1.

PHASE I GEO-ENVIRONMENTAL SITE ASSESSMENT

Ducie Bridge Pub
Corporation Street
Manchester
M4 4DU

Prepared for:

Russells Construction

Report Ref: 11-826-r1- Rev A
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e3p | Environmental | Energy | Engineering

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EXECUTIVE SUMMARY		
Site Address	Ducie Bridge, Corporation Road, Manchester, UK.	
Grid Reference	E384220 N399050	
Site Area	0.14 Hectares	
Current Site Use	The subject site is a rectangular shaped parcel of land that has three disused buildings and a storage yard that is currently used as storage for building materials. The site was previously a pub. The site is surrounded by brick walls, metal fencing and wooden boards.	
Proposed Development	E3P understands that Russells Construction propose to demolish the existing buildings and develop the subject site as a commercial storage area.	
Environmental Setting	*Drift Geology*	No drift deposits are anticipated in the west of the site, with the possibility of Glacial Till in the east- BGS borehole logs indicate Clay with granular Sand & Gravels.
	Bedrock Geology	Chester Pebble Beds Formation - Sandstone
	Hydrogeology	Where present the underlying drift is classified as an undifferentiated aquifer strata overlying a Principal Aquifer (Bedrock Geology).
	Hydrology	The River Irk is located 135m north of the site.
	Flood Risk	The area immediately in and around the site is within a Flood Zone 1.
	Ecology	Existing building may provide wildlife habitat and may need to be assessed prior to demolition.
	Subsidence Hazards	No significant hazards identified in data searches.
Site History	Historical mapping shows that the site was once occupied by a high concentration of small buildings in the north while where the current storage yard stands was once a large warehouse. One of the three existing buildings has been used as a pub/inn since1892 until recently. The remaining buildings appear to have been used as warehouses.	
Utility Locations	A formal GPR survey has not been completed.	
Landfill Sites & Ground Gases	There are no landfill sites within close proximity to the site.	
Invasive Plant Species	No invasive plant species were identified during the site walkover.	
Radon	Unaffected – No special precaution required.	
Coal Mining / Land Stability	The Envirocheck Report states the site is in an area which may be affected by coal mining. However, the Coal Authority Interactive Map shows that the site is not in a development high risk zone.	
Geotechnical Risk		
Given the predominantly developed nature of the site, it is likely there will be Made Ground fill deposits, obstructions and previous building's foundations. Existing buildings will require demolition with all foundations and relict foundations grubbed out, prior to the construction of the proposed development.		

EXECUTIVE SUMMARY

Contaminated Land Risk Assessment

Human Health

Due to the largely developed nature of the site, there are potential sources of contamination identified. However localised areas have been identified as being potentially impacted by heavy metals, SVOCs, VOCs and hydrocarbon compounds. Should heavy metals and PAH impact be identified this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks.

If any volatile hydrocarbon compounds are identified, this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks. To mitigate these risk construction workers must wear Personal Protective Equipment (PPE) to remove any potential exposure.

Existing buildings are likely to have had asbestos present however, it is understood that a full asbestos survey including removal of identified occurances has already taken place. However, previous phases of demolition and buildings may have released asbestos fibres into the ground. As such, dust may be released during the demolition of the building or during any future earthworks and then subsequently inhaled by construction workers.

Controlled Waters

Although unlikely to be significant, spillages and leaks of fuel and oil relating to storage yard activities and machinery movements have the potential to cause very localised impact the sub-surface however impact of the underlying Principal Aquifer and River Irk is unlikely to have been impacted from minor leaks.

Ground Gas

Made Ground relating to former industry and structures on-site may be a potential source of source of harmful ground gases such as Methane and Carbon Dioxide. Inhalation of these gases could result in asphyxiation, while accumulation of these gases can be explosive.

However, due to the proposed end use as a storage yard there are no areas that would allow gas accumulation.

Recommendations

A detailed Phase II intrusive Geo-Environmental Ground Investigation should be undertaken in order to confirm the findings of the initial conceptual site model and value engineer a development solution.

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1. INTRODUCTION

1.1 Background

E3P Ltd has been commissioned by Russells Construction to undertake a Phase I Geo-Environmental Site Assessment at a disused pub and storage yard off Corporation Street, Manchester.

This report is required to determine potential contaminated land and geotechnical liabilities associated with a proposed redevelopment.

1.2 Proposed Development

E3P understands that Russells Construction intends to demolish the existing buildings and develop the subject site as a commercial storage area for materials and cabins for works in the local area.

1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));

- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;

- Assess the desk study information and where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,

- Provide recommendations regarding future works required and undertake a preliminary pre-construction cost appraisal.

1.4 Limitations

The limitations of this report are presented in Appendix I.

1.5 Sources of Information

Background information was sought from the following sources:

- Envirocheck Search;
- Historical mapping dated 1848 to 2015. A selection of historical maps are reproduced in Appendix V;
- On-line planning records held by Manchester City Council;
- Consultations with representatives of the Manchester City Council;
- Environment Agency Groundwater Vulnerability Map (www.environment-agency.gov.uk/wiyby);
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and,
- British Geological Survey Map.

1.6 Confidentiality

E3P has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

2. SITE SETTING

2.1 Site Details

Site Address	Ducie Bridge Pub, Corporation Street, Manchester, M4 4DU
National Grid Reference	E384220, N399050
Site Area	0.14 Hectares

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 11-826-001.

2.2 Current Site Use

E3P has undertaken a site walkover of the entire site and a description of the key findings is summarised in Table 2.1.

Table 2.1 Site Description

Occupancy/use	The site currently comprises 3no three storey brick buildings in the west of the site, which are all currently disused. The east of the site is utilised as a storage yard.	
Structures	The northern most building is a former public house while the middle building is smaller than the other buildings and was possibly used as a shop prior to its abandonment. The third building which borders Oswald Street was previously used as warehouse. The eastern sector comprises hardstanding that is used as a storage yard. The yard is bordered by a mixture of walls, metal fencing and tall wooden fencing.	
Access	Pedestrian access to the site can potentially be granted from A665, however vehicle access is from Munster Street to the north east of the site.	
Slope	The site is relatively level.	
Retaining structures	No retaining features have been identified.	
Surface Cover (%)	Buildings:	30%
	Hardstand:	70%
	Soft cover:	0%
Vegetation/Ecology	No vegetation is present except for weeds growing out of the disused buildings and within the storage yard.	
Hazardous Material Storage	No Above Ground Storage Tanks (AST) or Underground Storage Tanks (UST) were observed at the site during the preliminary site walkover.	
Asbestos Containing Material (ACM)	No evidence of ACM was noted across the majority of the site during the site walkover. It is understood that ACMs have been removed from the existing buildings fabric during previous asbestos surveys. Previous phases of demolition across the site may have released ACMs into the soils across site and so there is potential for asbestos to be present within the Made Ground although this is expected to be only trace fibres.	

Polychlorinated Biphenyls (PCBs)	There is no equipment identified which may contain PCBs within the site boundary.
Waste Storage	Potentially hazardous waste streams are unlikely to be generated at the site and none were observed during the preliminary site inspection.
Drainage	A formal drainage survey has not been completed.

2.3 Surrounding Area

The surrounding area land uses are summarised in Table 2.2.

Table 2.2 Surrounding Land Uses

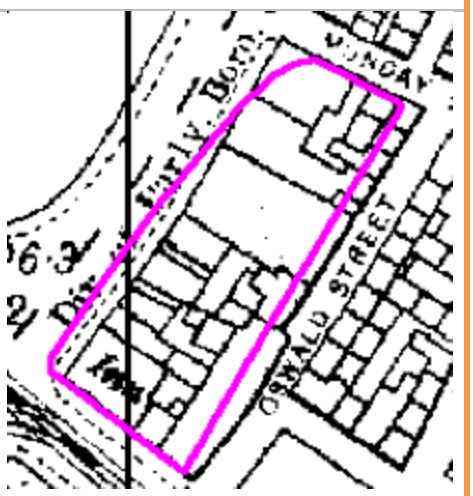
DIRECTION	LAND USE
North	Car park, commercial units, recreational park and apartment blocks.
East	Car parks and the Co-Op head office.
South	Pub, college and commercial units.
West	Manchester Victoria Station and apartment blocks.

3. SITE HISTORY

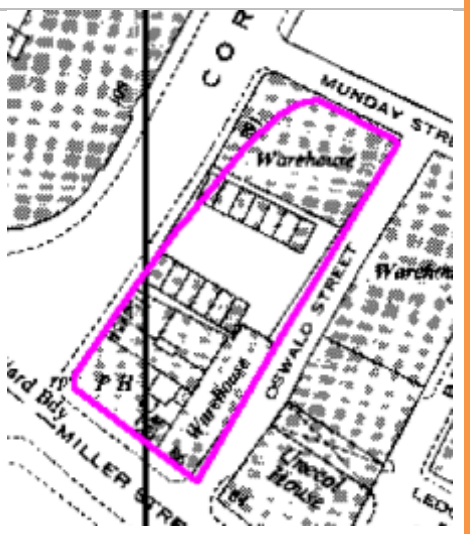
3.1 On-Site Historical Development

A review of historical mapping pertinent to the site is summarised in Table 3.1 below. In addition, historical site features are presented on Drawing No 11-826-003 in Appendix III.

Table 3.1 Site Historical Development

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1892-1893 **1:2,500**	The site comprises a collection of different sized structures across its entirety, including a large Public House in the north of the plot and an Inn in the south.	
1908 **1:2,500**	The building configurations have changed slightly and the public house in the north is no longer recorded.	
1922-1933 **1:2,500**	There are no significant changes to the site.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1948-1951 1:1,250	Large scale demolition has occurred on the site and is possible remnant of bomb damage. The large Public House and all the structures in the north and central sector of the site have been demolished to make way for a large warehouse and yard. One of the present buildings has been converted into a warehouse in the south east of the site.	
1951-1952 1:2,500	No significant changes to the site.	
1952-1955 1:1,250	No significant changes to the site.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1953-1958 1:2,500	No significant changes to the site.	
1958-1970 1:1,250	Thirteen small units have been constructed within the yard area.	
1970-1990 1:1,250	Demolition of the buildings behind the present buildings in the south, including the thirteen units erected in the previous historical map.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1992 1:1,250	No significant changes to the site.	
1993-1995 1:1,250	No significant changes to the site.	
2017 1:10,000	The warehouse in the north has been demolished pre 2017.	

3.2 Off-Site Historical Development

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250m radius of the site is summarised below in Table 3.2.

Table 3.2 Surrounding Potentially Contaminative Land Uses.

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Warehouse	10m	Pre 1948-Present	East
Manchester Victoria and railway tracks	50-100m	Pre 1848-Present	West
Warehouses *Then* car park	60m	Pre 1948- Pre 1990-Pre 1990 - Present	East
Tramway	70m	Pre 1892-Pre 1951	West
Cheetham Hospital (tank and chimney recorded) *Then* demolished *Then* redeveloped with unknown structure and substation	90m	Pre 1908-Pre 1970 Pre 1970-Pre 1987 Pre1987-Present	North
Cotton Mill with Reservoir *Then* becomes unmarked *Then* demolished *Then* construction of a large warehouse *Then* a car park	120m	Pre 1892-Pre 1908 Pre 1908-Pre 1948 Pre 1948-Pre 1970 Pre 1970-Pre 1990 Pre 1990-Present	East
Garage *Then* becomes unmarked building	150m	Pre 1952- Pre 1959 Pre 1959-Pre 1965	East
Ducie Works *Then* demolished	150m	Pre 1894-Pre 1908 Pre 1908-Present	North-West
Warehouse *Then* demolished and redeveloped under Angel Industrial Estate.	200m	Pre 1948-Pre 1993 Pre 1993-Present	East
Workhouse *Then* demolished for Victoria Station Goods Yard. *Then* multi-story car park	200m	Pre 1848- Pre 1951 Pre 1951-Pre 1996 Pre 1996-Present	West
Yew Tree Cemetery *Then* converted into St. Michael's recreational ground	200m	Pre 1848-Present	North-East
Iron Works *Then* becomes works *Then* demolished *Now* Car Park	200m	Pre 1908-Pre 1979 Pre 1979-Pre 1989 Pre 1989-Present	North
Tannery *Then* converted to the Union Bridge Iron Works *The demolished* *Then* converted into the Red Bank Spring & Axle Works and engineering works *Then* demolished becoming a garage	200m	Pre 1892-Pre 1933 Pre 1933-Pre 1951 Pre 1951-Pre 1965 Pre 1965-Pre1987 Pre 1987- Pre 2017	North
Iron Works *Then* disused *Then demolished* *The become a car park*	220m	Pre 1908-Pre 1933 Pre 1933-Pre 1965 Pre 1965-Pre 1987 Pre 1987-Present	West
Post Office *Now* moved or shut down	250m	Pre 1990- Pre 2017	South

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Red Bank Spring & Axle Works *Then* extended to land south and the demolished section of the Union Bridge Iron Works *Then* demolished *Then* redeveloped	250m	Pre 1892-Pre1951 Pre 1948-Pre 1965 Pre 1965-Pre 1993 Pre 1993-Pre 2017	North
Printing Works *Then* extended *Then* becomes works	250m	Pre 1908-Pre 1951 Pre 1958-Pre 1970 – Pre 1970-Present	West
Arena	250m	Pre 1996-Present	West

3.3 Planning History

E3P has undertaken a detailed search of on-line planning records held by Manchester City Council which has identified that the following planning applications:

Reference	050173/FU/NORTH2/96
Address	168, Corporation Street, Ancoats
Proposal	Use of land as a car park following demolition of existing warehouse building
Decision	Approved
Decision Issued Date	Fri 09 Aug 1996

4. ENVIRONMENTAL SETTING

4.1 Geology and Hydrogeology

The British Geological Survey (BGS) map for the site, (1:50,000, Solid & Drift edition) and online records indicates the site is underlain by the geological sequence presented in Table 4.1.

Table 4.1 Summary of Underlying Geology

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	No drift deposits are anticipated in the west of the site with Glacial Till possible in the east of the site.	(N/A)	Secondary Undifferentiated (Glacial Till)
Solid	Chester Pebble Beds Formation	Sandstone	Principal Aquifer

The Envirocheck Report indicates that the site is located 900m away from a Groundwater Source Protection Zone (Total catchment - Zone 3). There are 24 groundwater abstractions within 1km of the site, the closes of which is approximately 400m away from the site. The abstractions are generally used for commercial cooling

Based on the local topography and the location of surface watercourses, it is considered likely that shallow groundwater, if present, will flow in a westly direction, following the topographical gradient towards the River Irk.

4.2 Geotechnical Data

Geotechnical Data presented within a commercially available environmental database is summarised within Table 4.2.

Table 4.2 Summary of Geotechnical Data

HAZARD	DESIGNATION
Shrink-Swell Clay	No Hazard to Very Low Risk
Landslides	Very Low
Ground Dissolution	No Hazard
Compressible Ground	No Hazard
Collapsible Deposits	Very Low Risk
Running Sand	No Hazard to Very Low Risk

4.3 Coal Mining

The Envirocheck Report states the site is in an area which may be affected by coal mining. However, the Coal Authority Interactive Map shows that the proposed site is not in a high risk development zone and situated over 1km away from such a high risk development zone.

4.4 Hydrology

Surface water features within 250m of the subject site are summarised in Table 4.5.

Table 4.5 Surface Water Features

SURFACE WATER FEATURE	QUALITY	DISTANCE (m)	DIRECTION
River Irk	Fairly Good	135m	East / South

The site is located within a currently defined Flood Risk Zone 1; defined as land assessed as having less than 1 in 1,000 annual probability of river flooding (<0.1%), and as such is considered to be unaffected by river flooding. In addition, the Envirocheck Report states there is a limited potential for groundwater flooding to occur at the site.

4.5 Radon Risk Potential

The Envirocheck Report indicates the site is situated in an area where less than 1% of homes are above the Action Level and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

4.6 Industrial Land Uses

The site is located within 250m of two entries within the trade directory for industrial land uses. One is a Brewery found 199m away from the site and the other is a floorcovering manufacturer and seller located 223m away, both entries are located north-east of the site.

4.7 Sensitive Land Uses

The closest residential property is an apartment block located north of the site. There is also a recreational park in the north-east and the River Irk in the north.

No other environmentally sensitive land uses have been identified within close proximity to the site.

4.8 Site Sensitivity Assessment

The site is assessed to be located within a **Moderate to High** sensitivity setting as discussed within Table 4.6.

Table 4.6 Site Sensitivity Assessment

SESITIVITY PROFILE	DISCUSSION	RATING
Sensitive land uses within close proximity (e.g. residential, school, nursery, local nature reserves etc.)	There is an apartment block and a recreational park to the 100m north-east.	Moderate
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a Groundwater Source Protection Zone or a Drinking Water Safeguarding Zone.	Low
Distance to the closest groundwater abstraction point.	There are no groundwater abstraction points within 250m. The closest abstraction point is located approximately 400m west of the site.	Low

SESITIVITY PROFILE	DISCUSSION	RATING
Aquifer Classification in Superficial Drift Deposits.	Drift cover may be present in the east but there is unlikely to be a significant barrier to the underlying Principal Aquifer.	**High**
Aquifer classification in Bedrock.	The underlying Chester Pebble Beds contains a Principal Aquifer.	**High**
Is the site underlain by low permeability Drift to depths in excess of 10.0m?	BGS records confirm that the site is unlikely to be underlain by large thicknesses of Glacial Till.	**High**
Is the site located within 50m of a surface watercourse?	The River Irk is located 135m to the west of the subject site. While greater than 50m the likely fractured nature of the underlying Principal Aquifer means that it should be considered a potential receptor	**Low/ Moderate**
Overall Site Environmental Sensitivity		**Moderate/ High**

4.9 Preliminary Geotechnical Assessment

Based on the desk study information, the following geotechnical assessment has been made:

- Given the developed nature of the site, it is likely there will be Made Ground fill deposits, obstructions and previous building's foundations. Existing buildings will require demolition with all relict foundations grubbed out prior to the construction of the proposed development.

4.1 Unexploded Ordnance

The regional unexploded bomb risk map from Zetica indicates that the site is in an area at moderate to high risk from possible Unexploded Ordnance (UXO) resulting from the Second World War. (Zetica, 2014).

5. CONSULTATIONS

5.1 Contaminated Land Officer

E3P contacted the Environmental Health Department at Manchester City Council who have been unable to respond within the reporting timescales. Upon receipt of the search information, E3P will issue any pertinent information and / or use the information to inform the development of any intrusive investigation proposals.

5.2 Landfill Sites and Waste Treatment Sites

There are no landfills recorded within close proximity to the proposed site.

5.3 Regulatory Database

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250m of the subject site and not otherwise detailed in the report.

Table 5.1 Summary of Environmental Data

RECORD	ENTRIES WITHIN 250m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified (N/A).
Authorised industrial processes (IPC/IPPC/LAPPC).	0	N/A
Fuel Stations Entries	0	N/A
Licensed radioactive substances	0	N/A
Enforcements, prohibitions or prosecutions	0	N/A
Discharge Consents	8	All licenses belong to United Utilities Ltd. All eight licenses are for public sewage works - storage sewage overflows.
Pollution Incidents	1	Category 3 – Minor Incident, due to an unknown and unfound pollutant in the River Irwell 192m away in 1995. However due to the date and the distance from the site it is unlikely to affect the proposed site.
Consents issued under the Planning (Hazardous Substances) Act 1990	0	N/A
Control of Major Accident Hazard (COMAH) sites	0	N/A

6. INITIAL CONCEPTUAL SITE MODEL

6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P Ltd has developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 6.1.

Table 6.1 Initial Conceptual Site Model

SOURCE	PATHWAY	RECEPTOR
Human Health		
Heavy metals / Polycyclic Aromatic Hydrocarbon (PAH) associated within Made Ground and historical site use as a warehouse	Dermal Contact and Ingestion	Construction Workers Site End Users
Discussion: Elevated levels of heavy metals and PAHs might be present due the building material and storgage of materials associated with the warehouses previously used on the site and where the current storage yard lies. Should heavy metals and PAH impact be identified this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks. To mitigate these risk construction workers must wear Personal Protective Equipment (PPE) to remove any potential exposure. The risk to end users is considered likely to be limited due to the proposed hard cover end use**.**		
Volatile hydrocarbon compounds associated with current use as a storage yard	Volatilisation / Accumulation, Vapour Inhalation	Construction Workers, Site End Users
Discussion: It is possible contamination might have resulted due to spillages and leaks of vehicles associated with the recent storage yard, however if present these are anticipated to be very localised. If any volatile hydrocarbon compounds are identified, this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks. To mitigate these risk construction workers must wear Personal Protective Equipment (PPE) to remove any potential exposure. T		
Asbestos Containing Materials (ACM) within Made Ground	Fibre / Dust Inhalation	Construction Workers Site End Users Third Party Property
Discussion: Due to their age, the buildings on the site may contain ACM. It is understood, however, that a full asbestos survey has been completed on the remaining building and any asbestos has been safely removed. Although, ACMs may have also impacted the ground due to demolition of previous buildings. Therefore, dust may be released during the demolition of the building or during any future earthworks and then subsequently inhaled by construction workers, third Party Property and industrial end users. If identified, the risk associated with ACM can be mitigated by following guidance presented within CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks		
Hazardous Ground Gases		
No source	Inhalation Accumulation	Construction Workers Industrial End Users
Discussion: Made Ground relating to former industry and structures on-site may be a potential source of source of harmful ground gases such as Methane and Carbon Dioxide.		

SOURCE	PATHWAY	RECEPTOR
Inhalation of these gases could result in asphyxiation, while accumulation of these gases can be explosive. However, due to the proposed end use as a storage yard there are no areas that would allow gas accumulation.		
Controlled Waters		
Mobile hydrocarbon compounds associated with current use as a storage yard	Vertical / Lateral Migration	Principal Aquifer River Irk
Discussion: Although unlikely to be significant, spillages and leaks of fuel and oil relating to yard activities have the potential to cause very localised impact the sub-surface however impact of the underlying Principal Aquifer and River Irk is unlikely to have been impacted from minor leaks.		
Buildings and Infrastructure		
pH & Sulphate	Corrosion of Concrete	Foundations / Concrete
Discussion The pH and sulphate conditions within the Made Ground deposits may result in corrosion of buried concrete within the proposed development. Assess must be undertaken to confirm the levels of pH and sulphate within Made Ground deposits and thus determine the concrete classification.		
Ecology		
None Identified	Lateral Migration	None Identified
Discussion Due to the site's urban location and lack of vegetation it is unlikely that there will be any ecology on site or within the immediate surrounding area.		

7. CONCLUSIONS AND RECOMMENDATIONS

Site Summary	
The site has historically been utilised for several Public Houses and several warehouses. More recently the site has been occupied as a storage yard and the current buildings in the south are disused. These previous phases of demolition and industrial activity are considered to have the potential to be sources of heavy metal, polycyclic aromatic hydrocarbon (PAH), petroleum hydrocarbon, and asbestos impact to the sub-surface.	
Contamination Issues	
Human Health	Due to the largely developed nature of the site, there are potential sources of contamination identified. However localised areas have been identified as being potentially impacted by heavy metals, SVOCs, VOCs and hydrocarbon compounds. Should heavy metals and PAH impact be identified this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks. If any volatile hydrocarbon compounds are identified, this may pose a short-term risk to construction workers who may be exposed to impacted soils during earthworks. To mitigate these risk construction workers must wear Personal Protective Equipment (PPE) to remove any potential exposure. Existing buildings are likely to have had asbestos present however, it is understood that full asbestos surveys and removal have already taken place. Previous phases of demolition may have released asbestos into the ground and therefore dust may be released during the demolition of the building or during any future earthworks and then subsequently inhaled by construction workers.
Controlled Waters	Although unlikely to be significant, spillages and leaks of fuel and oil relating to yard activities have the potential to cause very localised impact the sub-surface however impact of the underlying Principal Aquifer and River Irk is unlikely to have been impacted from minor leaks.
Ground Gas	Made Ground relating to former industry and structures on-site may be a potential source of source of harmful ground gases such as Methane and Carbon Dioxide. Inhalation of these gases could result in asphyxiation, while accumulation of these gases can be explosive. However, due to the proposed end use as a storage yard there are no areas that would allow gas accumulation.
Potable Waters	Based on existing information, it is considered the site will be suitable for PE water supply pipework.
Geotechnical Issues	
Given the predominantly developed nature of the site, it is likely there will be Made Ground fill deposits, obstructions and previous building's foundations. Existing buildings will require demolition with all relic foundations grubbing out, prior to the construction of the proposed development.	

END OF REPORT

APPENDIX I
LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II
GLOSSARY

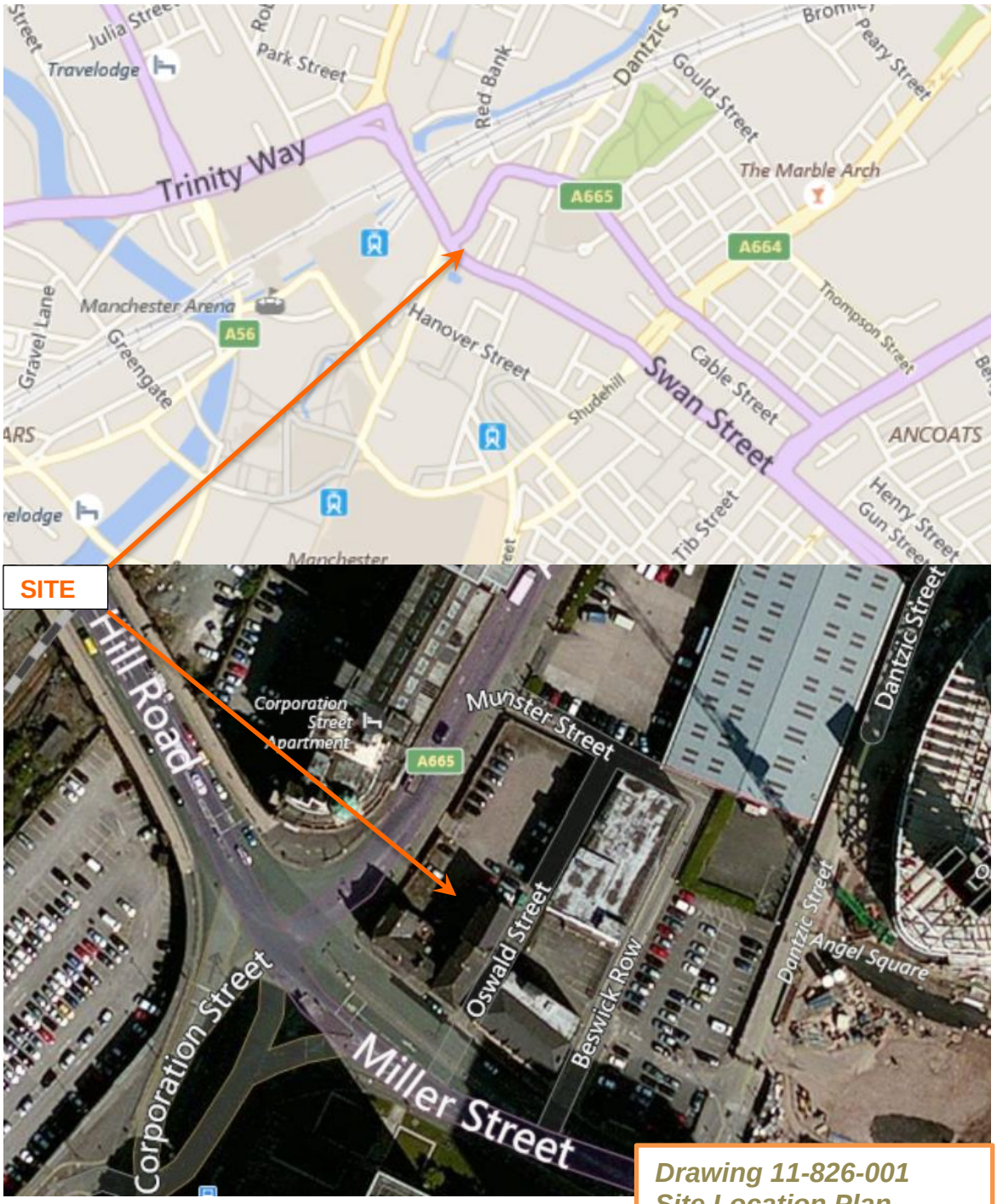


TERMS

AST	Above Ground Storage Tank	**SGV**	Soil Guideline Value
BGS	British Geological Survey	**SPH**	Separate Phase Hydrocarbon
BSI	British Standards Institute	**TPH CWG**	Total Petroleum Hydrocarbon (Criteria Working Group)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	**SPT**	Standard Penetration Test
CIEH	Chartered Institute of Environmental Health	**SVOC**	Semi Volatile Organic Compound
CIRIA	Construction Industry Research Association	**UST**	Underground Storage Tank
CLEA	Contaminated Land Exposure Assessment	**VCCs**	Vibro Concrete Columns
CSM	Conceptual Site Model	**VOC**	Volatile Organic Compound
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	**WTE**	Water Table Elevation
DWS	Drinking Water Standard	**m**	Metres
EA	Environment Agency	**km**	Kilometres
EQS	Environmental Quality Standard	**%**	Percent
GAC	General Assessment Criteria	**%v/v**	Percent volume in air
GL	Ground Level	**mb**	Milli Bars (atmospheric pressure)
GSV	Gas Screening Value	**l/hr**	Litres per hour
HCV	Health Criteria Value	**µg/l**	Micrograms per Litre (parts per billion)
ICSM	Initial Conceptual Site Model	**ppb**	Parts Per Billion
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)	**mg/kg**	Milligrams per kilogram (parts per million)
ND	Not Detected	**ppm**	Parts Per Million
LMRL	Lower Method Reporting Limit	**mg/m^3**	Milligram per metre cubed
NR	Not Recorded	**m bgl**	Metres Below Ground Level
PAH	Polycyclic Aromatic Hydrocarbon	**m bcl**	Metre Below Cover Level
PCB	Poly-Chlorinated Biphenyl	**mAOD**	Metres Above Ordnance Datum (sea level)
PID	Photo Ionisation Detector	**kN/m^2**	Kilo Newtons per metre squared
QA	Quality Assurance	**µm**	Micro metre
SGV	Soil Guideline Value		

APPENDIX III
DRAWINGS





Drawing 11-826-001
Site Location Plan

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APPENDIX IV
PHOTOGRAPHS





PLATE 1 – A PHOTO OF FORMER DUCIE BRIDGE PUBLIC HOUSE

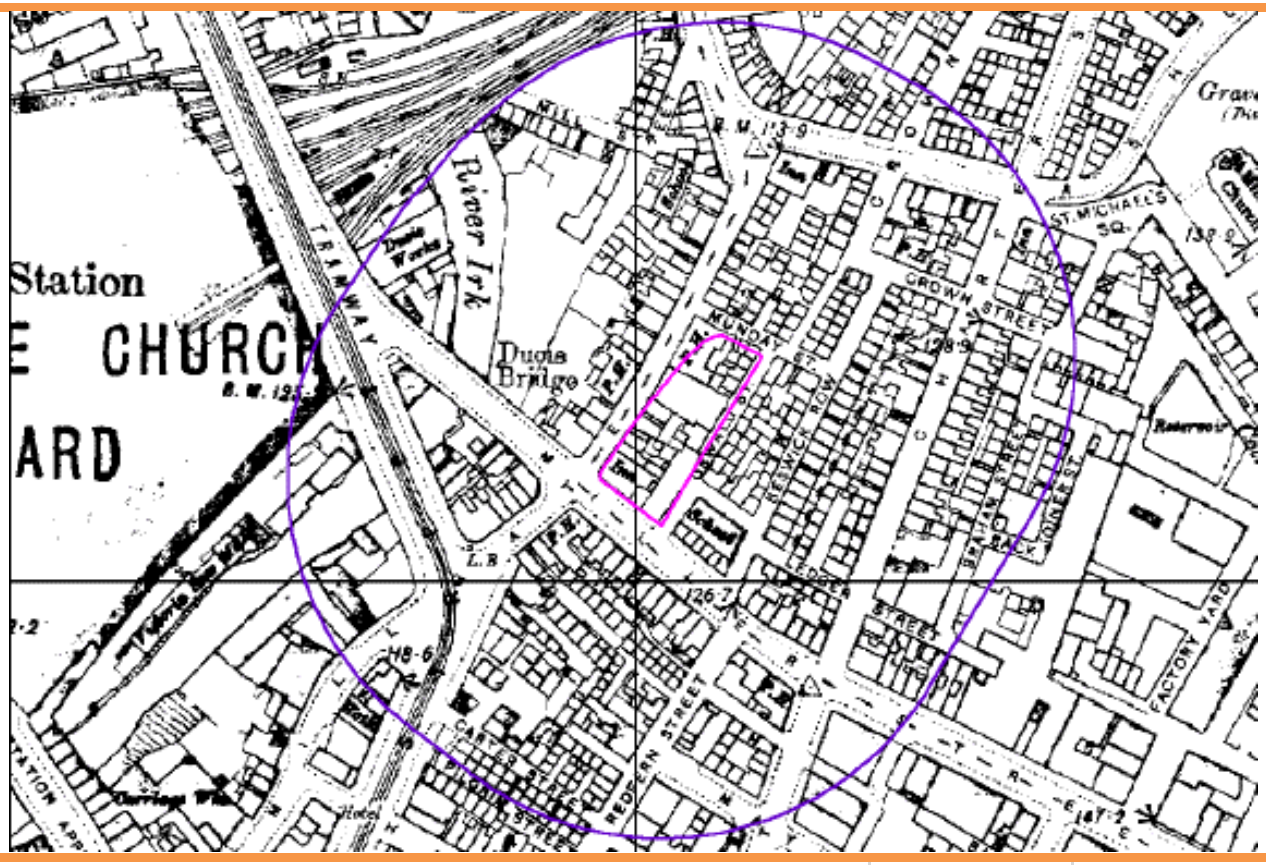


PLATE 2 – A PHOTO OF THE CURRENT STORAGE YARD AREA



PLATE 3 – A PHOTO OF THE NORTHERN BOUNDARY

APPENDIX V
HISTORICAL MAPS

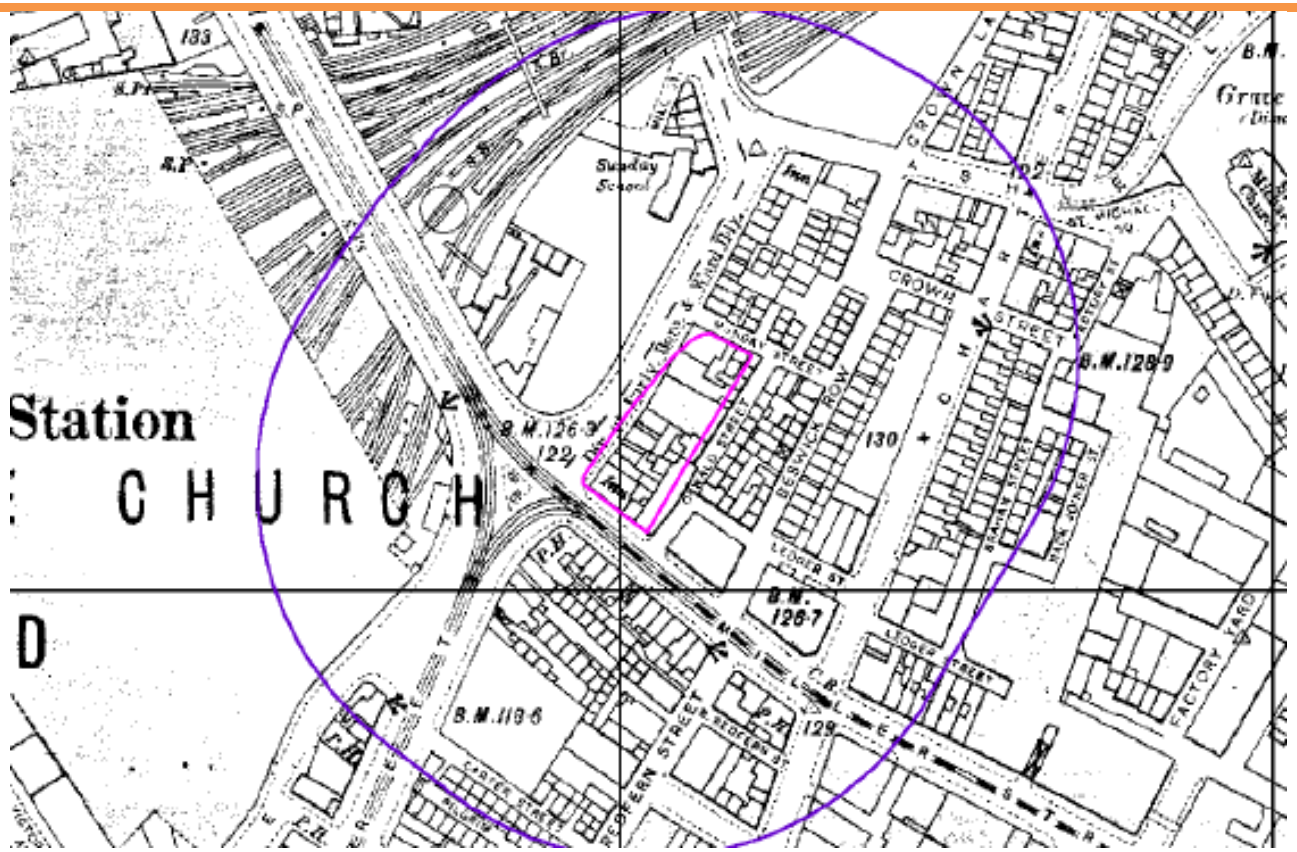


Historical Map

Dated: 1892-1893

Original Scale: 1:2,500

North



Historical Map

Dated: 1908

Original Scale: 1:2,500

North

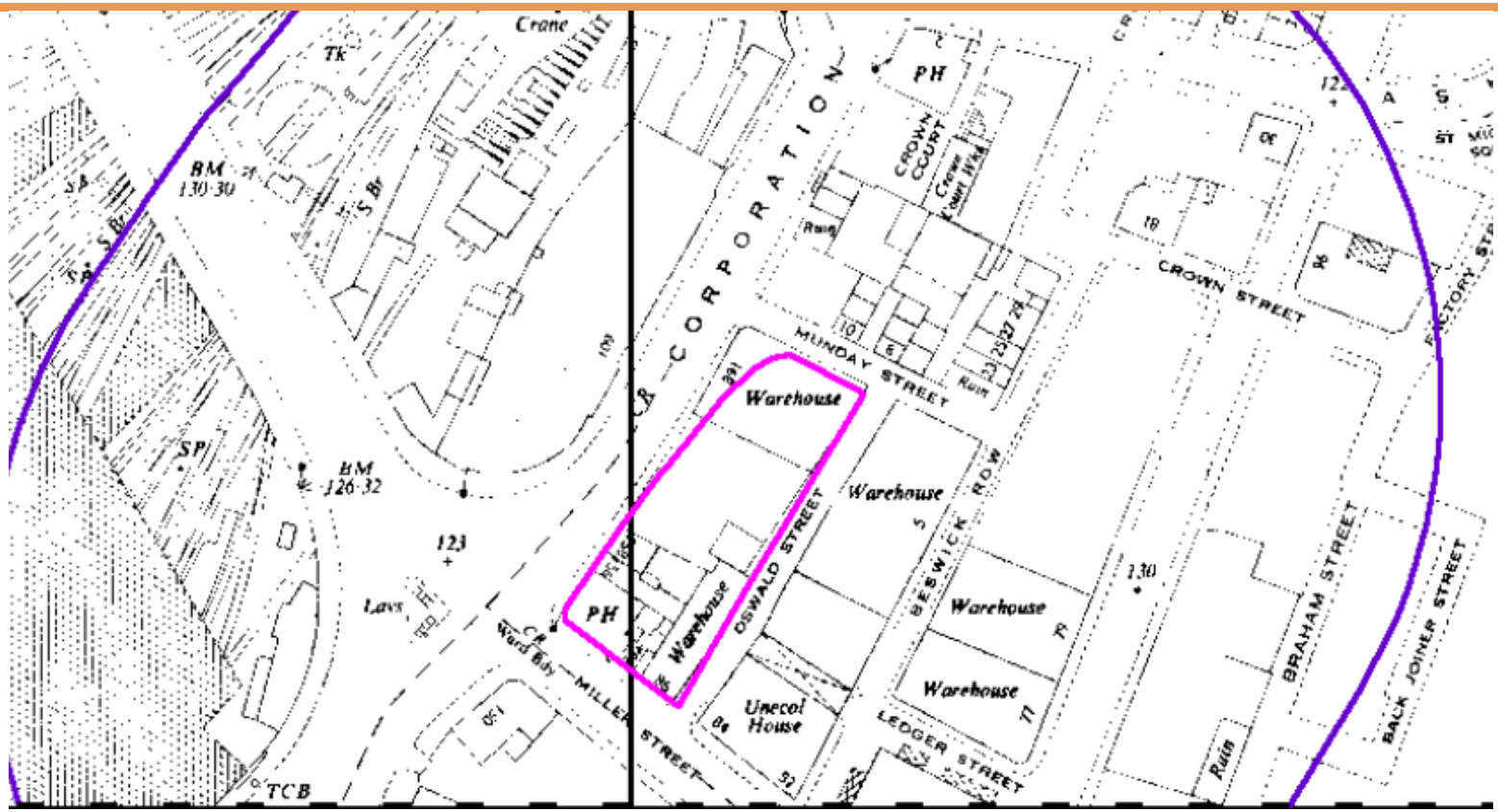


Historical Map

Dated: 1922-1933

Original Scale: 1:2,500

North

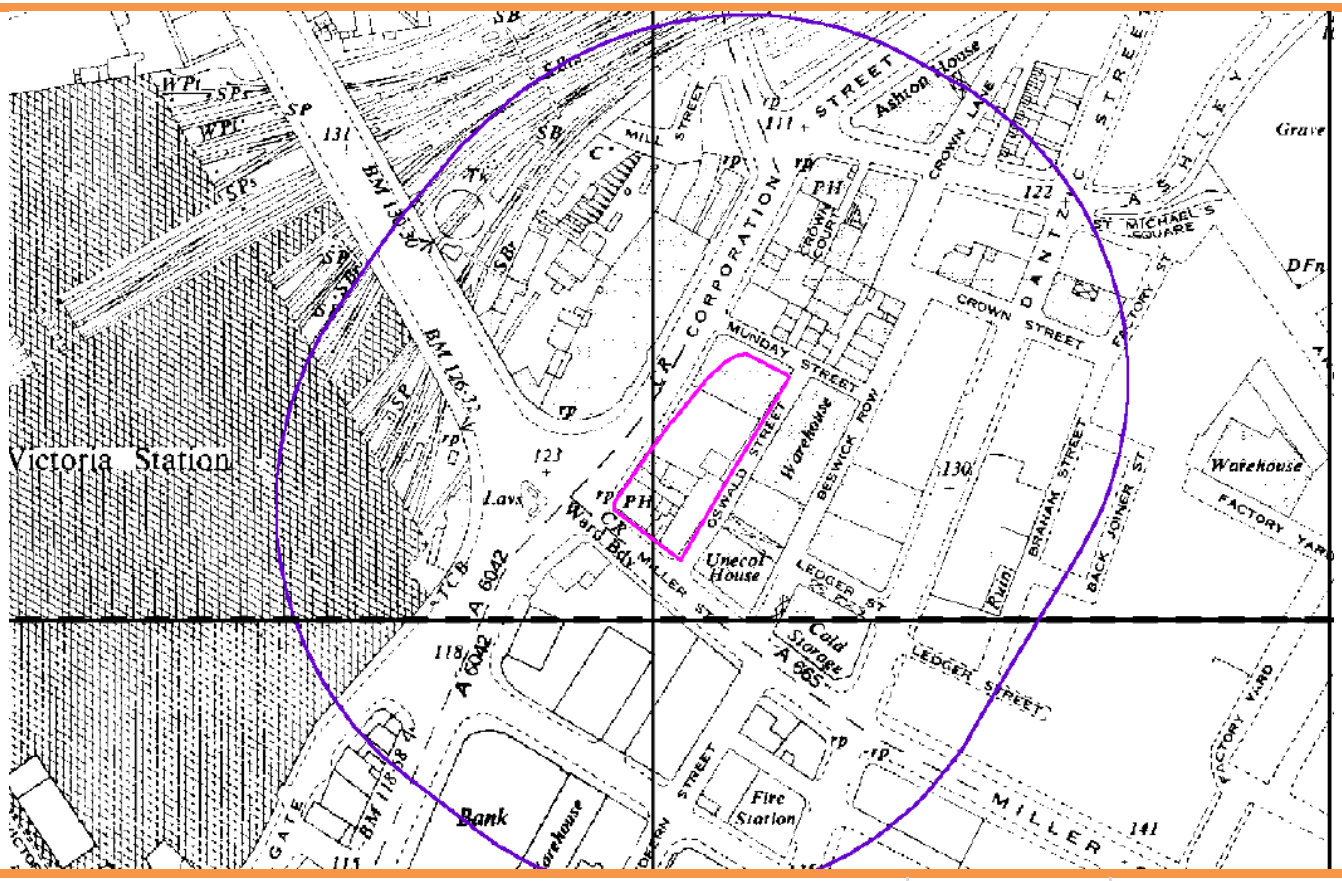


Historical Map

Dated: 1948-1951

Original Scale: 1:1,250

North



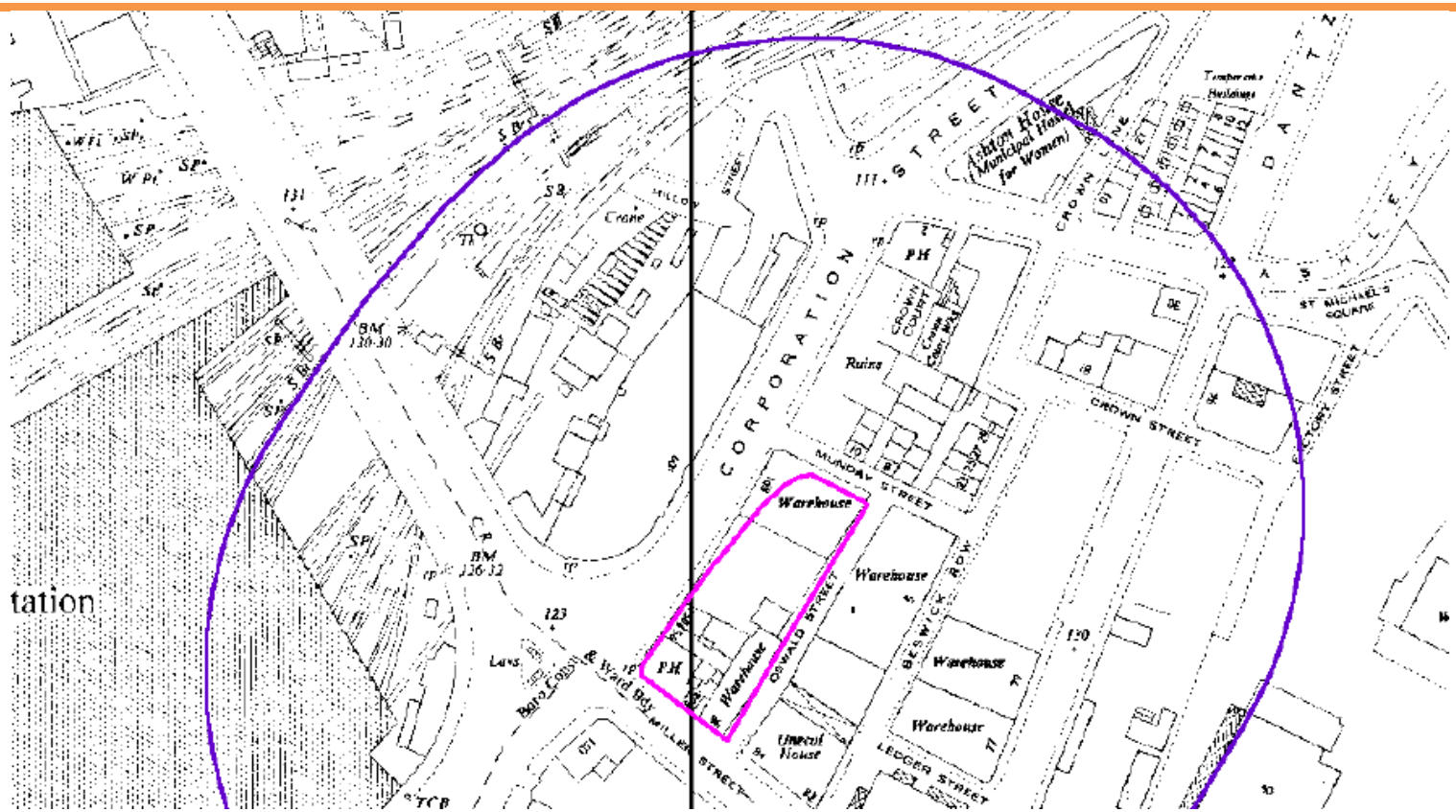
Historical Map

Dated: 1951-1952

Original Scale: 1:2,500

North

e3p



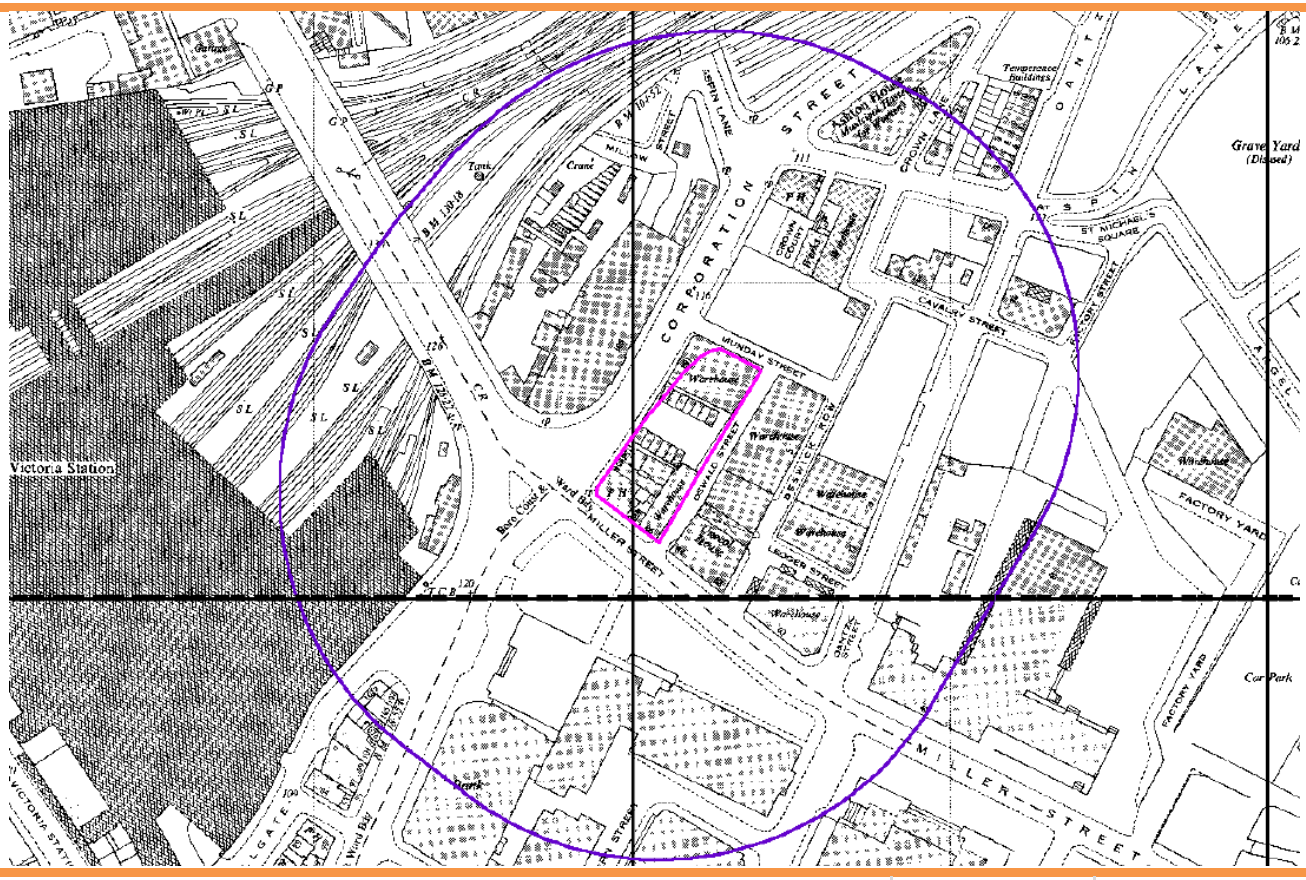
Historical Map

Dated: 1952-1955

Original Scale: 1:1,250

North


CORPORATION STREET
Warehouse
Warehouse
Warehouse
Warehouse
Warehouse
Warehouse
Canal House
Canal Basin
Ruins
Union House
(Workhouse)
Public House
Public House
Public House



Historical Map

Dated: 1958-1970

Original Scale: 1:1,250

North



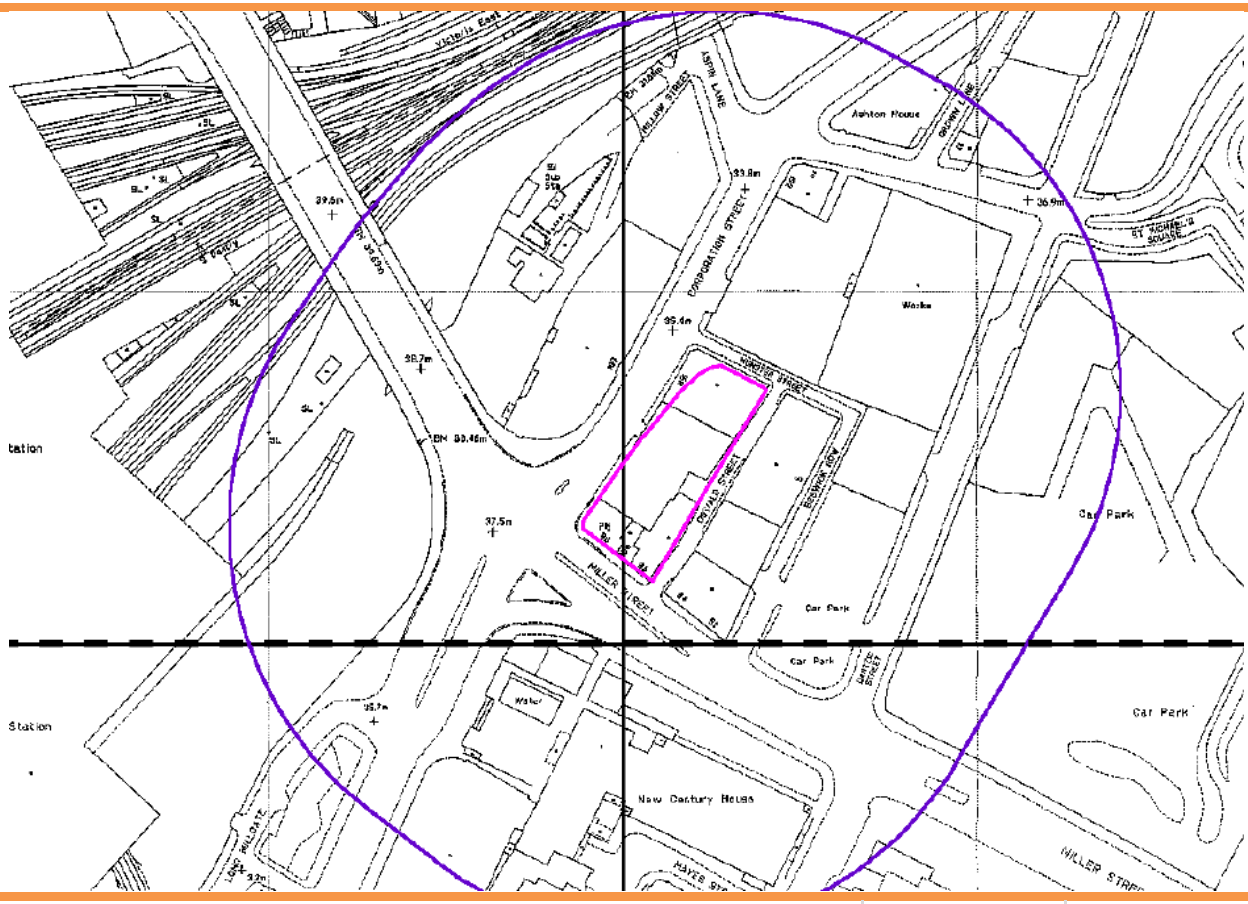
Historical Map

Dated: 1970-1990

Original Scale: 1:1,250

North

e3p

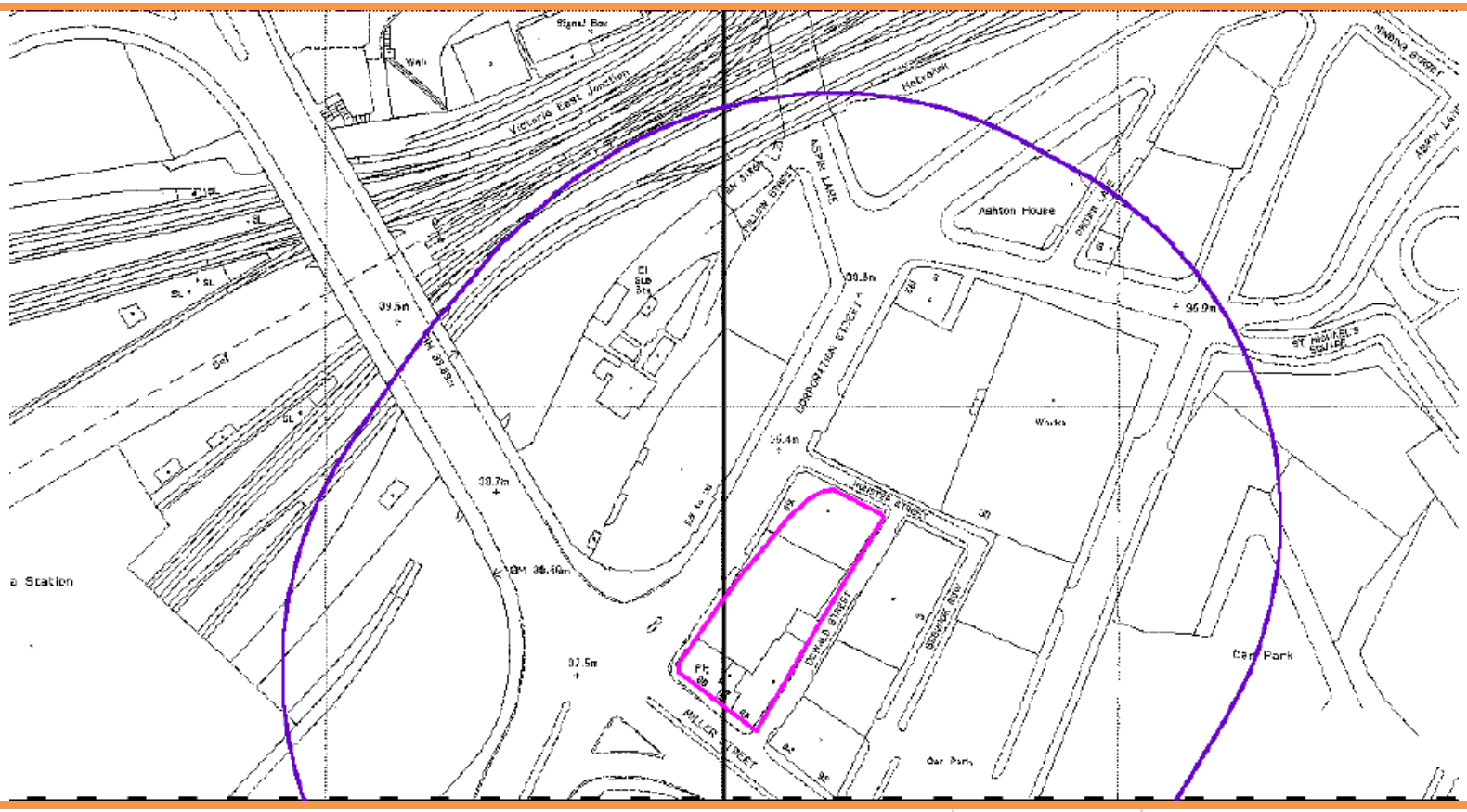


Historical Map

Dated: 1992

Original Scale: 1:1,250

North

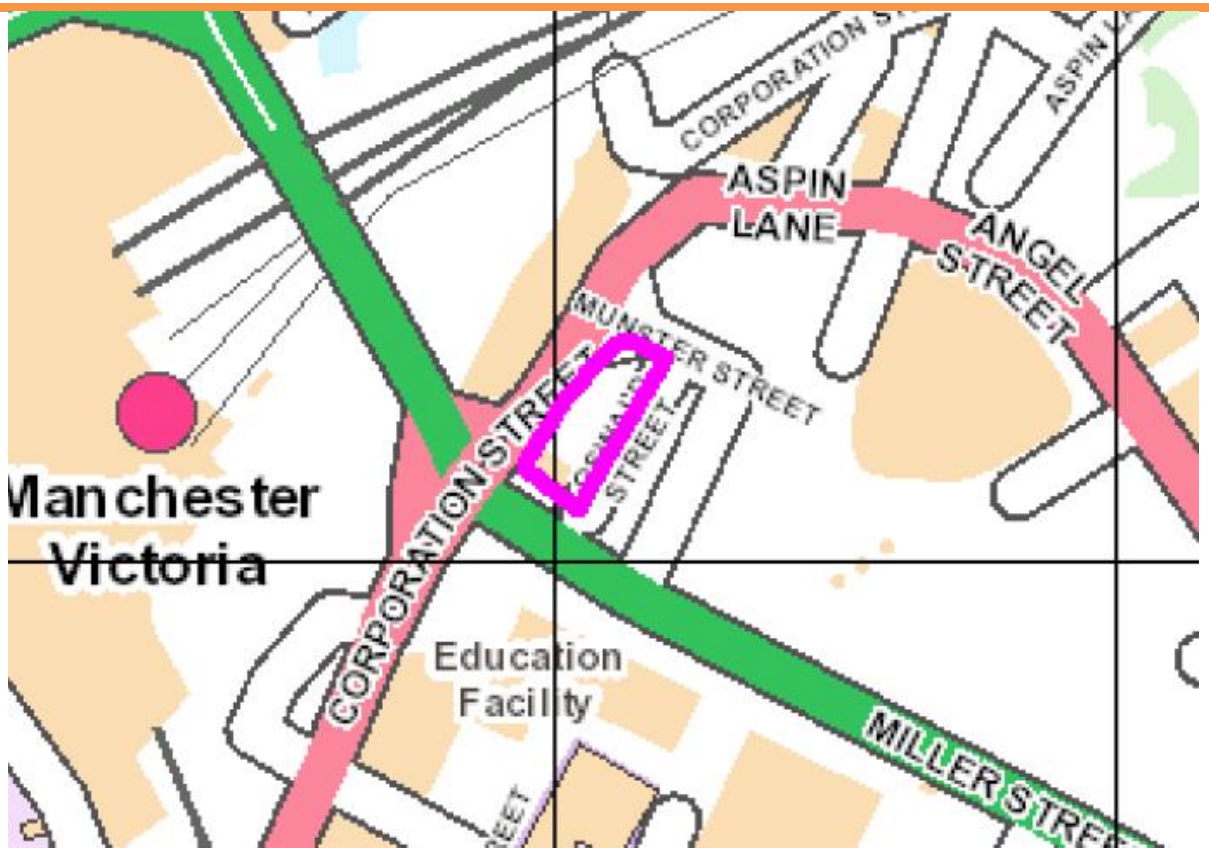


Historical Map

Dated: 1993-1995

Original Scale: 1:1,250

North



Historical Map

Dated: 2017

Original Scale: 1:10,000

North