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Ordsall Chord: Supporting Statement for Listed Building Consent Application for Intrusive Surveys to Castlefield Railway Viaduct, Grade II Listed	Project Code	Project Number	Discipline (Function) Code	Document Type	Originator Code	Sequential Number	Revision
Date: 21-10-13	127523	A	CEP	REP	PBL	000042	A01

Northern Hub Programme

Ordsall Chord: Statement for Listed Building Consent (LBC) Application for Intrusive Core Surveys to Castlefield MSJ&AR Railway Viaduct, Grade II Listed

Prepared by:

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GLOSSARY OF TERMS

Abbreviation	Term
BDP	Building Design Partnership
DBA	Desk Based Assessment
DPD	Development Plan Document
GMAAS	Greater Manchester Archaeological Advisory Service
HER	Historic Environment Record
LBC	Listed Building Consent
MOSI	Museum of Science and Industry (Manchester)
MSJ&AR	The Manchester South Junction & Altrincham Railway
NPPF	National Planning Policy Framework
OA	Oxford Archaeology
PB	Parsons Brinckerhoff
TWA	Transport and Works Act

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1. INTRODUCTION

1.1 Listed Building Consent (LBC) is sought under the Planning (Listed Building and Conservation Areas) Act 1990 for intrusive surveys in the form of coring to the Castlefield MSJ&AR Viaduct and Cast Iron Bridge over Water Street and for the brick testing of loosened bricks along the Viaduct at 57 locations (See Figure 1 for Site Boundary). The viaduct is a Grade II Listed structure and falls within the Castlefield Conservation Area. The locations for the proposed coring, which are to be approximately 100mm diameter, are shown on Drawing Number 127523-A-ECV-DRG-PBL-000099, see Appendix D.

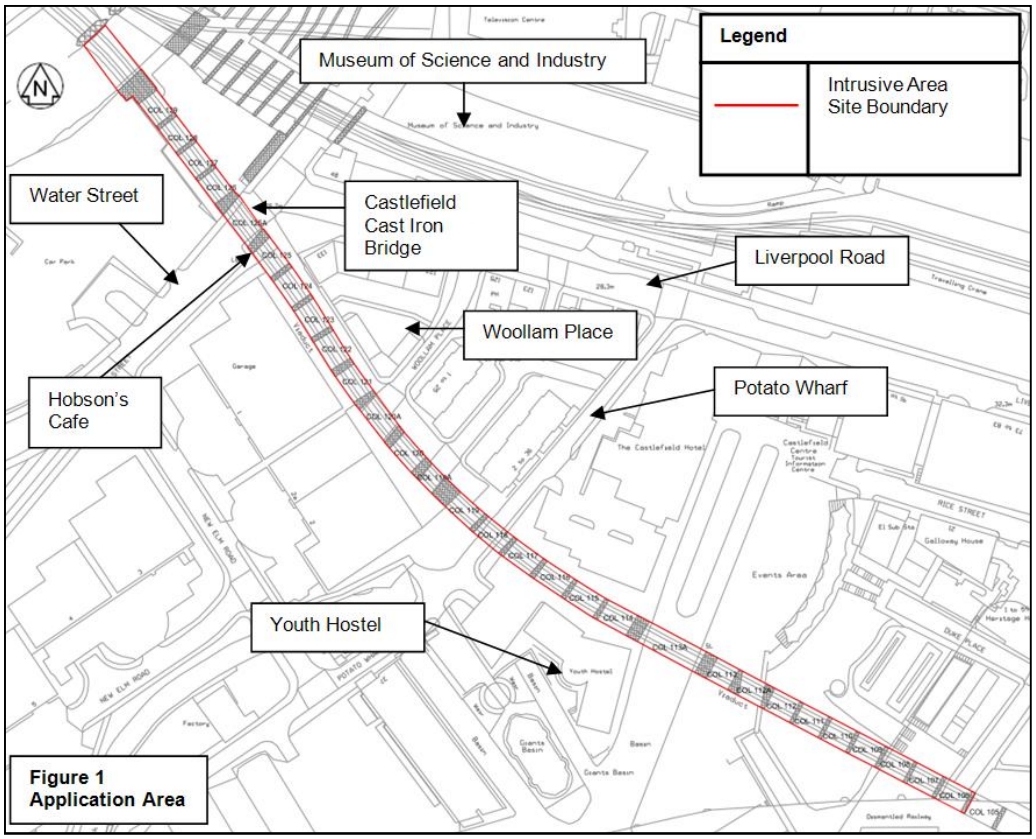


Figure 1
Application Area

1.2 The area of the Castlefield MSJ&AR Viaduct affected by these proposals consist of a series of brick arch spans, a deck type bridge (COL 119A) and a cast iron arch bridge (COL 125A). These currently carry the twin tracks of the Bolton Line, running southeast to northwest.

1.3 In the past, the brick arches were tenanted, although most are currently shut or unoccupied. The entrances to the arches are from the east, and they are brick walled to the west. The brick arches appear semi-circular in elevation with each spanning approximately 12.25m, supported on piers approximately 2.0m wide. The forms of the existing foundations are unknown (due to the lack of record drawings or ground investigations for the viaduct); they are assumed to be either supported on spread footings or timber piles.

1.4 The deck type bridge (COL 119A) consists of 7 No. wrought iron beams and 2 No. cast iron edge beams. Masonry jack arches are present between beams. The substructure consists of brick piers which are a continuation from the brick arch Viaduct either side.

1.5 The Grade II Listed Cast Iron Arch Bridge (COL 125A) over Water Street is supported on stone springing set into brick abutments. The superstructure consists of 6 No. cast iron arch ribs carrying cast iron deck plates and ornate parapets on top of the edge beams. The substructure consists of brick piers which are a continuation from the brick arch viaduct either side of the cast iron arch.

1.6 As noted above, the intrusive core hole surveys are required to inform the ongoing detailed design and construction methodology for the Ordsall Chord. The Ordsall Chord is a new two track railway, which would run on a combination of new and existing bridges and viaducts to provide a rail connection between the existing Middlewood L&MR Viaduct and the Castlefield MSJ&AR Viaduct. A Transport and Works Act Order application to grant powers to construct and maintain the Ordsall Chord was submitted to the Transport and Works Act Order Unit on 16 September 2013 and is currently being determined by the Secretary of State for Transport.

2 HISTORY

History of Development in the Area

2.1 The rapid expansion of Manchester and Salford began with the navigation of the River Irwell in the early 1700's. Water Street and Quay Street were laid out to provide access to the river and the area divided into development plots. The Castlefield MSJ&AR Viaduct was later constructed in 1846-9 by David Bellhouse.

2.2 This line is one of the country's earliest suburban railways and was the first in Manchester. It began as a joint venture between the Manchester and Birmingham Railway (later the London and North Western Railway, LNWR) and the Sheffield, Ashton-under-Lyne and Manchester Railway (later the Manchester, Sheffield and Lincolnshire Railway, MS&LR), the company which operated London Road Station (known as Manchester Piccadilly Station since 1960). The aim was to create an extension of their lines, known as the South Junction line, that would be carried on a viaduct along the southern boundary of the city centre and join the Liverpool and Manchester Railway at Ordsall Lane in Salford, thereby providing access to the port and city of Liverpool. A branch line, leaving the South Junction line at Castlefield, would also follow the Bridgewater Canal to Altrincham.

2.3 The Manchester South Junction and Altrincham Railway Act received Royal Assent on 21 July 1845. The MSJ&AR line opened in 1849. The line ran for 8.5 miles from London Road Station via Oxford Road and Deansgate Stations to Altrincham, with the viaduct forming a 1 ¾ mile (2 ¾ km) long stretch: the northern branch terminating at the north-west bank of the River Irwell, and the southern branch terminating at the east side of Dawson Street.

2.4 The viaduct runs from Manchester Piccadilly Station via Oxford Road and Deansgate, following approximately the route of the River Medlock (crossing it at a number of points), and then branches into two at Castlefield. The northern branch terminates on the north-west side of the River Irwell, and the southern branch terminates at the east side of Dawson Street.

2.5 The viaduct is approximately 1 ¾ mile (2 ¾ km) long and incorporates 224 brick arches that average a span and height of approximately 30ft, and a width of 28ft; many of the arches, particularly those near to Manchester Oxford Road Station and Deansgate Station, have been in-filled and converted into commercial premises. The tallest arches can be found in the section between Manchester Piccadilly and Oxford Road stations where the ground level is lower. A brick parapet has been altered and rebuilt in places and later repairs have been carried out to some of the arches.

2.6 The viaduct incorporates a series of predominantly arched, cast-iron bridges. These were designed by Edward Taylor Bellhouse, William Baker and William Cubitt and cross various streets, the Rochdale Canal, and the Bridgewater Canal. The bridges have an average span of 70ft, although one of Baker's bridges, across the Rochdale Canal, has a span of 105ft. A number of the bridges incorporate highly decorative Gothic-style ironwork, detailing and castellated towers (referencing the location of a Roman fort at Castlefield), whilst others, such as a bridge over Gloucester Street are more classically detailed. A bridge over Egerton Street was replaced in steel in 1976. Some of the viaduct's brick arches and bridges are skewed. The Irwell Bridge at the north-west end of the viaduct is of brick with two segmental arches, each of approximately 65ft span, with a central pier and cut-water. Rusticated stone voussoirs and pilaster strips exist to the central pier and abutments, and the parapet above the western arch incorporates cast-iron panelling.

2.7 In February 2013 the listings for the whole of the MSJ&AR Viaduct were subject to amendment, and combined to form a single Grade II listing between Deansgate Station and Manchester Piccadilly Station. This application relates to that part of the structure affected by the proposed bore holes as shown on Figure 1 entitled “The Application Site”.

2.8 Along the course of the viaduct are a number of attached or abutting buildings, most of which are later in date and are un-related to the viaduct's use; all are excluded from the listing, which relates solely to the viaduct. Manchester Piccadilly Station, Deansgate Station and Manchester Oxford Road Station (the two latter stations being constructed on top of and to the side of the viaduct) are also Grade II listed buildings, separately listed as Grade II listed buildings.

Heritage Assessment

2.9 The Heritage Assessment prepared for the Ordsall Chord TWA and LBC applications endorses a best practice approach in accordance with the National Planning Policy Framework (NPPF) and English Heritage guidance. It sets out the heritage significance of the wider site and identifies the key heritage assets which are being considered in detail as the design proposals progress. The document also includes a full Character Appraisal of the area and extracts are included in **Appendix E.**

2.10 The heritage assessment outlines the origins of the urban form and townscape characteristics. The assessment confirms that, excepting the reconstruction of the Water St Bridge (in 1905) and restoration works to the Liverpool Rd Station buildings (circa 1990), the area remains predominantly unchanged as laid out by the mid to late 19th century.

2.11 **Archaeological Desk Based Assessment (DBA)** – Oxford Archaeology (OA) have carried out an archaeological DBA. The principal aim of the assessment was to identify, as far as possible, the nature and significance of the archaeological resource within the application area. This work has informed the Heritage Assessment prepared by BDP and the emerging design development. Work involved in preparing this document has included a detailed review of all existing resource documents relating to the application site and a site assessment of the buildings.

2.12 Extracts of the Archaeological Desk Based Assessment are provided at **Appendices F and G**. Copies of the listing description for the structure affected is also provided at **Appendix C**.

3 LEGISLATIVE & POLICY CONTEXT

National Planning Policy Framework (NPPF)

3.1 National planning policy for the historic environment is contained in the National Planning Policy Framework (NPPF), March 2012. Section 12, paragraphs 126 though to 141 of the NPPF are particularly relevant.

3.2 The thrust of this Framework is to conserve and enhance the historic environment. Paragraph 132 is key:

'When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.'*

3.3 Paragraph 134 states that where a development proposal will lead to a less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use. It is noted that Castlefield Viaduct is Listed as a Grade II structure.

3.4 Noting the policy context above, the applicant submits that the proposed core holes will cause no substantial harm to the Viaduct. The investigations which are proposed will be relatively minor. Indeed Listed Building Consent was granted previously for similar investigative works under 101158/LO/2012/C1. It is submitted that this proposal accords with the policy thrust of the NPPF.

Consultation

3.5 The exact location of the intrusive works, core hole and removal of bricks for testing is a consequence of the Ordsall Chord proposal. These have been developed following extensive consultation with key stakeholders, including Manchester City Council, English Heritage and local residents.

Local Development Framework

3.6 The application site falls within the administrative boundary of Manchester City Council. A summary of the planning policy framework for this area that is relevant to this LBC application is provided below.

3.7 The Core Strategy Development Plan Document (DPD) for Manchester was adopted in March 2012. The Proposal Map shows that the site is not allocated for any specific development or use. It falls within the city centre limits and the Castlefield Conservation Area.

3.8 Policy EN1 Design Principles and Strategic Character Areas states that:

"Developers will be expected to consider the City's heritage and continue the rich pattern of activity in the core area..."

3.9 Policy EN3 Heritage - states:

"*New developments must be designed so as to support the Council in preserving or, where possible, enhancing the historic environment, the character, setting and accessibility of areas and buildings of acknowledgeable importance, including scheduled ancient monuments, listed buildings, registered parks and gardens, conservation areas and archaeological remains..."*

3.10 Policy CC9 Design & Heritage – states that development in Manchester City Centre should preserve or enhance the heritage assets that have been identified, including listed buildings, conservation areas and scheduled ancient monuments.

3.11 The previous LBC applications for investigative survey works were approved on the basis that the proposals accorded with approved policies RC4 (Environment) and DC19.1 (Listed Buildings) of the Unitary Development Plan, and policy DM1 (Development Management) of the Manchester Core Strategy.

3.12 It is, therefore, submitted that the proposed core holes will also be in accordance with:

- Policy RC4;
- Policy DC19.1; and
- Policy DM1

Compliance with the Development Plan

3.13 A thorough review of historic documents that relate to the application site has been carried out, and used to prepare the Heritage Assessment and Archaeological Desk Based Assessment. A visual site survey of all buildings has also been carried out from available public access locations. Extracts of these reports have been provided at Appendices E, F and G. The use of alternative, non-intrusive, survey methods have also been considered. These are addressed in Section 4 of this Statement which confirms that none of are considered to be suitable. The design development for the alignment of the Ordsall Chord is also considered to be sufficiently advanced to ensure that the survey locations in the structures will not alter as a consequence of later design developments. It is, therefore, considered that the application complies with the NPPF and development plan in this respect.

3.14 English Heritage produced a guidance note 'Investigative Work on Historic Buildings' in December 1994. The guidance note outlines the research which should be carried out and non intrusive alternatives considered prior to the submission of an application for intrusive investigative works. Due regard has been given to this guidance in the consideration of alternatives and preparation of this application.

3.15 English Heritage is the Government statutory adviser on the historic environment. English Heritage exists to protect and promote England's heritage and ensure that the past is researched and understood. It is understood that any engineering investigation or interventions for the development of Ordsall Chord should be justified and be carefully placed. The works proposed in this application have been designed to ensure that they take account of matters as they relate to intrusive investigation works.

4 ALTERNATIVE SURVEY METHODS CONSIDERED

4.1 Prior to submitting this application, non-intrusive alternative survey methods were explored. This was in accord with advice set out within English Heritage Guidance 'Investigative Work on Historic Buildings' which states that intrusive surveys *"…should only be dug if there is a clearly defined reason for doing so and if important information is likely to be gained as a result, for example about bearing strata or foundations".*

4.2 The following alternatives have been considered for this site:

- A review of all historical drawings of rail structures held within the Network Rail archive. Whilst the structures within this application site are no longer owned by Network Rail, a thorough review of the archives was undertaken which identified drawings for several structures close to the application site. This included the original design drawings for the Grade II listed girder bridge attached to the north side of Stephenson's Bridge. However, no drawings were found relating to the viaducts within this application site.

- A review of historical maps and records relating to the application site. This included a review of the Historic Environment Record (HER) held by the Greater Manchester Archaeological Advisory Service (GMAAS). Other records reviewed include the Manchester Archives and Local Studies, Greater Manchester Record Office, archives held by the Museum of Science and Industry in Manchester (MOSI), English Heritage Archives, and information held by Oxford Archaeology North. The Archaeological Desk Based Assessment and Heritage Assessment collate this information.

- A review of historical reports submitted with previous relevant planning applications. This identified an Archaeological Assessment of the viaducts prepared by the University of Manchester Archaeological Unit in 2006 to support a planning application for the conversion and redevelopment. The planning application was submitted by Nikal Investments. The aim of this document was to identify the nature and significance of the archaeological resource. Discussions have also taken place with the current owners of the site, Water Street Properties Limited to identify any further information they have relating to these structures. This Archaeological Assessment has informed the Heritage Assessment and Archaeological Desk Based Assessment for Ordsall Chord.

- A visual inspection of the structures was carried out. Photographs taken during this survey are provided at **Appendix I.** The survey did not provide adequate information on the internal form and make-up of the structure.

- The use of Ground Penetrating Radar from the top of the viaduct structures was also reviewed. A review of this type of survey and equipment concluded that this approach would not provide the necessary definitive information required for these structures and would still need to be supplemented by information gathered through intrusive survey. This is supported by advice published by the Highways Agency.

4.3 All possible avenues of non-intrusive investigations have been assessed before resorting to the proposed intrusive survey work. Intrusive survey work is deemed necessary to ascertain definitive structural information for this application and it is considered that non-intrusive works would be inappropriate and inconclusive if used.

5 PROPOSED SURVEY AND METHODOLOGY

5.1 The scope of the works proposed relates to coring in 57 locations along the Castlefield Viaduct structure. In addition to these works whole brick testing will be required at locations along the viaduct where bricks have become loosened. This will involve replacing approximately 50 no bricks in each location as they will be tested to destruction. A plan showing the location of the proposed core holes/bore holes is shown at in Appendix D.

Core holes to Arch Barrels

5.2 In total, the proposal will see coring at 57 locations, with approximately 3 core holes going through the arch barrel at each location. The core holes will measure 100mm in diameter. The cores are required to ascertain the thickness, makeup, and strength of the masonry. Brickwork samples from the cores may also be retained for material testing purposes and be reinstated where appropriate. The openings proposed will be filled with a dry pack mortar and the facing brick will be fully reinstated. If the existing bricks cannot be used when the cores are being reinstated, the size, type and colour of any alternative replacement bricks will be agreed with the Conservation Officer of Manchester City Council. The surveys will be carried out using the same equipment, the MC300 Drilling Rig or similar.

Structural Integrity

5.6 The core holes through the structure will measure 100mm in diameter. The diameter has been minimised to ensure that the integrity of the two structures is not materially affected either during the survey work or once the survey work is completed. A competent engineer will be employed to carry out the survey work and it is not anticipated that structural support will be required from underneath while the work is being carried out. However, this will be re-evaluated once access to the site has been secured and a thorough review of the structure has been undertaken by the site engineers and archaeologist.

6 PROPOSED MITIGATION

6.1 To mitigate the impact of the investigation:

- The number of intrusive surveys proposed has been limited as far as is practical.
- All of the works will be carried out under the supervision of an engineering geologist. A suitable qualified archaeologist will also be present on site to retrieve material samples and to record and monitor the exposed deposits.
- Photos of all openings will be taken during the surveys and findings will be submitted to Manchester City Council for information.
- Any holes within the structure will be filled and sealed in accordance with the details outlined in Section 5 of this report in order to protect the structures.
- Where loosened bricks are removed for testing/destruction, suitable replacement bricks will be sourced and reinstated, as required.

7 CONCLUSIONS

7.1 The intrusive surveys, in the form of 57 No core holes proposed to the MSJ&AR Viaduct, are required to understand the structural capacity of the Castlefield Viaduct. Information from these surveys will inform the ongoing design development of the Ordsall Chord.

7.2 All alternative non intrusive surveys have been considered. None of these methods are considered to be suitable or conclusive. Intrusive surveys using core holes are therefore considered to be necessary and justified.

7.3 The number of intrusive surveys proposed has been limited as far as is practical in order to minimise the impact of the development on this structure. Records will also be kept to ensure that information about this structure is readily available should they be required at any time.

7.4 It is submitted that:

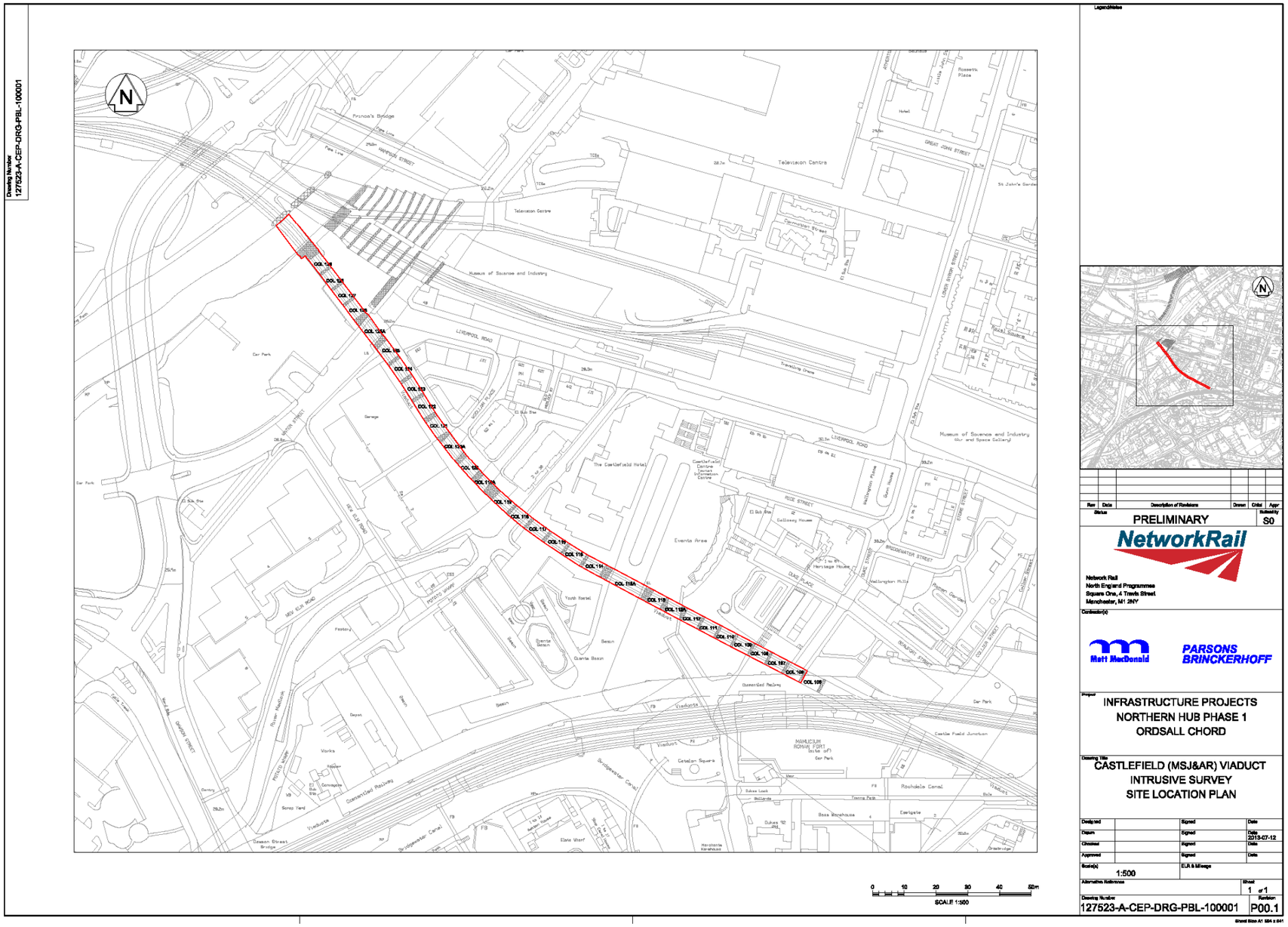
- The proposed intrusive surveys of coring at 57 locations (see drawing 127523-A-ECV-DRG-PBL-000099) and approximately 50 No brick tests are required in order to inform the ongoing design development of the Ordsall Chord.
- It is submitted that the impact of this work would not be substantial and relatively minor in significance.
- The proposed works were subject to consideration of the alternatives, pre-application discussions and are in accordance with National and Local Planning Policy.

7.5 Accordingly, it is respectfully requested that Listed Building Consent be granted for the proposed core holes and whole brick testing as detailed on the Listed Building Consent application.

APPENDIX A – Site Location Plan

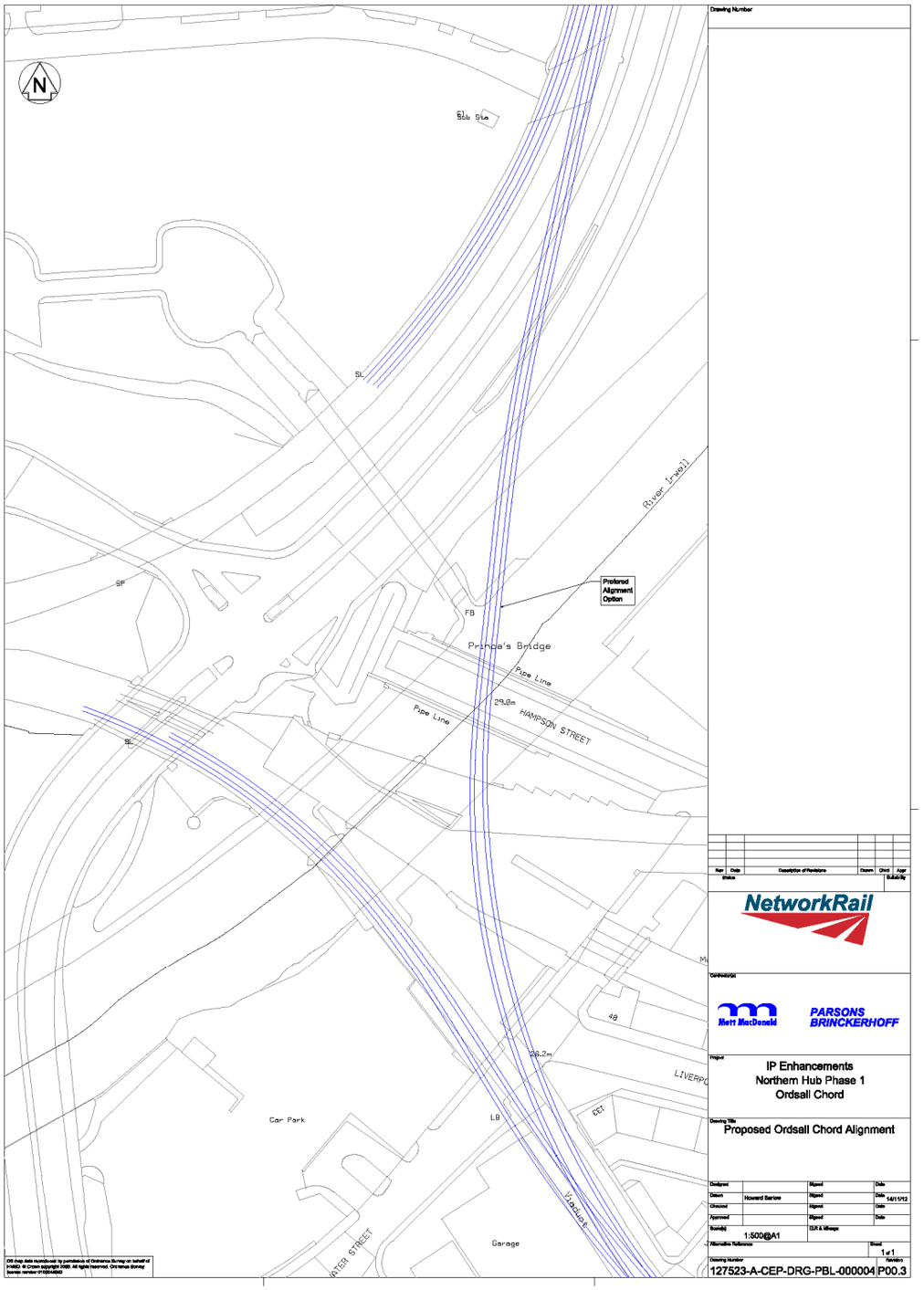
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APPENDIX B – Proposed Alignment of Ordsall Chord

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APPENDIX C – Listing Description for Castlefield MSJ&AR Viaduct

List Entry Summary

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: Manchester South Junction and Altrincham Railway Viaduct

List Entry Number: 1200837

Location

Manchester South Junction and Altrincham Railway Viaduct, Manchester and Salford

The building may lie within the boundary of more than one authority.

County:
District: Manchester
District Type: Metropolitan Authority
Parish: Non Civil Parish

County:
District: Salford
District Type: Metropolitan Authority
Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II

Date first listed: 06-Jun-1994

Date of most recent amendment: 26-Feb-2013

Legacy System Information

The contents of this record have been generated from a legacy data system.

Legacy System: LBS

UID: 388146

Asset Groupings

This List entry does not comprise part of an Asset Grouping. Asset Groupings are not part of the official record but are added later for information.

List Entry Description

Summary of Building

Railway viaduct for the Manchester South Junction & Altrincham Railway Company, 1846 -9, constructed by David Bellhouse Jnr. Red brick with some small sections of blue brick, sandstone dressings and cast-iron bridges.

Reasons for Designation

The Manchester South Junction & Altrincham Viaduct is designated at Grade II for the following principal reasons:

* Design interest: it is an impressive 1 3/4 mile long urban viaduct incorporating a series of well-detailed bridges; some with highly decorative Gothic-style ironwork;

* Date: it is an early example of a railway viaduct dating from the second phase of railway development - the period from 1841-50 often referred to as 'railway mania' - in which commercial speculation and competition for routes led to the rapid construction of lines and expansion of the railway network;

* Historic interest: the viaduct forms an important and integral component of the Manchester South Junction & Altrincham Railway, which was one of the country's earliest suburban railways, and Manchester's first; helping to bring this form of transport to the hinterlands;

* Group value: the viaduct has strong group value with neighbouring railway structures (both contemporary and later), including two other railway bridges crossing the River Irwell (the 1830 Grade I listed stone bridge and the 1869 Grade II listed girder bridge) and their associated viaducts, the Grade II listed Castlefield Viaduct (c1880), the Grade II listed stations of Manchester Oxford Road (1958-60) and Deansgate (1896), and the Grade II listed former goods offices (c1850-60) and train shed (c1881) at Manchester Piccadilly Station.

History

The Manchester South Junction & Altrincham Railway viaduct was constructed in 1846-9 by David Bellhouse junior for the Manchester South Junction & Altrincham Railway (MSJ&AR) Company; Bellhouse was also responsible for laying the track. Several of the cast-iron bridges situated along the viaduct were built by his son, the engineer and iron-founder, Edward Taylor Bellhouse, along with others by the line's Chief Engineer, William Baker, and William Cubitt.

The MSJ&AR line is one of the country's earliest suburban railways and was the first in Manchester. It was started as a joint venture between the Manchester & Birmingham Railway (later the London & North Western Railway, LNWR) and the Sheffield, Ashton-under-Lyne & Manchester Railway (later the Manchester, Sheffield & Lincolnshire Railway, MS&LR) which operated London Road Station (known as Manchester Piccadilly

Station since 1960). The aim was to create an extension of their lines, known as the South Junction line, that would be carried along the southern boundary of the city centre on a viaduct and then join the Liverpool and Manchester Railway at Ordsall Lane in Salford, providing access to the lucrative port and city of Liverpool. A branch line, leaving the South Junction line at Castlefield, would also follow the Bridgewater Canal to Altrincham. The Manchester South Junction & Altrincham Railway Act received Royal Assent on 21 July 1845.

300,000 cubic feet of stone (91,440 cubic metres), 50 million bricks and 3000 tons (3048 tonnes) of cast iron were used in the viaduct's construction. The MSJ&AR line opened on 20 July 1849, although sections of the viaduct were not opened until 1 August 1849. The line ran for 8 1/2 miles from London Road Station via Oxford Road and Deansgate Stations to Altrincham, with the viaduct forming a 1 ¾ mile (2 ¾ km) long stretch: the northern branch terminating at the north-west bank of the River Irwell, and the southern branch terminating at the east side of Dawson Street.

Details

LOCATION: The viaduct runs from Manchester Piccadilly Station via Oxford Road and Deansgate, following approximately the route of the River Medlock (crossing it at a number of points), and then branches into two at Castlefield, with the northern branch terminating on the north-west side of the River Irwell, and the southern branch terminating at the east side of Dawson Street.

ARCHITECTURE: The viaduct is approximately 1 ¾ mile (2 ¾ km) long and incorporates 224 brick arches that average a span and height of approximately 30ft, and a width of 28ft; many of the arches, particularly those near to Manchester Oxford Road Station and Deansgate Station, have been in-filled and converted into commercial premises. The tallest arches can be found in the section between Manchester Piccadilly and Oxford Road stations where the ground level is lower. A brick parapet has been altered and rebuilt in places and later repairs have been carried out to some of the arches.

The viaduct incorporates a series of predominantly arched, cast-iron bridges by Edward Taylor Bellhouse, William Baker and William Cubitt that cross various streets, the Rochdale Canal, and the Bridgewater Canal. The bridges have an average span of 70ft, although one of Baker's bridges, which spans the Rochdale Canal has a span of 105ft. A number of the bridges incorporate highly decorative Gothic-style ironwork and detailing and castellated towers (referencing the location of a Roman fort at Castlefield), whilst others, such as a bridge over Gloucester Street are more classically detailed. A bridge over Egerton Street by William Baker was replaced in steel in 1976. Some of the viaduct's brick arches and bridges are skewed. The Irwell Bridge at the north-west end of the viaduct is of brick with two segmental arches, each of approximately 65ft span, with a central pier and cut-water. Rusticated stone voussoirs and pilaster strips exist to the central pier and abutments, and the parapet above the western arch incorporates cast-iron panelling.

Following electrification of the line in the C20 the viaduct now incorporates a series of C20 and early-C21 gantries along its course. Also along the viaduct's course are a number of attached or abutting buildings, most of which are later in date and are un-related to the viaduct's use; all are excluded from the listing, which relates solely to the viaduct. Manchester Piccadilly Station, Deansgate Station and Manchester Oxford Road Station (the two latter stations being constructed on top of and to the side of the viaduct) are all separately listed at Grade II.

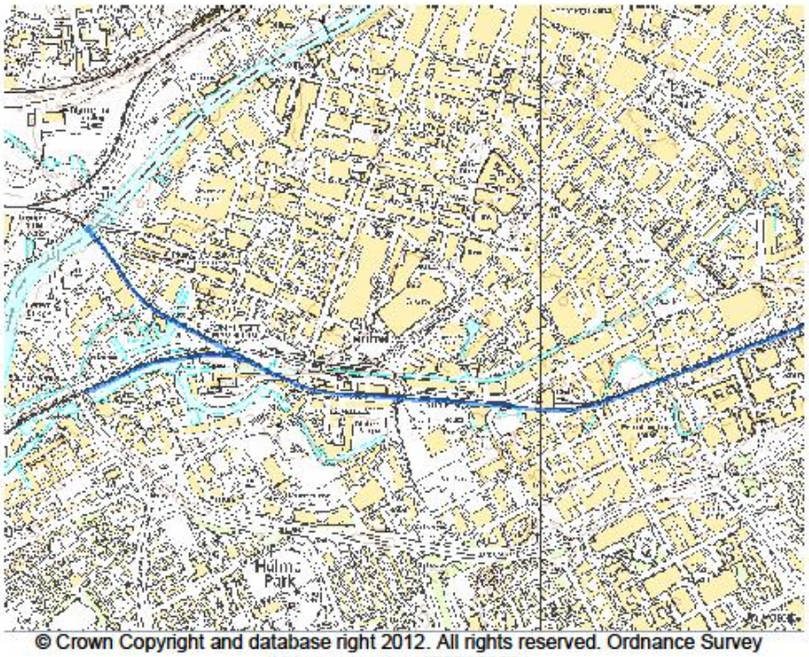
Selected Sources

1. **Book Reference** - *Author:* Hartwell, C - *Title:* Pevsner Architectural Guides: Manchester - *Date:* 2001 - *Page References:* 215-217
2. **Website Reference** - *Author:* The University of Manchester - *Title:* A Guide To Civil Engineering in Manchester. Manchester South Junction & Altrincham Railway - *Date:* 25 July 2012 - *URL:* http://maceserv.mace.man.ac.uk/apache2-default/trail/xml/Features/msjar.html
3. **Book Reference** - *Author:* Dixon, F - *Title:* The Manchester South Junction and Altrincham Railway - *Date:* 1994 edition

Map

National Grid Reference: SJ8382597704

The below map is for quick reference purposes only and may not be to scale. For a copy of the full scale map, please see the attached PDF - 1200837.pdf

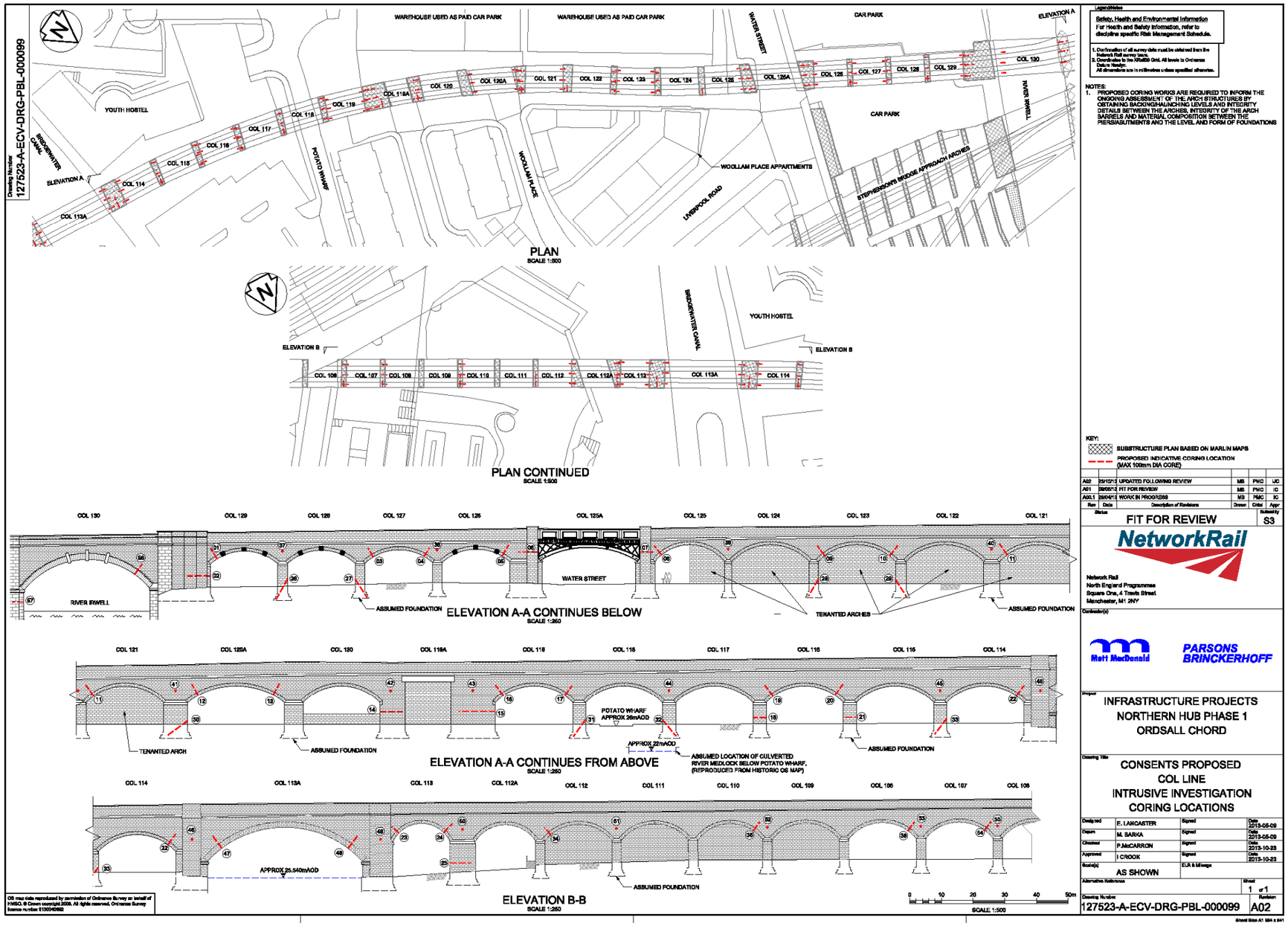


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APPENDIX D – Intrusive Survey Locations - Drawing No: 127523-A-ECV-DRG-PBL-000099

Northern Hub Programme
Ordsall Chord: Supporting Statement for Listed Building Consent Application for Intrusive Surveys to Castlefield Railway Viaduct, Grade II Listed
Date: 22--10-13

Document Reference Number						
Project Code	Project Number	Discipline (Function) Code	Document Type	Originator Code	Sequential Number	Revision
127523	A	CEP	REP	PBL	000042	P00.1



APPENDIX E – Extracts from BDP Heritage Assessment

Character Appraisal Area A: Liverpool Rd Station Character Area

Location

4.2.4 For the purposes of this study the Liverpool Road Station Character Area has been defined as the area bounded by the Castlefield MSJ&AR Viaduct and Liverpool Road to the south, the Girder Bridge, Zig Zag Viaduct and Colonnaded Viaduct to the north, the River Irwell to the west and abutting MOSI's main building and Power Hall (formerly Lower Byrom St Railway Goods Warehouse and Railway Goods Transfer Shed).

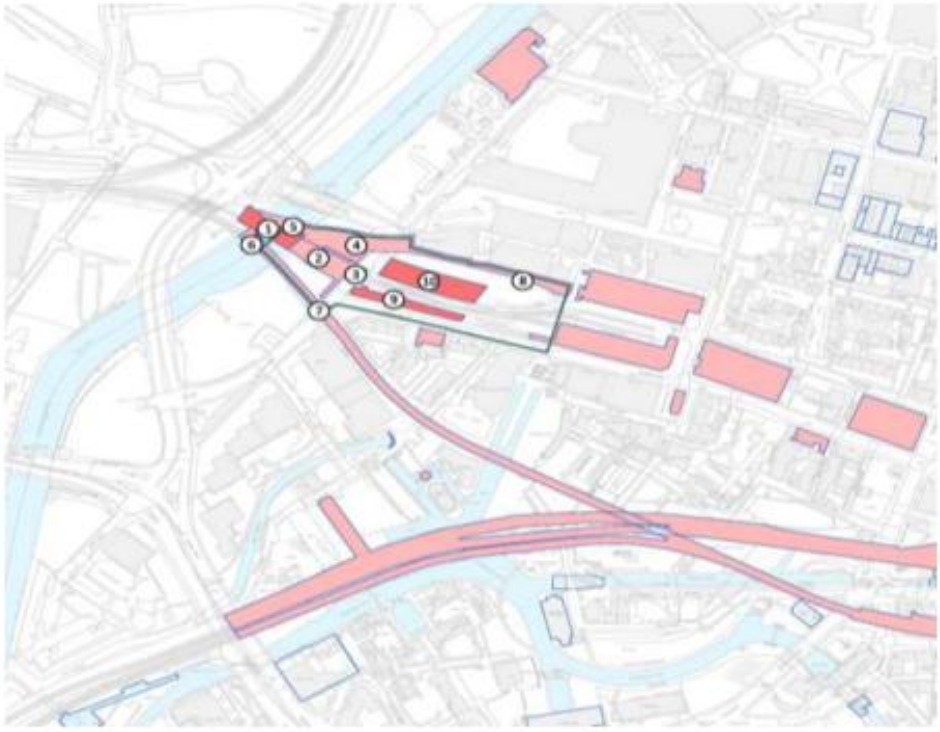


Figure 11: Character Area A: Liverpool Rd Station Character Area Plan

Key Heritage Assets within the Character Area

4.2.5 The following are the key heritage assets within the character area;

Ref	Name	Listing Grade & (Ref)	DBA Gazetteer Ref	
1.	Stephenson's Bridge	Grade I	(1270603 & 1391927)	79
2.	1830 Viaduct	Grade II	(1254726)	80
3.	Water St Bridge	Grade II	(1254726)	81
4.	Zig Zag Viaduct & Water St bridge	Grade II	(1254829)	85
5.	Girder Bridge	Grade II	(1391929)	85
6.	1845 Brick Bridge	Grade II	(1386189)	89
7.	Castlefield (MSJ&AR) Viaduct & Cast Iron Bridge	Grade II	(1200855)	89
8.	Colonnaded Viaduct	Grade II	(1200805)	85
9.	Liverpool Road Station Buildings	Grade I	(1291477)	11
10.	1830 Warehouse	Grade I	(1282991)	104

Origins and Development of the Area

4.2.6 The origins of the urban form and townscape characteristics of this area can be traced back to the rapid developments of the eighteenth and nineteenth century. A key milestone was the use of the River Irwell for navigation in the early 1700s which led to increased activity and development in the area including the establishment of Water Street and Quay Street (the lines of which can be seen to Casson & Bury's map of 1710-50). These orthogonal streets broke the medieval pattern of street development to the north and established the grid form of planned streets to this area.

4.2.7 In the mid to late 1700s the area was parcelled up and laid out for development. Some residential development followed but this area was principally occupied by industry, particularly along the River Irwell. Industrial development included a dye works which was established within the boundary of this character area. The siting of the Bridgewater canal to the south of the character area reinforced this location as a hub of transportation for industry. By 1808 the line of Liverpool Road had been established as well as the first building on the site of the future Liverpool Road station at the corner of Liverpool Road and Water Street which was associated with the dye works. Up to 1830 development along Liverpool Road increased but was concentrated to the east and the site of Liverpool Road station remained unbuilt until the construction of the station in 1830.

4.2.8 The establishment of the Liverpool and Manchester Railway in this location involved the construction of a group of station buildings along

Liverpool Road at the junction with Water Street. Due to the proximity of this site to the River Irwell and the necessity for the railway to be at a determined height over the Mersey and Irwell navigation the platforms were constructed above street level. This first phase of railway development in this area therefore also involved the construction of a stone bridge over the River Irwell (attributed to Stephenson), a brick viaduct and a cast iron bridge over Water Street (replaced in 1905). Other associated structures include the existing 1830 Warehouse, alongside other early warehouse buildings which were demolished in later phases of development. The gazetteer produced by Oxford Archaeology provides detail on the associated structures such as the water tower and arrivals platform which were constructed as part of the Liverpool Road complex but have subsequently been altered and / or demolished.

4.2.9 Due to the success of the Liverpool and Manchester Railway, the rapid development of the railways across Manchester then followed. In 1844 Victoria station was constructed and Liverpool Road station became a goods station rather than a passenger station. By 1850 the Castlefield (MSJ&AR) Viaduct had been constructed to the south of Liverpool Rd station.

4.2.10 Then in 1866 a major fire enabled redevelopment of the Liverpool Road station site (which was by then functioning as a goods station). The redevelopment involved the construction of a Girder Bridge (abutting Stephenson's Bridge) and viaduct leading to Grape Street Bonded Warehouse.

4.2.11 Except for the reconstruction of the Water St bridge (in 1905) and restoration works to the Liverpool Rd station buildings (circa 1990) the area remains predominantly unchanged and as laid out by the mid to late 19th century.

<u>The Prevailing or Former Uses within the Area and Their Historic Patronage, and the Influences of These on the Plan Form and Building Types</u>

4.2.12 As detailed above the prevailing uses and building types within the area are related to this part of Manchester forming a base for industry and major transport hub.

4.2.13 The plan forms of the buildings in this area, particularly of the station buildings, were significantly influenced by the point in history at which this area was developed.

4.2.14 As the "first surviving example in the world", the former Liverpool Road Station (and station master's house) of 1830 resembles "a terrace of

smart town houses". Constructed at a time when the future success of the railways was not fully envisaged, the architectural form was influenced by the expanding development of town houses in which the station was sited. This plan and architectural form is unique in this respect.

4.2.15 Associated structures such as the 1830 warehouse and parts of the arrival station are also significant survivals. The retention of the 1830 Warehouse as part of the Museum of Science and Industry has ensured that the original plan form and key aspects of its typology which relate to its use and association with the railway have been retained and can be understood.

4.2.16 The railway bridges and viaducts each have interest as individual structures reflecting the point in railway development at which they were constructed but also provide group interest, demonstrating how this area changed and developed.

<u>The Architectural and Historic Qualities of the Buildings and the Contribution they make to the Special Interest of the Area</u>

4.2.17 The special interest of the area is primarily due to;

- Liverpool Road Station being an intact surviving example of the first passenger station
- The historic significance of the Liverpool and Manchester Railway and its influence on railway development as a whole
- The additional phases of railway development which occurred in the area, which contribute significantly to the group value of structures and the understanding of railway development in Manchester as well as regionally and nationally
- the relationship of associated warehouses and sheds to the railway structures, adding to the group value

4.2.18 The architectural and historic qualities of the Liverpool Road station buildings contribute significantly to the special interest of the area. The fact that these buildings retain their intended relationship with the streetscape, upper platform level, railway tracks and adjacent warehouse buildings enables the original configuration of the station to be recognised. Their unique architectural form contributes to the understanding of the development of this area of Manchester, demonstrating the type of development prevalent at the time, much of which has since been lost.

4.2.19 The multi-level environment created by the railway viaducts is considered to be "unique in the world" and contributes significantly to the special interest of the area. The railway viaducts in Manchester as

a whole are highlighted in the 'Manchester Urban Historic Landscape Characterisation' Report as being significant landscape features.

4.2.20 The group of warehouse and shed buildings adjacent to the Liverpool Road Station structures contribute to the special interest of the area, highlighting the areas importance for the transfer and transportation of goods.

4.2.21 The later phases of railway development, evidenced by bridge and viaduct structures to the north and south of the Liverpool to Manchester line, also contribute to the special interest of the area. The group of structures further reinforces this area as a key gateway into the city and demonstrates that its interest spans many years of railway development.

The Character and Relationship of Spaces within the Area and Key Views

4.2.22 The area altered rapidly between the late 1700's and mid to late 1800's, but since the late 1800 has remained predominantly unchanged. As such the character and relationship of the spaces within the area is as developed in the late 1800's.

4.2.23 The Castlefield (MSJ&AR) Viaduct and cast iron bridge forms a boundary to this character area, enclosing this space around the Liverpool Road station buildings so that when in this area the dominant characteristic is one of railway structures. The viaduct and bridge forms a gateway into this area which is reinforced by the very different urban characteristics to the Water Street regeneration area (Area C).

4.2.24 The key views from and to this area are as follows;

- along Liverpool Road towards Water Street and the group of bridges and viaducts
- short 'views' which acknowledge the relationship of Liverpool Rd station buildings to adjacent bridge structures (as seen in historic lithographs)
- restricted views of Stephenson's Bridge from the existing car park site adjacent to the 1830 viaduct.
- views through arches of Castlefield (MSJ&AR) Viaduct
- views from Liverpool Road to Potato Wharf
- from within MOSI site towards the railway viaducts and bridges
- from Stephenson's Bridge back towards MOSI

Prevalent and Traditional Building Materials, Textures and Colours

4.2.25 The prevalent building materials in the area include brick, stone, render, cast iron. Colours are used to the Castlefield (MSJ&AR) Viaduct and within the MOSI site.

4.2.26 "Although the variety of building materials used in Castlefield is very wide, it tends to be more rugged and industrial in character than in other parts of the city centre. Stone, brick and slate are used extensively, but the most impressive components are the massive cast-iron columns supporting the railway viaducts and, or course, the viaducts themselves, which are constructed of iron lattice beams." Castlefield CAA.

Local Details

4.2.27 Although the palette of materials is consistent, the manner in which the materials are used and detailed varies. Variety ranges from robust but refined use of stonework to Stephenson's bridge in comparison to decorative stonework / stucco to the Liverpool Road elevation and from robust and industrial use of cast iron to the girder bridge in comparison to decorative use of cast iron to the Castlefield (MSJ&AR) Viaduct Bridge over Water Street. Detailing predominantly follows Georgian patterns.

The Contribution Made by Green Spaces and Other Natural or Cultivated Elements to the Character of the Area

4.2.28 There are no green spaces within the defined character area. The character area takes in part of the River Irwell and although the river is a very important element, influencing urban development in this area, it is not accessible from this area and is only visible to limited points.

4.2.29 Parts of the railway bridges and viaducts which have become disused are currently overgrown with trees and shrubs. This is generally not visible from street level within this area but is highly visible from other Character Areas and within parts of the MOSI site but is detrimental to the condition and visual character of the structures.

The Setting of the Conservation Area and its Relationship with Surrounding Landmarks, Vistas and Panoramas

4.2.30 The Castlefield Conservation Area is large and takes in areas of varying characteristics. The character area under consideration sits on the northern boundary of the Conservation Area but at the centre, and as the location of key structures of railway heritage embodies key aspects of the conservation area. The relationship with surrounding railway heritage structures (such as the Castlefield (MSJ&AR) Viaduct and the Bridgewater Canal basin) is important albeit that this relationship is not experienced through any direct vistas but as a

dynamic experience as the observer moves through the Conservation Area.

4.2.31 The key relationships to be considered by the proposals are:

- the relationship of the railway bridges and viaducts with other MOSI structures along Liverpool Rd
- views / panorama from Regent Road across to Castlefield (MSJ&AR) viaduct and bridges - in relation to other viaducts
- views down River Irwell in both directions from the river walk
- view down River Irwell from Irwell St bridge
- views from Salford - Irwell City Park and other development sites

The Extent of Loss, Intrusion or Damage, i.e. the negative factors

4.2.32 As highlighted, this area changed and developed rapidly between the late 1700s and mid to late 1800s but since the 1800s has remained predominantly unchanged. It should be noted that the remaining elements of the initial phase of development are of upmost importance. However it should also be noted that the station site does not retain all elements from the original development, some of the early warehouses having been demolished in the 1800's. Some later changes, such as the girder bridge, although now hold heritage value in their own right, caused damage to Stephenson's Bridge and altered the setting and views of this bridge.

The Existence of any Neutral Areas

4.2.33 The car park areas in between the viaducts and the adjacent open development sites (also currently used as car parking) could be classed as neutral areas.

4.3 Character Appraisal Area B: Liverpool Road Residential Character Area

Location

4.3.1 For the purposes of this study the Liverpool Road Residential Character Area has been defined as the area bounded by Liverpool Road to the north, the Castlefield (MSJ&AR) Viaduct to the south, Water Street to the west and Potato Wharf to the east.

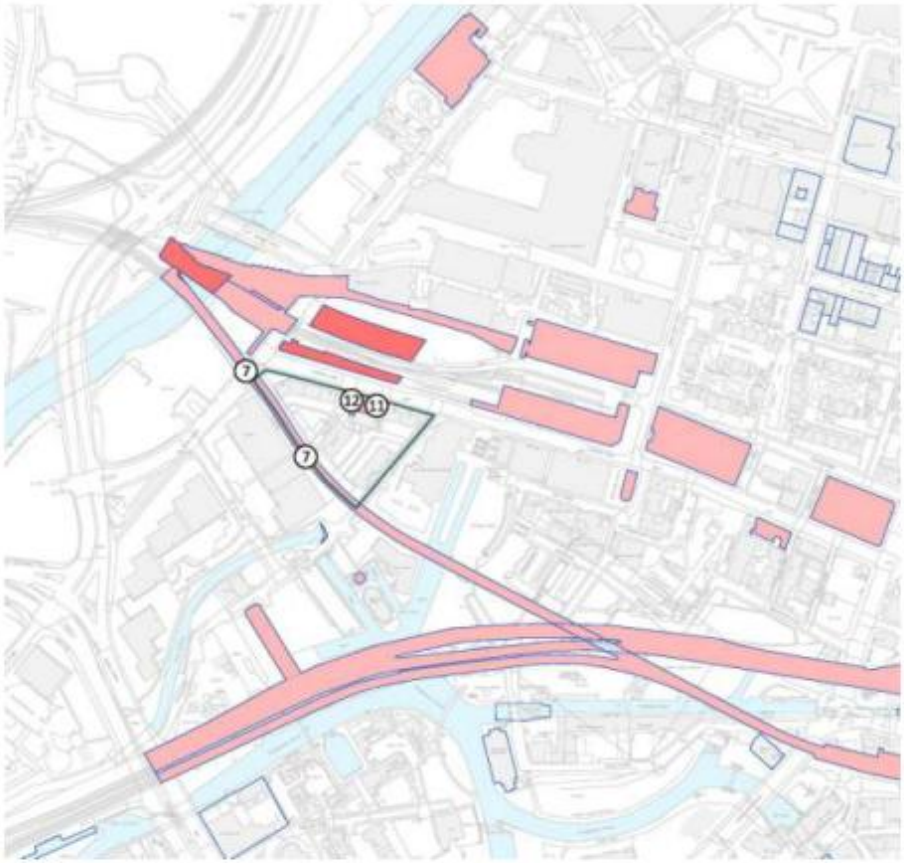


Figure 12: Character Area B: Liverpool Road Residential Character Area Plan

Key Heritage Assets within the Character Area

4.3.2 The following are the key heritage assets within the character area;

Ref	Name	Listing Grade & (Ref)	DBA Gazetteer Ref
7.	Castlefield (MSJ& AR) Viaduct	Grade II (1200855)	89
11.	123 Liverpool Road,	Grade II (1200804)	N/A
12.	Commercial Hotel, 125 Liverpool Road	Grade II (1219418)	N/A

The Origins and Development of the Area

4.3.3 As with Character Area A (Liverpool Road Station Area), the origins of the urban form and townscape characteristics of this area can be traced back to the rapid development of the eighteenth and nineteenth centuries. The lines of Water Street and Liverpool Road were both established by 1808 and the map of this date shows the first built form (the future Station Masters House) constructed on the corner of Liverpool Rd and Water Street. Further built form within the Character Area boundary, to the south of Liverpool Road, appears to have been associated with the cotton works constructed near to the Bridgewater Canal. The most significant development within this Character Area is related to the construction of the railway. The 1831 map appears to show the plan form of The Commercial Hotel, 125 Liverpool Road, whose construction therefore appears to be contemporary with the construction of Liverpool Road Station. 123 Liverpool Road followed at a slightly later date and is shown to the 1849 map. These two buildings are extant today and both listed Grade II. Rapid development of this area followed so that by the end of the nineteenth century (as seen to the 1896 map), the Character Area is bounded by the Castlefield (MSJ&AR) Viaduct to the south and Liverpool Road is lined with properties. A triangular block is formed at the corner of Liverpool Road and Water Street, enclosed by the viaduct, and behind the Commercial Hotel is a group of terraced properties to Medlock Street (seen to the 1930 aerial), the street pattern for which continues on past the viaduct.

The Prevailing or Former Uses within the Area and Their Historic Patronage, and the Influences of These on the Plan Form and Building Types

4.3.4 The prevailing former uses within the area appear to have been residential to the portion around Woollam Place and Medlock Street. Although the terraced housing has been demolished, the retention of 123 and 125 Liverpool Road has influenced the plan form and building types as these sites have been developed.

4.3.5 The Castlefield (MSJ&AR) Viaduct has influenced the manner in which the later development has evolved, whereas originally development crowded around the viaduct, now the residential development steps away in places creating areas used for car parking.

The Architectural and Historic Qualities of the Buildings and the Contribution they make to the Special Interest of the Area

4.3.6 The architectural and historic qualities of 123 and 125 Liverpool Road contribute significantly to the special interest of the area. Of particular interest is the connection of 125 Liverpool Road with the development of the station. These buildings also contribute in their group value with the station buildings and by providing an indication of the character of the area at the peak of its development, and the type of residential properties which were built in this area in the early-mid 1800s.

4.3.7 The Castlefield (MSJ&AR) Viaduct also contributes significantly to the special interest of the area, reinforcing the historic connections of this area with industry.

The Character and Relationship of Spaces within the Area and Key Views

4.3.8 As highlighted above the character of the spaces has been altered by later redevelopment. Originally the dense built form created a very tight urban grain of narrow streets. The residential development of the 1990's has stepped away from the viaduct, creating pockets of open ground which are used as car parking. Not withstanding these changes the railway viaduct still creates unique views from Liverpool Road along Potato Wharf. The viaduct is a particularly important visual element as it enters Castlefield Basin.

Prevalent and Traditional Building Materials, Textures and Colours

4.3.9 The two listed buildings, 124 and 125 Liverpool Road and the listed viaduct provide a representation of the predominant building materials which were used at the areas peak of development, most significantly

brick The residential development of the 1990's has followed this precedent and also used brick.

Local Details

4.3.10 As with the materials, the detailing of the listed buildings 123 and 125 Liverpool Road is of most interest and has formed the reference point for the neighbouring residential development which as noted to the previous Character Area, follows Georgian patterns.

The Contribution Made by Green Spaces and Other Natural or Cultivated Elements to the Character of the Area

4.3.11 There are areas of planting around the residential flats which provide visual amenity to the residents but does not particularly contribute to the urban character of the area.

The Setting of the Conservation Area and its Relationship with Surrounding Landmarks, Vistas and Panoramas

4.3.12 As with the previous Character Area this area also sits to the north but centrally within the Castlefield Conservation Area. It is adjacent to the key grouping of railway structures and is therefore important in providing a setting for these structures which includes Grade I and Grade II listed buildings, railway viaducts and bridges. This area provides the setting for key views along Liverpool Road and dynamic views moving through the area.

The Extent of Loss, Intrusion or Damage, i.e. the negative factors

4.3.13 The loss of historic built form within this character area has been significant. The only 'original' elements that this character area retains are the Castlefield (MSJ&AR) Viaduct and 123 and 125 Liverpool Road, all of which have experienced some degree of alteration. The residential development of the 1990's has aimed to replicate the Georgian detailing of neighbouring buildings but the existing form and the architectural detailing are weak.

4.11 Character Appraisal Area K: Castlefield Basin / Potato Wharf Character Area

Location

4.11.1 For the purposes of this study the Castlefield Basin / Potato Wharf Character Area has been defined as the area bounded by Liverpool Road to the north-east, Castlefield outdoor arena to the east, the Castlefield (MSJ&AR) Viaduct to the south-east, the Bridgewater Canal basin to the south-west and Potato Wharf to the north-west.

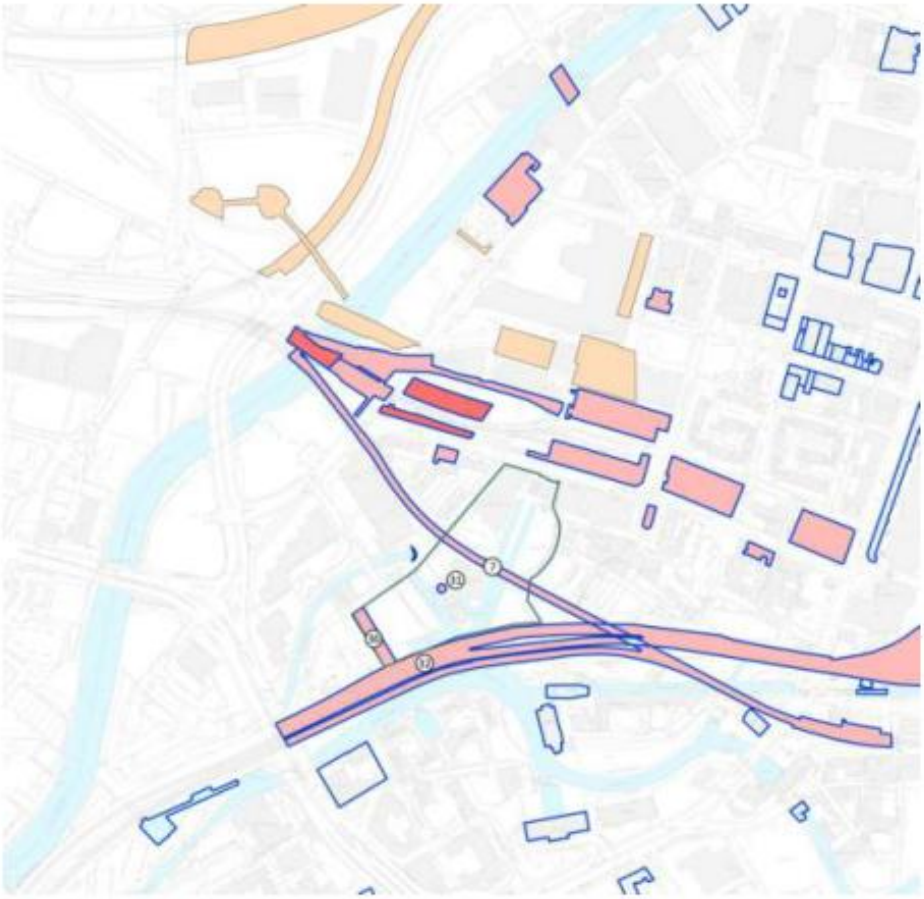


Figure 20: Character Appraisal Area K: Castlefield Basin / Potato Wharf Character Area Plan

Key Heritage Assets within the Character Area

4.11.2 The following are the key heritage assets within the character area;

Ref	Name	Listing Grade & (Ref)	DBA Gazetteer Ref
7.	Castlefield (MSJ&AR) Viaduct	Grade II (1200855)	89
30.	Bridgewater Canal Basin at Potato Wharf	Grade II (1246959)	N/A
31.	The Giants Basin	Grade II (1247068)	N/A
32.	Castlefield Railway Viaduct	Grade II (1292315)	N/A

Note: In proximity Remains of Roman Fort Scheduled Ancient Monument

The Origins and Development of the Area

4.11.3 The origins of the urban form in this area can be traced back to the establishment of the Bridgewater Canal in this area by the Duke of Bridgewater in 1765. The creation of the canal basin led to the construction of a number of warehouse structures and the area progressively developed into the 1800's. Following the canals the railways had a major impact on the development of the area. The construction of Liverpool Road station reinforced the area as a hub for transport and industry. Then the construction of the Castlefield Railway viaduct in stages from circa 1840s through to the late 1800s established the major railway infrastructure which dominates the character of this area today. The industrial uses are no longer present but recent residential development has re-established the urban density.

The Prevailing or Former Uses within the Area and Their Historic Patronage, and the Influences of These on the Plan Form and Building Types

4.11.4 The dominant influences on the urban form in this area are the canal basins, the railway viaducts and the River Medlock which have defined the parcels of land and subsequent development.

The Architectural and Historic Qualities of the Buildings and the Contribution they make to the Special Interest of the Area

4.11.5 The historic warehouse buildings that were constructed in this area during the development of the canals and railways have been lost. The principal structures that remain and contribute to the special historic interest of the area are the canal structures and railway viaducts. The Castlefield (MSJ&AR) Viaduct cuts through the area and crosses the canal basins, creating varied views of the canal basins and other railway viaducts through the arches. The multi-level

environment created by the railway arches is of principal interest and uniquely characteristic of the Castlefield area.

The Character and Relationship of Spaces within the Area and Key Views

4.11.6 As highlighted above there are many varied views created in this area, particularly through the railway arches. The multi-layered and interwoven character and relationship of the spaces within this area is such that the dynamic views achieved whilst moving through the area are significant. The Liverpool Road station buildings and associated bridges crossing Water Street cannot be directly viewed from this area but are part of the dynamic experience.

Prevalent and Traditional Building Materials, Textures and Colours

4.11.7 As with the other areas the prevalent traditional building materials are brick, stone and cast-iron.

Local Details

4.11.8 The local details vary from the use of brick and stone to the Castlefield (MSJ&AR) Viaduct to the dramatic and massive iron forms of the Castlefield Railway Viaduct.

The Contribution Made by Green Spaces and Other Natural or Cultivated Elements to the Character of the Area

4.11.9 There are areas of planting around the parking to the residential flats which provides visual amenity, screening the parking from the basin.

The Setting of the Conservation Area and its Relationship with Surrounding Landmarks, Vistas and Panoramas

4.11.10 This character area is located within the centre of the Castlefield conservation area. The changes in level separate this area visually from the key group of railway structures on Liverpool Road. However this area does have an important relationship with the adjacent railway structures of the Liverpool Road station achieved through dynamic views as the observer moves through the area. The viaduct structures located within this area are significant landmarks.

APPENDIX F – Extracts from Oxford Archaeology Desk Based Archaeology Assessment

INTRODUCTION

1.1 Circumstances of Project

1.1.1 Oxford Archaeology (OA) was commissioned by Parsons Brinckerhoff, on behalf of Network Rail, to undertake an archaeological desk-based assessment in order to support a Development Consent Order Application for a proposed new two-track rail link, which would traverse both Manchester and Salford. The link would be approximately 1.5km long with associated overhead line equipment, plant, junction equipment and signalling, and would be elevated and supported on earthworks, modified existing structures, or new structures.

1.2 Purpose and Scope of the Assessment

1.2.1 ***Purpose:*** This Assessment has been prepared for compliance with the requirements of Regulation 5(2)(m) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (the APFP Regulations) as an Application document and in accordance with the Department for Communities and Local Government guidance, 'Planning Act 2008: Guidance' and the IPC Guidance Note 2 on Preparation of Application Documents under s37 of the Planning Act 2008. It is required in order to identify any statutory or non-statutory sites, features or structures of the historic environment and to assess any likely effects of the development on them. It is also intended to provide an appraisal of the significance of any archaeological heritage assets within the site of the proposed development, and will form the basis for an Environmental Impact Assessment (EIA) which will examine the impact of the development upon these assets and inform recommendations concerning the Development Consent Order Application.

1.2.2 ***Scope:*** In accordance with central and local government guidance this assessment draws together the available archaeological, topographic and land-use information in order to clarify the archaeological potential of the site.

The assessment comprises an examination of evidence in the Greater Manchester Historic Environment Record (HER), considers the results of nearby archaeological investigations, incorporates published and unpublished material, and charts historic land-use through a map regression exercise.

1.2.3 The assessment has focused on identifying heritage features and structures within the site of the proposed development, referred to hereafter as the area within the Red Line Plan Boundary. Section 4 of this report comprises a detailed illustrated Gazetteer of these features. Heritage Features have been allocated a discrete number and these numbers are used in the text below (Site 1, Site 2 and so forth). The location of the features is marked upon Figure 12 of this report.

1.2.4 Data on the historic environment was also collected for a wider study area, and a gazetteer has been compiled of all the heritage assets within 500m from the Red Line Plan Boundary. Summary details of these sites are contained in Appendix A of this report and their location is marked upon Figures 13-15.

1.3 Location, Topography and Geology

1.3.1 ***Location:*** The Red Line Plan Boundary forms a linear corridor running for a distance of *c* 1.5 km between the Castlefield area of Manchester and Salford's historic core (NGR SJ 829 978 to SJ 837 989; Figure 1). More specifically, in its southern section, the area encompasses portions of the former Liverpool Road Railway Station, which now houses the Museum of Science and Industry (MOSI), after which it crosses the River Irwell, into Salford, in the vicinity of Prince's Bridge, where it then widens to cover an area formerly occupied by the Salford Goods Station, located to the east of East Ordsall Lane. After this point, the study area then hugs Salford Central Station (**Site 90**) and the line of several adjoining nineteenth-century railway viaducts, between Irwell Street and Blackfriars Road, and finally widens to

cover the area formerly occupied by both Salford's historic core and Exchange Station.

1.3.2 ***Geology:*** The solid geology across the entire Red Line Plan Boundary consists of Sherwood Sandstone (formerly classified as Bunter Sandstone), which is overlain in the Castlefield area, and within the area occupied by Exchange Station, by Devensian Glaciofluvial deposits. The superficial geology across the remaining portion of the Red Line Plan Boundary consists of Devensian Till (Ordnance Survey Geological Survey 1970).

1.3.3 ***Topography:*** As a region, the Manchester and Salford Conurbations lie within an undulating lowland basin, which is bounded by the Pennine uplands to the east and to the north. The region comprises the Mersey River valley, which is dominated by its heavily meandering river within a broad floodplain (Countryside Commission 1998, 125). The River Irwell forms a tributary of the River Mersey and is partly crossed by, and runs parallel with, the study area. This feature also forms the historic boundary between Manchester and Salford. Within the vicinity of MOSI, the topography across the study area slopes westwards towards the River Irwell, falling from *c* 28.3m to 26.2m Above Ordnance Datum (AOD). The site of the former Salford Goods Station resides at *c* 27m AOD, after which the topography gently rises to *c* 28m at Salford Central Station, and then to *c* 29m in the vicinity of Salford's historic core.

1.4 Statutory Sites

1.4.1 There are 13 structures/buildings with statutory protection that lie within the Red Line Plan Boundary. These include:

- Stephenson's Bridge (**Site 79**), crossing the River Irwell, and dating to 1830, which is a Grade I Listed Building (List Entry No. 1270603);
- A brick-built railway viaduct, which dates to 1830 (**Site 80**), and its extension (**Site 80**), a cattle ramp

(**Site 86**), and cast-iron bridge dating to 1905 (**Site 81**), which run from Stephenson's Bridge across Water Street and that together form a Grade II Listed Building (List Entry No. 1254726);

- A Zig Zag Viaduct (**Site 85**) between the River Irwell and Water Street, and Girder Bridge crossing the Irwell and Water Street (**Site 85**), which date to the mid 1860s and that together form a Grade II Listed Building (List Entry No. 1254829). The viaduct also incorporates the remains of an earlier station dating to 1837 (**Site 84**);
- The Water Street Bridge viaduct (**Site 85**) dating from the mid 1860s, which runs from Water Street bridge (**Site 81**) (*see above*) and that is a Grade II Listed Building (List Entry No. 1200805);
- A brick-built railway viaduct, with a cast-iron bridge across Water Street (**Site 89**), which date to 1849 and that together form a Grade II Listed Building (List Entry No. 1200855);
- The Castlefield Viaduct & Cast Iron Bridge (**Site 89**), linking to the 1849 railway viaduct (*see above*), which is a Grade II Listed Building (List Entry No. 1386189);
- The Middlewood L&MR Viaduct **(Site 91)**, which was extended in 1884. The section of this viaduct which crosses New Bailey Street, and which also supports Salford Station **(Site 90)**, forms a Grade II* Listed Building (List Entry No. 1386162);
- Part of the Middlewood L&MR Viaduct (**Site 91**), and its retaining walls, running from Chapel Street to Greengate, which forms a Grade II Listed Building (List Entry No. 1386119);
- A railway viaduct dating to 1865 (Central Railway Viaduct) (**Site 92**). The section of this viaduct which crosses New Bailey Street forms a Grade II Listed Building (List Entry No. 1386160);
- A railway viaduct dating to 1894 (Northern Railway Viaduct) (**Site 93**). The section of this viaduct which crosses New Bailey Street forms a Grade II Listed Building (List Entry No. 1386161);

- A railway warehouse dating to 1830 (**Site 104**), which is associated with the former Liverpool Road Station and that forms a Grade I Listed Building (List Entry No. 388282); and
- A passenger station and station master's house (**Site 113**), which are associated with the former Liverpool Road Station Buildings and that form a Grade I Listed Building (List Entry No. 1291477).

1.4.2 In addition, the Red Line Plan Boundary also encompasses portions of the Castlefield Conservation Area in Manchester, the Flat Iron Conservation Area in Salford, and the Cathedral Conservation Area, which is dominated by Manchester Cathedral, Victoria Station and contains portions of the historic cores of both Manchester and Salford. Castlefield was designated as a conservation area on account of its important canal and railway architecture and canal warehouses. It also contains the former Liverpool Road Station Buildings, forming part of the world's first mainline passenger railway, and covers part of Manchester's Roman settlement. The Flat Iron Conservation Area is centred on Sacred Trinity Church in Salford, and is bounded by Blackfriars Road and Blackfriars Street on the east, the River Irwell to the south, Booth Street and Bury Street to the west, and the railway line to the north, incorporating part of the historic core of Salford.

1.5 Tentative World Heritage Status

1.5.1 The southern portion of the Red Line Plan Boundary, specifically the area containing the former Buildings Station and its ancillary features, also lies within an area that formed part of the Manchester and Salford proposed World Heritage Site. The area was included within the UK's Tentative List of possible World Heritage Sites announced by the Secretary of State for Culture, Media and Sport in 1999. The proposed designation centred on Manchester as 'the archetype city of the Industrial Revolution', and concentrated on three themes: its

association with Britain's first industrial true canal, the Bridgewater Canal; with the country's first inter-city passenger railway, the Liverpool and Manchester; and with its first industrial suburb based on steam power, Ancoats. The proposed World Heritage Site was outlined in 2002 (McNeil 2002) and follows a linear route between Worsley and Ancoats along the Bridgewater Canal and Rochdale Canal, widening at the key areas of Worsley, Barton, Castlefield, and Ancoats (*ibid*).

1.5.2 However, it was not re-submitted for consideration in 2010 when the government invited submissions for inclusion on the new tentative list of sites. As such, the present assessment has not taken any further consideration of the previous tentative World Heritage Status.

METHODOLOGY

2.1 Desk-based Assessment

2.1.1 This assessment has been carried out in accordance with the relevant (Institute for Archaeologists (IfA) and English Heritage guidelines (IfA 1999; English Heritage 2006). It has focused on the area within the Red Line Plan Boundary. Heritage features data was collected for a wider study area (500m from the Red Line Plan Boundary) although the sheer size of the data set engendered (over 2000 sites) makes it unfeasible to map or discuss these sites individually. This data was assessed and has been used to provide essential contextual background for the production of the baseline survey within this report.

2.1.2 For the area within the Red Line Plan Boundary, the principal sources of information consulted were historical and modern maps, published and unpublished sources, as well as the Greater Manchester Historic Environment Record (HER), whilst data for the wider study area, 500m around this, was obtained from the HER and also select published and unpublished sources. The following repositories were consulted during the data-gathering process:

- ***Greater Manchester HER:*** *This forms a database of all known archaeological sites in the municipal area and it was consulted to establish the known sites of Cultural Heritage interest within the Red Line Plan Boundary and the wider study area. As part of the HER search, the archives of the former Greater Manchester Archaeological Unit (GMAU) were also consulted;* ***Salford Local Studies Library:*** This local studies library contains many relevant published works, as well as photographs, maps and trade directories pertinent to the Red Line Plan Boundary area;

- ***Manchester Archives and Local Studies:*** This local studies unit, housed in Manchester Central Library, similarly contains many relevant published works, as well as photographs, maps and trade directories pertinent to the Red Line Plan Boundary area;
- ***Greater Manchester Record Office, Manchester (GMRO(M)):*** The catalogue of the Greater Manchester Record Office was searched for information relating to the Red Line Plan Boundary and the wider study area. The Record Office also holds numerous railway engineering plans;
- ***MOSI:*** The archives held by the Museum of Science and Industry in Manchester (MOSI) were consulted extensively during the compilation of the desk-based assessment of the Water Street Viaducts in 2004 (Gregory *et al* 2004), and any relevant information has been incorporated into the present assessment;
- ***English Heritage Archives:*** The catalogue of the English Heritage Archives (formerly part of the National Monuments Record) was searched for information relating to the Red Line Plan Boundary and the wider study area;
- ***Oxford Archaeology North:*** OA North has an extensive archive of secondary sources relevant to the Red Line Plan Boundary area, as well as numerous unpublished client reports on work carried out in the vicinity.

2.1.3 All archaeological sites within the Red Line Plan Boundary have been included in the Site Gazetteer. Details of Cultural Heritage features within the wider 500m study area, as listed within the Greater Manchester HER, are contained in *Appendix A*. Key sites are discussed within the baseline text and short descriptions are provided within the catalogue in *Appendix A*. The locations of sites within the wider 500m study area are shown on Figures 13-15.

2.2 Site Visit

2.2.1 The Red Line Plan Boundary area was subject to a rapid site visit to assess the information derived from the desk-based sources and to relate the past landscape and surroundings to that of the present. However, this visit was confined to accessible areas within the Red Line Plan Boundary. It was therefore not possible to view the upper levels of all of the railway viaducts, with the exception of the former Exchange Station, which is now used as a car park. Access was also not possible beneath many of the viaduct arches, some of which now contain commercial concerns or are used for car parking. Any additional information recovered during the site visit has been added to the Site Gazetteer (*Section 4*), where appropriate.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Pre-industrial period

3.1.1 ***Prehistoric:*** The Red Line Plan Boundary contains tentative evidence for prehistoric activity. This evidence consists of several 'Neolithic water-rolled flints', along with a 'Neolithic flint core' (**Site 01**) from an area sandwiched between East Ordsall Lane and the River Irwell, which was later occupied by the Salford Goods Station (Hampson 1945, 162). However, the provenance of these finds is far from secure and it is quite possible that they were originally recovered from Woden's Cave, which lay further to the south-east, close to Ordsall Lane (*ibid*). In addition, the Greater Manchester HER also notes the presence of a circular stone structure from this area (**Site 01**), reminiscent of a prehistoric house or cairn, though its form, date and precise location are far from clear.

3.1.2 More generally, the floodplain of the River Irwell would probably have comprised a broad expanse of marshland, which may not have been particularly attractive for prehistoric settlement, and it appears that prehistoric activity was confined to better-drained and more topographically pronounced areas. Specifically, these comprise two separate areas, which lie east of the Red Line Plan Boundary, within the City of Manchester. One of these areas is located within Castlefield, covering the sandstone bluff which would later form the core of Manchester's Roman settlement (Section 3.3.3). In this area, several re-deposited prehistoric artefacts have been recovered during archaeological excavations at Collier Street, Barton Street, Byrom Street and Liverpool Road (Gregory 2007, 181). These artefacts include Mesolithic-Bronze Age lithics and late Bronze Age or Iron Age pottery (*ibid*). However, although these artefacts suggest a prehistoric presence in this area, its nature and

extent are far from clear, though it is likely to have been of a peripatetic nature. The second area of known prehistoric activity is located within the vicinity of Manchester Cathedral and focuses on a small watercourse, which was later modified to form Hanging Ditch, which partially enclosed Manchester's medieval settlement. Within this channel, a Bronze Age rapier and flat axe were deposited, perhaps for votive purposes (Davey and Forster 1975, item 62).

3.1.3 ***Roman:*** During the early centuries of the first millennium AD, the Roman fort of *Mamucium* was established on a sandstone bluff, close to the confluence of the rivers Irwell and Medlock, to the east of the Red Line Plan Boundary, within Castlefield (Bryant *et al* 1986). Archaeological excavation has shown that the fort was first built in the late first century and, although modified, appears to have remained in use until the end of Roman rule in Britain, three centuries later (*ibid*). Outside the defences of the fort, a substantial extra-mural settlement, or *vicus*, was also established in the late first century, which was occupied until the early third century (Jones and Grealey 1973; Jones and Reynolds and; Proctor 2005; Gregory 2007). Based on recent archaeological excavation and the distribution of Roman finds, the limits of this settlement appear to have extended northwards from the fort to approximately Quay Street, westwards along Liverpool Road for *c* 100m from the north-west corner of the fort, eastwards across Deansgate to the area now occupied by the Beetham Tower, and south-eastwards along Chester Road, terminating somewhere in the vicinity of Great Jackson Street (Plate 1).

3.1.4 Although the Red Line Plan Boundary does not contain any suspected limits of the settlement core, it is possible that Roman remains may also exist along the eastern bank of the River Irwell. For example, six Roman coins, at least five of which dated to the second century, are reported to have been found 'in 1876 while foundations were being dug for a bridge over the Irwell, near Quay Street' (Conway *et al* 1909, 84-5). These finds may

therefore suggest that the eastern bank of the Irwell, including the portion traversed by the Red Line Plan Boundary, witnessed more ephemeral Roman activity on the fringe of the Roman settlement. Furthermore, it is also possible that a Roman road, perhaps linking Manchester with the settlement at Wigan, forded the Irwell directly within the Red Line Plan Boundary, at a point close to Prince's Bridge, although confirmation remains an objective for future archaeological investigation.

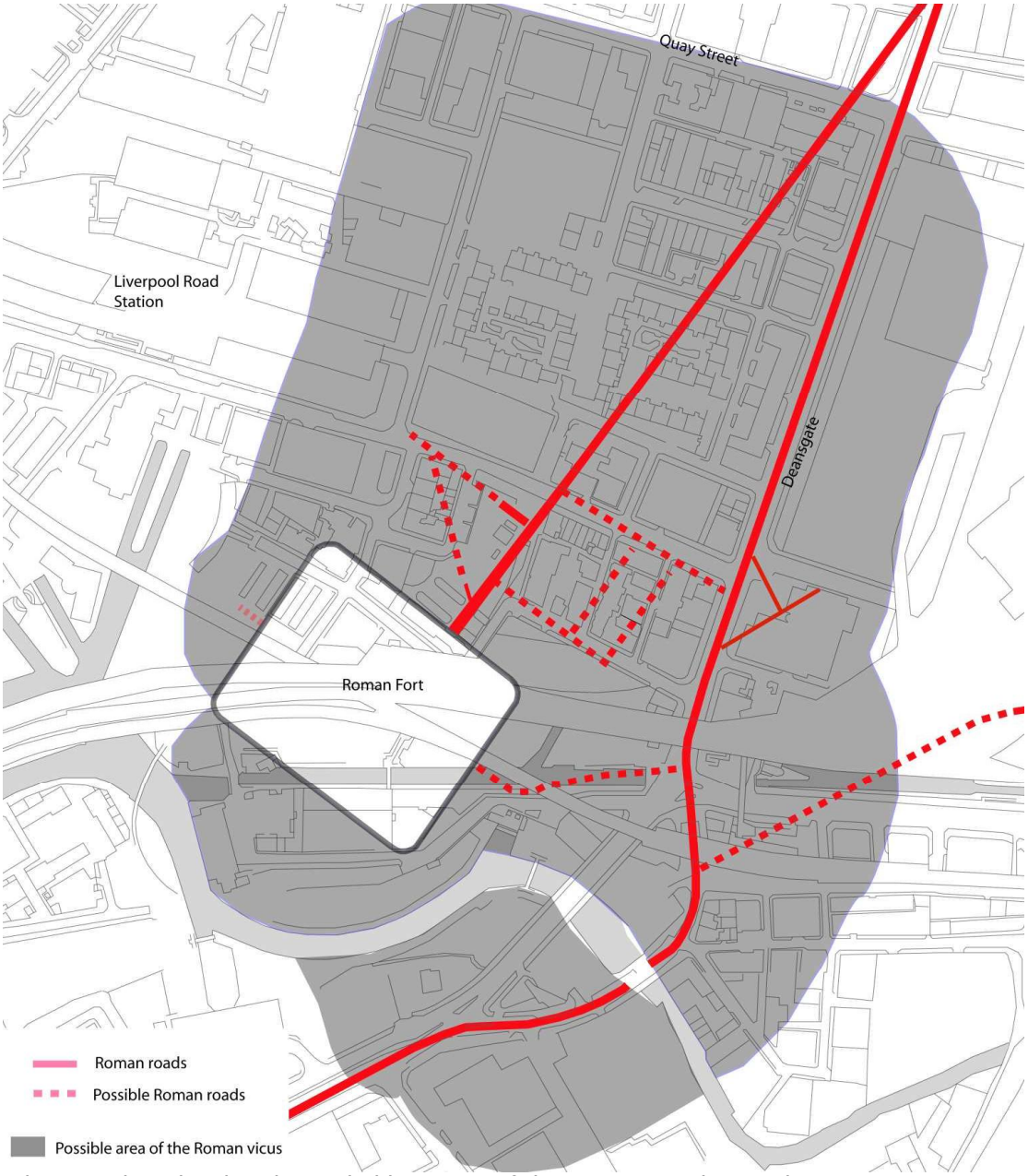


Plate 1: Plan showing the probable extent of the Roman settlement in Manchester, superimposed on modern mapping (from Gregory forthcoming)

3.1.5 ***Early medieval:*** Following the collapse of formal Roman administration in the fifth century, the area around Manchester eventually came under the control of several kingdoms. Aethelfrith extended his kingdom of Northumbria to the Mersey after the battle of Chester in *c* AD 617. Shortly after, his successor, Edwin conquered and occupied Manchester in AD 620, and it may have been during this period that settlement in the town was established around the cathedral (Farrer and Brownbill 1911).

3.1.6 The physical remains of this period are rare in the North West as a region (Newman 1996), and this is certainly the case in Manchester and Salford. One of the few artefacts in the area known of an Anglo-Saxon origin is the so-called 'Angel Stone', or effigy of the Archangel Michael, which was unearthed by workmen repairing the South Porch of the cathedral in 1871. Another remnant of the period is a Saxon-style funerary urn of probable sixth-century date, which was found during construction work in *c* 1850 just to the north of Red Bank (Morris 1983), whilst an Anglo-Saxon coin hoard was discovered at Knott Mill, Castlefield (Hill and Metcalf 1984), all of which lie beyond the Red Line Plan Boundary.

3.1.7 ***Medieval to late eighteenth century:*** The Red Line Plan Boundary covers two areas of known medieval activity. At its southern end, within the City of Manchester, it lies within an area formerly occupied by a small deer park, named Aldport Park. This park is documented in 1282 and seems to have been still in existence in about 1599. According to one report, it was destroyed in the Civil War during the early 1640s. Its boundaries are believed to have been the Rivers Irwell and Medlock and the approximate line of the later Quay Street and Peter Street on the north (GM HER 112.1.0). This park was probably bounded on its 'landward' side by a bank and ditch, and given its suspected limits, the Red Line Plan Boundary probably crosses its central area. Following its destruction, its name was recalled in the name Aldport Lane or Aldport Street which was used as

a name for Deansgate, south of Peter Street, into the early nineteenth century (Bradshaw 1985, 20-1).

3.1.8 The second focus of medieval activity encompasses Salford's medieval town. Documentary evidence indicates that following its establishment, the town was granted market status by Henry III in 1228 (Frangopulo 1962), whilst in 1231, Ranulph de Blundeville, Earl of Chester, granted this settlement its borough charter (*ibid*). Within this settlement resided the burgesses, who owned burgage plots, which were formally laid out plots of land often delimited by a boundary ditch. A survey of 1346 indicates that there were approximately 129 burgages in Salford, which were held by 52 individuals, suggesting a population somewhere in the region of between 200 and 300 people (Arrowsmith 2006). During this period, Salford was connected to Manchester via a wooden bridge across the Irwell, which was extant by 1226 (Thomson 1966, 37). This was replaced by a stone bridge, which is mentioned in the will of Thomas del Bothe of Barton in 1368, who bequeathed £30 for the erection of a chantry chapel on it (*op cit*, 52). The bridge lay at the eastern edge of the town, close to the point where Greengate and Chapel Lane converged.

3.1.9 Although no medieval maps of Salford survive, its form can be discerned, to some degree, from the early cartographic sources, principally a map dating to 1650 (Plate 2). This map which shows that by the early post-medieval period, at least, the settlement was arranged around three major routes. These included Greengate and Chapel Street (formerly Sergeant Street), which might be the earlier of the streets, and Gravel Lane, which might represent a slightly later, medieval, routeway (Arrowsmith 2006). Of these routes, Chapel Street continued beyond the town, running eventually to Warrington, via White Cross Bank, Eccles and Barton, and it formed the major westerly route into south Lancashire, for both Salford and Manchester, during the medieval period (Tindall nd, 8). The medieval marketplace was found on Greengate, to the north of the

Red Line Plan Boundary, near its junction with Gravel Lane, which was associated by a post-medieval period with a market cross, stocks and the town pump, together with a Court House (Arrowsmith 2006).

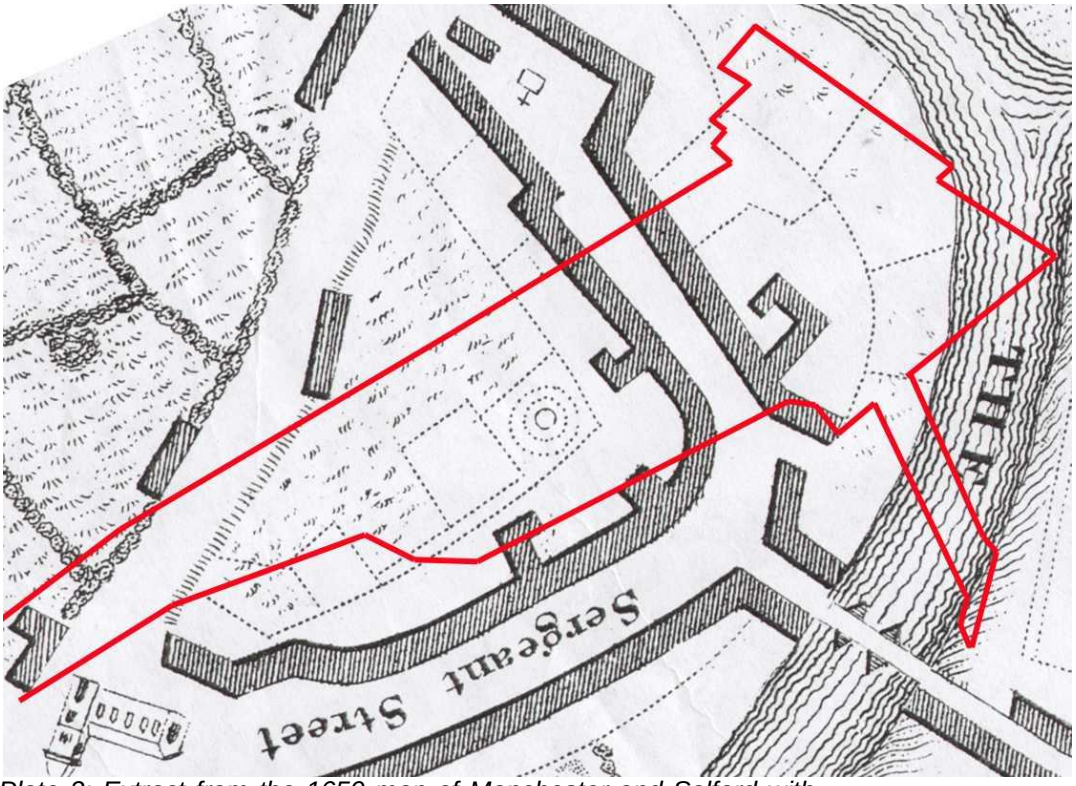


Plate 2: Extract from the 1650 map of Manchester and Salford with the portion of the Red Line Plan Boundary traversing Salford's historic core

3.1.10 Significantly, the Red Line Plan Boundary cuts a large swathe through Salford's historic core. This area is principally located beneath Exchange Station (**Site 95**), its inclined approaches, and a later viaduct to the north (Northern Railway Viaduct) (**Site 93**), and encompasses a substantial area, bounded by Greengate, Chapel Street and Gravel Lane. Casson and Berry's 1745 edition map (Plate 3) suggests that during the medieval and early post-medieval periods this area probably contained burgage plots, running back from Greengate and Chapel Street, as well as a small area of waste ground to the north. In addition, Exchange Station and the later viaduct

also traverse an area which may have originally contained medieval buildings fronting Greengate, as well as an area of burgage plots and waste ground, positioned between Greengate and the River Irwell, which are also depicted on Casson and Berry's 1745 edition map (Plate 3). It is therefore quite possible that isolated features, structures and deposits associated with medieval artefacts are present within the Red Line Plan Boundary beneath the nineteenth-century viaduct arches, and also those arches supporting Exchange Station and its inclined roadways. To the west of Exchange Station, the Red Line Plan Boundary also traverses Gravel Lane, although the 1650 map indicates that this route was less developed by this date and, unlike Greengate and Chapel Lane, was not lined by continuous ranges of buildings.

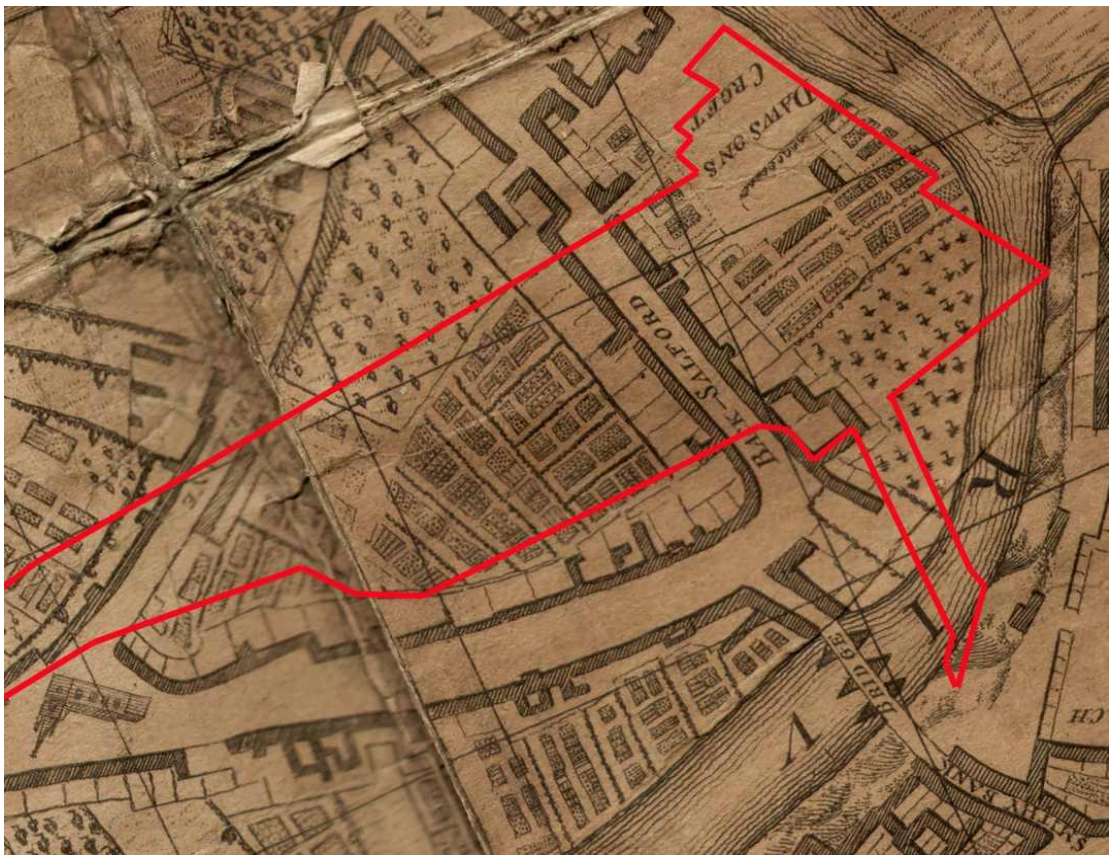


Plate 3: An extract from Casson and Berry's 1745 edition map of Manchester and Salford, with the portion of the Red Line Plan Boundary traversing Salford's historic core

3.1.11 According to Aston, who was writing in the early nineteenth century, it was during the reign of James I that Salford became 'a populous place; Sergeant Street and Greengate being nearly in the state they are now' (Aston 1816, 15). It was also during this period that the manufacture of textiles became firmly embedded within the town's economy. These textiles initially included woollens and linens, and later cottons, which probate records dating to the late sixteenth and seventeenth centuries indicate were manufactured in workshops and warehouses attached to a number of domestic dwellings (Arrowsmith 2006). These activities certainly increased the prosperity of the town and within Salford's historic core, one notable outcome included the establishment of the Sacred Trinity Church in 1635, positioned on Chapel Street to the south of the Red Line Plan Boundary, whose construction was funded by Humphrey Booth, a merchant clothier and woollen manufacturer (Hartwell *et al* 2004, 389; Vigeon 1989, 13).

3.1.12 The form of the post-medieval town is apparent on Casson and Berry's 1745 edition map, as well as Tinker's 1772 map (Plate 4). These maps depict the town during the early part of the eighteenth century, as essentially similar to that depicted on the 1650 map (Plate 2). However, these maps indicate that by this date, buildings had been established along Gravel Lane, as well as portions of Chapel Street, immediately west of the medieval core. In terms of the post-medieval buildings lining Greengate and Chapel Street, a proportion of these survived into the eighteenth and nineteenth centuries, to the north of the Red Line Plan Boundary, and their form is therefore known from early illustrations and photographs (Arrowsmith 2006). These indicate that these were of timber-frame construction and were one, or one-and-half, storeyed (*ibid*), and it is likely that these are typical of the other post-medieval buildings located within the town.

3.1.13 Within the Red Line Plan Boundary, Casson and Berry's 1745 edition map indicates that several of these buildings lining Greengate certainly lay within the Red Line Plan Boundary, and it is probable that some of these post-medieval buildings are also those depicted on Green's 1787-94 map and early nineteenth-century mapping (**Sites 10**, **12-17**, **20**, **21**, **23**, and **35**). Significantly, the sites of these potential timber-framed buildings were later covered by the Middlewood L&MR Viaduct (**Site 91**) and Exchange Station, and its inclined approaches (**Site 95**), and it is therefore possible that below-ground remains relating to these buildings survive beneath the supporting arches of the nineteenth-century railway features. Similarly, timber-framed buildings probably also lined Gravel Lane during the post-medieval period (**Sites 54**, **56**, **58**, and **110**). Moreover, one of these timber-framed buildings (**Site 110**), which functioned as the Jolly Carter pub in the nineteenth century, is depicted on a nineteenth-century photograph (Richardson 2003, 35). As with those post-medieval buildings lining Greengate and Chapel Lane, it is therefore possible that below-ground remains relating to the post-medieval buildings on Gravel Lane are present beneath the nineteenth-century railway viaducts.

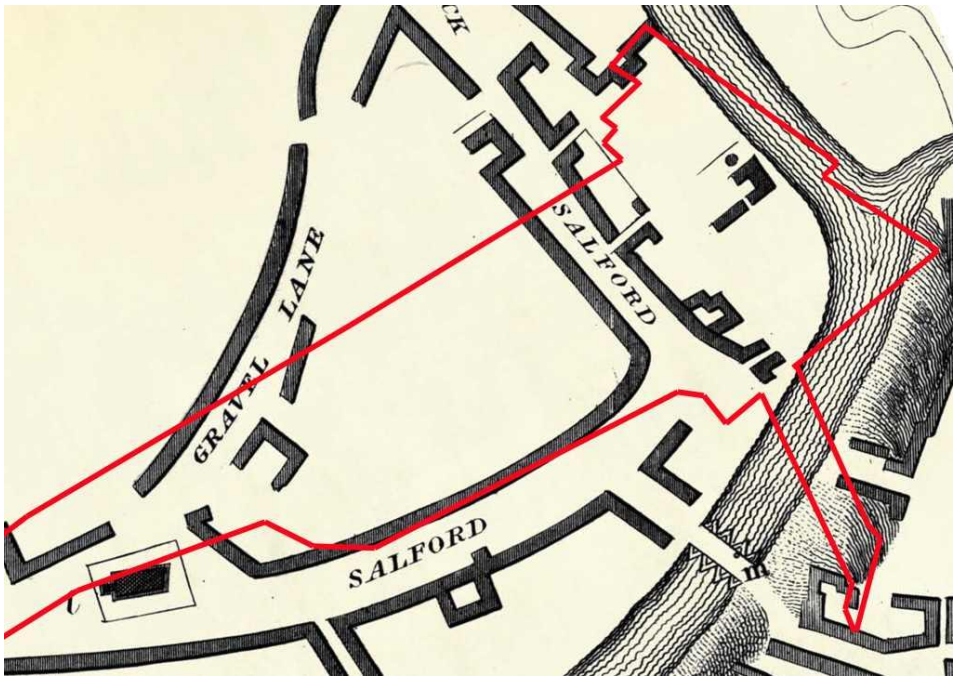


Plate 4: An extract from Tinker's 1772 map of Manchester and Salford, with the portion of the Red Line Plan Boundary traversing Salford's historic core

3.1.14 The early part of the eighteenth century also witnessed significant advances in transportation. In particular, an Act of Parliament of 1721 allowed the Mersey and the Irwell to be made navigable between Warrington and Manchester, allowing waterborne trade to enter Manchester and Salford for the first time, and providing an efficient link to the expanding port of Liverpool. (Hadfield and Biddle 1970, 16-18). The navigation was probably completed in 1736 and by 1740 wharfage facilities for boats of up to 50 tons were provided by a quay established on the Manchester side of the river in 1735 by Edward Byrom, a wealthy cloth dealer and one of the proprietors of the Mersey Irwell Navigation Company (*ibid*). The quay lies to the north of the Red Line Plan Boundary, at the bottom of Quay Street, strategically located to carry much of the town's trade, with a river frontage of 136 yards (George and Brumhead 2002, 22). This street also linked to Water Street, whose southern end lies within the Red Line Plan Boundary.

This street, which joined with Quay Street at a right angle and provided a more direct link between the quay and the town of Manchester, appears from the map evidence to have been laid out in about 1750 (Gregory and Bell 2008). In the early 1770s, the Navigation Company then opened a quay on the opposite side of the River Irwell, with the intention of securing the Salford trade (Nevell 2004, 31). This quay also lay at the bottom of a route, similarly named Quay Street, and its position is initially depicted on Tinker's 1772 map. The northern end of this street, at its junction with Quay Street, is located within the Red Line Plan Boundary.

3.2 Industrial period *Late eighteenth to early nineteenth century (Figures 2-6):* In the latter decades of the eighteenth century, both Salford and Manchester entered a period of massive expansion, largely as a result of the rise of the region's textile industry. This resulted in a rapid increase in population, and a concomitant growth of both urban centres, which continued throughout the early part of the nineteenth century. A summary of the development of the townscape during this period from an architectural perspective is presented in the Heritage Assessment produced by BDP (BDP 2012).

3.2.2 Within Salford, the town's textile tradition was based upon weaving and finishing, using the relatively pure water of the Irwell for bleaching (Williams with Farnie 1992, 22). Within Salford, the River Irwell also had considerable potential to power waterwheels, offering a distinct advantage over Manchester to pioneering factory masters prior to the advent of steam engines. Hence, in 1782, James Ackers, Jonathan Beever and Joseph Ramsbottom established Bank Mill and William Douglas built a mill beside the Irwell, at Pendleton in Salford, representing two of the earliest water-powered mills in Lancashire (Aspin 2003, 453); the sites of both of these mills lie to the west of the Red Line Plan Boundary. Salford was also notable in cotton-spinning history, as it became the site of the seven-storey Salford Twist Mill,

built in 1799-1802, and was one of the first buildings with a fireproof iron frame (Williams with Farnie 1992, 23).

3.2.3 The Red Line Plan Boundary contains numerous sites which hold relevance for understanding the process of industrialisation of both Manchester and Salford. In terms of industry, the River Irwell has a particular importance, as along its course numerous textile-finishing works were established during the late eighteenth and early nineteenth centuries (Miller 2012). Two such sites, the dye works located at Dawson Street (**Site 09**) and Water Street (**Site 77**), lie within the Red Line Plan Boundary.

3.2.4 In addition to the textile-finishing works, the Red Line Plan Boundary also contains two textile mill complexes. The earliest of these lay within Dawson's Croft (**Site 03**) and is plotted on Green's 1787-94 map, adjacent to the River Irwell. Its position, and its late eighteenth-century date, indicates that initially this mill was water powered, though its buildings and power systems appear to have been progressively rebuilt and modified over the course of the early nineteenth century, particularly following the construction of the 1844 railway viaduct (*Section 3.2.15*). The other textile mill, located within the Red Line Plan Boundary, was positioned on Foundry Street (**Site 49**), and historic mapping suggests that this site dates to the early nineteenth century.

3.2.5 Apart from the sites involved in textile manufacturing and finishing, the Red Line Plan Boundary contains other significant sites associated with the early textile industry. One of these was Salford's first linen and woollen cloth hall (**Site 19**), a building which dates to the late eighteenth century, and was positioned to the rear of Greengate. This site formed the focus for trade in Salford's traditional fabric types and it was in operation until 1814 (Tomlinson 1989, 21), after which date it appears to have been converted into housing. Following its closure, two halls were then constructed in order to house Salford's linen and woollen market, and one of these (**Site 39**) also lay within the Red Line Plan Boundary. However, by the mid nineteenth-century this

building, like its late eighteenth-century predecessor, had been partly demolished and converted into housing.

3.2.6 Several other industries, dating to the late eighteenth or early nineteenth century, are also located within the Red Line Plan Boundary. These include: an iron works (**Site 18**) adjacent to the River Irwell; two eighteenth-century breweries (**Sites 02** and **46**), one of which (**Site 46**) possibly formed the original site of the Cook Street Brewery; an early nineteenth-century rope walk (**Site 63**); and a small early nineteenth-century industrial works on Gore Street (**Site 59**).

3.2.7 The late eighteenth and early nineteenth century is also characterised by significant advances in waterborne infrastructure and the development of pre-existing areas of wharfage, and several sites relevant to these advances are located within the Red Line Plan Boundary. One of these sites is located at the far southern end of the Red Line Plan Boundary and consists of a series of six locks, which connected the Manchester, Bolton, and Bury Canal to the River Irwell. This canal, which was in use by 1795, was designed as a means of transporting coal to Manchester and Salford from the collieries situated to the north in the Irwell valley (Gray 1989, 6). However, the river locks were not an original feature of this navigation and were not opened until 1808 (*ibid*). The Manchester side of the Irwell, along Water Street, which formed the site of the Old Quay Company's wharf (*Section 3.1.8*), also witnessed considerable development during the late eighteenth and early nineteenth century through the construction of a series of warehouses (George and Brumhead 2002) and one of these, the New Botany Warehouse (**Site 78**), was positioned within the Red Line Plan Boundary. This warehouse, which was demolished in 1981, was constructed by the Old Quay Company in 1824, had five storeys, with its first floor being supported by cast-iron columns (Fitzgerald 1980, 32).

3.2.8 Aside from industrial sites, and those connected with the areas textile economy, the Red Line Plan Boundary

contains a large swathe of late eighteenth and early nineteenth-century workers' housing (**Sites 08**, **10**, **13**, **20**, **22-3**, **25**, **28-33**, **36-7**, **40-5**, **47**, **50-3**, **55**, **57**, and **60**). Within Salford, this housing was largely concentrated within its historic core and also extended to the south-west within an area roughly bounded by Chapel Street, Irwell Street and the River Irwell. Beyond this zone, although a small block of housing was established during the 1820s (**Site 62**), in the early nineteenth century this low-lying area appears to have been used for horticulture and contained a series of garden plots, lanes and small buildings (**Sites 64-8**). Within the Manchester portion of the Red Line Plan Boundary, a small block of housing (**Sites 107-8**) had also been established in the early nineteenth century, prior to the construction of the Liverpool Road Station Buildings.

3.2.9 The housing within the Red Line Plan Boundary consists of the three major forms of workers' dwelling, which were to characterise urban housing within industrial Manchester and Salford. These types include double-depth houses, some of which were provisioned with yards and privies to the rear, and the more insalubrious blind-back and back-to-back houses, which typify early nineteenth-century slum dwelling. Nestling within these areas of housing, the Red Line Plan Boundary also contains other sites integral to the functioning of the late eighteenth- and early nineteenth-century town. These included sites of worship (**Sites 06**, **38**, and **53**), education (**Sites 27** and **61**) and 15 public houses/beer houses (**Sites 14**, **21**, **30**, **33**, **36**, **37**, **41** (x3), **42-3**, **44** (x2), **47** and **110**). In addition, two alehouse yards were found within the Red Line Plan Boundary, which were positioned to the rear of the Spread Eagle (**Site 24**) and King's Head (**Sites 25** and **26**) public houses. A stagecoach service to Leeds and Liverpool is known to have run from the Spread Eagle Yard during the late eighteenth and nineteenth centuries (Richardson 2003, 3), whilst in the nineteenth century the King's Head Yard, the largest inn yard in Salford, is known to have contained cottages, stabling for *c* 100 horses and a

coach house (*op cit*, 5). An early nineteenth-century police station (**Site 32**) also lay within the Red Line Plan Boundary, suitably positioned within the heart of Salford's historic core.

3.2.10 Another site significant to the late eighteenth-century history of Salford was New Bailey Prison (**Site 73**). Opened in April 1790 as a replacement for the Old Dungeon, New Bailey was the chief prison for the 'Hundred of Salford'. (Hampson 1930, 188). It was enlarged and substantially modified in 1816 (*op cit*, 189), through the construction of additional felon wards, workshops, a schoolroom and extended grounds, all of which were enclosed within a prison wall. In July 1868 the prison was closed (Gray 1989, 76), and in 1871 it was demolished, and felons were then incarcerated in the newly opened prison at Strangeways (Hampson 1930, 189). Portions of the late eighteenth- and early nineteenth-century prison lie partially within the Red Line Plan Boundary.

3.2.11 ***Mid nineteenth to twentieth century (Figures 7-9):*** Across the Red Line Plan Boundary area, the period dating between the mid nineteenth and twentieth century was dominated by the development of railways. Importantly, the Red Line Plan Boundary contains a series of sites which hold great relevance for understanding railway development both regionally and nationally if not internationally. The area also contains other sites pertinent to the industrial development of Manchester and Salford. Significantly, in the portion of the Red Line Plan Boundary positioned to the north-east of Irwell Street, the construction of features relating to the nineteenth-century railways necessitated the partial or complete demolition of any pre-existing buildings lying within their footprints, and made their way through previously undeveloped areas and as such greatly influenced the structure of the urban fabric that survives today.

3.2.12 The network of impressive railway structures within the Red Line Plan Boundary was developed progressively

between 1830 and the early twentieth century. The principal stages in its development are summarised in Plate 5.

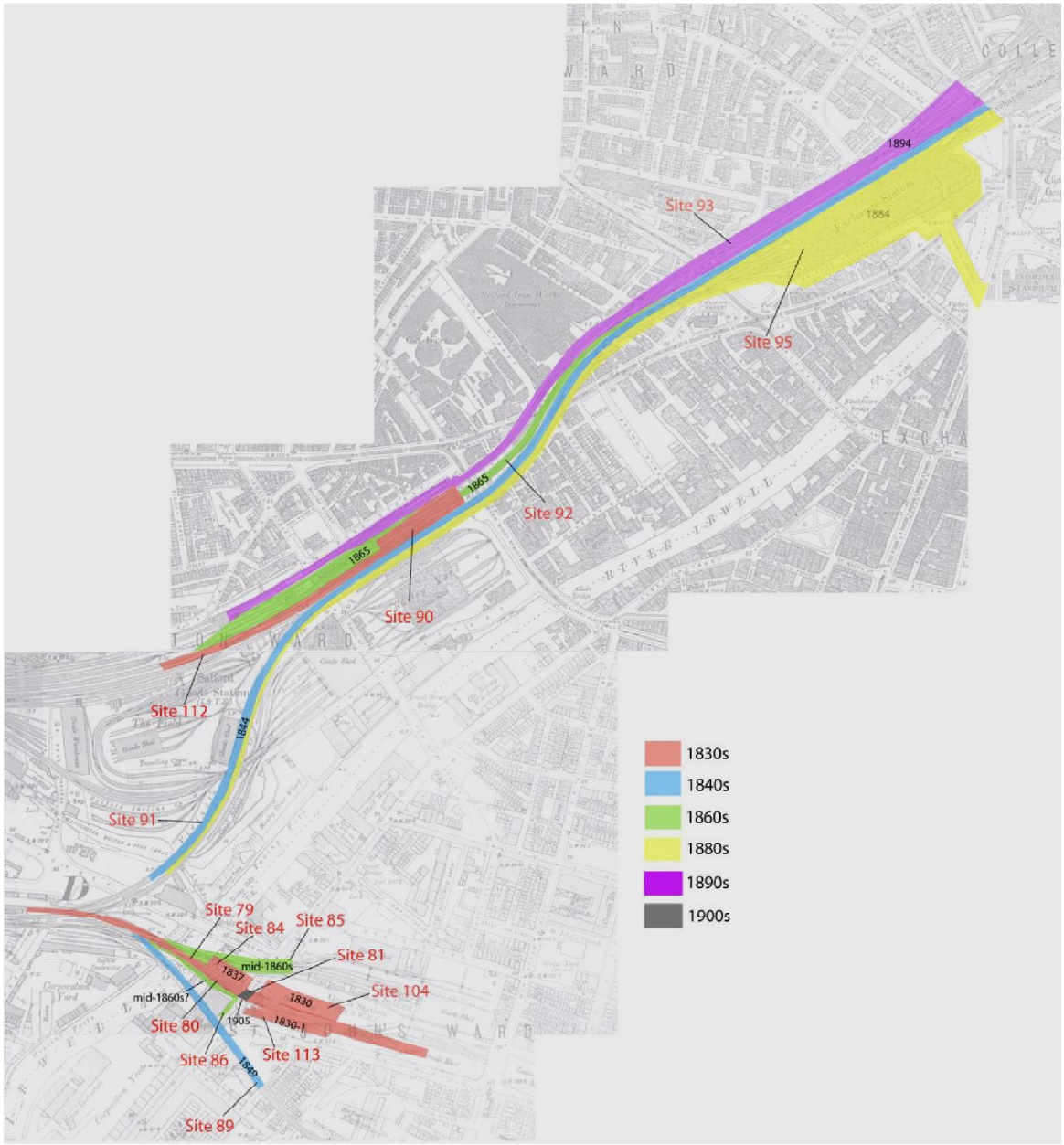


Plate 5: Plan showing the phased development of railway structures within the Red Line Plan Boundary

3.2.13 An important section of the earliest passenger railway in the world, dating to 1830 (Fitzgerald 1980), lies within the Red Line Plan Boundary. This railway was constructed by the Liverpool and Manchester Railway (L&MR)

Company, linking Liverpool and Manchester, with Liverpool Road Station forming its Manchester terminus. This terminus lay either side of Water Street, and the line was originally carried across the River Irwell and Water Street by a skewed masonry bridge (**Site 79**), designed by George Stephenson (Fitzgerald 1980, 19), and a brick-built viaduct (**Site 80**) and brick and cast-iron girder bridge (**Site 81**), which were both constructed by Brockbank and Findlay (Thomas 1980, 50). These elements lie directly within the Red Line Plan Boundary and, although the cast-iron and girder bridge was demolished and rebuilt in 1905 (**Site 81**), the masonry bridge (**Site 79**) and brick-built viaduct (**Site 80**) are still extant and form Grade I and II Listed Buildings respectively, whilst the later 1905 bridge (**Site 81**) is a Grade II Listed Building. The area beneath the brick-built viaduct was also originally used as stabling and it appears that below-ground remains associated with this may survive (**Site 80**).

3.2.14 In addition to the bridges and viaduct, several other elements associated with the 1830s railway terminus also fall within the Red Line Plan Boundary. To the west of Water Street, these elements included a ramp (**Site 82**), allowing cart access over the masonry bridge, a water tower (**Site 82**) and a single-storey building (**Site 83**), all of which had been demolished by the late nineteenth century. In addition, the Liverpool Road arrival station (**Site 84**) was also located in this area. This station was designed by Haig and Franklin and was constructed in 1837 immediately north of the 1830 viaduct (**Site 80**). Its platform was accessed via an inclined roadway and, at platform level, cast-iron columns supported its roof, whilst its western end functioned as a loading dock. Beneath, and supporting the station were also vaults used for stabling and storage and it appears that these elements, along with the stations outer façade, facing Water Street, are partially extant and were incorporated into a later Zig Zag Viaduct (**Site 85**). This later structure is a Grade II Listed Building.

3.2.15 To the east of Water Street, elements associated with the 1830s terminus, which fall within the Red Line Plan Boundary, include three warehouses (**Sites 104-6**) and portions of the departure station and adjoining station master's house, which form part of the Liverpool Road Station Buildings (**Site 113**). The station master's house pre-dates the station and was in existence in 1808 and is also known to have been occupied by 'John Rothwell, of the dye works partnership Rothwell Harrison' (Fitzgerald 1980, 53), whose dye works was located within the Red Line Plan Boundary, to the north-west (**Site 77**). The building was then occupied by Joseph Green, the L&MR's agent, from July 1830 (*ibid*). The attached departure station was constructed between 1830 and 1831, and together with the station master's house forms a Grade I Listed Building. It was divided into first and second class rooms/booking offices, which could be accessed through separate entrances fronting Liverpool Road (*op cit*, 52), and now forms the world's oldest surviving passenger railway station. In terms of the warehouses, the earliest of these (**Site 104**) was built in 1830 and is still extant. It is a Grade I Listed Building and represents the first building to be completed at Liverpool Road Station Buildings and thus forms the world's oldest extant railway building (Greene 2002, 26). The other warehouses (**Sites 105** and **106**) were constructed in 1831, though both were demolished in the mid 1860s during the expansion of the station (*Section 3.2.17*). During the late 1830s, Manchester's and Salford's rail network was further developed through the construction of the Manchester, Bolton, and Bury (MB&B) railway. This railway was carried across Salford on the brick-built MB&B Viaduct (**Site 112**) and its original terminus was Salford Central Station (**Site 90**), which lies within the Red Line Plan Boundary. This station fronted New Bailey Street and contained the head offices of the MB&B Railway (Gray 1989, 76). This functioning station still survives was opened in 1838 (Holt 1986, 108), and was modified in 1865, 1884, and 1894, particularly on its

northern side. Portions of this station form part of a Grade II* Listed Building.

3.2.16 Further developments to the rail system then occurred in the 1840s due to the opening of the Middlewood L&MR Viaduct in 1844 (**Site 91**), running from Ordsall Lane to the newly opened station at Hunt's Bank (later Victoria). This line was constructed by the L&MR and was carried on a brick-built viaduct through Salford Station, onwards to Victoria. It was also linked to two engine houses (**Site 94**), which lay within Salford's historic core. This viaduct is extant and portions of it form a Grade II* Listed Building. The construction of this line, and Hunt's Bank Station, also had a significant effect on the Liverpool Road Station Buildings (*see above*). In consequence, the station became defunct as a passenger terminus and was thus converted into a goods station, resulting in several alterations to the fabric of the original station buildings (Fitzgerald 1980, 53).

3.2.17 In addition to the 1844 line, the Red Line Plan Boundary is also traversed by another railway line (**Site 89**) dating to the 1840s, the Castlefield MSJ&AR Viaduct. This line was constructed by the Manchester and South Junction and Altrincham Railway (MSJ&AR), opened in 1849, and was designed as a link between London Road (later Piccadilly) Station and the L&MR line at Ordsall Lane (Holt 1986, 114). Within the Red Line Plan Boundary, this line was carried on a brick-built viaduct, with a bridge across the Irwell, and a cast-iron bridge across Water Street, all of which are extant and are Grade II Listed.

3.2.18 The latter half of the nineteenth century witnessed further developments and alterations to the railway system. At the Liverpool Road Station Buildings, this included the expansion of the goods station involving the construction of several features which lie within the Red Line Plan Boundary. These include a brick and cast-iron viaduct, associated with two cast-iron bridges crossing the Irwell (the Zig Zag Viaduct & Water Street Bridge and Girder Bridge) (**Site 85**), which were constructed in the mid 1860s. These extant structures form a Grade II Listed

Building and they linked the former L&MR line, which by the mid 1860s was operated by the London and North Western Railway (LNWR), with the London and North Western bonded warehouse and the Great Western warehouse (Fitzgerald 1980, 59). During the construction of this new link, the former 1837 arrival station (**Site 84**) was partly demolished and its lower portions subsumed into the Zig Zag Viaduct (**Site 85**) positioned between Water Street and the River Irwell. These viaduct arches were subsequently used for stabling and portions of this stabling were partly recorded in 2004 (Gregory *et al* 2004). These remains included timber stalls and a hay loft in one viaduct arch, whilst stone post-pads and flooring were noted in the remaining viaduct arches (*ibid*). It was also during the latter part of the nineteenth century that a travelling crane was constructed at the Liverpool Road Station Buildings (**Site 109**) and the original 1830 brick-built viaduct (**Site 80**), positioned between the River Irwell and Water Street was expanded on its southern side, which entailed the demolition of an earlier ramp and water cistern (**Site 82**). This extended section of viaduct is extant and linked to a cattle ramp (**Site 86**), which is also extant and forms a Grade II Listed Building running down from the viaduct parallel with Water Street. The cattle ramp, in turn, was integral to the functioning of covered pig market (**Site 86**), which lay adjacent to Water Street.

3.2.19 Outside of the Liverpool Road Station Buildings, within the Salford portion of the Red Line Plan Boundary, major alterations were made to the pre-existing system of railways through the construction of additional viaducts and station facilities. Initially, this included the construction of a small extension to the MB&B Viaduct (**Site 112**) and also an additional railway viaduct running between Salford Central Station and Victoria (Central Railway Viaduct) (**Site 92**). This viaduct opened in 1865 and was constructed by the Lancashire and Yorkshire Railway (L&YR), who by this date had subsumed the MB&B railway. The construction of this viaduct, which is extant and contains portions forming a Grade II Listed

Building, also necessitated the reconstruction of Salford Central Station (**Site 90**).

3.2.20 Following the construction of the 1865 viaduct, and the concomitant alteration to Salford Station, a major scheme of railway construction then occurred in the 1880s connected to the establishment of Exchange Station (**Site 95**), which opened in 1884 (Holt 1986, 134). This station was built across the centre of Salford's historic core and was supported by a series of brick-built arches and its platform level could be accessed by two inclined roadways, named Salford Approach and Cathedral Approach, the latter of which also crossed the River Irwell. Although all of the original station buildings are no longer present, the station's supporting arches are still extant, as are the inclined roadways. In addition, portions of the platforms, as well as a footbridge, are still visible at platform level (**Site 95**). The construction of Exchange Station also entailed the extension of the Middlewood L&MR Viaduct (**Site 91**). This extension is extant and is largely constructed in brick, and is butted directly against the southern side of the pre-existing Middlewood L&MR Viaduct (**Site 91**).

3.2.21 A final extant nineteenth-century railway viaduct (Northern Railway Viaduct) (**Site 93**) was constructed in 1894 and, within the Red Line Plan Boundary, ran from immediately east of Salford Station (**Site 90**), which itself was extended during its construction, and Victoria. This viaduct is largely brick-built, though a cast-iron portion across New Bailey Street forms a Grade II Listed Building.

3.2.22 Outside of the railway viaducts and former passenger stations, at Liverpool Road, Salford Central and Exchange Stations, the area between Irwell Street and Ordsall Lane also formed part of the Salford Goods Station in the latter half of the nineteenth century. This site was acquired by the MB&B railway in the mid nineteenth century (Gray 1989, 76), and initially contained a wharf adjacent to the Manchester, Bolton, and Bury Canal (**Site 74**). However, by the late

nineteenth century the site had been considerably developed, particularly following the demolition of New Bailey prison in 1871 (*Section 3.2.9*), whose site was used as part of this goods station, and following the construction of a railway line directly into the goods station in 1867 (Gray 1989, 76). Access to this area was further enhanced following the construction of Prince's Bridge in 1863 (**Site 87**), which allowed access between Water Street and East Ordsall Lane. During the late nineteenth-century historic mapping indicates that within the Red Line Plan Boundary the goods station contained a series of buildings and ancillary structures. The major buildings included railway warehouses (**Sites 96**, **98**, and **111**), goods shed (**Site 97** and **102**), whilst smaller buildings were positioned on Irwell Street (**Site 103**) and in the northern portion of the goods station (**Sites 99** and **100**). Moreover, access from the adjacent railway viaduct in this area, to the goods station below, was via two wagon hoists (**Sites 99** and **101**). In addition, to serving the railway, the goods station was provisioned with a wharf (**Site 69**), positioned adjacent to the River Irwell, which was also originally associated with a canal arm linking with the Manchester, Bury, and Bolton Canal.

3.2.23 Apart from the major features associated with the evolving nineteenth-century railway system, the Red Line Plan Boundary also contains the sites of several mid nineteenth-century industrial buildings and areas of housing. Within Salford's historic core, specifically the area forming Dawson's Croft, these were associated with the textile industry and included: a cotton mill (**Site 02**), forming part of the Dawson's Croft Cotton mill complex (**Site 03**), which appears to have subsumed an earlier brewery building; a dye works (**Site 12**); and a print works (**Site 04**).

3.2.24 Other mid to late nineteenth-century industrial sites within the Salford portion of the Red Line Plan Boundary included; a dye works (**Site 70**), marble works (**Site 71**), and industrial buildings (**Site 72**), all on Irwell Street, which were all later replaced by the Salford Goods

Station; an iron works (**Site 88**); and a late nineteenth-century engineering works (**Site 11**). The remaining nineteenth-century industrial works are located within the Manchester section of the Red Line Plan Boundary and included a late nineteenth-century hide and skin yard (**Site 48**) and a mid nineteenth-century paper mill (**Site 114**), which was replaced by a late nineteenth-century abattoir (**Site 115**). A row of mid nineteenth-century double-depth and single-depth houses (**Site 75**), fronting Woollam Place and Medlock Street and forming workers' housing, were also found close to these latter sites, whilst a larger, and more salubrious dwelling (**Site 76**), also fronted Woollam Place.

3.2.25 ***Twentieth century (Figs 10 and 11):*** the pattern of mid and late nineteenth-century development was largely retained into the twentieth century, and many of the nineteenth-century features, particularly the railway viaducts, and Salford Central Station, still form important components of Salford's and Manchester's infrastructure and townscape; this is discussed in the Heritage Assessment (BDP 2012). However, the twentieth century did witness the establishment of an asphalt plant (**Site 69**) within the Red Line Plan Boundary and the destruction of many nineteenth-century sites, notably those associated with the Salford Goods Station (**Sites 97-103**), the New Botany warehouse (**Site 78**), and those elements of Dawson's Croft Mill (**Site 03**), which lay to the north of the nineteenth-century railway viaducts. Exchange Station (**Site 95**) was also severely damaged during the 1940 Manchester Blitz and was eventually closed in 1969 (Hall 1995). Similarly, the Liverpool Road Station Buildings lay derelict for much of the twentieth century until its conversion into the MOSI in 1980.

APPENDIX G – Extract from Gazetteer of Sites relevant to application site numbered 80-84 from Archaeology Desk Based Assessment

Site number	**75**
Site name	**Woollam Place/Medlock Street**
NGR	SJ 8296 9779
Site type	Site of housing
Period	Mid-nineteenth century
HER No	**None**
Stat. Designation	None
Sources	Historical mapping
Description	The OS large-scale 1849 survey plots the position of a row of double-depth properties with outshuts and yards to the rear fronting Woollam Place, and positioned either side of the MSJ&AR viaduct (**Site 89**). To the rear of these properties, and separated by an alleyway this map also depicts a row of single-depth properties, fronting Medlock Street, and a small timber yard. By the time of the 1888-9 OS 1:2500 survey two additional single-depth properties had been constructed across the site of the timber yard. These buildings were extant in 1932, but were demolished in the latter part of the twentieth century. The site is now partially occupied by twentieth-century housing.
Assessment	It is probable that below-ground remains are present associated with the demolished housing. However, the survival and extent of these remains are unknown.

Site number	**76**
Site name	**Woollam Place**
NGR	SJ 8294 9781
Site type	Site of house
Period	Mid-nineteenth century
HER No	**None**
Stat. Designation	None
Sources	Historical mapping

Description The OS large-scale 1849 survey plots a detached house fronting Woollam Place, which has an L-shaped plan. This property had been demolished by the time of the 1915-16 OS 1:2500 survey. The site is presently vacant.

Assessment It is possible that below-ground remains associated with this site are present. However, their survival and extent are unknown.

Site number **77**
Site name Water Street
NGR SJ 8291 9795 (centred on)
Site type Site of dye works
Period Late eighteenth-early nineteenth century
HER No **12375.1.0 and 12669.1.1-6**
Stat. Designation None
Sources Historical mapping; Trade Directories; Gregory *et al* 2004

Description Green's 1787-94 survey plots the position of a dye works adjacent to the River Irwell, which consists of a large building with an irregular T-shaped plan, six smaller ancillary buildings immediately to the south-west, and a further ancillary building to the north-east. Although these buildings range in size, six of them are approximately square, rectangular or T-shaped, while the largest building has an L-shaped plan. Immediately to the east and south and associated with this larger building are two allotments, whilst to the south-west Green's map depicts an area containing tenters. By the time of Swire's 1824 survey those buildings mapped by Green directly adjacent to the River Irwell formed a single wing, which linked to the large T-shaped dye-house located to the north. By this date the dye

works were owned by Rothwell and Harrison (Baines 1825, 257), but by the 1830s the dye works were under the ownership of Messrs. Harrison & Company (Anon 1833). An early lithograph suggests that the dye houses were two-storey buildings (Gregory *et al* 2004, illus 8). It is probable that the form of the dye-works was slightly modified during the early 19th century as Bancks' 1831 survey indicates that an extra building had been constructed and two of the buildings plotted on Green's 1787-94 map had been expanded. It also appears as if one of buildings had been demolished and presumably this was required as this structure was located on the line of the 1830 railway viaduct (**Site 80**). In addition, approximately half of the large T-shaped dye house plotted on Greens 1787-94 survey had been demolished and replaced by a warehouse (**Site 78**). It is possible, however, that the dye works used some of the space found beneath the viaduct arches as Walker (1830, 43) comments that 'the arches will be appropriated to various mercantile purposes; those nearest the river being already employed as a dye-work'. The remaining element of the dye works were then probably demolished prior to the construction of the Liverpool Road arrival station in 1837 (**Site 84**). The site was later partially covered by this station, Prince's Bridge (**Site 87**), and a brick-built viaduct dating to the late nineteenth century (**Site 85**).

Assessment

It is possible that below-ground remains associated with this site are present beneath the later viaduct arches and also in the area to north formerly occupied by the

warehouse. Although in the northern area their survival and extent is unknown, possible remains relating to the dye works were uncovered during a scheme of geotechnical test pitting (Gregory *et al* 2004) undertaken next to the brick-built railway viaduct (**Site 85**). These remains consisted of a handmade brick wall exposed in the one of the test pits (TP1), which may have formed part of the large L-shaped dye-house plotted on Green's map of 1787-94 (*ibid*).

Site number	**89**
Site name	**Manchester and South Junction and Altrincham Railway (MSJ&AR) Viaduct and bridges over River Irwell and Water Street**
NGR	from SJ 8295 9775 to SJ 8275 9797; Irwell Bridge, SJ 8281 9793; Water Street Bridge, SJ 8288 9785
Site type	Extant viaduct and bridges
Period	Mid-nineteenth century
HER No	**3081.1.0**
Stat. Designation	Garde II Listed Building (railway viaduct Listed Entry No. 1200855; Irwell Bridge Listed Entry No. 1386189)
Sources	Historical mapping; Documentary; HER
Description	The MSJ&AR was authorised by an Act of Parliament in 1845 and opened in 1849. It was originally planned as a line linking London Road (now Piccadilly) Station with the Manchester to Liverpool line at Ordsall Lane. The Application Area is traversed by the viaduct carrying this line, which is a Grade II Listed Building. The viaduct has segmental arches and brick piers with stone

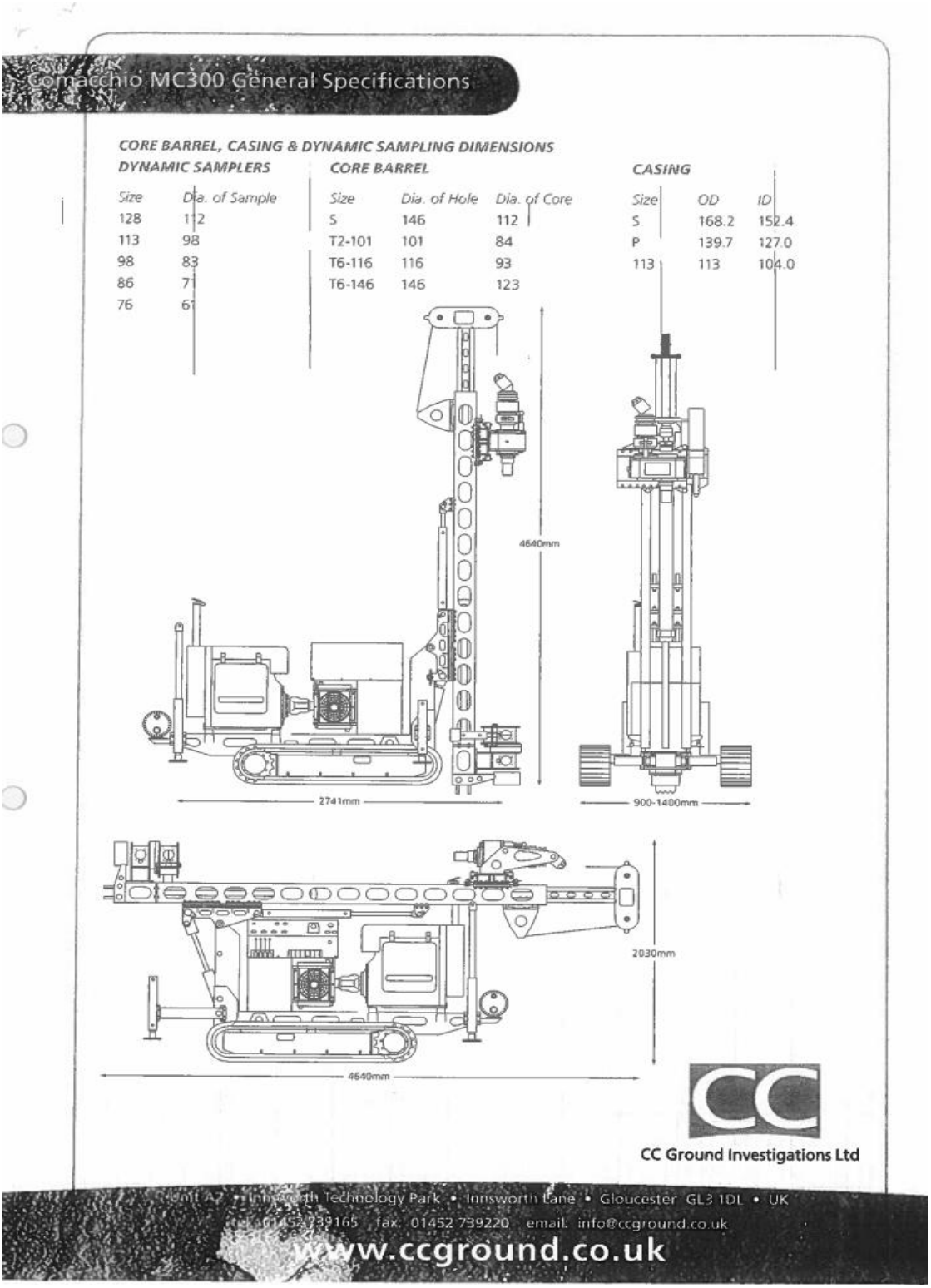
capitals and brick parapet, and was constructed by David Bellhouse Junior (Hartwell 2001, 217). The line is carried across the Irwell by a bridge, which the Listed Building descriptions note is composed of 'two segmental arches with central pier and cut-water (the east half in City of Manchester). Rusticated stone voussoirs and pilaster strips to central pier and abutments. Plain brick parapet with stone coping (absent above west arch on north side of bridge). Bridge extended out above west arch on south side with cast-iron girders and cast-iron panelling. Brick parapet built on top. Both spans have three rectangular metal restraining ties projecting below the voussoirs'. The bridge over Water Street is extant and is a cast-iron structure, which was constructed by by David Bellhouse Junior's son, Edward Taylor Bellhouse (*ibid*). It has six cast-iron ribs, which support cast-iron floor plates (Dunkerley and Dunkerlay nd; Pl 14).



Plate 14: Water Street bridge and the MSJ&AR viaduct

Assessment The bridges and viaduct are extant.

APPENDIX H – Detailed Specification for MC300 Drilling Rig (information from www.ccground.co.uk)



Comacchio MC300 General Specifications

CORE BARREL, CASING & DYNAMIC SAMPLING DIMENSIONS

DYNAMIC SAMPLERS

Size	Dia. of Sample
128	112
113	98
98	83
86	71
76	61

CORE BARREL

Size	Dia. of Hole	Dia. of Core
S	146	112
T2-101	101	84
T6-116	116	93
T6-146	146	123

CASING

Size	OD	ID
S	168.2	152.4
P	139.7	127.0
113	113	104.0

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Overview

The Comacchio MC300 is a multi purpose track mounted drilling rig used for geotechnical and geo-environmental investigations. The capability and versatility of the MC300 means the rig can cope with all ground conditions. The ability to switch between drilling techniques such as dynamic soil sampling, augering, rotary coring and open hole drilling means that all soils, hard strata and made ground can be penetrated.

The 2.85 ton rig is designed to be able to drill through all soil and rock types using a range of drilling techniques. The MC300 is capable of drilling to depths in the order of 50m. In-situ standard penetration

testing (SPT) and undisturbed sampling (70mm U70) can be undertaken whilst drilling. On completion a wide range of monitoring instrumentation can be installed in the boreholes.

The MC300 is transported to site on a trailer towed by a Land Rover. Ancillary equipment and materials are transported in a dedicated support vehicle.



The rig is mounted on rubber tracks and is easily manoeuvred around site, coping with a variety of terrain. The rig is easily set up at borehole positions and can be operational within minutes.

Dynamic Sampling (Soils)



For drilling in soils the MC300 employs a dynamic sampling technique. Fully lined sample barrels are driven into the ground with a high frequency hydraulic hammer. This process is

suitable in all soil types and produces high quality fully lined samples. Temporary casing can be used as drilling proceeds to support unstable ground.

Rotary Coring



The MC300 has a top drive rotary head that is geared to allow high rotation speed for coring rock and hard strata. Thin wall double tube core barrels incorporating a plastic liner are used to retrieve cores up to 123mm diameter. The MC300 can use water, air or polymer flush as required. The ability of the MC300 to soil sample and rotary core allows for borehole progression in most ground conditions.

Augering - Hollow Stem/Solid Stem



The rotary head can also be operated in a low speed high torque gear to allow hollow or solid stem augering. Hollow stem augers upto 200mmOD and with 100mm diameter hollow stem can be operated. If required soil sampling can be undertaken in advance of the auger to obtain soil samples. The sample barrel is simply advanced through the hollow stem and then withdrawn to allow continuation of augering. This technique allows for fully lined samples and a large diameter borehole.

Open Hole Drilling



Down the hole hammer (DTHH), tri-cone rock roller and drag bits can be employed for rotary open hole drilling. DTHH is used with air flush for open hole drilling in rock and hard strata. Tri-cone and drag bits can be operated with air or water flush. Open hole diameters range between 100 and 150mm.



Concrete Coring

Sites covered in hardstanding cause little problem for the MC300. Concrete and tarmacadam can be water flush cored in up to 300mm diameter to allow drilling to commence or for excavation of hand dug inspection pits.

APPENDIX I –Site Survey Photos






WARNING
WHEEL
CLAMPING IN
OPERATION
BEYOND THIS
POINT







Northern Hub Programme	Document Reference Number						
Ordsall Chord: Supporting Statement for Listed Building Consent Application for Intrusive Surveys to Castlefield Railway Viaduct, Grade II Listed	Project Code	Project Number	Discipline (Function) Code	Document Type	Originator Code	Sequential Number	Revision
Date: 22-10-13	127523	A	CEP	REP	PBL	000042	A01



