	5.3	1	Above						
19		38	32.9									
19	21	39	34.1	5.3	2	Above	47	14	Above		Above	
19		40	35.1				56	19	Above			
19		41	33.6				57	19	Above			
19		42	21.9				36	26	Above			
19	22	43	21.9	5.2	2	Above	40	28	Above		Above	
19		44	33.6				50	15	Above			
19		45	34.9				46	12	Above			
19		46	34.1				40	10	Above			
19	23	47	32.7	5.1	1	Above						
19		48	35									
19	24	49	34.9	5.9	1	Above						
19		50	34.1									
19	25	51	33.6	3.9	2	Above	50	16	Above		Above	
19		52	34.9				46	12	Above			
19	26	53	34.9	5.5	1	Above						
19		54	34.5									
19	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
20	0	0	18.9	3	2	Above						
20	1	1	19	3	2	Above						
20	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
20	3	3	34.7	5.7	1	Above						
20		4	35.1									
20	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
20		6	33.8				17	1	Below	North Facing		
20	5	7	33.8	6	1	Above						
20		8	35									
20	6	9	35.2	5.4	1	Above						
20		10	33									
20	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
20		12	35.2				23	3	Below	North Facing		
20		13	33.7				17	1	Below	North Facing		
20		14	22.9				6	1	Below	North Facing		
20	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
20		16	33.6				25	4	Below	North Facing		
20		17	35				33	7	Above	North		

										Facing		
20		18	33.7				33	7	Above	North Facing		
20	9	19	32.8	5.3	1	Above						
20		20	35									
20	10	21	34.9	6	1	Above						
20		22	33.7									
20	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
20		24	34.9				33	7	Above	North Facing		
20	12	25	35	5.8	1	Above						
20		26	34.7									
20	13	27	22.6	2.1	2	Above	28	7	Above		Above	
20	14	28	19	3	2	Above						
20	15	29	19	3	2	Above						
20	16	30	22.9	2.1	2	Above	30	8	Above		Above	
20	17	31	34.7	5.9	1	Above						
20		32	35.1									
20	18	33	35.1	3.9	2	Above	56	19	Above		Above	
20		34	33.8				55	19	Above			
20	19	35	34.2	5	1	Above						
20		36	35.1									
20	20	37	35.1	5.3	1	Above						
20		38	32.9									
20	21	39	34.1	5.4	2	Above	47	14	Above		Above	
20		40	35.2				56	19	Above			
20		41	33.6				57	19	Above			
20		42	22				37	27	Above			
20	22	43	22	5.3	2	Above	41	29	Above		Above	
20		44	33.6				51	16	Above			
20		45	34.9				46	12	Above			
20		46	34.1				41	11	Above			
20	23	47	32.7	5.1	1	Above						
20		48	35									
20	24	49	34.9	5.9	1	Above						
20		50	34.1									
20	25	51	33.6	3.9	2	Above	50	16	Above		Above	
20		52	34.9				46	12	Above			
20	26	53	34.9	5.5	1	Above						
20		54	34.5									
20	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
21	0	0	18.9	3	2	Above						
21	1	1	19	3	2	Above						

21	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
21	3	3	34.7	5.7	1	Above						
21		4	35.1									
21	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
21		6	33.8				17	1	Below	North Facing		
21	5	7	33.8	6	1	Above						
21		8	35									
21	6	9	35.2	5.4	1	Above						
21		10	33									
21	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
21		12	35.2				23	3	Below	North Facing		
21		13	33.7				17	1	Below	North Facing		
21		14	22.9				6	1	Below	North Facing		
21	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
21		16	33.6				25	4	Below	North Facing		
21		17	35				33	7	Above	North Facing		
21		18	33.7				33	7	Above	North Facing		
21	9	19	32.8	5.3	1	Above						
21		20	35									
21	10	21	34.9	6	1	Above						
21		22	33.7									
21	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
21		24	34.9				33	7	Above	North Facing		
21	12	25	35	5.8	1	Above						
21		26	34.7									
21	13	27	22.6	2.1	2	Above	28	7	Above		Above	
21	14	28	19	3	2	Above						
21	15	29	19	3	2	Above						
21	16	30	22.9	2.1	2	Above	30	8	Above		Above	
21	17	31	34.7	5.9	1	Above						
21		32	35.2									
21	18	33	35.1	3.9	2	Above	56	19	Above		Above	
21		34	33.9				55	19	Above			
21	19	35	34.2	5	1	Above						
21		36	35.1									
21	20	37	35.2	5.3	1	Above						
21		38	33									
21	21	39	34.1	5.4	2	Above	47	14	Above		Above	
21		40	35.2				56	19	Above			

21		41	33.6				57	19	Above			
21		42	22				37	27	Above			
21	22	43	22	5.3	2	Above	41	29	Above		Above	
21		44	33.6				51	16	Above			
21		45	34.9				46	12	Above			
21		46	34.1				41	11	Above			
21	23	47	32.7	5.2	1	Above						
21		48	35.1									
21	24	49	35	5.9	1	Above						
21		50	34.2									
21	25	51	33.7	3.9	2	Above	50	16	Above		Above	
21		52	35				46	12	Above			
21	26	53	35	5.5	1	Above						
21		54	34.5									
21	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
22	0	0	18.9	3	2	Above						
22	1	1	19	3	2	Above						
22	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
22	3	3	34.7	5.7	1	Above						
22		4	35.1									
22	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
22		6	33.8				17	1	Below	North Facing		
22	5	7	33.8	6	1	Above						
22		8	35									
22	6	9	35.2	5.4	1	Above						
22		10	33									
22	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
22		12	35.2				23	3	Below	North Facing		
22		13	33.7				17	1	Below	North Facing		
22		14	22.9				6	1	Below	North Facing		
22	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
22		16	33.6				25	4	Below	North Facing		
22		17	35				33	7	Above	North Facing		
22		18	33.7				33	7	Above	North Facing		
22	9	19	32.8	5.3	1	Above						
22		20	35									
22	10	21	34.9	6	1	Above						
22		22	33.7									
22	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing

22		24	34.9				33	7	Above	North Facing		
22	12	25	35	5.8	1	Above						
22		26	34.7									
22	13	27	22.6	2.1	2	Above	28	7	Above		Above	
22	14	28	19	3	2	Above						
22	15	29	19	3	2	Above						
22	16	30	22.9	2.1	2	Above	30	8	Above		Above	
22	17	31	34.7	5.9	1	Above						
22		32	35.2									
22	18	33	35.2	3.9	2	Above	56	19	Above		Above	
22		34	33.9				55	19	Above			
22	19	35	34.2	5	1	Above						
22		36	35.2									
22	20	37	35.3	5.3	1	Above						
22		38	33.1									
22	21	39	34.2	5.4	2	Above	47	14	Above		Above	
22		40	35.3				56	19	Above			
22		41	33.8				57	19	Above			
22		42	22.2				37	27	Above			
22	22	43	22.3	5.3	2	Above	41	29	Above		Above	
22		44	33.7				51	16	Above			
22		45	34.9				46	12	Above			
22		46	34.2				41	11	Above			
22	23	47	32.8	5.1	1	Above						
22		48	35									
22	24	49	35	5.9	1	Above						
22		50	34.2									
22	25	51	33.7	3.9	2	Above	50	16	Above		Above	
22		52	35				46	12	Above			
22	26	53	35	5.5	1	Above						
22		54	34.5									
22	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
23	0	0	18.9	3	2	Above						
23	1	1	19	3	2	Above						
23	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
23	3	3	34.7	5.7	1	Above						
23		4	35.1									
23	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
23		6	33.8				17	1	Below	North Facing		
23	5	7	33.8	6	1	Above						

23		8	35									
23	6	9	35.2	5.4	1	Above						
23		10	33									
23	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
23		12	35.2				23	3	Below	North Facing		
23		13	33.7				17	1	Below	North Facing		
23		14	22.9				6	1	Below	North Facing		
23	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
23		16	33.6				25	4	Below	North Facing		
23		17	35				33	7	Above	North Facing		
23		18	33.7				33	7	Above	North Facing		
23	9	19	32.8	5.3	1	Above						
23		20	35									
23	10	21	34.9	6	1	Above						
23		22	33.7									
23	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
23		24	34.9				33	7	Above	North Facing		
23	12	25	35	5.8	1	Above						
23		26	34.7									
23	13	27	22.6	2.1	2	Above	28	7	Above		Above	
23	14	28	19	3	2	Above						
23	15	29	19	3	2	Above						
23	16	30	22.9	2.1	2	Above	30	8	Above		Above	
23	17	31	34.7	5.9	1	Above						
23		32	35.2									
23	18	33	35.2	3.9	2	Above	56	19	Above		Above	
23		34	33.9				55	19	Above			
23	19	35	34.2	5	1	Above						
23		36	35.2									
23	20	37	35.3	5.3	1	Above						
23		38	33.1									
23	21	39	34.2	5.4	2	Above	47	14	Above		Above	
23		40	35.3				56	19	Above			
23		41	33.8				57	19	Above			
23		42	22.2				37	27	Above			
23	22	43	22.4	5.3	2	Above	41	29	Above		Above	
23		44	33.7				51	16	Above			
23		45	34.9				46	12	Above			
23		46	34.2				41	11	Above			
23	23	47	32.8	5.2	1	Above						

23		48	35.1									
23	24	49	35	5.9	1	Above						
23		50	34.2									
23	25	51	33.7	3.9	2	Above	50	16	Above		Above	
23		52	35				46	12	Above			
23	26	53	35	5.5	1	Above						
23		54	34.5									
23	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
24	0	0	18.9	3	2	Above						
24	1	1	19	3	2	Above						
24	2	2	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
24	3	3	34.7	5.7	1	Above						
24		4	35.1									
24	4	5	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
24		6	33.8				17	1	Below	North Facing		
24	5	7	33.8	6	1	Above						
24		8	35									
24	6	9	35.2	5.4	1	Above						
24		10	33									
24	7	11	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
24		12	35.2				23	3	Below	North Facing		
24		13	33.7				17	1	Below	North Facing		
24		14	22.9				6	1	Below	North Facing		
24	8	15	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
24		16	33.6				25	4	Below	North Facing		
24		17	35				33	7	Above	North Facing		
24		18	33.7				33	7	Above	North Facing		
24	9	19	32.8	5.3	1	Above						
24		20	35									
24	10	21	34.9	6	1	Above						
24		22	33.7									
24	11	23	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
24		24	34.9				33	7	Above	North Facing		
24	12	25	35	5.8	1	Above						
24		26	34.7									
24	13	27	22.6	2.1	2	Above	28	7	Above		Above	
24	14	28	19	3	2	Above						
24	15	29	19	3	2	Above						
24	16	30	22.9	2.1	2	Above	30	8	Above		Above	

24	17	31	34.7	5.9	1	Above						
24		32	35.2									
24	18	33	35.2	3.9	2	Above	56	19	Above		Above	
24		34	33.9				55	19	Above			
24	19	35	34.2	5	1	Above						
24		36	35.2									
24	20	37	35.3	5.3	1	Above						
24		38	33.1									
24	21	39	34.2	5.4	2	Above	47	14	Above		Above	
24		40	35.3				56	19	Above			
24		41	33.8				57	19	Above			
24		42	22.2				37	27	Above			
24	22	43	22.4	5.3	2	Above	41	29	Above		Above	
24		44	33.7				51	16	Above			
24		45	34.9				46	12	Above			
24		46	34.2				41	11	Above			
24	23	47	32.8	5.2	1	Above						
24		48	35.1									
24	24	49	35	5.9	1	Above						
24		50	34.2									
24	25	51	33.7	3.9	2	Above	50	16	Above		Above	
24		52	35				46	12	Above			
24	26	53	35	5.6	1	Above						
24		54	34.6									
24	27	55	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
25	0	336	18.9	3	2	Above						
25	1	337	19	3	2	Above						
25	2	338	22.7	2.1	2	Above	21	4	Below	North Facing	Below	North Facing
25	3	339	34.7	5.7	1	Above						
25		340	35.1									
25	4	341	35	3.9	2	Above	23	3	Below	North Facing	Below	North Facing
25		342	33.7				17	1	Below	North Facing		
25	5	343	33.8	6	1	Above						
25		344	35									
25	6	345	35.2	5.4	1	Above						
25		346	33									
25	7	347	33.9	7.4	2	Above	26	5	Above	North Facing	Above	North Facing
25		348	35.2				23	3	Below	North Facing		
25		349	33.7				17	1	Below	North Facing		
25		350	22.9				6	1	Below	North Facing		

25	8	351	22.7	7.3	2	Above	8	1	Below	North Facing	Above	North Facing
25		352	33.6				25	4	Below	North Facing		
25		353	35				33	7	Above	North Facing		
25		354	33.7				33	7	Above	North Facing		
25	9	355	32.8	5.3	1	Above						
25		356	35									
25	10	357	34.9	6	1	Above						
25		358	33.7									
25	11	359	33.7	3.9	2	Above	25	4	Below	North Facing	Above	North Facing
25		360	34.9				33	7	Above	North Facing		
25	12	361	35	5.8	1	Above						
25		362	34.7									
25	13	363	22.6	2.1	2	Above	28	7	Above		Above	
25	14	364	19	3	2	Above						
25	15	365	19	3	2	Above						
25	16	366	22.9	2.1	2	Above	30	8	Above		Above	
25	17	367	34.7	5.9	1	Above						
25		368	35.2									
25	18	369	35.2	3.9	2	Above	56	19	Above		Above	
25		370	33.9				55	19	Above			
25	19	371	34.2	5	1	Above						
25		372	35.2									
25	20	373	35.3	5.3	1	Above						
25		374	33.1									
25	21	375	34.2	5.4	2	Above	47	14	Above		Above	
25		376	35.3				56	19	Above			
25		377	33.8				57	19	Above			
25		378	22.3				37	27	Above			
25	22	379	22.4	5.3	2	Above	41	29	Above		Above	
25		380	33.7				51	16	Above			
25		381	35				46	12	Above			
25		382	34.2				41	11	Above			
25	23	383	32.8	5.2	1	Above						
25		384	35.1									
25	24	385	35	5.9	1	Above						
25		386	34.2									
25	25	387	33.7	3.9	2	Above	50	16	Above		Above	
25		388	35				46	12	Above			
25	26	389	35	5.6	1	Above						
25		390	34.6									

25	27	391	22.7	2.1	2	Above	22	6	Below	North Facing	Below	North Facing
26	0	0	18.9	3.1	1	Above						
26	1	1	19	3.1	1	Above						
26	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
26		3	34.7				27	5	Above	North Facing		
26		4	33.4				17	1	Below	North Facing		
26	3	5	34.2	5.5	1	Above						
26		6	35									
26		7	33.9									
26	4	8	34	5.2	1	Above						
26		9	35									
26	5	10	35.2	4.5	1	Above						
26		11	33									
26	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
26		13	35.2				23	3	Below	North Facing		
26		14	33.7				17	1	Below	North Facing		
26		15	22.9				6	1	Below	North Facing		
26	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
26		17	33.6				25	4	Below	North Facing		
26		18	35				33	7	Above	North Facing		
26		19	33.7				33	7	Above	North Facing		
26	8	20	32.8	5	1	Above						
26		21	35									
26	9	22	34.9	5.9	1	Above						
26		23	33.8									
26	10	24	33.8	5.7	1	Above						
26		25	34.9									
26		26	34.2									
26	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
26		28	34.7				35	8	Above	North Facing		
26		29	22.6				28	7	Above			
26	12	30	19	3.2	1	Above						
26	13	31	19	3.1	1	Above						
26	14	32	22.9	3.1	2	Above	30	8	Above		Above	
26		33	34.7				52	17	Above			
26		34	33.4				55	19	Above			
26	15	35	34.4	5.8	1	Above						
26		36	35.2									
26		37	34									

26	16	38	34.2	5.9	1	Above						
26		39	35.2									
26	17	40	35.3	5.1	1	Above						
26		41	33.1									
26	18	42	34.2	4.5	2	Above	47	14	Above		Above	
26		43	35.3				56	19	Above			
26		44	33.8				57	19	Above			
26		45	22.3				37	27	Above			
26	19	46	22.4	4.5	2	Above	41	29	Above		Above	
26		47	33.7				51	16	Above			
26		48	35				46	12	Above			
26		49	34.2				41	11	Above			
26	20	50	32.8	5.1	1	Above						
26		51	35.1									
26	21	52	35	5.8	1	Above						
26		53	34.2									
26	22	54	33.8	5.9	1	Above						
26		55	35									
26		56	34.3									
26	23	57	33.4	3.2	2	Above	50	16	Above		Above	
26		58	34.6				42	11	Above			
26		59	22.7				22	6	Below	North Facing		
27	0	0	18.9	3.1	1	Above						
27	1	1	19	3.1	1	Above						
27	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
27		3	34.7				27	5	Above	North Facing		
27		4	33.4				17	1	Below	North Facing		
27	3	5	34.2	5.5	1	Above						
27		6	35									
27		7	33.9									
27	4	8	34	5.2	1	Above						
27		9	35									
27	5	10	35.2	4.5	1	Above						
27		11	33									
27	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
27		13	35.2				23	3	Below	North Facing		
27		14	33.7				17	1	Below	North Facing		
27		15	22.9				6	1	Below	North Facing		
27	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
27		17	33.6				25	4	Below	North Facing		

27		18	35				33	7	Above	North Facing		
27		19	33.7				33	7	Above	North Facing		
27	8	20	32.8	5	1	Above						
27		21	35									
27	9	22	34.9	5.9	1	Above						
27		23	33.8									
27	10	24	33.8	5.7	1	Above						
27		25	34.9									
27		26	34.2									
27	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
27		28	34.7				35	8	Above	North Facing		
27		29	22.6				28	7	Above			
27	12	30	19	3.2	1	Above						
27	13	31	19	3.1	1	Above						
27	14	32	22.9	3.1	2	Above	30	8	Above		Above	
27		33	34.7				52	17	Above			
27		34	33.4				55	19	Above			
27	15	35	34.4	5.8	1	Above						
27		36	35.2									
27		37	34									
27	16	38	34.2	5.9	1	Above						
27		39	35.2									
27	17	40	35.3	5.1	1	Above						
27		41	33.1									
27	18	42	34.2	4.5	2	Above	47	14	Above		Above	
27		43	35.3				56	19	Above			
27		44	33.8				57	19	Above			
27		45	22.3				37	27	Above			
27	19	46	22.4	4.5	2	Above	41	29	Above		Above	
27		47	33.7				51	16	Above			
27		48	35				46	12	Above			
27		49	34.2				41	11	Above			
27	20	50	32.8	5.1	1	Above						
27		51	35.1									
27	21	52	35	5.8	1	Above						
27		53	34.2									
27	22	54	33.8	5.9	1	Above						
27		55	35									
27		56	34.3									
27	23	57	33.4	3.2	2	Above	50	16	Above		Above	
27		58	34.6				42	11	Above			

27		59	22.7				22	6	Below	North Facing		
28	0	0	18.9	3.1	1	Above						
28	1	1	19	3.1	1	Above						
28	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
28		3	34.7				27	5	Above	North Facing		
28		4	33.4				17	1	Below	North Facing		
28	3	5	34.2	5.5	1	Above						
28		6	35									
28		7	33.9									
28	4	8	34	5.2	1	Above						
28		9	35									
28	5	10	35.2	4.5	1	Above						
28		11	33									
28	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
28		13	35.2				23	3	Below	North Facing		
28		14	33.7				17	1	Below	North Facing		
28		15	22.9				6	1	Below	North Facing		
28	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
28		17	33.6				25	4	Below	North Facing		
28		18	35				33	7	Above	North Facing		
28		19	33.7				33	7	Above	North Facing		
28	8	20	32.8	5	1	Above						
28		21	35									
28	9	22	34.9	5.9	1	Above						
28		23	33.8									
28	10	24	33.8	5.7	1	Above						
28		25	34.9									
28		26	34.2									
28	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
28		28	34.7				35	8	Above	North Facing		
28		29	22.6				28	7	Above			
28	12	30	19	3.2	1	Above						
28	13	31	19	3.1	1	Above						
28	14	32	22.9	3.1	2	Above	30	8	Above		Above	
28		33	34.7				52	17	Above			
28		34	33.4				55	19	Above			
28	15	35	34.4	5.8	1	Above						
28		36	35.2									
28		37	34									

28	16	38	34.2	5.9	1	Above						
28		39	35.2									
28	17	40	35.3	5.1	1	Above						
28		41	33.1									
28	18	42	34.2	4.5	2	Above	47	14	Above		Above	
28		43	35.3				56	19	Above			
28		44	33.8				57	19	Above			
28		45	22.3				37	27	Above			
28	19	46	22.4	4.5	2	Above	41	29	Above		Above	
28		47	33.7				51	16	Above			
28		48	35.1				46	12	Above			
28		49	34.2				41	11	Above			
28	20	50	32.8	5.1	1	Above						
28		51	35.1									
28	21	52	35	5.8	1	Above						
28		53	34.2									
28	22	54	33.8	5.9	1	Above						
28		55	35									
28		56	34.3									
28	23	57	33.4	3.2	2	Above	50	16	Above		Above	
28		58	34.6				42	11	Above			
28		59	22.7				22	6	Below	North Facing		
29	0	0	18.9	3.1	1	Above						
29	1	1	19	3.1	1	Above						
29	2	2	22.8	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
29		3	34.7				27	5	Above	North Facing		
29		4	33.4				17	1	Below	North Facing		
29	3	5	34.2	5.5	1	Above						
29		6	35									
29		7	33.9									
29	4	8	34	5.2	1	Above						
29		9	35									
29	5	10	35.2	4.5	1	Above						
29		11	33									
29	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
29		13	35.2				23	3	Below	North Facing		
29		14	33.7				17	1	Below	North Facing		
29		15	22.9				6	1	Below	North Facing		
29	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
29		17	33.6				25	4	Below	North Facing		

29		18	35				33	7	Above	North Facing		
29		19	33.7				33	7	Above	North Facing		
29	8	20	32.8	5	1	Above						
29		21	35									
29	9	22	34.9	5.9	1	Above						
29		23	33.8									
29	10	24	33.8	5.7	1	Above						
29		25	34.9									
29		26	34.2									
29	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
29		28	34.7				35	8	Above	North Facing		
29		29	22.6				28	7	Above			
29	12	30	19	3.2	1	Above						
29	13	31	19	3.1	1	Above						
29	14	32	22.9	3.1	2	Above	30	8	Above		Above	
29		33	34.7				52	17	Above			
29		34	33.4				55	19	Above			
29	15	35	34.4	5.8	1	Above						
29		36	35.2									
29		37	34									
29	16	38	34.2	5.9	1	Above						
29		39	35.2									
29	17	40	35.3	5.1	1	Above						
29		41	33.1									
29	18	42	34.2	4.5	2	Above	47	14	Above		Above	
29		43	35.3				56	19	Above			
29		44	33.8				57	19	Above			
29		45	22.3				37	27	Above			
29	19	46	22.4	4.5	2	Above	41	29	Above		Above	
29		47	33.7				51	16	Above			
29		48	35.1				46	12	Above			
29		49	34.2				41	11	Above			
29	20	50	32.8	5.1	1	Above						
29		51	35.1									
29	21	52	35	5.8	1	Above						
29		53	34.2									
29	22	54	33.8	5.9	1	Above						
29		55	35									
29		56	34.3									
29	23	57	33.4	3.2	2	Above	50	16	Above		Above	
29		58	34.6				42	11	Above			

29		59	22.7				22	6	Below	North Facing		
30	0	0	18.9	3.1	1	Above						
30	1	1	19	3.1	1	Above						
30	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
30		3	34.7				27	5	Above	North Facing		
30		4	33.4				17	1	Below	North Facing		
30	3	5	34.2	5.5	1	Above						
30		6	35									
30		7	33.9									
30	4	8	34	5.2	1	Above						
30		9	35									
30	5	10	35.2	4.5	1	Above						
30		11	33									
30	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
30		13	35.2				23	3	Below	North Facing		
30		14	33.7				17	1	Below	North Facing		
30		15	22.9				6	1	Below	North Facing		
30	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
30		17	33.6				25	4	Below	North Facing		
30		18	35				33	7	Above	North Facing		
30		19	33.7				33	7	Above	North Facing		
30	8	20	32.8	5	1	Above						
30		21	35									
30	9	22	34.9	5.9	1	Above						
30		23	33.8									
30	10	24	33.8	5.7	1	Above						
30		25	34.9									
30		26	34.2									
30	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
30		28	34.7				35	8	Above	North Facing		
30		29	22.6				28	7	Above			
30	12	30	19	3.2	1	Above						
30	13	31	19	3.1	1	Above						
30	14	32	22.9	3.1	2	Above	30	8	Above		Above	
30		33	34.7				52	17	Above			
30		34	33.4				55	19	Above			
30	15	35	34.4	5.8	1	Above						
30		36	35.2									
30		37	34									

30	16	38	34.2	5.9	1	Above						
30		39	35.2									
30	17	40	35.3	5.1	1	Above						
30		41	33.1									
30	18	42	34.2	4.5	2	Above	47	14	Above		Above	
30		43	35.3				56	19	Above			
30		44	33.8				57	19	Above			
30		45	22.3				37	27	Above			
30	19	46	22.4	4.5	2	Above	41	29	Above		Above	
30		47	33.7				51	16	Above			
30		48	35.1				46	12	Above			
30		49	34.2				41	11	Above			
30	20	50	32.8	5.1	1	Above						
30		51	35.1									
30	21	52	35	5.8	1	Above						
30		53	34.2									
30	22	54	33.8	5.9	1	Above						
30		55	35									
30		56	34.3									
30	23	57	33.4	3.2	2	Above	50	16	Above		Above	
30		58	34.6				42	11	Above			
30		59	22.7				22	6	Below	North Facing		
31	0	0	18.9	3.1	1	Above						
31	1	1	19	3.1	1	Above						
31	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
31		3	34.7				27	5	Above	North Facing		
31		4	33.4				17	1	Below	North Facing		
31	3	5	34.2	5.5	1	Above						
31		6	35									
31		7	33.9									
31	4	8	34	5.2	1	Above						
31		9	35									
31	5	10	35.2	4.5	1	Above						
31		11	33									
31	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
31		13	35.2				23	3	Below	North Facing		
31		14	33.7				17	1	Below	North Facing		
31		15	22.9				6	1	Below	North Facing		
31	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
31		17	33.6				25	4	Below	North Facing		

31		18	35				33	7	Above	North Facing		
31		19	33.7				33	7	Above	North Facing		
31	8	20	32.8	5	1	Above						
31		21	35									
31	9	22	34.9	5.9	1	Above						
31		23	33.8									
31	10	24	33.8	5.7	1	Above						
31		25	34.9									
31		26	34.2									
31	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
31		28	34.7				35	8	Above	North Facing		
31		29	22.6				28	7	Above			
31	12	30	19	3.2	1	Above						
31	13	31	19	3.1	1	Above						
31	14	32	22.9	3.1	2	Above	30	8	Above		Above	
31		33	34.7				52	17	Above			
31		34	33.4				55	19	Above			
31	15	35	34.4	5.8	1	Above						
31		36	35.2									
31		37	34									
31	16	38	34.2	5.9	1	Above						
31		39	35.2									
31	17	40	35.3	5.1	1	Above						
31		41	33.1									
31	18	42	34.2	4.5	2	Above	47	14	Above		Above	
31		43	35.3				56	19	Above			
31		44	33.8				57	19	Above			
31		45	22.5				37	27	Above			
31	19	46	22.5	4.5	2	Above	41	29	Above		Above	
31		47	33.7				51	16	Above			
31		48	35.1				46	12	Above			
31		49	34.2				41	11	Above			
31	20	50	32.8	5.1	1	Above						
31		51	35.1									
31	21	52	35	5.8	1	Above						
31		53	34.2									
31	22	54	33.8	5.9	1	Above						
31		55	35									
31		56	34.3									
31	23	57	33.4	3.2	2	Above	50	16	Above		Above	
31		58	34.6				42	11	Above			

31		59	22.7				22	6	Below	North Facing		
32	0	0	18.9	3.1	1	Above						
32	1	1	19	3.1	1	Above						
32	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
32		3	34.7				27	5	Above	North Facing		
32		4	33.4				17	1	Below	North Facing		
32	3	5	34.2	5.5	1	Above						
32		6	35									
32		7	33.9									
32	4	8	34	5.2	1	Above						
32		9	35									
32	5	10	35.2	4.5	1	Above						
32		11	33									
32	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
32		13	35.2				23	3	Below	North Facing		
32		14	33.7				17	1	Below	North Facing		
32		15	22.9				6	1	Below	North Facing		
32	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
32		17	33.6				25	4	Below	North Facing		
32		18	35				33	7	Above	North Facing		
32		19	33.7				33	7	Above	North Facing		
32	8	20	32.8	5	1	Above						
32		21	35									
32	9	22	34.9	5.9	1	Above						
32		23	33.8									
32	10	24	33.8	5.7	1	Above						
32		25	34.9									
32		26	34.2									
32	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
32		28	34.7				35	8	Above	North Facing		
32		29	22.6				28	7	Above			
32	12	30	19	3.2	1	Above						
32	13	31	19	3.1	1	Above						
32	14	32	22.9	3.1	2	Above	30	8	Above		Above	
32		33	34.7				52	17	Above			
32		34	33.4				55	19	Above			
32	15	35	34.4	5.8	1	Above						
32		36	35.2									
32		37	34									

32	16	38	34.2	5.9	1	Above						
32		39	35.2									
32	17	40	35.3	5.1	1	Above						
32		41	33.1									
32	18	42	34.2	4.5	2	Above	47	14	Above		Above	
32		43	35.3				56	19	Above			
32		44	33.8				57	19	Above			
32		45	22.5				37	27	Above			
32	19	46	22.5	4.5	2	Above	41	29	Above		Above	
32		47	33.7				51	16	Above			
32		48	35.1				46	12	Above			
32		49	34.2				41	11	Above			
32	20	50	32.8	5.1	1	Above						
32		51	35.1									
32	21	52	35.1	5.9	1	Above						
32		53	34.2									
32	22	54	33.8	5.9	1	Above						
32		55	35									
32		56	34.4									
32	23	57	33.5	3.2	2	Above	50	16	Above		Above	
32		58	34.6				42	11	Above			
32		59	22.7				22	6	Below	North Facing		
33	0	0	18.9	3.1	1	Above						
33	1	1	19	3.1	1	Above						
33	2	2	22.8	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
33		3	34.7				27	5	Above	North Facing		
33		4	33.4				17	1	Below	North Facing		
33	3	5	34.2	5.5	1	Above						
33		6	35									
33		7	33.9									
33	4	8	34	5.2	1	Above						
33		9	35									
33	5	10	35.2	4.5	1	Above						
33		11	33									
33	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
33		13	35.2				23	3	Below	North Facing		
33		14	33.7				17	1	Below	North Facing		
33		15	22.9				6	1	Below	North Facing		
33	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
33		17	33.6				25	4	Below	North Facing		

33		18	35				33	7	Above	North Facing		
33		19	33.7				33	7	Above	North Facing		
33	8	20	32.8	5	1	Above						
33		21	35									
33	9	22	34.9	5.9	1	Above						
33		23	33.8									
33	10	24	33.8	5.7	1	Above						
33		25	34.9									
33		26	34.2									
33	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
33		28	34.7				35	8	Above	North Facing		
33		29	22.6				28	7	Above			
33	12	30	19	3.2	1	Above						
33	13	31	19	3.1	1	Above						
33	14	32	22.9	3.1	2	Above	30	8	Above		Above	
33		33	34.7				52	17	Above			
33		34	33.4				55	19	Above			
33	15	35	34.4	5.8	1	Above						
33		36	35.2									
33		37	34									
33	16	38	34.2	5.9	1	Above						
33		39	35.2									
33	17	40	35.3	5.1	1	Above						
33		41	33.1									
33	18	42	34.2	4.6	2	Above	47	14	Above		Above	
33		43	35.3				56	19	Above			
33		44	33.8				57	19	Above			
33		45	22.6				37	27	Above			
33	19	46	22.6	4.6	2	Above	41	29	Above		Above	
33		47	33.8				51	16	Above			
33		48	35.1				46	12	Above			
33		49	34.2				41	11	Above			
33	20	50	32.8	5.1	1	Above						
33		51	35.1									
33	21	52	35.1	5.9	1	Above						
33		53	34.2									
33	22	54	33.8	5.9	1	Above						
33		55	35									
33		56	34.4									
33	23	57	33.5	3.2	2	Above	50	16	Above		Above	
33		58	34.6				42	11	Above			

33		59	22.7				22	6	Below	North Facing		
34	0	0	18.9	3.1	1	Above						
34	1	1	19	3.1	1	Above						
34	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
34		3	34.7				27	5	Above	North Facing		
34		4	33.4				17	1	Below	North Facing		
34	3	5	34.2	5.5	1	Above						
34		6	35									
34		7	33.9									
34	4	8	34	5.2	1	Above						
34		9	35									
34	5	10	35.2	4.5	1	Above						
34		11	33									
34	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
34		13	35.2				23	3	Below	North Facing		
34		14	33.7				17	1	Below	North Facing		
34		15	22.9				6	1	Below	North Facing		
34	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
34		17	33.6				25	4	Below	North Facing		
34		18	35				33	7	Above	North Facing		
34		19	33.7				33	7	Above	North Facing		
34	8	20	32.8	5	1	Above						
34		21	35									
34	9	22	34.9	5.9	1	Above						
34		23	33.8									
34	10	24	33.8	5.7	1	Above						
34		25	34.9									
34		26	34.2									
34	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
34		28	34.7				35	8	Above	North Facing		
34		29	22.6				28	7	Above			
34	12	30	19	3.2	1	Above						
34	13	31	19	3.1	1	Above						
34	14	32	22.9	3.1	2	Above	30	8	Above		Above	
34		33	34.7				52	17	Above			
34		34	33.4				55	19	Above			
34	15	35	34.4	5.8	1	Above						
34		36	35.2									
34		37	34									

34	16	38	34.2	5.9	1	Above						
34		39	35.2									
34	17	40	35.3	5.1	1	Above						
34		41	33.1									
34	18	42	34.2	4.6	2	Above	47	14	Above		Above	
34		43	35.3				56	19	Above			
34		44	33.8				57	19	Above			
34		45	22.6				37	27	Above			
34	19	46	22.6	4.6	2	Above	41	29	Above		Above	
34		47	33.8				51	16	Above			
34		48	35.1				46	12	Above			
34		49	34.2				41	11	Above			
34	20	50	32.8	5.1	1	Above						
34		51	35.1									
34	21	52	35.1	5.9	1	Above						
34		53	34.2									
34	22	54	33.8	5.9	1	Above						
34		55	35									
34		56	34.4									
34	23	57	33.5	3.2	2	Above	50	16	Above		Above	
34		58	34.6				42	11	Above			
34		59	22.7				22	6	Below	North Facing		
35	0	0	18.9	3.1	1	Above						
35	1	1	19	3.1	1	Above						
35	2	2	22.7	3.2	2	Above	21	4	Below	North Facing	Above	North Facing
35		3	34.7				27	5	Above	North Facing		
35		4	33.4				17	1	Below	North Facing		
35	3	5	34.2	5.5	1	Above						
35		6	35									
35		7	33.9									
35	4	8	34	5.2	1	Above						
35		9	35									
35	5	10	35.2	4.5	1	Above						
35		11	33									
35	6	12	33.9	4.6	2	Above	26	5	Above	North Facing	Above	North Facing
35		13	35.2				23	3	Below	North Facing		
35		14	33.7				17	1	Below	North Facing		
35		15	22.9				6	1	Below	North Facing		
35	7	16	22.7	4.6	2	Above	8	1	Below	North Facing	Above	North Facing
35		17	33.6				25	4	Below	North Facing		

35		18	35				33	7	Above	North Facing		
35		19	33.7				33	7	Above	North Facing		
35	8	20	32.8	5	1	Above						
35		21	35									
35	9	22	34.9	5.9	1	Above						
35		23	33.8									
35	10	24	33.8	5.7	1	Above						
35		25	34.9									
35		26	34.2									
35	11	27	33.3	3.2	2	Above	25	4	Below	North Facing	Above	
35		28	34.7				35	8	Above	North Facing		
35		29	22.6				28	7	Above			
35	12	30	19	3.2	1	Above						
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35		33	34.7				52	17	Above			
35		34	33.4				55	19	Above			
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35		39	35.2									
35	17	40	35.3	5.1	1	Above						
35		41	33.1									
35	18	42	34.2	4.6	2	Above	47	14	Above		Above	
35		43	35.3				56	19	Above			
35		44	33.8				57	19	Above			
35		45	22.6				37	27	Above			
35	19	46	22.6	4.6	2	Above	41	29	Above		Above	
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35		48	35.1				46	12	Above			
35		49	34.2				41	11	Above			
35	20	50	32.8	5.1	1	Above						
35		51	35.1									
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35		53	34.2									
35	22	54	33.8	5.9	1	Above						
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35		56	34.4									
35	23	57	33.4	3.2	2	Above	50	16	Above		Above	
35		58	34.7				42	11	Above			

35		59	22.7				22	6	Below	North Facing		
36	0	0	18.9	3.1	1	Above						
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36		7	33.9									
36	4	8	34	5.2	1	Above						
36		9	35									
36	5	10	35.2	4.5	1	Above						
36		11	33									
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36		33	34.7				52	17	Above			
36		34	33.4				55	19	Above			
36	15	35	34.4	5.8	1	Above						
36		36	35.2									
36		37	34									

36	16	38	34.2	5.9	1	Above						
36		39	35.2									
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36		48	35.1				46	12	Above			
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37		17	14.1				1	0	Below	North Facing		
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37		51	35.5									
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38		2	19				23	8	Below	North Facing		
38	1	3	17.9	4.2	1	Above						

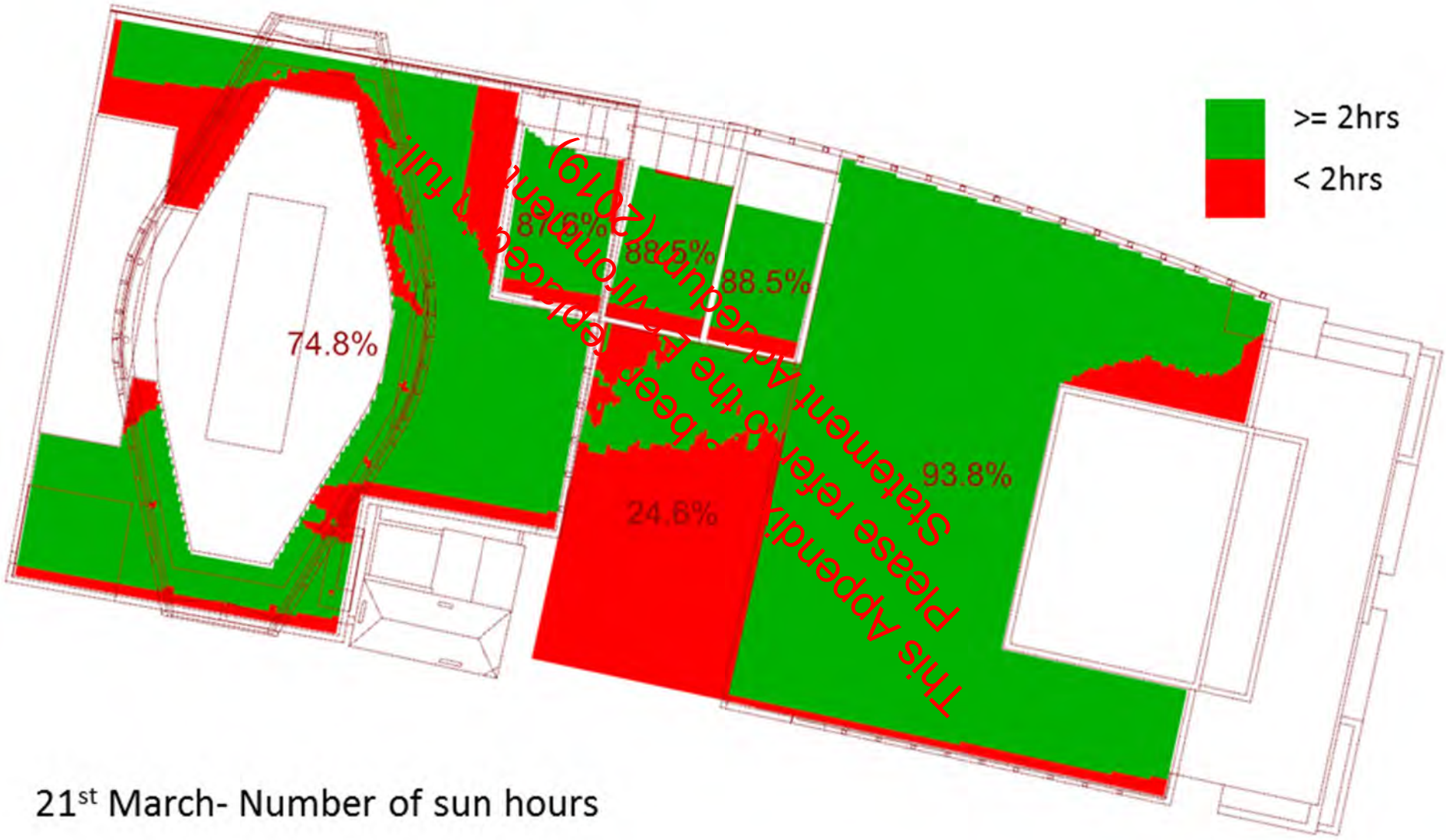
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38		10	34.6									
38	5	11	35.4	5.3	2	Above	27	5	Above	North Facing	Above	North Facing
38		12	37				24	3	Below	North Facing		
38		13	36.7				24	3	Below	North Facing		
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38		18	34.8				25	4	Below	North Facing		
38		19	36.9				33	7	Above	North Facing		
38		20	36.8				33	7	Above	North Facing		
38		21	36.9				33	7	Above	North Facing		
38		22	35.3				33	7	Above	North Facing		
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38		25	35.5				33	7	Above	North Facing		
38	7	26	35	4.7	2	Above	25	4	Below	North Facing	Above	
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38		42	13.2				21	20	Below			
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38		45	36.8				46	12	Above			
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38		47	35.8				41	11	Above			
38	12	48	34.7	5.7	1	Above						
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38		51	35.5									
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39		10	32.9									
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39		13	33.2									

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 11.4

Internal Overshadowing Results



21st March- Number of sun hours

Appendix 11.5

GLOSSARY

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

VSC – Vertical Sky Component - A measure of the percentage of skylight incident at a point on a vertical plane in relation to the unobstructed skylight incident on the horizontal plane.

APSH – Annual Probable Sunlight Hours – The total no. of sunlight hours in a year falling on a window or a vertical surface expressed as a percentage of total no. of unobstructed sunlight hours.

WPSH – Winter Probable Sunlight Hours - The total no. of sunlight hours falling on a window or a vertical surface between 21st September and 21st March expressed as a percentage of total no. of unobstructed sunlight hour.

ADF – Average Daylight Factor – It is the ratio of the average indoor illuminance on a working plane to the outdoor illuminance.

CIE – Commission Internationale De L'Eclairage – It is an authority which has developed a number of standard sky distributions (e.g. overcast, uniform) based on very specific mathematical formula.

θ – Angle of visible sky – It is the angle subtended in the vertical plane normal to the window by sky visible from centre of the window.

This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addedum (2019)

Appendix 11.6

EXTERNAL OVERSHADOWING ANALYSIS

Figure 1 - Jackson's Row Sensitive Receptors for Overshadowing

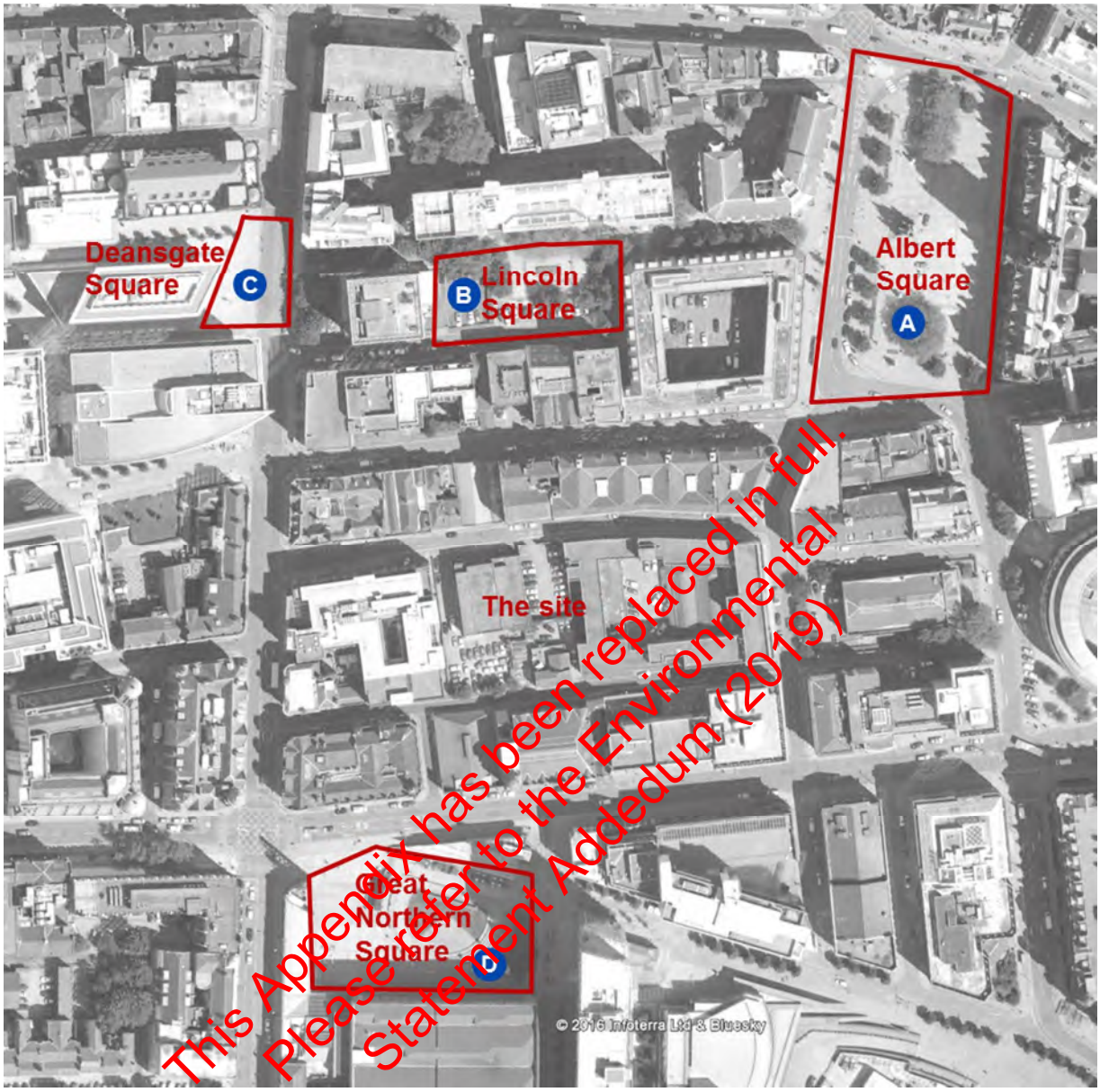


Table A11.6.1 - Detailed results of Overshadowing Analysis for External Spaces

Square Name	Ground Area Receiving >2hr sunlight		Ratio
	Baseline	Proposed	
A - Albert Square	96%	96%	100%
B - Lincoln Square	66%	64%	98%
C - Deansgate Square	98%	95%	98%
D - Great Northern Square	53%	53%	100%

Figure 2 - Baseline Scenario Overshadowing on 21st of March



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addeduum (2019)

Figure 3 - Proposed Scenario Overshadowing on 21st of March



This Appendix has been replaced in full.
Please refer to the Environmental
Statement Addendum (2019)

Appendix 12.1

ARCHAEOLOGICAL DESK BASED ASSESSMENT

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

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APPENDIX 12.1
ST MICHAEL'S, JACKSON'S ROW

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

CONFIDENTIAL

NOVEMBER 2016

WSP | PARSONS BRINCKERHOFF

APPENDIX 12.1

JACKSON'S ROW

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

Jackson's Row Development Ltd

Type of document (Draft v2)
Confidential

Project no: 70010278
Date: November 2016

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QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2
Remarks	Draft For Comment	Final (V2)	
Date	28/10/16	November 2016	
Prepared by	Charly Vallance	Charly Vallance	
Signature		Digitally signed by rob.early@wspgroup.com DN: cn=rob.early@wspgroup.com, email=rob.early@wspgroup.com Reason: I am approving this document Location: Birmingham Date: 2017.01.04 10:54:20 Z rob.early@wspgroup.com	
Checked by	Alison Plummer	Alison Plummer	
Signature		Digitally signed by rob.early@wspgroup.com DN: cn=rob.early@wspgroup.com, email=rob.early@wspgroup.com Reason: I am approving this document Location: Birmingham Date: 2017.01.04 10:54:36 Z rob.early@wspgroup.com	
Authorised by	Alison Plummer	Alison Plummer	
Signature		Digitally signed by rob.early@wspgroup.com DN: cn=rob.early@wspgroup.com, email=rob.early@wspgroup.com Reason: I am approving this document Location: Birmingham Date: 2017.01.04 10:54:50 Z rob.early@wspgroup.com	
Project number	70010278	70010278	
Report number			
File reference			

PROJECT TEAM

WSP | PARSONS BRINCKERHOFF

Heritage Consultant	Charlotte Vallance
Principal Heritage Consultant	Alison Plummer

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Plate 3 : Casson and Berry's map of Manchester, 1820, showing housing and associated yards within the Site between Jacksons Street and Bootle Street

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Plate 5: 1896 ordnance survey 25 inch showing commercial properties, housing and a fire station inside the Site (outlined in red)

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Plate 7: Car park to the east of the Manchester Reform Synagogue

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Figure 1: Site Location
Figure 2: Non-designated Heritage Assets
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Table 1: Summary of British Archaeological Periods and Date Ranges
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APPENDICES

Appendix A Plates and figures

1 EXECUTIVE SUMMARY

1.1.1 WSP | Parsons Brinckerhoff (WSP | PB) was commissioned by Jackson's Row Developments Ltd to undertake an archaeological desk-based assessment (ADBA) of the Proposed Scheme in support of a planning application for redevelopment of the Site. This was duly undertaken in February 2016. None of the 27 heritage assets identified within the Study Area have statutory designation or are of national importance. Six assets were identified within the boundaries of the Proposed Scheme and comprise the sites of late 19th century commercial properties including a packing warehouse and beer store (WSP | PB1), a row of workers' housing, a coal yard and rags store (WSP|PB2), a fire station and two former passages (WSP | PB3), a packing warehouse (WSP | PB4), the site of a late nineteenth century warehouse, a plumbers' and printers' premises (WSP | PB5) and the sites of late 18th / early 19th century workers' housing (WSP | PB6). There is also the potential for other remains associated with early to mid-nineteenth century double-depth and back to back housing, courtyard developments and a cotton dye works to survive.

1.1.2 Archaeological evidence from the surrounding area suggests there is potential for unknown previously unrecorded assets to also be present within the Study Area and possibly dating from the prehistoric and Romano-British periods.

1.1.3 The results of the ADBA suggest that excavation works relating to the Proposed Scheme are likely to disturb any surviving remains associated with the known assets and potential archaeological remains.

1.1.4 Eighteenth and nineteenth century remains of the type likely to be present at the Site are often very robust and survive well. Due to the high potential for archaeological remains to be present, a programme of investigative fieldwork comprising the excavation of four evaluation trenches has been devised in consultation with the GMAAS Heritage Management Director. This fieldwork is intended to determine the extent, depth, function, chronology and relative significance of any archaeological deposits, and if necessary will serve to inform further stages of more detailed archaeological mitigation and appropriate recording of significant remains.

2 PROJECT BACKGROUND

2.1 CIRCUMSTANCES OF THE PROJECT

2.1.1 The detailed planning application is for a mixed use development comprising residential dwellings, a hotel, synagogue, a number of restaurants and bars, retail provision and office space. The Proposed Scheme also proposes public realm areas, amenity space, and elevated gardens, revised access, car parking, landscaping and pedestrian routes through the Proposed Scheme. The Site will be cleared of the existing uses prior to development.

2.1.2 (WSP | PB) was commissioned by Jackson's Row Developments Ltd to undertake an archaeological desk-based assessment of the Site in support of the planning application. The assessment considers the potential for below-ground archaeological remains only, and the built heritage assessment including setting is being undertaken separately.

2.2 LOCATION, TOPOGRAPHY AND GEOLOGY

2.2.1 The Proposed Scheme is located in Manchester City centred on SJ 83657 98026 (**Figure 1**) and covers an area of approximately 0.56 hectares. A former Police Headquarters occupies the eastern half of the Site and this is four storeys in height and features a basement and central courtyard area. The western half of the Site comprises a public house, the Manchester Reform Synagogue and car parking areas. The elevation on-site gently decreases from approximately 39.5m AOD in the northeast corner to approximately 36.0m AOD in the southwest corner.

2.2.2 The Site lies to the immediate south of Jackson's Row, with a five storey building beyond of mixed use including office space, cafes, a gymnasium, and nightclub. To the south lies Bootle Street and the Albert Hall theatre, an office, restaurants, and a public house. The western boundary is formed by 210 Deansgate; an office building with retail units on the ground floor, and Deansgate itself beyond. To the east lies South Mill Street and the Friends Meeting House.

2.2.3 Published geological mapping (BGS 2004) indicates that the eastern half of the Site, beneath the former Police Headquarters, is underlain by Glacial Till and Chester Pebble Beds Formation of the Sherwood Sandstone Group. Mapping indicates that the western half of the Site is underlain by the Chester Pebble Beds Formation. Glacial Fluvial Sheet Deposits (sand and gravel) outcrop immediately to the south of the eastern half of the site.

3 POLICY, APPROACH AND GUIDANCE

3.1 PLANNING BACKGROUND AND LEGISLATIVE FRAMEWORK

NATIONAL PLANNING POLICY FRAMEWORK

3.1.1 National planning policies on the conservation of the historic environment are set out in the NPPF, which was published by the Department of Communities and Local Government (DCLG) in 2012. Sites of archaeological or cultural heritage significance that are valued components of the historic environment and merit consideration in planning decisions are grouped as 'heritage assets'. The NPPF states that "heritage assets are an irreplaceable resource" the conservation of which can bring "wider social, cultural, economic and environmental benefits." (DCLG 2012, Section 12, paragraph 126). It also states that the "significance of any heritage assets affected including any contribution made by their setting... should be understood in order to assess the potential impact (*op cit*, 128). In addition to standing remains, heritage assets of archaeological interest can comprise sub-surface remains and, therefore, assessments should be undertaken for a site with potential below-ground archaeological deposits.

3.1.2 It is normally accepted that non-designated heritage assets will be preserved by record, in accordance with their significance and the magnitude of the harm to or loss of the asset as a result of the proposals to "avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposals." *(op cit*, 129). Non-designated heritage assets of archaeological interest will also be subject to the policies reserved for designated heritage assets if they are of equivalent significance to Scheduled Monuments (*op cit*, 132).

LOCAL PLANNING POLICY

3.1.3 Relevant policy can be found in the Extant Unitary Development Policies (UDP) within the Citywide Development Control Policies, Section 20:

DC20 ARCHAEOLOGY.

3.1.4 The Council will give particular careful consideration to development proposals which affect scheduled ancient monuments and sites of archaeological interest, to ensure their preservation in place. In particular:

- Applications for consent to alter scheduled ancient monuments or sites of archaeological interest or their settings should be accompanied by an evaluation and assessment of the implications of the proposal.
- The Council will have special regard to the desirability of securing the preservation of ancient monuments and other sites of archaeological interest and their setting in place. It will not permit development that, in its opinion, would adversely affect scheduled ancient monuments, or other sites of archaeological interest, and their settings, In exceptional cases where development is inevitable, the Council will look at the scope for combining preservation in place with limited investigation and recording.
- Where the preservation of scheduled ancient monuments and sites of archaeological interest in place is not appropriate, the Council will seek to gain full and proper recording of the site through early consultation between the applicant and approved archaeological organisation.

3.2 APPROACH

CONSULTATION

3.2.1 During February 2014 the Greater Manchester Archaeological Advisory Service (GMAAS) Heritage Management Director was consulted regarding the nature of the archaeological resource both within the limits of the scheme and the immediate vicinity of the Site. A programme of trial trenching was suggested for the car parking areas, although this was prior to any detailed investigation of the Proposed Scheme having taken place. The client is advised to submit this assessment to the Heritage Management Director at GMAAS.

STUDY AREA

3.2.2 Although the focus of the ADBA is the Site, a wider area and archaeological contextual background is presented for the general area of the scheme. A Study Area of approximately 250m extending out from the limits of the Proposed Scheme was applied for the identification of all known and potential below-ground heritage assets types (**Figure 2**).

TERMINOLOGY

3.2.3 The technical terminology applied to the assessment process is based on that contained within the NPPF Planning Practice Guide (DCLG 2014) and the Cultural Heritage Section (Volume 11, Section 3, Part 2) of the Design Manual for Road and Bridges (DMRB) issued by the Highways Agency in 2007. This latter document has been widely adopted throughout the heritage industry as a baseline. However, the terminology has been enhanced as appropriate throughout this report and professional judgement is applied throughout. For the ease of presentation in this document, cultural heritage features are referred to as heritage assets.

LIMITATIONS

3.2.4 The assessment considers below-ground archaeological remains only. The assessment of built heritage including a setting assessment has been undertaken by Stephen Levrant of Heritage Architecture Ltd and presented in a separate document.

3.2.5 The assessment is based on the development proposals as presented at the time of compiling this report. Any comments received on this document from the GMAAS Heritage Management Director should be taken into consideration for future assessment or investigations.

3.3 STANDARDS AND GUIDANCE

3.3.1 In addition to compliance with the NPPF this ADBA has been compiled in accordance with professional standards and guidance. The standards and guidance which relate to this assessment are:

- Chartered Institute for Archaeologists (CIfA) 2014, Standard and Guidance for Historic Environment Desk-based Assessment;
- CIfA, 2014a, Code of Conduct; and
- CIfA, 2014b, Standards and Guidance for Consultancy Advice.

4 ASSESSMENT PROCESS

4.1 ARCHAEOLOGICAL DESK-BASED ASSESSMENT

4.2 This assessment consists of an analysis of existing written, graphic, photographic and electronic information in order to identify heritage assets and their significance within the footprint of the Site and its immediate vicinity. The sensitivity or importance of the archaeological resource is judged in a local, county/regional, national or international context as appropriate. The cultural heritage significance of any assets identified is considered against their heritage interest which is based on the values prescribed in the NPPF.

4.3 The assessment concludes with a consideration of the potential harm to the significance of the archaeological assets. This considers the nature of the predicted impact resulting from the Proposed Scheme, and offers an investigation strategy as necessary (based on design data available to date).

4.4 OUTLINE METHOD STATEMENT

4.4.1 This section presents an overview and order of presentation of the assessment process. Detailed method statements are included as appropriate within each section highlighted below.

4.4.2 Aims and Objectives: The ADBA will aim to gain an understanding of the archaeological resource in order to achieve the objectives stated below:

- Assess the potential for buried archaeological remains to survive within the Site;
- Assess the sensitivity/ importance of any such remains or potential remains;
- Identify the potential harm to the significance of the assets as a predicted impact of the Proposed Scheme, and similarly for positive effects of the scheme.
- Provide strategies for further investigation where the nature, extent or significance of the archaeological resource is not sufficiently well defined;
- Suggest strategies to conserve the significance of the archaeological remains, and;
- Present proposals for archaeological mitigation as appropriate.

4.4.3 *Baseline Condition (Section 5):* This section presents a summary of the historical and archaeological background of the general area. It is presented by historical period, and has been compiled in order to place the Study Area into a wider archaeological context.

4.4.4 *Gazetteer of Heritage Assets (Section 6):* This presents a tabulated list of assets within the 250m Study Area.

4.4.5 *Statement of Importance/Sensitivity (Section 7):* The importance or sensitivity of the heritage assets identified is judged in a neighbourhood, local, county/regional, national and international context. The importance or sensitivity of an asset informs the mitigation strategy required in the event of predicted harm to the significance of the asset.

4.4.6 *Cultural Heritage Significance (Section 8):* A statement of cultural heritage significance is presented for those assets that will be subject to an adverse or harmful impact from the Proposed Scheme (Section 9). The NPPF specified heritage values: historical, aesthetic, architectural and archaeological interests are discussed as appropriate.

4.4.7 *Potential Harm (Section 9):* The level of potential harm to the significance of the heritage assets

as a result of the Proposed Scheme on built heritage or buried archaeological remains will be determined. Similarly, any positive impacts are presented.

4.4.8 *Investigation or Mitigation Strategy (Section 10):* Suitable mitigation measures, where possible, to avoid, reduce, or remedy adverse impacts are presented. Suggestions for further investigation of significance are presented as appropriate.

5 BASELINE

5.1 DATA COLLECTION

5.1.1 The principal source of information consulted was the Greater Manchester Historic Environment Record (HER); this is a database of all known archaeological sites in the municipal area, and it was consulted to establish the known heritage assets within the Site and wider Study Area.

5.1.2 A review of publicly available data including reports on any archaeological work conducted in or near the Study Area was undertaken. Historic maps were studied including but not exclusive to Ordnance Survey. The results of the data collection are presented in the gazetteer Section 6 and on **Figure 2**.

SITE VISIT

5.1.3 The Site was visited in February 2016 in order to assess its character, identify any visible archaeological assets and assess possible factors which may affect the survival or condition of known or potential assets (**Figure 2**). A photographic archive was compiled and a selection of images is presented as **Plates 6** and **7** in the appendix to this report. At the time of visit, the Site comprised standing buildings which include the Police Headquarters, the Sir Ralph Abercromby public house and the Manchester Reform Synagogue. Three car parks and a pub garden are also present.

5.2 HISTORICAL AND ARCHAEOLOGICAL BASELINE

5.2.1 The following section presents a brief summary of the historical and archaeological background of the general area. This is presented by historical period (**Table 1**), and has been compiled in order to place the Study Area into a wider archaeological context.

Table 1: Summary of British Archaeological Periods and Date Ranges

PERIOD	DATE RANGE
Prehistoric Period:	
Palaeolithic	500,000 – 10,000 BC
Mesolithic	10,000 – 3,500 BC
Neolithic	3,500 – 2,200 BC
Bronze Age	2,200 – 700 BC
Iron Age	700 BC – AD 43
Romano-British	AD 43 – AD 410
Early Medieval (Anglo-Saxon and Viking periods)	AD 410 – AD 1066
Late Medieval	AD 1066 – AD 1540
Post-medieval	AD 1540 – *c*1750
Industrial Period	*c*AD1750 – 1901
Modern	Post-1901

PREHISTORIC PERIOD (500,000 – AD 43)

5.2.1 Evidence for prehistoric activity in the Northwest is sparse and based on chance finds, but this evidence does point to settlement and other activity being concentrated on sands and gravels, particularly close to watercourses or wetlands. Prehistoric finds are known from Manchester, particularly in the general area of the Cathedral *c* 0.7km to the north of the Site which lies on an area of sands and gravels at the junction of the Irwell and Irk. A flint flake of possibly Neolithic date was found 200m to the north-west of the Site in the late nineteenth century by local antiquarian Charles Roeder, and indicates evidence for prehistoric activity in the immediate area (UMAU 2001).

ROMANO-BRITISH PERIOD (AD 43 – AD 410)

5.2.2 The Proposed Scheme lies 0.5 km north-east of the Roman Fort of *Mancunium*. Evidence for a civilian settlement or *vicus* (415.2.0) has been found through archaeological excavation and chance finds on this side of the fort. The full extent of the *vicus* is uncertain but it is unlikely that it extended as far as the Proposed Scheme.

5.2.3 The course of the Manchester to Ribchester Roman Road (14.1.0) is known to have extended from the north gate of the fort along an alignment which fell into the present line of Deansgate in the area of St Mary's Street. In the late 18th century the local antiquarian, John Whitaker, reported the road could still be traced as low earth works in the gardens just north of the fort and in 1760 part of the road was discovered on this same alignment adjacent to property at the eastern end of Quay Street, and approximately 100m from the Proposed Scheme (UMAU 2001).

MEDIEVAL AND POST-MEDIEVAL PERIOD (AD410 – *C*. 1750)

5.2.4 Deansgate is attested as a thoroughfare in the Medieval Period and modern research has identified the location of several properties known from documentary sources to have been located here at that date (Morris 1983, 39). A plan of Manchester in 1650 (**Plate 1**) shows the nucleus of the medieval town to the north of the Proposed Scheme, which at this time comprises fields.

5.2.5 A small deer park, Aldport Park, was present at the southern end of Deansgate and was documented in 1282 up until about 1599. Its boundaries are believed to have been the Irwell and Medlock rivers and the approximate line of the later Quay Street and Peter Street on the north. No evidence has been found to suggest the park, which on its 'landward' sides is likely to have been bounded by a bank and ditch, extended as far north as the Proposed Scheme (UMAU 2001).

INDUSTRIAL PERIOD (*C*.1750 – 1901)

5.2.6 Manchester saw extraordinary growth and changes from the late 18th century to the mid-19th century when it became the archetypal City of the industrial age. It is in this period that Manchester's industrial heritage can claim to have international importance (Redhead 2010, 53).

5.2.7 The rapid factory-based industrialisation saw a phenomenal rise in population. Manchester nearly doubled its size between 1801 and 1821 from 75,281 to 126,066 people, and then more than doubled it by 1851, when there were 303,382 people within the new borough (Hartwell 2001, 17). This new population required huge amounts of housing and between 1773 and 1821 the number of dwellings in the city rose from 3446 to 17,257 (Kidd 2002, 38), and by 1851 had reached nearly 50,000 houses (Nevell 2011).

5.2.8 In the late 18th century, workshop dwellings were a common form of housing and which generally had three storeys, a yard and a basement with a top floor having a characteristic long row of window lights to add domestic weaving (Redhead 2010). Such dwellings were characteristic of the proto-industrialisation process which relied heavily on hand-manufacturing processes

particularly in the textile sector (Palmer 2004, 3-7).

5.2.9 Whilst such vernacular workshop dwellings represented on the whole good quality, single-family, artisan housing, by the end of the eighteenth century the rapid industrialisation of Manchester had begun to lead to a decline in housing standards and a sharp rise in population densities. These conditions would culminate in the overcrowded and insanitary living spaces recorded by Engels, Kay, Reach and other social commentators during the 1830s and 1840s. John Aikin (1795, 193) was probably the first to detail these problems, noting in 1795 that 'in some parts of the town, cellars are so damp as to be unfit for Habitations; … I have known several industrious families lost to the community, by a short residence in damp cellars'.

5.2.10 The population rise had a dramatic effect upon housing as dwellings were thrown up in every available space within the working class areas. Back to back dwellings arranged in narrow courts, which provided communal yard spaces and latrines, were especially commonplace in the 1830's and 1840's.These properties encapsulate many of the features of later slum housing; small domestic unit size, poor lighting, restricted access through narrow alleyways and a lack of sanitation. When the poet and historian Robert Southey visited Manchester in 1808 he commented 'The dwelling of the labouring manufacturers are in narrow streets and lanes blocked up from light air....crowded together because every inch of land is of such value, that room for light and air cannot be afforded to them' (Bradshaw 1987, 24).

5.2.11 These and other nineteenth century commentaries can be amplified by the growing body of excavated domestic dwellings in the City centre. An excavation in the west of the Study Area along Hardman Street, exposed foundations of buildings and other structures which date predominately to the 18th century which included the remains of early back to back housing in addition to privies, house yard wall and brick drains. The excavation also recovered the remains of a 18th/19th century hat factory and chemical works (UMAU 2005).

MODERN PERIOD (POST-1901)

5.2.12 At the beginning of the 20th century, Manchester was reaping the benefits of the one of the most ambitious municipal undertakings of the 19th century, the Manchester Ship Canal, which opened in 1894. It cushioned the City from the worst effects of the interwar recession. The cotton industry, which had been in decline since the 1930s had collapsed by the 1950s and the most dramatic period of industrial decline began in the late 1960s. In the centre the emphasis was at first on rebuilding war-damaged and run down areas. The Manchester Reform Synagogue was built on the site of a bomb-damaged building in 1952, using money from the War Damage Commission, after the previous synagogue building was destroyed on 1 June 1941 during the Manchester Blitz (Hartwell 2001).

5.3 ARCHAEOLOGICAL INTERVENTIONS

5.3.1 There are no recorded archaeological interventions within the Study Area.

5.4 DEVELOPMENT OF THE STUDY AREA

5.4.1 A plan of Manchester produced in 1650 (**Plate 1**) depicts the nucleus of the medieval town to the north of the Proposed Scheme which at this time is agricultural in nature. By 1772 and as shown on Tinkers map (**Plate 2**), a street plan had been laid out. No detail of the flanking housing no detail of the individual properties is presented. The streets extend into the Site. It is likely the properties are workshop dwellings which commonly featured attic-floor workshops above tenement housing in the basements, ground and first floors. The central part of the Site appears devoid of development, however due to the map's low level of detail this may be misleading.

5.4.2 Almost fifty years later Casson and Berry's map of Manchester in 1820 (**Plate 3**) presents the housing described above in more detail. Rows of adjacent properties are shown fronting on to

Jackson's Row (denoted as *Street o*n the map*)* and Bootle Street with associated yards to the rear. The central part of the Proposed Scheme is now occupied by garden or allotment plots, each flanked by passageways which lead to a central alleyway.

5.4.3 The Ordnance Survey (OS) map of 1849 (**Plate 4**) presents evidence suggesting that by the mid nineteenth century the street pattern had changed slightly with the addition of two north/south aligned roads - Roger's Row and South Sea. The Study Area is occupied by workers' housing of various standards which include rows of back to backs, double- depth houses and courtyard developments such as Brown's Court and Taylor's Court. A cotton dye works occupies the north-east corner of the Proposed Scheme and a Quaker's burial ground and church lies just outside of it to the west.

5.4.4 Goads Insurance Plan of 1886 (not reproduced) indicates that by late nineteenth century, the majority of worker's housing had been replaced by commercial properties which included livery stables, beer stores, joiners and printers in addition to a public house. In the east of the Study Area, workers' housing has been demolished and Rodger's Row removed to make way for a fire brigade station. The cotton dye works identified on previous mapping has also been replaced with a packing warehouse featuring basements. Surviving dwellings from the mid-nineteenth century include a cluster of three storey back-to-backs and a courtyard development around Browns Square in the south-east corner of the Site. A single line of two storey dwellings also survives immediately north of Sayers Court.

5.4.5 The OS map of 1896 (**Plate 5**) shows little change had taken place in ten years other than the addition of housing immediately south of the public house. The next significant change relates to the mid-twentieth century, as illustrated by the OS map of 1948. With the exception of the public house, all earlier buildings have been demolished and plots left open or replaced with modern structures, the largest of which is the Police Headquarters, constructed in 1934 on the site of the fire station and packing warehouse. The mapping also indicates bomb damage to the north-east corner of the Proposed Scheme. This area is later occupied by the Manchester Reform Synagogue.

5.4.6 On present day OS mapping the Study Area contains now vacant Police Headquarters Building, the Manchester Reform Synagogue, and the early nineteenth century public house (Sir Ralph Abercromby). The remaining spaces are open and include car parks and a pub garden.

6 GAZETTEER OF HERITAGE ASSETS

6.1.1 A total of 27 heritage assets are present within the 250m Study Area. Of these, six non-designated assets were identified from the analysis of historical mapping identified six non-designated heritage assets within the Study Area which are in addition to those listed in the HER. A list is presented in Table 2, below, and the locations of assets are presented on **Figure 2.**

Table 2: Non-designated Heritage Assets within the 250m Study Area

HER NUMBER	NAME / DESCRIPTION	HISTORIC PERIOD
12421.1.0	Bale Street Glass Works (site of)	Industrial
9858.1.0	Windmill (site of) on Windmill Street	Industrial
9886.1.0	Site of Peter's Field (Peterloo Massacre)	Industrial
1715.1.0	Manchester and Salford Junction Canal Tunnel section under Manchester Central	Industrial
129.1.1	Cheshire Lines Railway Goods Shed (site of) (Area of Roman Manchester)	Industrial
415.4.6	Coins (Roman) at New Goods Station (Area of Roman Manchester)	Romano-British
8431.1.0	Princes Chambers	Industrial
16257.1.0	Post-pit at Plot 106 Spinningfields	Early Medieval
11240.1.0	Northcliffe House	Industrial
414.1.0	Flint Flake (Neolithic)	Prehistoric
11264.1.0	New Magistrates' Courthouse site (formerly Cumberland House)	Industrial
15267.1.0	Manchester Poor House/Duke of Cumberland Public House (site of)	Industrial
16079.1.0	Bowers' House (site of)	Industrial
16081.1.0	Hat Manufactory (site of)	Industrial
16080.1.0	Housing on Hardman Street and Tivoli Street (site of)	Industrial
16082.1.0	Soda Water Manufactory (site of)	Industrial
415.2.0	Castlefield Roman *Vicus* (site of) (Area of Roman Manchester)	Romano-British
14.1.0	Manchester to Ribchester Roman Road (Area of Roman Manchester)	Romano-British
16050.1.0	Area of Medieval Manchester	Early-Late Medieval
9911.1.0	Gaiety Theatre (site of)	Industrial
9922.1.0	Reiss Brothers Shipping Warehouse (site of)	Industrial

WSP | PB1	Site of late 19th century commercial properties including a packing warehouse and beer store, previously workers' housing	Industrial
WSP | PB2	A row of workers' housing, a coal yard and rags store (WSP|PB2) survive below-ground, previously workers' housing	Industrial
WSP | PB3	Site of fire brigade station and two passages (South Sea and Rodgers Row), previously workers housing	Industrial
WSP | PB4	Site of a packing warehouse previously cotton dye works and workers' housing.	Industrial
WSP | PB5	Site of a late 19th century warehouse in addition to a plumbers and printers premises, previously workers housing	Industrial
WSP | PB6	Site of late 18th/early 19th century workers' housing	Industrial

7 STATEMENT OF IMPORTANCE/SENSITIVITY

7.1.1 The sensitivity or importance of a heritage asset is judged in a neighbourhood, local, regional, national and international using the criteria presented below, **Table 3**, as a guideline.

Table 3: Criteria Used to Determine Importance/Sensitivity of Heritage Assets

CULTURAL IMPORTANCE/SENSITIVITY	CRITERIA
Statutory Designated Assets	
International (Very High)	World Heritage Sites; Sites of International Importance.
National (High)	Scheduled Monuments; All Grades of Listed Buildings; Registered Parks and Gardens; Conservation Areas; Areas of Archaeological Importance; Protected wreck sites; Registered battlefields; **Non-designated heritage assets** of archaeological interest that are demonstrably of equivalent significance to scheduled monuments
Non-designated Assets	
Regional / County (Medium)	Locally listed buildings; Archaeological sites and remains which contribute to regional research objectives; Historic buildings/structures that contribute to regional character either through architectural interest or a specific function. Assets which contribute to regional or cultural understanding of the area.
Local / Borough (Low)	Archaeological sites and remains with a local or borough interest for education, cultural appreciation; Assets which contribute to local or cultural understanding of the area.
Neighbourhood / Negligible	Relatively numerous types of remains, of some local importance; Isolated findspots with no context; Areas in which investigative techniques have revealed no, or minimal, evidence of archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated.
Uncertain / Potential	Potential archaeological sites for which there is little information. It may not be possible to determine the importance of the site based on current knowledge. Such sites are likely isolated findspots, place names or cropmarks identified on aerial photographs.

7.1.2 **Table 3** is a general guide to the attributes of cultural heritage assets and it should be noted that not all the qualities listed need be present in every case and professional judgement is used in balancing the different criteria. The list is not exhaustive.

Of the assets to be affected by the Proposed Scheme, the following importance or sensitivity is applied, as shown in **Table 4**, below

Table 4: Importance/Sensitivity of Heritage Assets affected by the Proposed Scheme

CULTURAL IMPORTANCE/SENSITIVITY	ASSETS
Statutory Designated Assets	
International (very high)	None
National (high)	None
Non-designated Assets	
Regional / County (medium)	WSP | PB6 WSP | PB2
Local / Borough (Low)	WSP | PB1 WSP | PB4 WSP | PB5 WSP | PB3
Neighbourhood / Negligible	None
Uncertain / Potential	None

8 CULTURAL HERITAGE SIGNIFICANCE

8.1.1 Cultural heritage significance is defined in Annex 2 of the NPPF as 'The value of a heritage asset to this and future generations because of its heritage interest'. The NPPF is clear that 'heritage interest' may be archaeological, architectural, artistic or historic and that significance derives not only from an assets physical presence, but also from its setting. The NPPF definitions for the heritage value are provided in **Table 5**, below.

Table 5: Definition of NPPF Historical Significance

HERITAGE VALUE	NPPF DEFINITION
Archaeological Interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them
Architectural Interest	To be of special architectural interest a building must be of importance in its architectural design, decoration or craftsmanship; special interest may also apply to nationally important examples of particular building types and techniques (e.g. buildings displaying technological innovation or virtuosity) and significant plan forms.
Artistic Interest	Interest in the design and general aesthetics of a place. It can arise from conscious design or fortuitously from the way the place has evolved. More specifically, architectural interest is an interest in the art or science of the design, construction, craftsmanship and decoration of buildings and structures of all types. Artistic interest is an interest in other human creative skill, like sculpture
Historic Interest	To be of special historic interest a building must illustrate important aspects of the nation's social, economic, cultural, or military history and/or have close historical associations with nationally important people. There should normally be some quality of interest in the physical fabric of the building itself to justify the statutory protection afforded by listing.

Source: taken from NPPF Guidance

8.1.2 Through the application of the values it is possible to define what it is that gives significance to a heritage asset and therefore warrants protection. The Proposed Scheme and its immediate environs encompass layers of archaeological and historical development, which may be valued for different reasons by different people, all of which should be taken into account in determining the overall significance.

8.1.3 The statement of significance is applied where it is considered that the Proposed Scheme will cause harm to the significance of the asset, and therefore not all of the assets presented in the gazetteer are included in the statement.

8.1.4 It is considered that the sites of the following assets are likely to be subject to an impact from the Proposed Scheme: a coal yard, rags store and a row of workers' housing (WSP | PB2); the fire station and two former passages (WSP|PB3); the packing warehouse (WSP | PB4), the small late nineteenth century warehouse, a plumbers' and printers' premises (WSP | PB5), and late 18th/early 19th century workers' housing (WSP | PB6).

ARCHAEOLOGICAL INTEREST

8.1.5 The archaeological process (research, fieldwork investigation and reporting) is now the only way of revealing the extent and quality of nineteenth century workers housing in Manchester, and the recent economic boom and consequent building activity, has provided the opportunity to study industrial housing in one of the world's shock cities, where ideas of society, economy, of the way people lived and worked, were turned on their heads, leading the country in to the modern age.

8.1.6 Back to back houses such as those which once occupied the Study Area, no longer exist in Manchester, therefore archaeological investigations of the buried remains are particularly important and can help reveal how this type of housing developed during the nineteenth century The investigation of workers' housing and the cotton factories, warehouses, the narrow alleyways and courts that were packed in between them will lead to a better understanding of land ownership and the impoverished social conditions which emerged at the turn of the century.

ARCHITECTURAL INTEREST

8.1.7 The Study Area was historically occupied by worker's housing which varied in size and plan form. This basic form of vernacular architecture epitomised this period of unplanned and unrestricted growth, typical of many contemporary industrializing cities and reflected changes in urban settlement that were unprecedented in scale and speed of transformation (Nevell, 2011).

ARTISTIC INTEREST

8.1.8 In the nineteenth century the lives of the communities occupying the 'slum' dwellings of the type which once stood on the Site featured in novels of the period Amongst these were authors such as Elizabeth Gaskell,1848 (*Mary Barton: a tale of Manchester life*) and *The Manchester Man*, by Mrs. G. Linnaeus Banks.The latter is considered to be an important social and historical novel, charting the rise of Jabez Clegg, the eponymous "Manchester Man", from the time of the Napoleonic Wars to the first Reform Act and mirrors the growth and prosperity of the City.

HISTORIC VALUE

8.1.9 The emergence of the workers' housing, commercial properties and industrial works within the Proposed Scheme is intrinsically linked to phenomenal population growth when Manchester became the archetypal city of the industrial age. Described as the original "shock city" of the industrial revolution, Manchester owes its size, shape and status to its manufacturing and trading history, making it one of the most intense sites for industrial archaeology and exploration in the world (Nevell 2011).

Many nationally important social commentators who were alarmed at the unchecked growth of towns like Manchester include historian Thomas Carlyle and novelists, Benjamin Disraeli, Elizabeth Gaskell and Charles Dickens. Dickens's famous creation, Coketown in Hard Times, was a mill-town set in the north of England and inspired by a visit to the north of England. The most enduring legacy came from Friedrich Engels, who in his 1844 publication, *The Condition of the Working Class in England**,*** describes the historic heart of Manchester as a place of 'filth, ruin, and uninhabitableness', it was, quite simply, 'Hell upon Earth'.

9 POTENTIAL HARM / IMPACT

9.1 HARM TO SIGNIFICANCE

9.1.1 The CIfA 'Standard and Guidance for Historic Environment Desk-based Assessment' (2014) considers that an assessment of the cultural heritage significance of heritage assets (**Section 8**) should identify the potential impact of proposed or predicted changes on the significance of the asset and the opportunities for reducing that impact. Paragraph 129 of NPPF states that this evidence should be taken into account when considering the impact of a proposal.

9.1.2 Key impacts are defined as those that would potentially harm the cultural heritage significance of the heritage asset and so consideration is afforded to the heritage values of the assets (See Section 8).

9.1.3 The level of harm to cultural heritage significance is the basis of assessing the significance of impact. The level of harm is often difficult to define. However, substantial harm is taken to be 'total loss of significance of a heritage asset' (NPPF 2012, paragraph 133) which implies loss of the asset, loss of its heritage values and its setting. Furthermore, NPPF Planning Policy Guidance (revised 2014) states that 'even minor works have the potential to cause substantial harm. It goes on to state 'It is the degree of harm to the asset's significance that is to be assessed rather the scale of the development'. Consequently, this provides a baseline for varying levels of harm with less than substantial being harm, slight harm, or negligible, as defined in **Table 6**.

Table 6: Criteria used to Determine Level of Harm showing equivalent Magnitude of Effect

LEVEL OF HARM (MAGNITUDE)	DESCRIPTION
Substantial harm (Major adverse)	
Complete destruction of the asset or its setting (i.e. total loss of significance); change to the asset or its setting resulting in loss to significance which fundamentally changes our ability to understand and appreciate the resource. Minor works which adversely impact on heritage values which are intrinsic to the significance of the asset/setting have the potential to cause substantial harm.	
Less than substantial harm (Moderate adverse to negligible):	
Harm (Moderate adverse)	Change to the asset or setting (some loss of significance) resulting in an appreciable change in ability to understand and appreciate the resource. Some heritage interest remains unaffected.
Slight harm (Minor adverse)	Change to the asset or setting (some loss of significance) resulting in a slight change in ability to understand and appreciate the resource. Overall, the heritage interests remain unaffected.
Negligible	Negligible change or no material changes to the asset or setting. No real change in our ability to understand and appreciate the resource. The heritage interests remain unaffected.

*Derived from DMRB guidance *as outlined by NPPF paragraphs 133 and 134*

9.2 ASSESSMENT OF HARM

9.2.1 This section looks in detail at the impact of the proposed construction works, including excavation

for foundations and services, upon the archaeological remains and the predicted level of harm to the significance of the archaeological assets.

9.2.2 The extent of any previous disturbance to buried archaeological remains is an important factor in assessing the potential impact of the Proposed Scheme. Using the information collected during the map regression analysis it has been possible to define disturbed areas within the Site, and also suggest areas of less disturbance (**Figure 3**).

9.2.3 The Proposed Scheme has the potential to impact upon buried archaeological remains dating to the Industrial Period and comprising a row of workers' housing, a coal yard and rags store (WSP | PB2), a fire station and two former passages (WSP | PB3), a packing warehouse (WSP | PB4), a late nineteenth century warehouse in addition to a plumbers' and printers' premises (WSP | PB5) and late 18th/early 19th century workers' housing (WSP | PB6).

9.2.4 The proposed intrusive works will include excavations up to 13.5m below ground level (bgl) across the Site. Construction related excavation associated with geotechnical trial pitting, boreholes, foundations, landscaping, services, and ground levelling for instance, has the potential to cause substantial harm to the known and hitherto unrecorded assets.

9.2.5 A Geo-environmental risk assessment (WSP | PB) 2015) has concluded that due to the presence of shallow bedrock the most appropriate foundation type for the development will be a raft foundation. This will comprise a concrete slab extending under each building in order to support a number of columns and walls. The excavation for the raft foundation will necessitate considerable earth-moving activities and has the potential to truncate any surviving archaeological remains. The excavation of service trenches across the scheme will also truncate any features present. These activities will cause harm and possibly substantial harm to the archaeological resource.

9.3 ARCHAEOLOGICAL POTENTIAL

9.3.1 Historic development within the footprint of the Police Headquarters will almost certainly have caused some level of disturbance to the buried archaeological remains, and most significantly to the sites of the fire station, two former passages (WSP | PB3), and a packing warehouse (WSP | PB4). The extensive basement levels of the Manchester Reform Synagogue suggest that archaeological features or deposits are also unlikely to survive in this location (**Figure 3**).

9.3.2 However, there is the potential for the buried remains of the archaeological assets to survive *in-situ* within the open courtyard of the Headquarters (**Figure 3**). It is not anticipated that this area will have undergone the same level of ground disturbance as would have taken place beneath the buildings. The robust nature of archaeological remains of this type and period i.e. brick walls, stone flagstones, cobbled surfaces, lined drains and similar would certainly support this.

9.3.3 In the car park to the south of the Manchester Reform Synagogue, there is high potential that remains associated with a plumbers' and printers' premises (WSP | PB5) and late 18th/early 19th century workers' housing (WSP | PB6) to survive below ground. There is also potential for the remains of late eighteenth and early nineteenth century workers' housing which predated the commercial premises to be present.

9.3.4 In the car park to the east of the Manchester Reform Synagogue, the remains of a coal yard, rags store and a row of workers' housing (WSP | PB2) may survive below ground. There is also likelihood that for earlier remains associated with early to mid-nineteenth century double depth and back to back housing and courtyard developments may also be present.

9.3.5 The part of the Study Area which is currently occupied by the twentieth century kitchen extension to the Sir Ralph Abercromby public house was occupied by workers' housing which appears on mapping in the mid-nineteenth century. There is medium potential that remains associated with this housing survive below the modern structure; however the extent to which its foundations have

truncated the remains is unknown. Cartographic evidence suggests the public house itself was constructed on previously developed land, which has potential to yield evidence for Romano-British occupation, although the concentration of evidence from this period is concentrated outside and to the southwest of the Study Area. The ephemeral nature of remains dating to the Prehistoric period suggests that the survival of any such remains is very unlikely.

10 FURTHER INVESTIGATION / MITIGATION

10.1 RECOMMENDATIONS

10.1.1 Heritage assets of less significance that those of national importance may undergo preservation by record (intrusive), where Regional / County or Local / Borough significance can be demonstrated. Furthermore, the NPPF (2012) in paragraph 128 states the requirement for the evaluation of assets where their significance is not fully understood. The full character, extent, survival and significance of below-ground remains within the Proposed Scheme are at present unknown and warrant intrusive investigation, and particularly within the area of high archaeological potential (**Figure 3**). Trial trenching is appropriate for this area, although some health and safety access restrictions will apply and particularly within the courtyard of the Police Headquarters if extant during these site investigations. The trenches will be located to target the archaeological resource as shown the historic mapping.

10.1.2 Should proposals go ahead for the demolition of the Sir Ralph Abercromby public house, the groundworks associated with the clearance of the building should be monitored by an archaeologist (archaeological watching brief), as the remains of nineteenth century housing, associated courtyards and to a lesser extent Romano-British features have the potential to survive in this location.

10.1.3 A programme of investigative fieldwork comprising the excavation of four evaluation trenches has been devised in consultation with the GMAAS Heritage Management Director. This fieldwork is intended to determine the extent, depth, function, chronology and relative significance of any archaeological deposits, and if necessary will serve to inform further stages of more detailed archaeological mitigation and appropriate recording of significant remains.

MANCHESTER RESEARCH FRAMEWORK

10.1.4 Historic England state that "...future strategies must underpin the need for investigation of threatened and unthreatened sites by defining priorities based upon a rigorous, consistent and comprehensive assessment of the archaeological resource' (Frameworks for our Past 1996). With this in mind, the primary goals of the archaeological research strategy devised in November 2003 by UMAU must be considered when assessing the significance of assets within the Study Area. In summary these include an advanced understanding of Manchester's archaeology particularly in those periods which are the most important regionally and nationally, namely the Post-medieval and Industrial periods, since Manchester transformed the world through combining industrialisation and urbanisation (UMAU 2003, 60). A second agenda is to establish the most important surviving archaeological and historic environment resources within the city and thus improve their protection (*ibid*).

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Appendix A

PLATES AND FIGURES

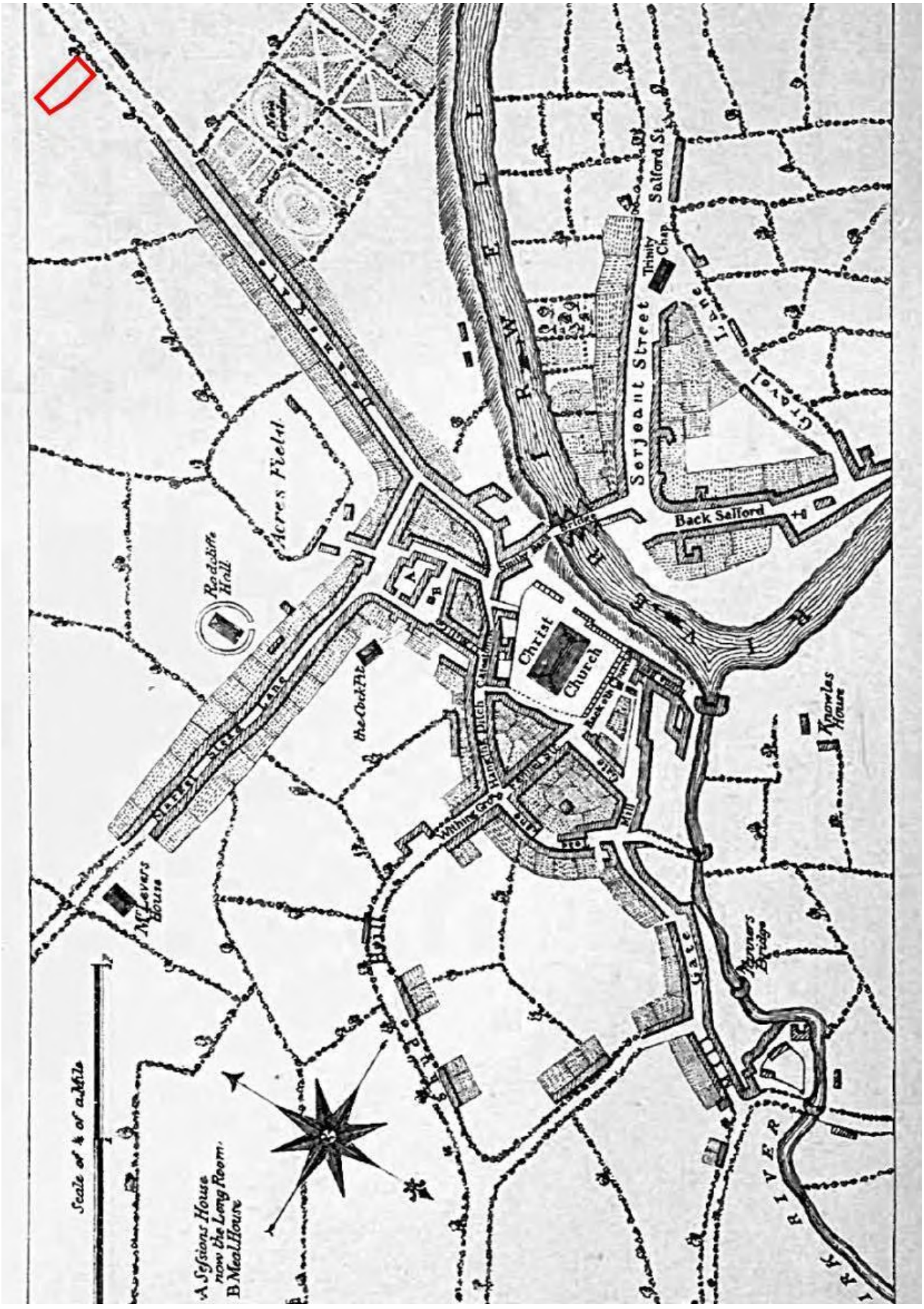


Plate 1: Plan of Manchester in 1650 with approximate location of the Site in the top right corner



Plate 2: Tinkers Map of Manchester and Salford, 1772 showing the Site between Jacksons Row and Bootle Street

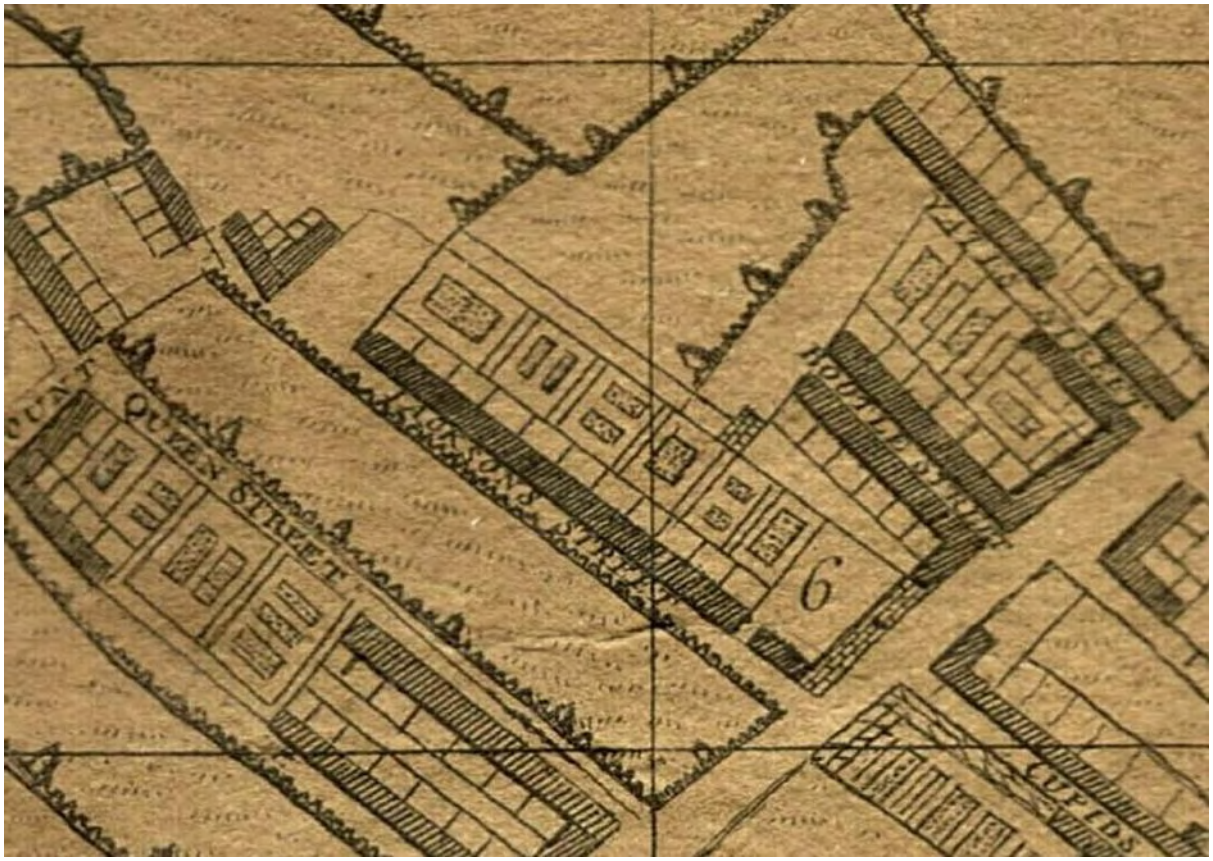


Plate 3: Casson and Berry's map of Manchester, 1820, showing housing and associated yards within the Site between Jacksons Street and Bootle Street

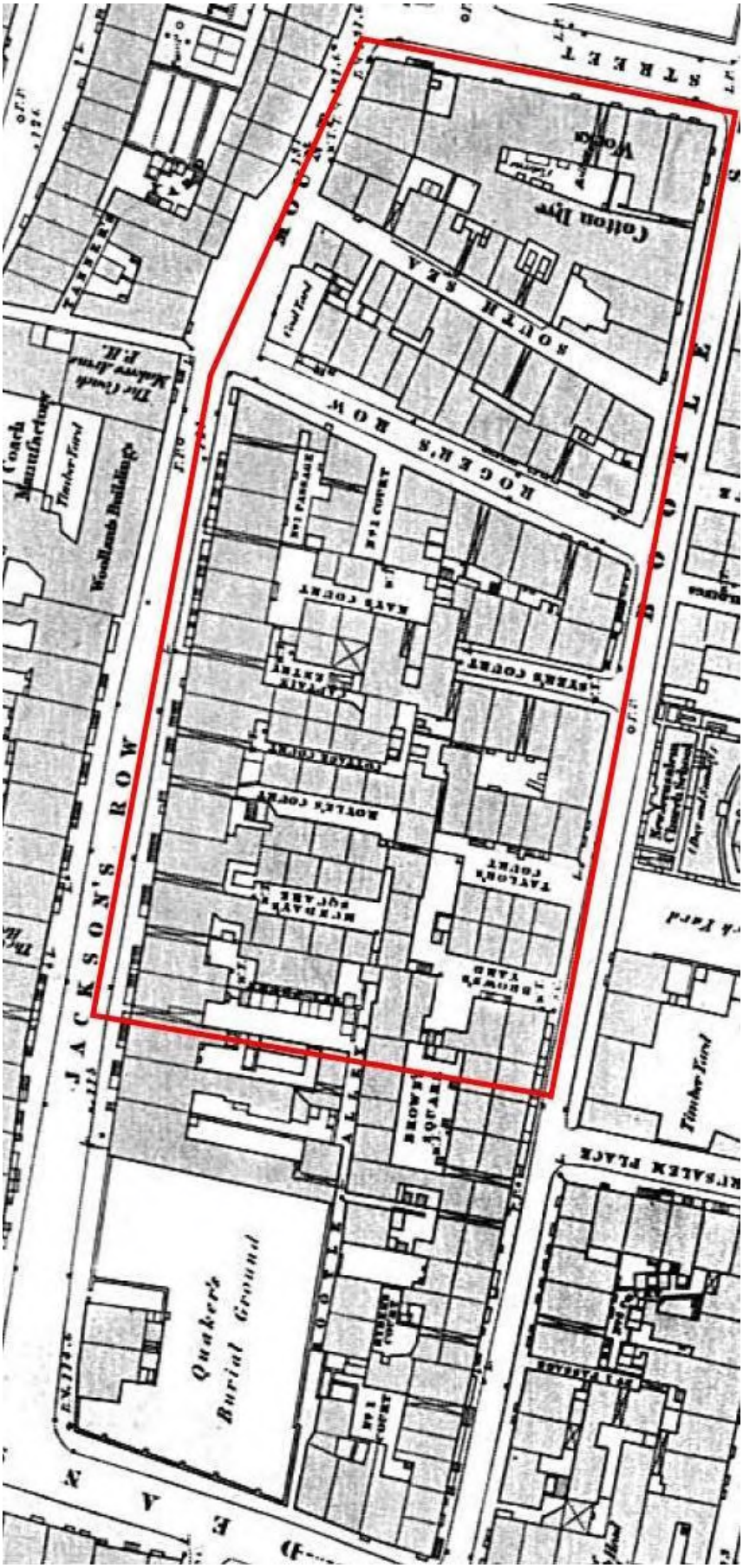


Plate 4: 1844-49 OS 6 inch to 1mile showing workers housing and cotton dye works inside the Site (outlined in red)

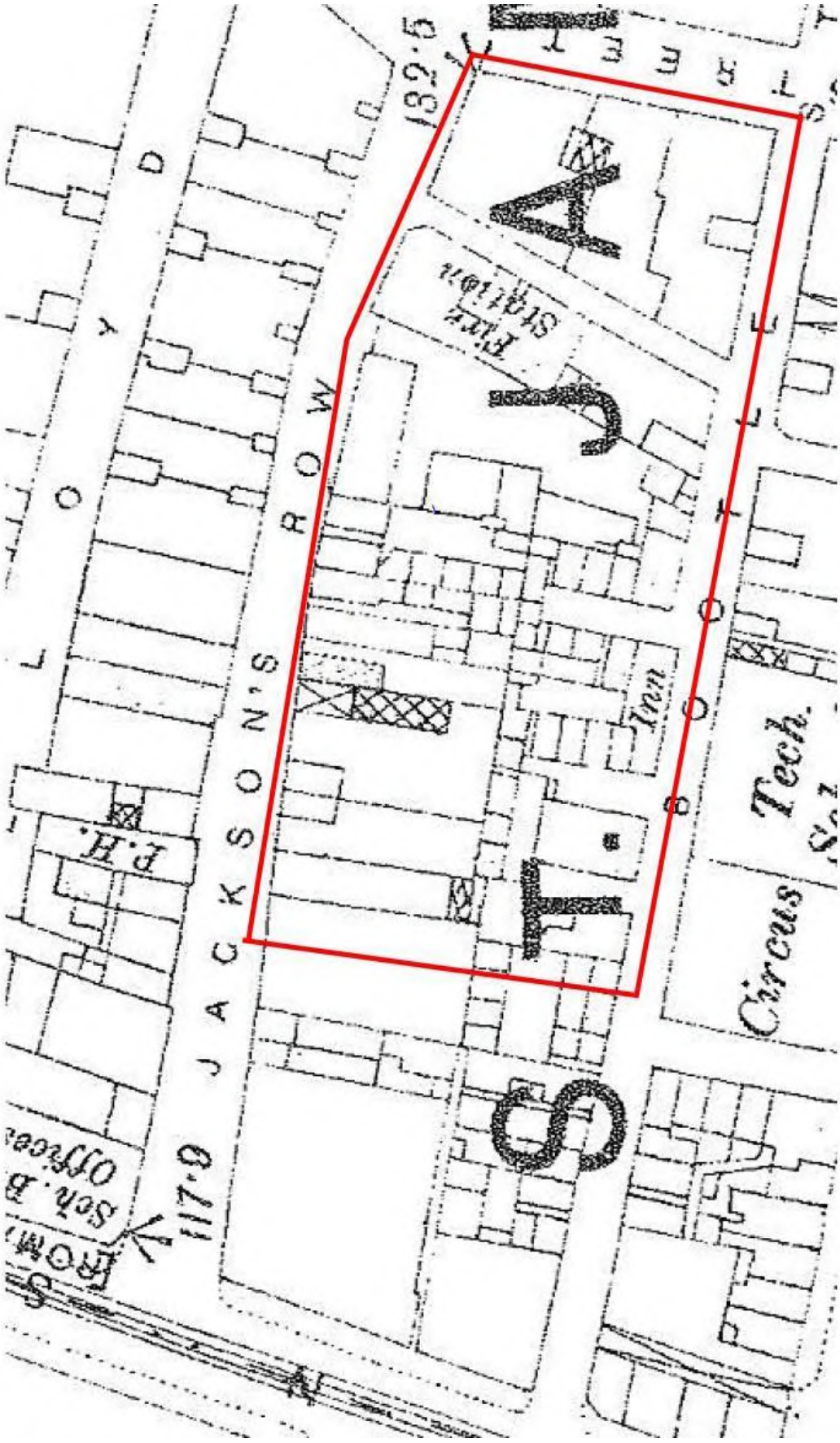


Plate 5: 1896 Ordnance Survey 25 inch showing commercial properties, housing and a fire station inside the Site (outlined in red)



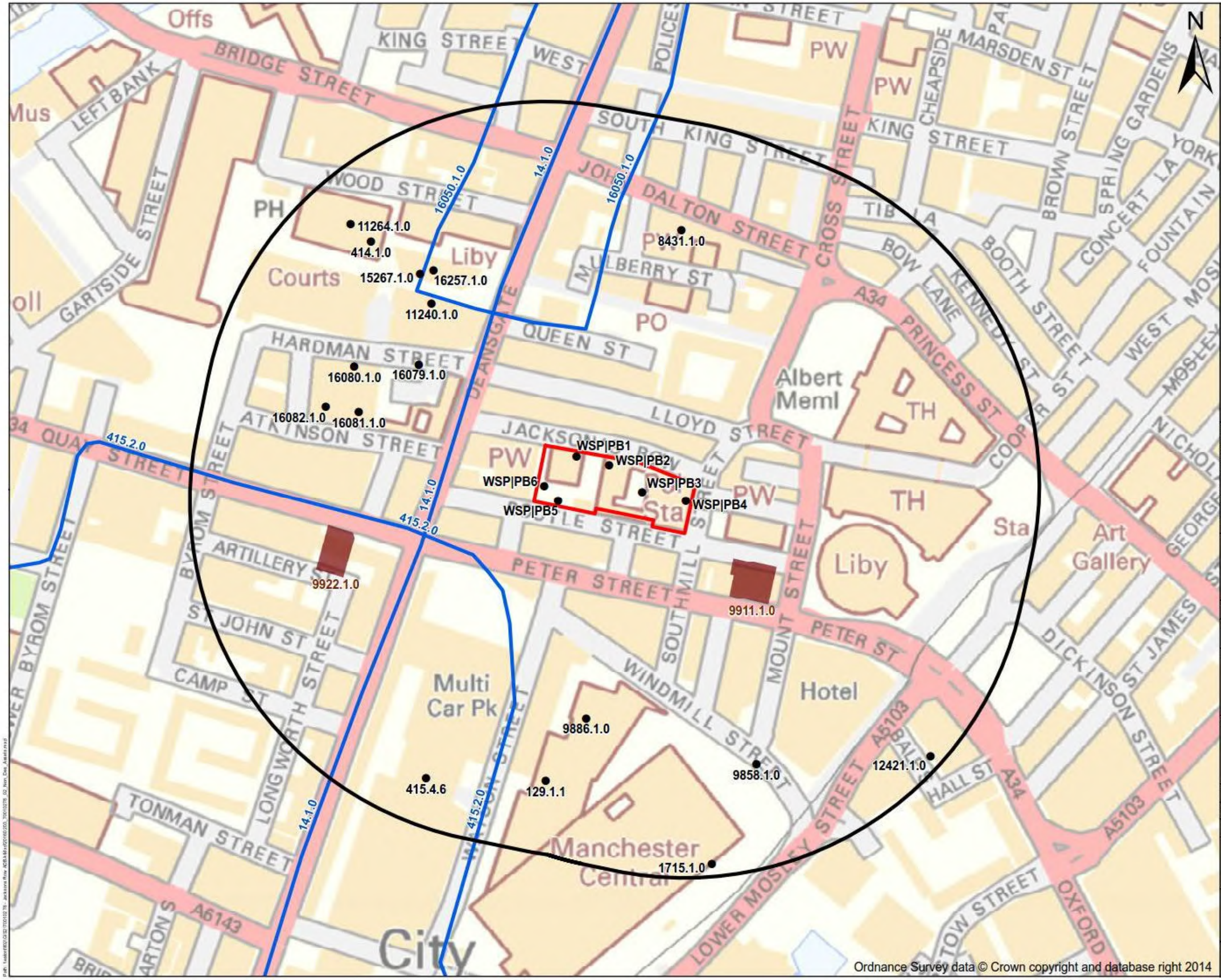
Plate 6: Car park to the rear of the Sir Ralph Abercromby Public House



Plate 7: Car park to the east of the Manchester Reform Synagogue



Figure 1: Site Location



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Notes

- Proposed Development Area
- 250m Study Area

Non-designated Heritage Asset

- Heritage Asset
- Linear Heritage Asset
- Site of Building

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Revision Details	By	Check	Date	Suffix

Drawing Status: FINAL

Job Title: Jackson Row ADBA

Drawing Title: Figure 2: Non-designated Heritage Assets

Scale at A3			
1:2,500			
Drawn: AD			
Stage 1 check: CD	Stage 2 check: CV	Originated: CV	Date: 09/02/2016

0 100 Meters

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Drawing Number: 70010278_02 Rev: -



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Notes

Proposed Development Area

Archaeological Potential

- High Potential
- Medium Potential
- Low Potential

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Revision Details	By / Check	Date	Suffix

Drawing Status: FINAL

Job Title: Jackson Row ADBA

Drawing Title: Figure 3: Areas of archaeological potential within the proposed development area

Scale at A4: NOT TO SCALE

Drawn: AD

Stage 1 check	Stage 2 check	Originated	Date
CV	-	CV	11/02/2016

NOT TO SCALE

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Drawing Number: 70010278_03

Rev: -

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Appendix 12.2

ARCHAEOLOGICAL EVALUATION WRITTEN SCHEME OF INVESTIGATION

NOTE

Jackson's Row Developments Ltd (hereinafter referred to as ‘the Applicant’) is seeking to construct a major development proposal known as St Michael’s, Jackson’s Row, Manchester, UK

The planning application for the development was originally registered in January 2017. Following feedback, the decision was taken to revise the scheme. Revised plans and documents were submitted in November 2017 and the development was granted planning permission in June 2018.

Through the detailed design process, a number of relatively minor improvements to the original scheme have been identified; these will also provide technical and functional improvements through the next stage design process. The Applicant wishes to progress these proposed changes, which are considered to require amendments to the original scheme, through a Section 73 application.

An Environmental Statement, produced in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011, was submitted in support of the Approved Development in 2017. The 2017 Environmental Statement comprised three volumes, as follows:

Volume 1: Main Text and Figures;
Volume 2: Technical Appendices;
Volume 3: Non-Technical Summary

With reference to Volumes 1 and 2 of the 2017 Environmental Statement, it has been decided that rather than updating and re-submitting the entire Volumes in support the Section 73 application, an ‘Addendum’ to the 2017 Environmental Statement should be submitted. This is because the Proposed Amendments to the scheme are minor in nature and the potential to affect the environmental assessment is limited.

This Environmental Statement Volume 2 (2017) appendix formed part of the application package for the June 2018 approved scheme and remains valid.

Salford Archaeology

Centre for Applied Archaeology

University of Salford

JACKSON'S ROW, MANCHESTER,

ARCHAEOLOGICAL EVALUATION

WRITTEN SCHEME OF INVESTIGATION

Version: 1.0

Client: WSP Parsons Brinckerhoff

Project	Document Title	Document Type	Author	Date	Version
Jackson's Row, Manchester	Jackson's Row, Manchester: Archaeological Evaluation	WSI	Graham Mottershead	21/09/2016	1.0

Site Location: Land between Jackson's Row and Bootle Street, Manchester

NGR: SJ 83657 98026

Prepared for: WSP Parsons Brinckerhoff

Doc Title: Jackson's Row, Manchester: Archaeological Evaluation

Doc Type: Written Scheme of Investigation

Version: Version 1.0

Author: Graham Mottershead
Position: Project Officer
Date: September 2016

Copyright: Copyright for this document remains with the Centre for Applied Archaeology, University of Salford.

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Project	Document Title	Document Type	Author	Date	Version
Jackson's Row, Manchester	Jackson's Row, Manchester: Archaeological Evaluation	WSI	Graham Mottershead	21/09/2016	1.0

1. Introduction

1.1 Circumstances of the Project

Salford Archaeology was requested by WSP Parsons Brinckerhoff, on behalf of JRDL, to produce a Written Scheme of Investigation for an initial phase of archaeological evaluation at the proposed development of land at Jackson's Row, Manchester. The development will include significant intrusive groundworks which will affect any below ground archaeological remains surviving on the site.

A desk based assessment carried out by WPS Parsons Brinckerhoff in February 2016 demonstrated that there was a high potential for the survival of industrial period remains below the open car parks to the east and south of the reform Synagogue and within the open courtyard in the Police Headquarters. The area of the Sir Ralph Abercromby public house is also considered to be of medium potential and would be subject an archaeological watching brief.

This document comprises a Written Scheme of Investigation (WSI) for the phase 1 programme of archaeological evaluation that is required to inform the planning processes for the proposed development and covers the evaluation trenching to be carried out within the car parks to the east and south of reform Synagogue. The phase 2 evaluation within the Police Headquarters and the watching brief at the Sir Ralph Abercromby public house will be subject to separate WSIs. It is proposed that the evaluation comprises the excavation of four trenches, which will be intended to establish the presence or absence of any buried archaeological remains, and thereby enable a strategy to be formulated that will mitigate the ultimate loss of any such remains. The document has been prepared by Salford Archaeology on behalf of WSP Parsons Brinckerhoff.

1.2 Purpose of the Document

An archaeological Written Scheme of Investigation (WSI) is a comprehensive document detailing the requirements and methodological approaches of a programme of archaeological works. It is defined by Historic England as:

"Where development will lead to the loss of a material part of the significance of a heritage asset, policy HE12.3 [of PPS5, now paragraph 141 of the NPPF] requires local planning authorities to ensure that developers take advantage of the opportunity to advance our understanding of the past before the asset or the relevant part is irretrievably lost. As this is the only opportunity to do this it is important that:

1: Any investigation, including recording and sampling, is carried out to professional standards and to an appropriate level of detail proportionate to the assets likely significance, by an organisation or individual with appropriate expertise;

2. The resultant records, artefacts and samples are analysed and where necessary conserved;

3: The understanding gained is made publically available;

4: An archive is created, and deposited for future research.

The steps to be taken by the developer to achieve these aims can be controlled through a Written Scheme of Investigation (WSI), usually drafted by the applicant. The local planning authority can advise as to what the scheme should cover.

The WSI is intended to provide methodological approaches to the programme of archaeological works. In the event of significant archaeological remains being discovered in the evaluation trenches, further archaeological investigation is likely to be required in advance of or during development works; this may take the form of an open-area excavation, or a targeted watching brief during the earth-moving works necessitated by the construction programme. Any such additional works will be carried out in accordance with an Updated WSI, which will be formulated in consultation with the Local Authority, and will also allow for an appropriate level of dissemination of the results.

2. Aims and Objectives

2.1 Aims

The main aims of the investigation, given the commercial nature of the project, will be to establish the presence or absence of any buried remains within the proposed development area and, if present, characterise the level of preservation and significance, and provide a good understanding of their potential. This will enable a decision to be reached as to whether any further archaeological investigation is merited in advance of development.

2.2 Objectives

The principal objectives of the evaluation trenching are:

- to determine the presence, character, and extent of any industrial period remains;
- to compile an archival record of any archaeological remains within the development area;
- to produce a technical report on the phase 1 evaluation work findings;
- to inform a decision as to whether further archaeological investigation will be required in advance of development ground works.

3. Method Statement

3.1 The Evaluation Trenches

The development site will be investigated initially via the excavation of four evaluation trenches, one measuring 20m x 1.6m, one measuring 15m x 1.6m and two measuring 10m x 1.6m (Figs 1 - 3). In the event of significant archaeological remains being discovered in the trenches, it is likely that further archaeological investigation will be required. Any such additional works will be carried out in accordance with an Updated Written Scheme of Investigation.

3.2 Methodology

Excavation of the modern ground surface will be undertaken by a machine of appropriate power using a toothed bucket and, where necessary, a breaker. The uppermost levels of overburden/demolition material will then be removed using the same machine, but fitted with a toothless ditching bucket, to the top of the first significant archaeological level. Machine excavation will then be used to define carefully the extent of any surviving foundations, floors, and other remains. All machine work will be supervised closely by a suitably experienced archaeologist. Thereafter, structural remains will be cleaned manually to define their extent, nature, form and, where possible, date. If the excavation is to proceed below a depth of 1.2m, then the trenches will be widened to allow the sides to be stepped in.

All information identified in the course of the site works will be recorded stratigraphically. Results of the evaluation will be recorded on *pro-forma* context sheets, and will be accompanied with sufficient pictorial record (plans, sections and high-resolution digital photographs) to identify and illustrate individual features. Primary records will be available for inspection at all times.

Context Recording: all contexts will be recorded using *pro-forma* sheets, and details will be incorporated into a Harris matrix. All written recording of survey data, contexts, photographs, artefacts and ecofacts will be cross-referenced from record sheets using sequential numbering.

Photography: a full and detailed photographic record of individual contexts will be maintained and similarly general views from standard view points of the overall site at all stages of the excavation will be generated. Photography will be undertaken using high-resolution digital cameras. All frames will include a visible, graduated metric scale. Photographs records will be maintained on special photographic *pro-forma* sheets.

Planning: the precise location of all archaeological structures encountered will be surveyed by EDM tacheometry using a total station linked to a pen computer data logger. This process will generate scaled plans within AutoCAD, which will then be subject to manual survey enhancement. The drawings will be generated at an accuracy appropriate for 1:20 scale, but can be output at any scale required. Sections will be manually drafted as appropriate at a scale of 1:10. All information will be tied in to Ordnance Datum.

Human remains: human remains are not expected to be present, but if they are found they will, if possible, be left *in-situ* covered and protected. The removal of human remains will only take place in compliance with environmental health regulations and following discussions with, and with the approval of, the Ministry of Justice. If human remains are identified, the Ministry of Justice will be informed immediately. An osteoarchaeologist will be available to give advice on site.

Where a licence is issued, all human skeletal remains must be properly removed in accordance with the terms of that licence. Where a licence is not issued, the treatment of human remains will be in accordance with the requirements of Civil Law, CIfA Technical Paper 13 (1993) and Historic England guidance (2005).

Finds policy: finds recovery and sampling programmes will be in accordance with best practice (following current Chartered Institute for Archaeologists' guidelines) and subject to expert advice in order to minimise deterioration. Finds storage during fieldwork and any site archive preparation will follow professional guidelines (UKIC).

Any gold and silver artefacts recovered during the course of the excavation will be removed to a safe place and reported to the local Coroner according to the procedures relating to the Treasure Act, 1996.

3.3 Health and Safety

Full regard will be given to all constraints during the course of the project. The University of Salford provides a Health and Safety Statement for all projects and maintains a Safety Policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers.

- The Health and Safety at Work Act (1974);
- Management of Health and Safety at Work Regulations (1999);
- Manual Handling Operations Regulations 1992 (as amended in 2002);
- The Construction (Design and Management) Regulations (2007);
- The Control of Asbestos Regulations (2006);
- The Workplace (Health, Safety and Welfare) Regulations (1992);
- Construction (Health, Safety and Welfare) Regulations (1996);
- The Health and Safety (Miscellaneous Amendments) Regulations (2002);
- The Work at Height Regulations (2005);

- The Control of Substances Hazardous to Health Regulations (2002);
- The Health and Safety (First-Aid) Regulations (1981);
- The Regulatory Reform (Fire Safety) Order (2005);
- The Provision and Use of Work Equipment Regulations (1998);
- Lifting Operations and Lifting Equipment Regulations (1998).

Salford Archaeology undertakes to safeguard, so far as is reasonably practicable, the health, safety and welfare of its staff and of others who may be affected by our work. This applies in particular to providing and maintaining suitable premises, and providing all reasonable safeguards and precautions against accidents. The University of Salford will also take all reasonable steps to ensure the health and safety of all persons not in their employment, such as volunteers, students, visitors, and members of the public (this includes trespassers).

Insurance: the University of Salford has employers' liability cover to a value of £50,000,000 and public and products liability to the same value of £50,000,000. Written details of insurance cover can be provided if required.

3.4 Other Matters

Contingencies: if there are more complex or generally deeper deposits than can be anticipated from the evidence available, there may need to be a corresponding increase in costs, which will be subject to agreement with the Client and the archaeological curator. These contingency costs are in accordance with the Chartered Institute for Archaeologists' guidance.

Working Hours: normal working hours are between 8.00 am and 4.00 pm, Monday to Friday, though adjustments to hours may be made to maximise daylight working time in winter and to meet travel requirements. It is not normal practice for the University of Salford staff to be asked to work weekends or bank holidays, and should the Client require such time to be worked during the course of a project a contract variation to cover additional costs will be necessary.

3.5 Post-Excavation and Report Production

Report: a draft copy of a written synthetic report will be submitted for comment to the client and local authority. The report will include:

- a title page detailing site address, NGR, author/originating body, client's name and address;
- full content's listing;
- a non-technical summary of the findings of the fieldwork;
- a description of the archaeological background;

- a detailed account of the historical development of the site, accompanied with map regression analysis;
- a description of the topography and geology of the study area;
- a description of the methodologies used during the fieldwork;
- a description of the findings of the fieldwork;
- detailed plans of the excavated trenches, showing the archaeological features exposed;
- interpretation of the archaeological features exposed and their context within the surrounding landscape;
- appropriate photographs of specific archaeological features;
- a consideration of the importance of the archaeological remains present on the site in local, regional and national terms.

Archive: the results of the archaeological investigation will form the basis of a full archive to professional standards, in accordance with current Historic England guidelines (*The Management of Archaeological Projects, 2nd edition, 1991*), the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990), and current CIfA standards and guidance for the creation, compilation, transportation and deposition of archaeological archive (published October 2009). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. The deposition of a properly ordered and indexed project archive in an appropriate repository is considered an essential and integral element of all archaeological projects by the CIfA in that organisation's code of conduct.

The initial result of the fieldwork stage will be the site archive, which will be prepared in accordance with the '*Management of Archaeological Projects*' (English Heritage 1991). The site archive will be so organised as to be compatible with the other archaeological archives produced in Lancashire. All drawn records to be transferred to and stored in digital format, in systems which are easily accessible.

The minimum acceptable standard for the site archive is defined in the '*Management of Archaeological Projects 5.4*' and '*Appendix 3*' as well as '*The Management of Research Projects in the Historic Environment*' (MoRPHE; English Heritage 2006). As part of the archiving process, the on-line OASIS (On-line Access to Index of Archaeological Investigations) form will be completed.

The archaeological archive will consist of the following:

- The project specification or research design;
- The schedule of works or similar documents;
- All original written records created throughout the course of the project;
- All original drawings, whether created during fieldwork, in analysis or for publication;

- Indexes to the drawings;
- Indexes to the photographic archive;
- Digital material created from written, drawn or photographed records;
- Documentation accompanying the digital archive, either in digital or written form;
- All finds and other archaeological materials selected for retention, and associated documentation;
- The final project report;
- Other work published during the life of the project;
- A list of contents of the archive.

3.6 Timetable

A one-week period has been allowed to carry out the excavation of the four trenches.

A draft report will be submitted to the Client for comment within eight weeks of completion of the fieldwork. The project archive will be deposited with the receiving museum (where applicable) within six months of completion of the fieldwork.

4. Staffing Proposal

4.1 Project Staff

The project will be under the overall charge of **Ian Miller BA FSA** (Assistant Director, Salford Archaeology) to whom all correspondence should be addressed. Ian has over 26 years' experience of commercial archaeology, and has a particular interest in the archaeology of the Industrial Period, and particular that of Greater Manchester and Lancashire. He has managed numerous evaluations and excavations of former industrial sites in the region, and was responsible for archaeological survey of Bamber Bridge New Mill as part of the Lancashire Textile Mill Survey.

His role will be to ensure that the Written Scheme of Investigation is implemented within the framework of the Project Objectives. He will be responsible for all aspects of staff and resource logistics, ensuring the smooth running of the project programme. He will liaise with the Client with regard to progress, and will maintain relationships with other contractors.

The fieldwork is likely to be directed by **Graham Mottershead BA** (Project Officer, Salford Archaeology). Graham is a highly experienced field archaeologist, with over 25 years' continuous experience of field archaeology.

It is not possible to provide details of specific technicians that will be involved with the fieldwork at this stage, but all shall be suitably qualified archaeologists with proven relevant experience. It is anticipated that up to two technicians will be required for the initial stage of the fieldwork.

4.2 Contact Details

Salford Archaeology
Centre for Applied Archaeology
University of Salford
Peel Building,
Salford M5 4NW

Nominated Contact Details
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Project Officer
Telephone: 07973 341 297
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University of Salford MANCHESTER

The Centre for Applied Archaeology

REGISTERED ORGANISATION IfA

CONSULTANCY



DESK BASED ASSESMENTS



WATCHING BRIEF & EVALUATION



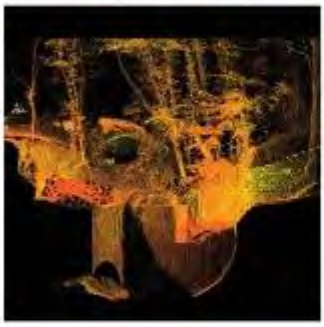
EXCAVATION



BUILDING SURVEY



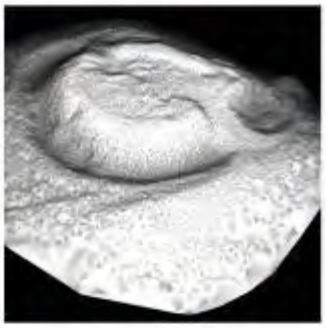
3D LASER SCANNING



COMMUNITY INVOLVEMENT



LANDSCAPE SURVEYS



GEOPHYSICAL SURVEYS



WORKSHOPS & VOCATIONAL TRAINING



RESEARCH PUBLICATIONS

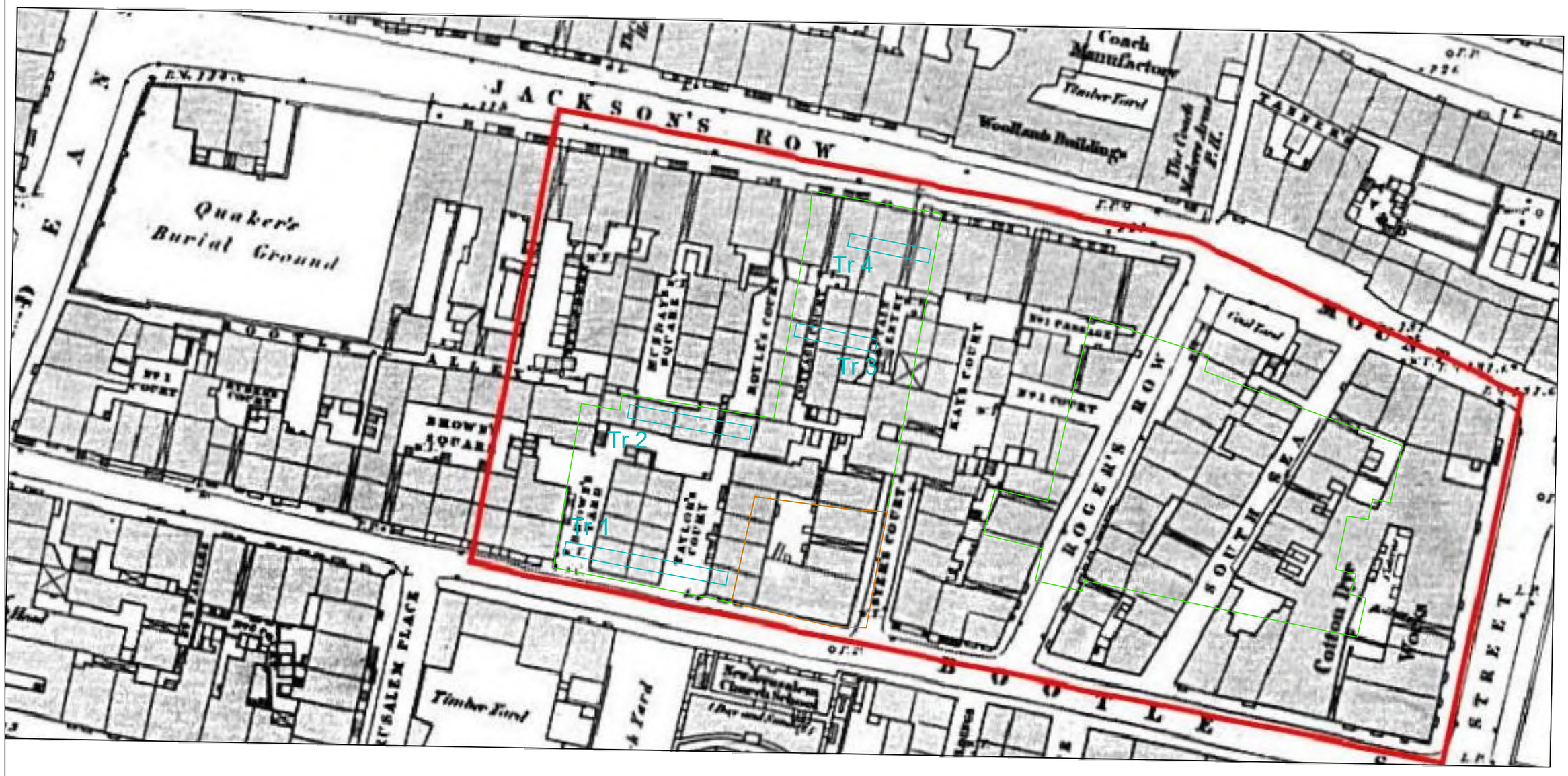


SEMINARS, DAYSCHOOLS CPD EVENTS

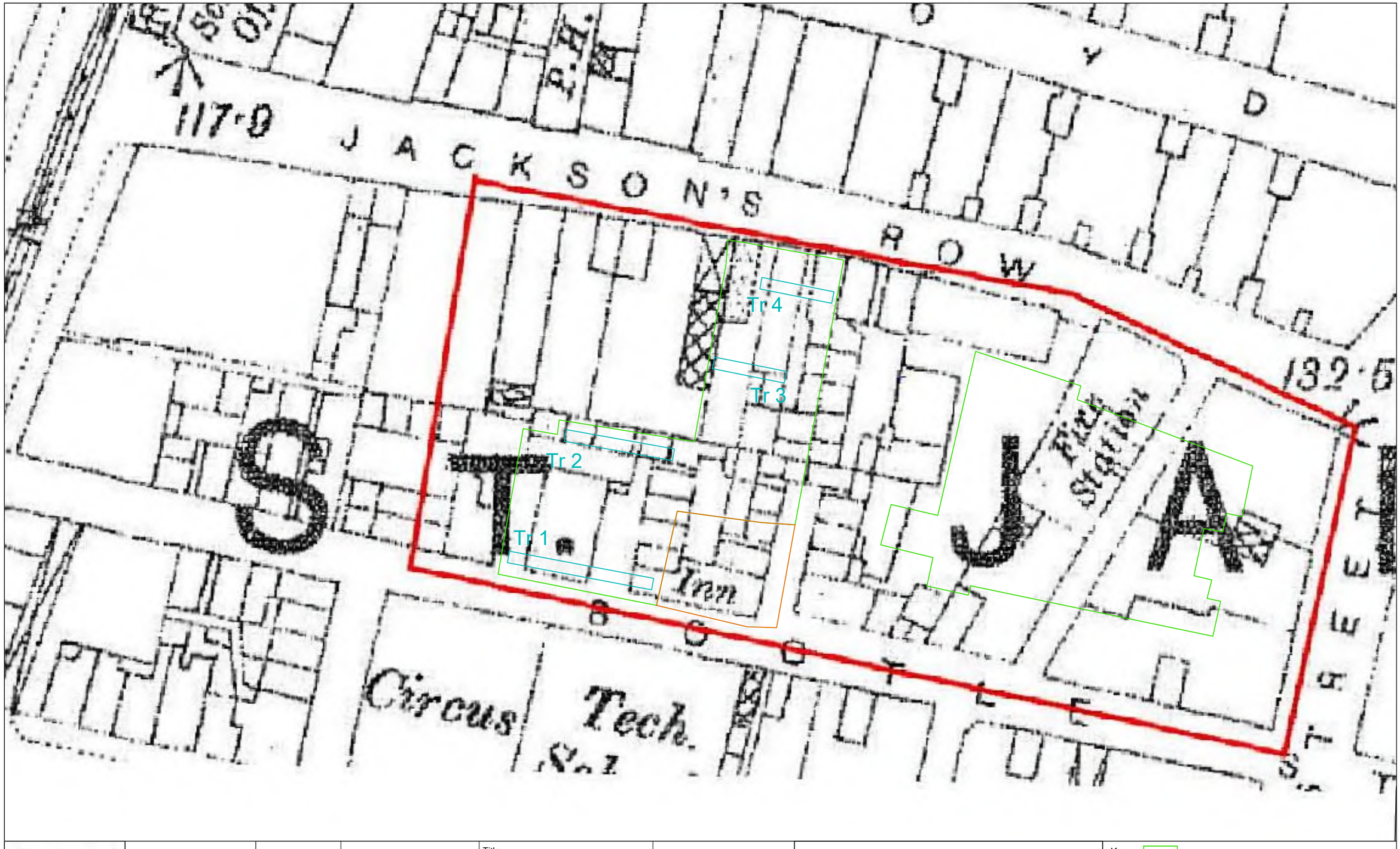




University of Salford MANCHESTER	Salford Archaeology	The Centre for Applied Archaeology	Centre for Applied Archaeology Peel Building University of Salford Salford M5 4WT	Title: Fig 1: Proposed trenches overlaid on current mapping	Site Name: Jackson's Row Site Code: Survey Data supplied by: N/A	0 20 m Scale at A3 1:500 N	Key: Area of high potential Proposed evaluation trench Area of high potential



University of Salford MANCHESTER	Salford Archaeology	The Centre for Applied Archaeology	Centre for Applied Archaeology Peel Building University of Salford Salford M5 4WT	Title: Fig 2: Proposed trenches overlaid onto mapping of 1844-46	Site Name: Jackson's Row Site Code: Survey Data supplied by: N/A	0 20 m Scale at A3 1:500 N	Key: Area of high potential Proposed evaluation trench Area of high potential



University of Salford MANCHESTER	Salford Archaeology	The Centre for Applied Archaeology	Centre for Applied Archaeology Peel Building University of Salford Salford M5 4WT	Title: Fig 3: Proposed trenches overlaid onto mapping of 1896	Site Name: Jackson's Row Site Code: Survey Data supplied by: N/A	0 — 20 m Scale at A3 1:500 N	Key: Area of high potential Proposed evaluation trench Area of high potential