SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

POTATO WHARF BLOCKS 3 & 4

FLOOD RISK ASSESSMENT & DRAINAGE STATEMENT

Shepherd Gilmour Infrastructure Ltd.
Castlefield House
29 Ellesmere Street
Manchester
M15 4LZ

C1114/DR/EAJ/Z0115
June 2015

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

Report Title: Potato Wharf Blocks 3 & 4
Flood Risk Assessment & Drainage Statement

Client: Lend Lease Residential (North West) Ltd

Report Status: Version REV A

Date of Issue: June 2015

Prepared by: _____

Dean O'Reilly BSc (Hons)

Checked & Approved: _____

Emyr Jones B.Eng (Hons)

Version	Date	Initials	Comments
-	*Jun 2015*	*DOR*	*First Issue*
A	*Jun 2015*	*DOR*	*Updated as per comments*

SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

Limitations

All findings, recommendations and conclusions contained within this report are based on information provided to us during investigations. Shepherd Gilmour Infrastructure Ltd. has created the report based on the assumption that all the information is accurate and accepts no liability should additional information exist or become available.

Unless otherwise requested by the client, Shepherd Gilmour Infrastructure Ltd. is not obliged to and disclaims any obligation to update the report for events taking place after the date noted on the report.

Shepherd Gilmour Infrastructure Ltd. makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the report. The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. The study provides no guarantee against the flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

This report has been prepared for the sole use of the client. No other third parties may rely upon or reproduce the contents of this report without the written permission of Shepherd Gilmour Infrastructure Ltd.

SHEPHERD • GILMOUR • SHEPHERD • GILMOUR • SHEPHERD • GILMOUR

CONTENTS

Contents 4
List of Tables 5
List of Figures 5
List of Appendicies 5

SECTION 1 FRA PRO-FORMA 139 6

1. DEVELOPMENT DESCRIPTION AND LOCATION 6
2. DEFINITION OF THE FLOOD HAZARD 7
3. PROBABILITY 8
4. CLIMATE CHANGE 8
5. DETAILED DEVELOPMENT PROPOSALS 9
6. FLOOD RISK MANAGEMENT MEASURES 9
7. OFFSITE IMPACTS 9
8. RESIDUAL RISKS 10

SECTION 2 SITE INVESTIGATION 11

INTRODUCTION 11
EXISTING SITE DESCRIPTION 11
THE PROPOSED DEVELOPMENT 12
EXISTING DRAINAGE INFORMATION 13
INFILTRATION EXPECTATIONS 14

SECTION 3 POTENTIAL SOURCES OF FLOODING 15

SOURCES OF DATA 15
FLUVIAL FLOOD RISK 15
GROUND WATER FLOOD RISK 18
ARTIFICIAL WATERBODIES 18
PLUVIAL RUNOFF 18
SEWER FLOODING 18

SECTION 4 FLOOD RISK MITIGATION 19

FLOOD LEVEL ANALYSIS 19
FLOOD MITIGATION 19

SECTION 5 SURFACE WATER RUNOFF 21

EXISTING RUNOFF RATE 21
PROPOSED RUNOFF RATE 22
PREFFERED RUNOFF DESTINATION 22

SECTION 6 PRELIMINARY DRAINAGE STRATEGY 24

SURFACE WATER STRATEGY 24
FOUL WATER STRATEGY 25

SECTION 7 ASSESSMENT OF FLOOD RISK & DRAINAGE 26

SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

LIST OF TABLES

TABLE 2.1 DIFFERENT SOIL CLASSES 14
TABLE 3.1 SOURCES OF FLOODING 15
TABLE 3.2 RIVER MEDLOCK FLOOD LEVELS 17
TABLE 3.3 GREY IRWELL/MSC FLOOD LEVELS 17
TABLE 3.4 BRIDGEWATER CANAL FLOOD LEVELS 17
TABLE 4.1 RIVER MEDLOCK FLOOD LEVELS 19
TABLE 5.1 EXISTING SITE ANALYSIS 21
TABLE 5.2 WALLINGFORD PROCEDURE VOLUME 3 VARIABLES 21
TABLE 5.3 RETURN PERIOD RAINFALL INTENSITY 21
TABLE 5.4 EXISTING PEAK RUNOFF RATES 22
TABLE 5.5 PROPOSED PEAK RUNOFF RATES 22

LIST OF FIGURES

FIGURE 2.1 SITE LOCATION (STREET MAP) 11
FIGURE 2.2 AERIAL PHOTO (GOOGLE MAPS) 12
FIGURE 2.3 INDICATIVE MASTERPLAN (LANDSCAPE ARCHITECTURE & DESIGN) 12
FIGURE 2.4 SEWER RECORDS ABSTRACT (UU) 13
FIGURE 2.5 BLOCKS 1 & 2 AS BUILT RECORDS ABSTRACT 14
FIGURE 3.1 FLOOD ADVICE MAP (ENVIRONMENT AGENCY) 16
FIGURE 3.2 EA FLOOD NODE POSITIONS (ENVIRONMENT AGENCY) 16
FIGURE 3.3 PLUVIAL RUNOFF RISK (SFRA) 18
FIGURE 4.1 SFRA 1000 YEAR RECOMMENDATIONS 19
FIGURE 4.2 EA FLOOD LEVELS & INDICATIVE ROUTES 20

LIST OF APPENDICIES

APPENDIX A	TOPOGRAPHICAL SURVEY
APPENDIX B	PROPOSED ARCHITECTS LAYOUT
APPENDIX C	UNITED UTILITIES RECORDS
APPENDIX D	ENVIRONMENT AGENCY DATA FLOOD ANALYSIS
APPENDIX E	EXISTING AND PROPOSED AREA ANALYSIS
APPENDIX F	PRELIMINARY DRAINAGE LAYOUT

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SECTION 1 FRA PRO-FORMA 139

1. DEVELOPMENT DESCRIPTION AND LOCATION

1a) What type of development is proposed and where will it be located? Include whether it is new development, an extension to existing development or change of use etc.

The client intends to develop a site located off Potato Wharf Road in Manchester into residential apartments and associated hard and soft landscaping.

Nearest Postcode: *M3 4JW*

OS Coordinates: *382861E, 397632N*

The existing topographical survey can be found in ***Appendix A****.*

1b) What is its vulnerability classification?

In accordance with National Planning Policy Framework the classification of the site is categorised under the "more vulnerable section".

1c) Is the proposed development consistent with the Local Development Documents?

Yes

1d) Please provide evidence that the Sequential Test and where necessary the Exception Test has been applied in the selection of this site for this development type?

Not applicable

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

2. DEFINITION OF THE FLOOD HAZARD

2a) What sources of flooding <u>could</u> affect the site?

1. *Fluvial and tidal flooding*
2. *Surface Water runoff*
3. *Ground Water*

2b) For each identified source, describe how flooding would occur; with reference to any historic records wherever these are available.

1. *Data provided by the Environment Agency place the site within a Flood Zone 2 area.*
2. *The SFRA has not highlighted any historic incidents in the vicinity of the site.*
3. *The SFRA has not highlighted any historic incidents in the vicinity of the site.*

2c) What are the existing sites surface water drainage arrangements?

Not Applicable

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

3. PROBABILITY

3a) Which flood zone, is the site within?

From the Environment Agency's Development Advise Maps, the SFRA and NPPF the site is identified under a "Zone 2 Medium Probability".

Flood Zone 2, medium probability i.e. assessed as having between 1 in 100 and 1 in 1000 annual chance of river and sea flooding in any year.

3b) If there is a Strategic Flood Risk Assessment covering this site, what does it show?

The Strategic Flood Risk Assessment produced by JBA Consulting indicates that the site is located within a Flood Zone 2.

3c) What is the probability of the site flooding taking account of the contents of the SFRA and of any further site-specific assessment?

Between 1in 100 and 1 in 1000 annual probability.

3d) What are the existing rates and volumes of run-off generated by the site?

The existing site is currently Brownfield and has been calculated to generate the following;

Return Period (Years)	1	2	5	30	100
Peak Runoff Rate(l/s)	140	178	230	327	404

4. CLIMATE CHANGE

4a) How is flood risk at the site likely to be affected by climate change?

An allowance of 30% for climate change will be included in the design of the onsite drainage.

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

5. DETAILED DEVELOPMENT PROPOSALS

5a) Please provide details of the development layout, referring to the relevant drawings.

*The proposed Architects layout has been included in **Appendix B**.*

5b) Where appropriate, demonstrate how land use most sensitive to flood damage has been placed in areas within the site that are at least risk of flooding.

Not Applicable

6. FLOOD RISK MANAGEMENT MEASURES

6a) How will the site be protected from flooding, including the potential impacts of climate change, over the development's lifetime?

The proposed FFL to be at least 26.500m and flood resilient construction methods used up to 28.700m AOD.

7. OFFSITE IMPACTS

7a) How will you ensure that you're proposed development and the measures to protect your site from flooding will not increase the flood risk elsewhere?

Any residual risk will be affectively managed onsite with the use of appropriate drainage methods and/or topographical level consideration

7b) How will you prevent run-off from the completed development causing an impact elsewhere?

The proposed surface water runoff will discharge into the River Medlock at 70% of the existing peak rate.

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

8. RESIDUAL RISKS

8a) What flood related risks will remain after you have implemented the measures to protect the site from flooding? *The end user will be provided with an as built drainage plan and need to undertake a regular maintenance regime i.e. visual and or CCTV survey. Subject to the above the network should remain without defects or blockages thus minimising flood risk on the site.*
8b) How, and by whom, will these risks be managed over the lifetime of the development? *The end users and or the management company who will operate the development.*

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SECTION 2 SITE INVESTIGATION

INTRODUCTION

2.1. Shepherd Gilmour Infrastructure Ltd has been engaged by Lend Lease Residential (North West) Ltd, to prepare a Flood Risk Assessment and Drainage Statement in support of a planning application.

2.2. The Flood Risk Assessment has been prepared in accordance with the Flood Risk and Coastal Change Planning Practice Guidance (PPG). It contains information from sources such as the Environment Agency, Local Sewerage Company and Manchester City Council.

2.3. The Drainage Statement has been prepared in line with the National Standards for Sustainable Systems (2011) and Sustainable Drainage Technical Standards (2015). It describes and outline proposals for the disposal of surface water runoff and foul effluent from the site.

EXISTING SITE DESCRIPTION

2.4. The site is located off Potato Wharf Road in Manchester and is approximately 1km from the City Centre. It is currently used as a storage area and is triangular in shape with the River Medlock to the north, Viaduct to the south and Canal basin to the east.

Site Location;	Nearest Postcode:	M3 4JW
	OS Coordinates:	382861E, 397632N
	Site Area:	1.25 ha

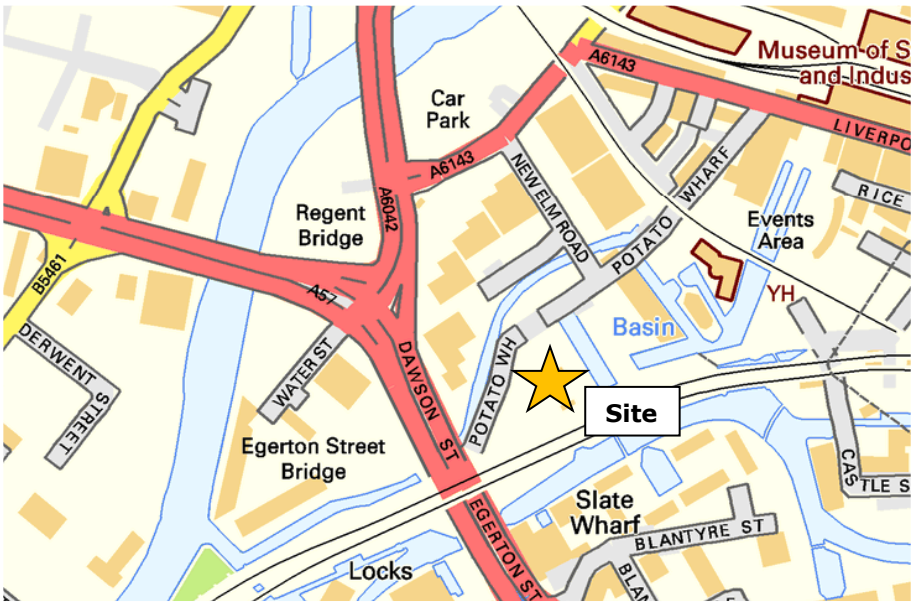


Figure 2.1 Site Location (Street map)

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR



Figure 2.2 Aerial Photo (Google Maps)

THE PROPOSED DEVELOPMENT

2.5. In short the proposed redevelopment will comprise of two residential buildings with associated hard and soft landscaping. A larger Architects plan has been included within **Appendix B.**



Figure 2.3 Indicative Masterplan (Landscape Architecture & Design)

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

EXISTING DRAINAGE INFORMATION

Public Sewers

2.6. The public sewers in the area are owned and maintained by United Utilities (UU). Their records have been included in **Appendix C** and shows a 150mm combined sewer within Potato Wharf Road which, flows eastwards to a pump station and over the River Medlock.

2.7. The combined water sewer on the opposite side of the River is a 225/300mm diameter and approximately 2.6m deep. The sewer flows in northward direction under New Elm Road and connects to the network in Water Street.

2.8. A large 1500x900mm surface water drain passes through the southwest corner of the site in an east to west direction. It passes beneath the Bridgwater Canal and railway viaduct to discharge into the River Medlock.

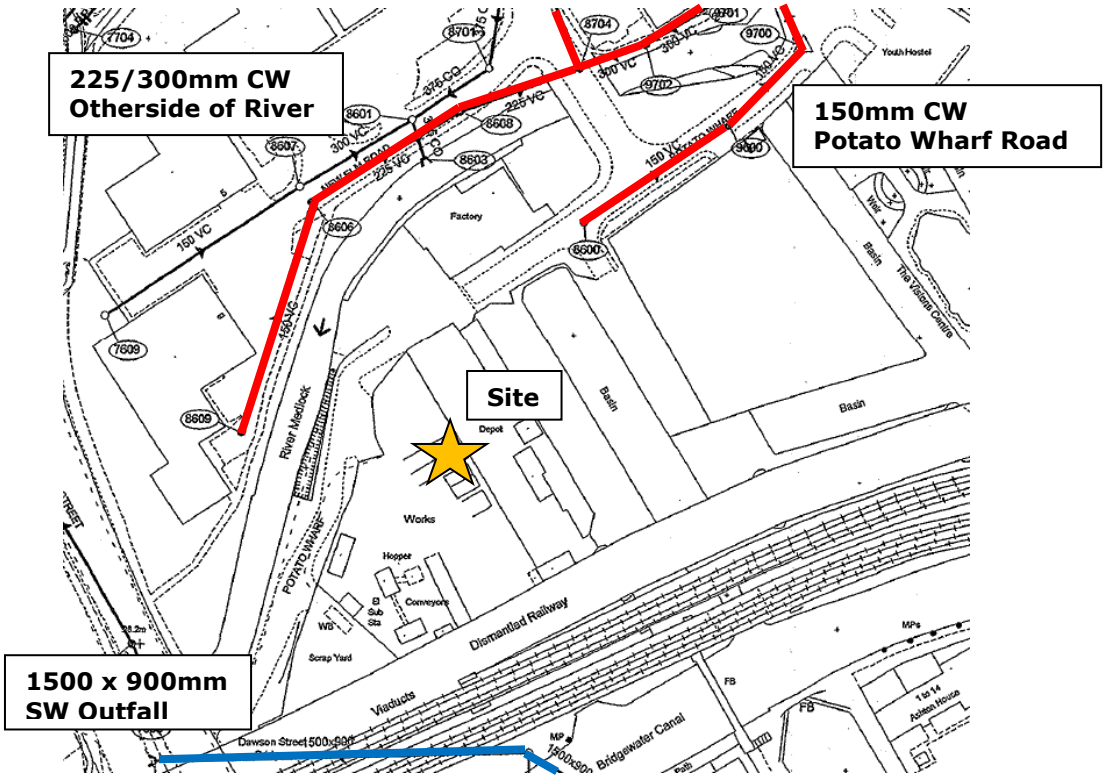


Figure 2.4 Sewer Records Abstract (UU)

Onsite Drainage – As Built Records

2.9. There are no known drainage provisions onsite. The final drainage drawing for Blocks 1&2 shows that surface water runoff discharges in the Bridgewater Canal. Whilst foul water effluent from the development is pumped over the River Medlock Bridge to the New Elm Road combined sewer.

2.10. These drawings also show that an additional rising main was installed for the future development of Blocks 3&4. This rising main should be confirmed onsite before any detailed design.

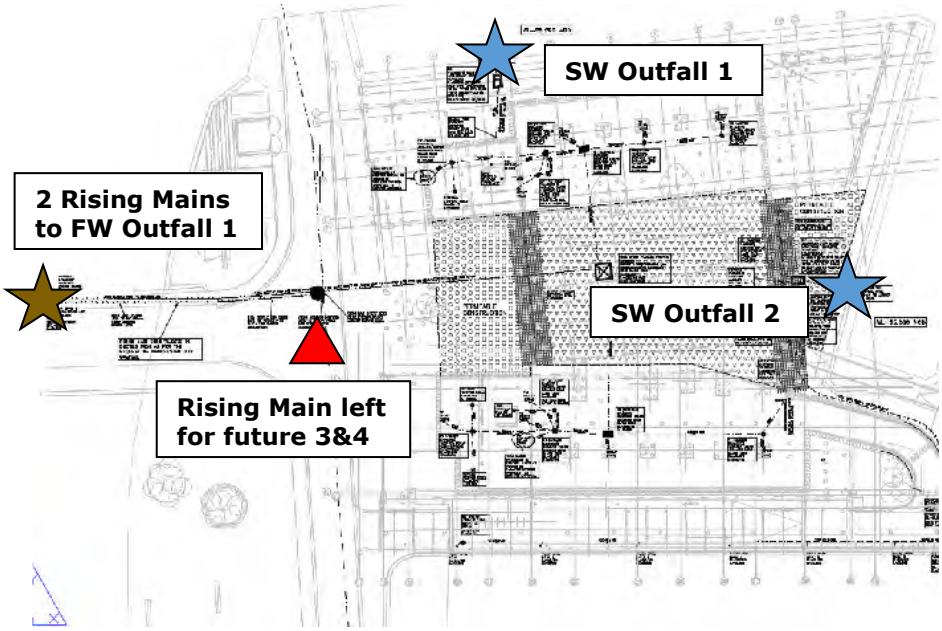


Figure 2.5 Blocks 1 & 2 as built Records Abstract

INFILTRATION EXPECTATIONS

2.11. There are five bands of soil classes in England which roughly describe the infiltration potential of an area. It is derived from factors such as, soil permeability, topography and the likelihood of impermeable layers.

Soil	WRAP	Runoff	Soil Value	Soil Characteristics
1	Very High	Very Low	0.15	Sandy, well drained
2	High	Low	0.30	Intermediate soils (sandy)
3	Moderate	Moderate	0.40	Intermediate soils (silty)
4	Low	High	0.45	Clayey, poorly drained
5	Very Low	Very High	0.50	Steep, rocky areas

Table 2.1 Different Soil Classes

2.12. The proposed sites soil is classified as type 4; thus the use of infiltration to disposal of surface water runoff is expected to be impractical.

2.13. The ground investigation also shows that contaminants are present within the Made Ground. Therefore the use of infiltration on site should be avoided to prevent the potential leaching of contaminates into the groundwater, aquifer below the site and waterbodies.

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SHEPHERD • GILMOUR • SHEPHERD • GILMOUR • SHEPHERD • GILMOUR

SECTION 3 POTENTIAL SOURCES OF FLOODING

SOURCES OF DATA

3.1. The sources of flooding which could affect the site have been identified below in **Table 3.1**. Their estimated influence on the proposed site is discussed in detail later in the section along with possible mitigation measures.

Source of Flooding	Potential Flood Risk				Description
	High	Medium	Low	None	
Fluvial		X			The site is located within Flood Zone 2 according to EA Maps and the SFRA
Tidal				X	The site is located outside of any tidal influence zone.
Canal			X		The site is located next to the Bridgewater Canal.
Ground Water				X	The SFRA data shows that the site is outside of any noted issues
Artificial Waterbodies				X	The site is located a considerable distance away from any reservoirs
Pluvial Runoff			X		SFRA maps show low risk.
Sewers				X	Nothing highlighted with the SFRA.

Table 3.1 Sources of Flooding

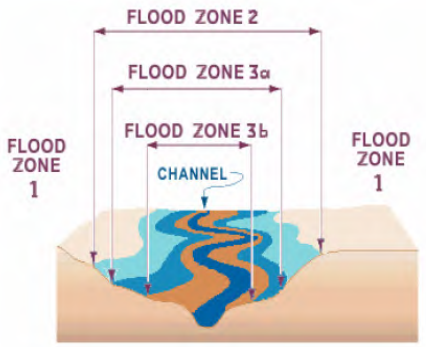
FLUVIAL FLOOD RISK

SFRA/Environment Agency

3.2. The Strategic Flood Risk Assessment for this area shows that the proposed site is located within Flood Zone 2. This report was produced by JBA Consulting in March 2010.

3.3. The Environment Agency Advice Maps as shown in **Figure 3.1** are more current. They also locate the site within Flood Zone 2 i.e. the site has been assessed as having between a 1 in 100 and 1 in 1000 chance of flooding.

3.4. The data is continuously updated for the majority of the watercourses within England and can provided on request. Node positions along the waterbody with estimated flood levels allow a detailed site comparison as shown below.



Flood Zone 1: Low Probability
Land assessed as having a less than 1 in 1000 chance of river and sea flooding.

Flood Zone 2: Medium Probability
Land assessed as having between a 1 in 100 and 1 in 1000 chance of river flooding (1%-0.1%) and between 1 in 200 and 1 in 1000 chance of sea flooding (0.5%-0.1%)

Flood Zone 3: High Probability
Land assessed as having between a 1 in 100 or greater chance of river flooding (>1%) and between 1 in 200 or greater chance of sea flooding (>0.5%).

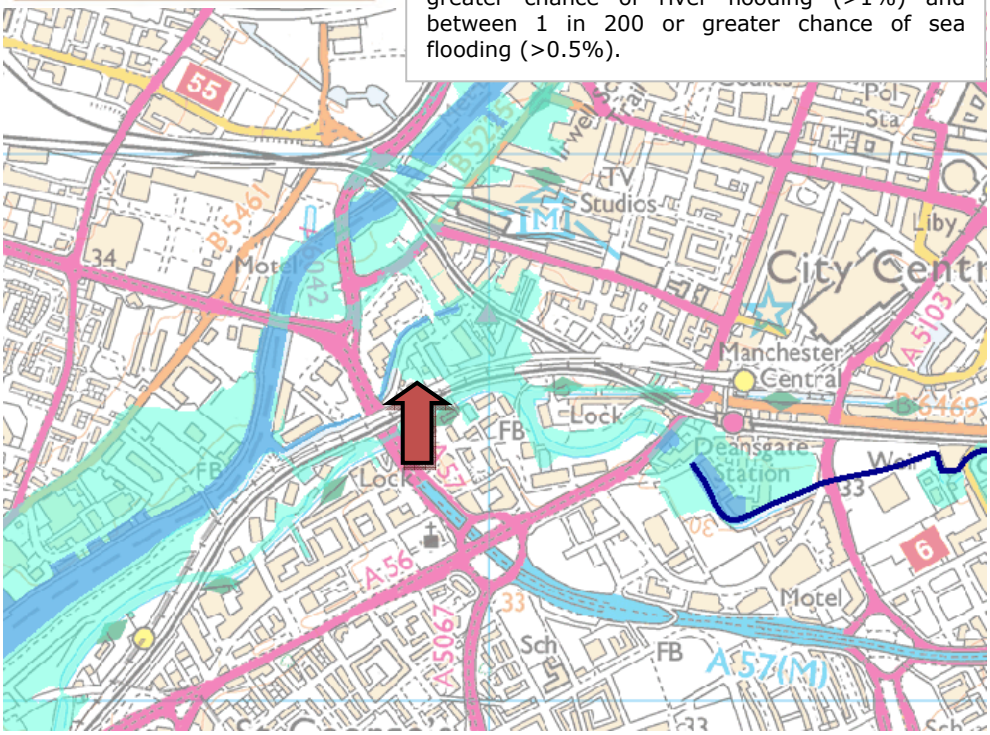


Figure 3.1 Flood Advice Map (Environment Agency)

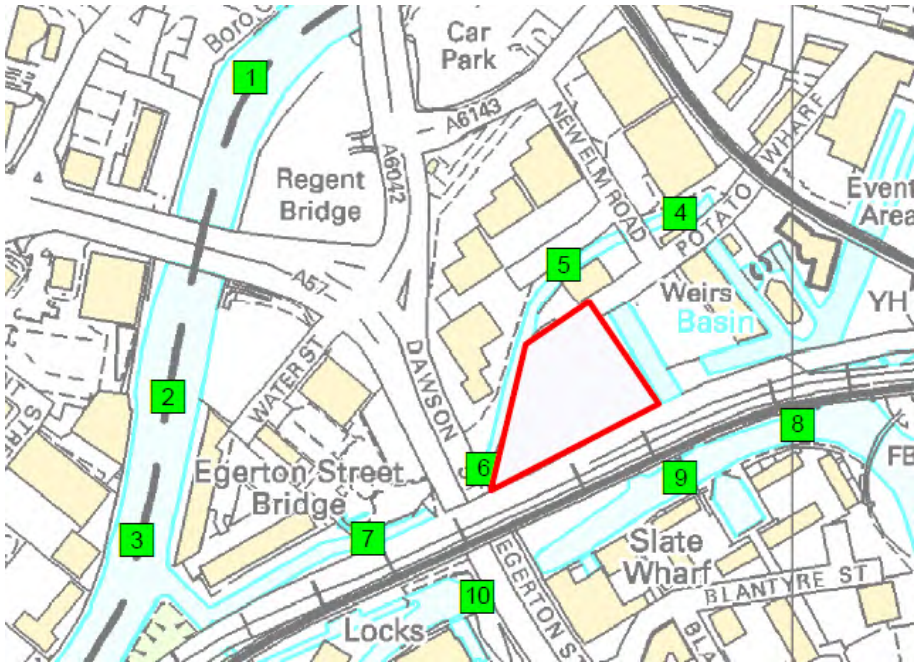


Figure 3.2 EA Flood Node Positions (Environment Agency)

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

River Medlock

3.5. The River Medlock flows around the northwest boundary of the site. The EA have provided four node locations with positions 5 & 6 more relevant to the site. The estimated flood levels at these position are below and will be compared to the site in **Section 4**.

Flood Event/Node	Node 4	Node 5	Node 6	Node 7
100 year	25.780	24.080	25.750	25.730
100 year + CC	26.200	24.200	26.200	26.100
1000 year	28.900	24.300	28.700	28.300

Table 3.2 River Medlock Flood Levels

Grey Irwell/Manchester Ship Canal

3.6. The Manchester Ship Canal (MSC) was built by canalising sections of the lower River Irwell and is to the west of the proposed site. The EA data has provided three Node locations with position 3 being the most relevant. Estimate flood levels at this position are lower than the River Medlock and will be ignored.

Flood Event/Node	Node 1	Node 2	Node 3
100 year	24.780	24.570	24.530
100 year + CC	25.600	25.330	25.300
1000 year	28.860	27.740	27.690

Table 3.3 Grey Irwell/MSC Flood Levels

Bridgewater Canal

3.7. The SFRA highlights that the high level overflows between the MSC and River Medlock into the canal are an issue and may contribute to flood risk. However these estimated flood levels are lower than from the River Medlock levels and will therefore be ignored.

Flood Event/Node	Node 8	Node 9	Node 10
100 year	25.700	25.700	25.540
100 year + CC	25.900	25.800	25.640
1000 year	26.100	26.100	25.810

Table 3.4 Bridgewater Canal Flood Levels

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

GROUND WATER FLOOD RISK

3.8. The SFRA and ground investigation show that there is no risk of ground water flooding.

ARTIFICIAL WATERBODIES

3.9. Reservoir screening maps within the SFRA show that the nearest artificial waterbody are the Sale or Kersal FSA. There are a considerable distance from the site and therefore any risk of flooding from these should be negligible.

PLUVIAL RUNOFF

3.10. The SFRA produced maps based upon a 200 year rainfall across a digital model to highlight areas which are susceptible to pluvial runoff. These maps show some of the site has a "low susceptibility" risk to surface runoff.

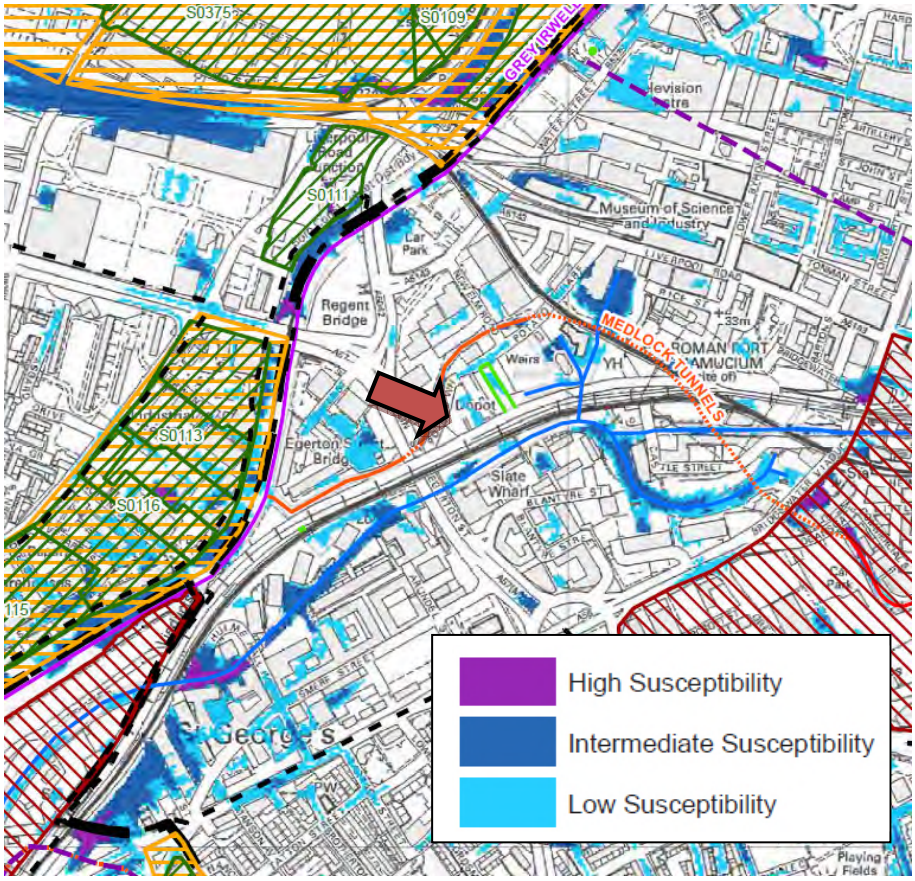


Figure 3.3 Pluvial Runoff Risk (SFRA)

SEWER FLOODING

3.11. The local statutory water undertaker maintains a DG5 register that is split up into Internal and External flooding events. This data is considered confidential so the amount of detail available for review is restricted. The SFRA maps were unable at this time and the report highlighted any issues within the vicinity of the site.

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SECTION 4 FLOOD RISK MITIGATION

FLOOD LEVEL ANALYSIS

4.1. The Client has provided a topographical survey for the proposed site which has allowed the existing ground and estimated flood levels to be compared. Node 6 is the most critical in relation to the site with an estimated flood level of 25.120m AOD for the 1 in 100 year plus climate change event.

Flood Event/Node	Node 6	Flooding Occurs	Area	Site %
100 year	25.750m	No	0%	0%
100 year + CC	26.200m	**Yes**	**8297m2**	**67%**
1000 year	28.700m	**Yes**	**12200m2**	**98%**

Table 4.1 River Medlock Flood Levels

4.2. As shown above the River Medlock only influences the site during the 100 plus CC and 1000 year events. The 100 year plus CC is shown to extend across approximately 60% of the site and primarily affects the eastern side of the site. The 1000 year event increases the flood level another 2.5m and would impact the whole site. Flood Analysis plans have been included within **Appendix D**.

FLOOD MITIGATION

Finished Floor Level

4.3. The Finished Floor Levels is to be set at or above 26.800m AOD which would provide a 600mm freeboard above the 1 in 100 year plus climate change level.

Flood Compensation

4.4. The model shows that no flooding occurs during the 1 in 100 year event. As such, no flood water compensation is required on this site.

Flood Resilient Construction

4.5. The proposed development is within the 1000 year flood plain (28.700m AOD). As per the SFRA recommendations any buildings must be structural sound up to this level and provide refuge on the floor above.

1 in 1000 year flood event, residual risk scenario		Refuge to be provided on floor above Building to be structurally sound to this level	Where practical flood warning and evacuation should be in place Where there are significant depths, refuge to be provided on floor above Building to be structurally sound to this level.

Figure 4.1 SFRA 1000 Year Recommendations

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

Safe Access and Egress

4.6. The site and surround area is located within the 100 year plus climate change floodplain. Dry access and egress from the site should be possible during this flood event and therefore a detailed outline evacuation plan will need to be produced. An indicative route has been shown in in **Appendix D**.

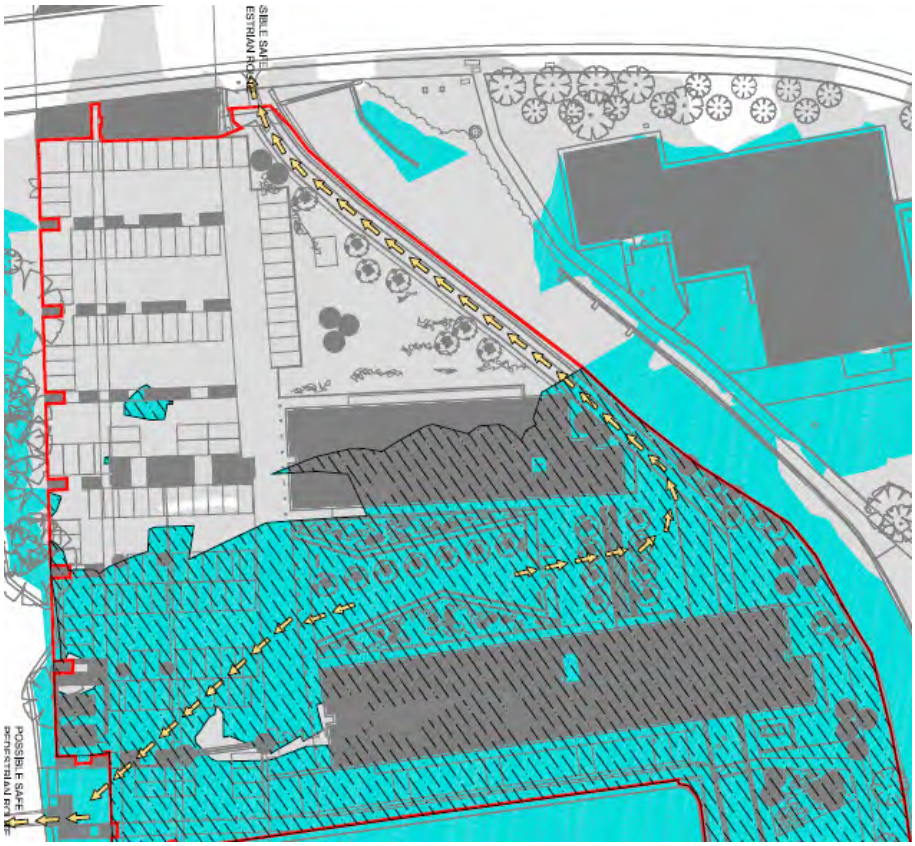


Figure 4.2 EA Flood Levels & Indicative Routes

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

SECTION 5 SURFACE WATER RUNOFF

EXISTING RUNOFF RATE

5.1. The Modified Rational Method has been used to calculate the existing runoff rate of the site. It requires the existing hardstanding areas (**Appendix E**), an approximate time of concentration and variables from the Wallingford Procedure.

	m2	ha
Site Area	12440	1.2440
Impermeable Area	10870	1.0870
Percentage	87%	

Table 5.1 Existing Site Analysis

Volume Wallingford Variables	Value
M5-60 minute rainfall depth	17.0mm
Ratio of M5-60 to M5-2 day rainfalls	0.40mm
Average Annual Rainfall (SAAR)	880mm
Winter Rain Acceptance Potential (SOIL)	Soil Type 4 (0.45)
Urban Catchment Wetness Index (UCWI)	95
Time of Concentration	5 min

Table 5.2 Wallingford Procedure Volume 3 Variables

Return Period (Years)	1	2	5	30	100
Rainfall Intensity (l/s)	44.3	56.4	72.8	103.4	127.8

Table 5.3 Return Period Rainfall Intensity

5.2. The peak flow rate, given by the Modified Rational Method is as follows;

$Q_{Brownfield}$ *(l/S)* $= 2.78 * C_v * C_r * R_i * Area$

Where;

PIMP	*= (Percentage of impermeable area)*	*= 87%*
P_r	*= 0.829PIMP+25SOIL+0.078UCWI – 20.7*	*= 70%*
C_v	*= Volumetric runoff coefficient =* $P_r/PIMP$	*= 0.805*
C_r	*= Routing coefficient (Urban Areas)*	*= 1.3*
R_i	*= Rainfall Intensity 1 Year*	*= 44.3 mm/hr*
Area	*= Impermeable Area*	*= 1.0870 ha*

$Q_{Brownfield}$ *(l/S)* $= 2.78 * 0.805 * 1.3 * 44.3 * 1.0870$ = **140 l/s**

Return Period (Years)	1	2	5	30	100
Peak Runoff Rate(l/s)	140	178	230	327	404

Table 5.4 Existing Peak Runoff Rates

PROPOSED RUNOFF RATE

5.3. The NSSDS and supporting technical standards state that any redevelopment should limit peak runoff to its original Greenfield rate or as close as reasonably practical.

5.4. To achieve a Greenfield runoff would require substantial underground storage. Due to onsite constraints such as proposed buildings, viaducts and the River Medlock, only a small area of landscaping as suitable for this.

5.5. Therefore in order to provide a betterment it is suggested that the proposed peak runoff rate be limited to 70% of the existing as follows;

Return Period (Years)	1	2	5	30	100
Peak Runoff Rate(l/s)	140	178	230	327	404
Modified Peak Runoff(l/s)	**98**	**125**	**161**	**229**	**283**

Table 5.5 Proposed Peak Runoff Rates

PREFFERED RUNOFF DESTINATION

5.6. The National Standards for Sustainable Drainage Systems was produced by Defra in December 2011. This document sets out the preferred surface water runoff destinations;

- *One* *Discharge into the ground*
- *Two* *Discharge to a surface water body*
- *Three* *Discharge to a surface water sewer*
- *Four* *Discharge to a combined sewer*

Discharge into the ground

Surface runoff must be discharged to the ground except where one or more of the following criteria can be demonstrated:

a) The rate of surface runoff is greater than the rate at which water can infiltrate into the ground. In this case as much of the water as reasonably practicable must be discharged by infiltration; or

b) There is an unacceptable risk of ground instability or subsidence; or

c) There is an unacceptable risk of pollution from the mobilising existing contaminants on the site; or

d) Infiltration is not complaint with the water quality requirements; or

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

e) Infiltration is an unacceptable risk of ground water flooding; or

f) The infiltration system would create a high risk of ground water leakage into the combined sewer.

5.7. Infiltration results onsite are expected to be low and therefore impractical as a runoff destination. Evidence must be provided to discount this approach, so we recommend that infiltration tests are carried out in accordance with BRE365.

Discharge to a surface water body

Surface runoff not discharged into the ground must be discharged to a surface water body except where it can be demonstrated that:

a) It is not reasonably practicable to convey the runoff of a surface water body; or

b) Pumping of the surface runoff, either on site or further downstream, would be required and there is a reasonably practicable alternative; or

c) Discharge would result in an unacceptable risk of flooding from the surface water body.

5.8. The Bridgewater Canal and River Medlock are located along the south and west development boundaries. Surface water runoff from the proposed development should therefore discharge into either of these waterbodies.

Discharge to a surface water sewer

Surface runoff that cannot be discharged into the ground or to a surface water body must be discharged to a surface water sewer or local highway drain, except where it can be demonstrated that it is not reasonably practical to do so.

5.9. **Not applicable in this site**

Discharge to a combined sewer

Surface runoff that cannot be discharged into the ground, a surface water body or a surface water sewer or local highway drain must be discharged to a public, combined sewer system.

5.10. **Not applicable in this site**

SHEPHERD · GILMOUR · SHEPHERD · GILMOUR · SHEPHERD · GILMOUR

SECTION 6 PRELIMINARY DRAINAGE STRATEGY

SURFACE WATER STRATEGY

6.1. Based on the topography of the site a proposed connection to the Bridgewater Canal would require a pumped solution. Hence a connection to the River Medlock via gravity is the preferred outfall.

6.2. The proposed surface water drainage will consists of two networks which will provide the most effective water treatment. A copy of this layout has been included within **Appendix F** of this report.

Curtilage Runoff - Network 1

6.3. In accordance with NSSDS, surface runoff from the canopy must be isolated from other sources to avoid contamination. The runoff is classified as "low hazard" and requires no treatment before discharging into a waterbody.

External Runoff - Network 2

6.4. Runoff from the proposed externals is classed as a "medium hazard" and requires two forms of treatment. Therefore gullies, channels etc. which capture the runoff, will require sump outlets which will prevent sediment entering the network and progressing onto the waterbody.

6.5. The second stage of treatment will be by passing flows through a full retention separator. This will treat the runoff by removing oil, chemicals and suspended solids before discharging into the water course.

Climate change provision

6.6. The detailed surface water design will be required to make an allowance for future climate change. The NPPF states that rainfall intensities used to calculate runoff volumes should be multiplied by 30% for this proposal.

Estimated Storage

6.7. The proposed development will be restricted to 70% of the existing peak runoff rate and as a result some attenuation will be required. This has been estimated to be between 150-250m^3 based upon the peak flowrates shown in **Table 5.5**.

Finished Floor Levels

6.8. Based on the existing topography of the site and the level of the proposed outfall there should be no drainage issues that dictate floor levels. However the proposed buildings should be set no lower than 26.800 AOD as discussed in **Section 4**.

SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

FOUL WATER STRATEGY

6.9. The foul water drainage will serve the proposed buildings perimeter before discharging into an onsite pumping station. The effluent will then be pumped to United Utilities combined sewer which is located in New Elm Road.

Foul Water Flows and Storage

6.10. The proposed flow rate allowed to be discharged from the site will be agreed with United Utilities during the detail design. The proposed pump station must be design in accordance with Building Regulations Document H1 and Sewers for Adoption 6/7th Edition.

Finished Floor Levels

6.11. The proposed site requires a pumped solution for the foul drainage and therefore has no restrictions on the proposed finished floor levels. However the proposed buildings should be set no lower than 26.800m AOD as per **Section 4**.

SHEPHERD · GILMOUR SHEPHERD · GILMOUR SHEPHERD · GILMOUR

SECTION 7 ASSESSMENT OF FLOOD RISK & DRAINAGE

7.1. A Flood Risk Assessment is required to satisfy all requirements of the National Planning Policy Framework (NFFP) and the Development and Flood Risk (2001).

7.2. This FRA as far as reasonably practical; determines the potential flood risk associated with the site and has concluded the following.

a) The proposed site lies within the "low probability" Flood Zone 1 and "medium probability" Flood Zone 2.

b) The proposed buildings should be set no lower than 26.500m AOD.

c) Flood resilient construction methods should be used up to 28.700m AOD.

d) A detail evacuation plan will need to be produced.

e) The proposed onsite drainage system must not contribute to any flood risk or overland flow risk. Any residual risk will be effectively managed onsite with the use of appropriate drainage and/or topographical level consideration.

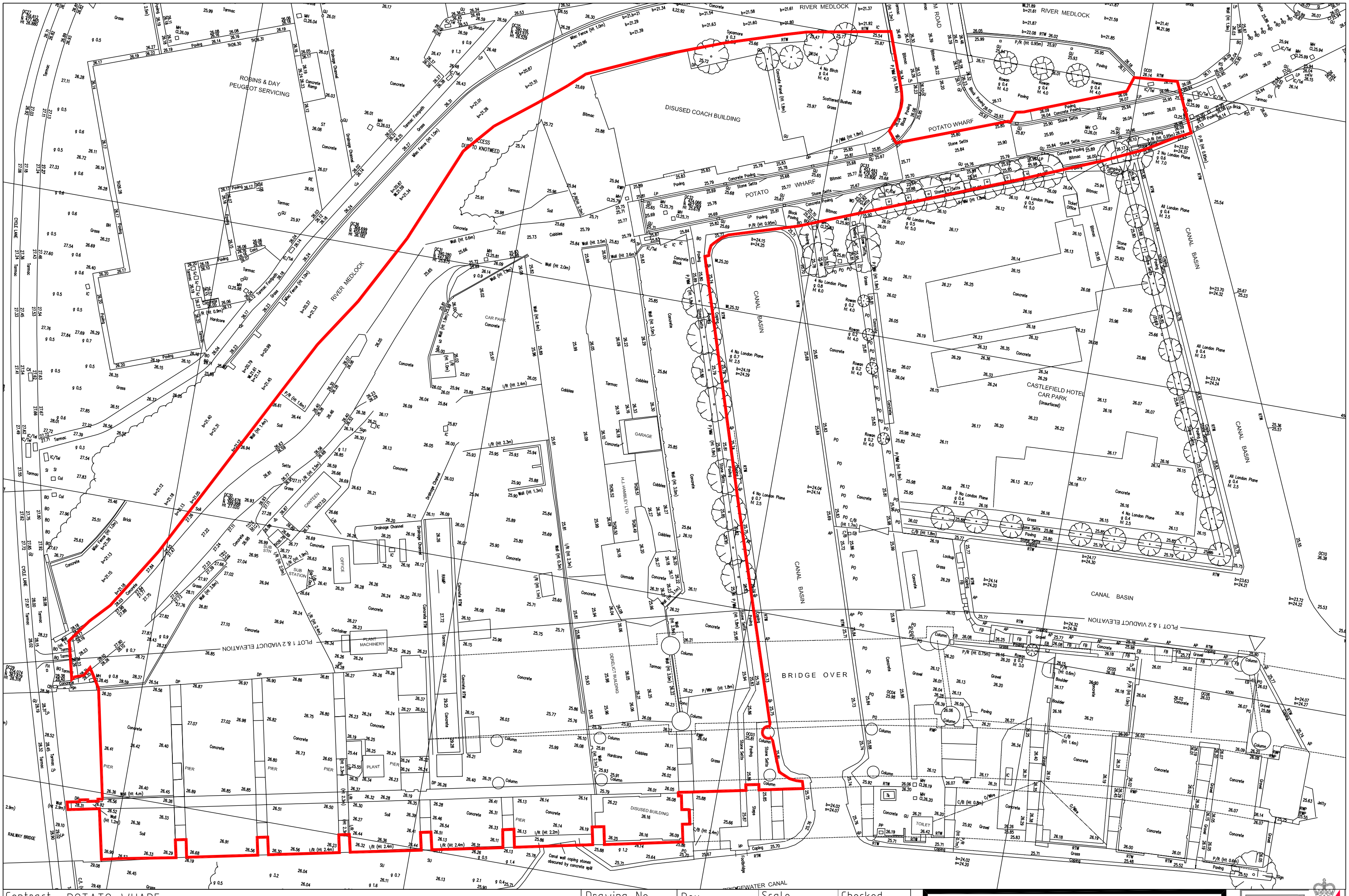
f) The redevelopment of the site should not commence until such time as a detailed scheme for surface water drainage has been submitted to and approved by the Local Panning Authority.

g) United Utilities have a legal obligation to ensure that their assets are maintained in order to mitigate flooding during "normal" operational conditions.

7.3. We recommend that the Local Planning Authority accept this Flood Risk Assessment and drainage strategy in support of the Planning Application.

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX A



Contract POTATO WHARF	Drawing No C1114-106	Rev A	Scale 1/500	Checked
Title TOPO SURVEY		Date 29.05.2015	Drawn DR	Approved

SHEPHERD·GILMOUR
Infrastructure Limited

NQA ISO 9001 REGISTERED COMPANY

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX B

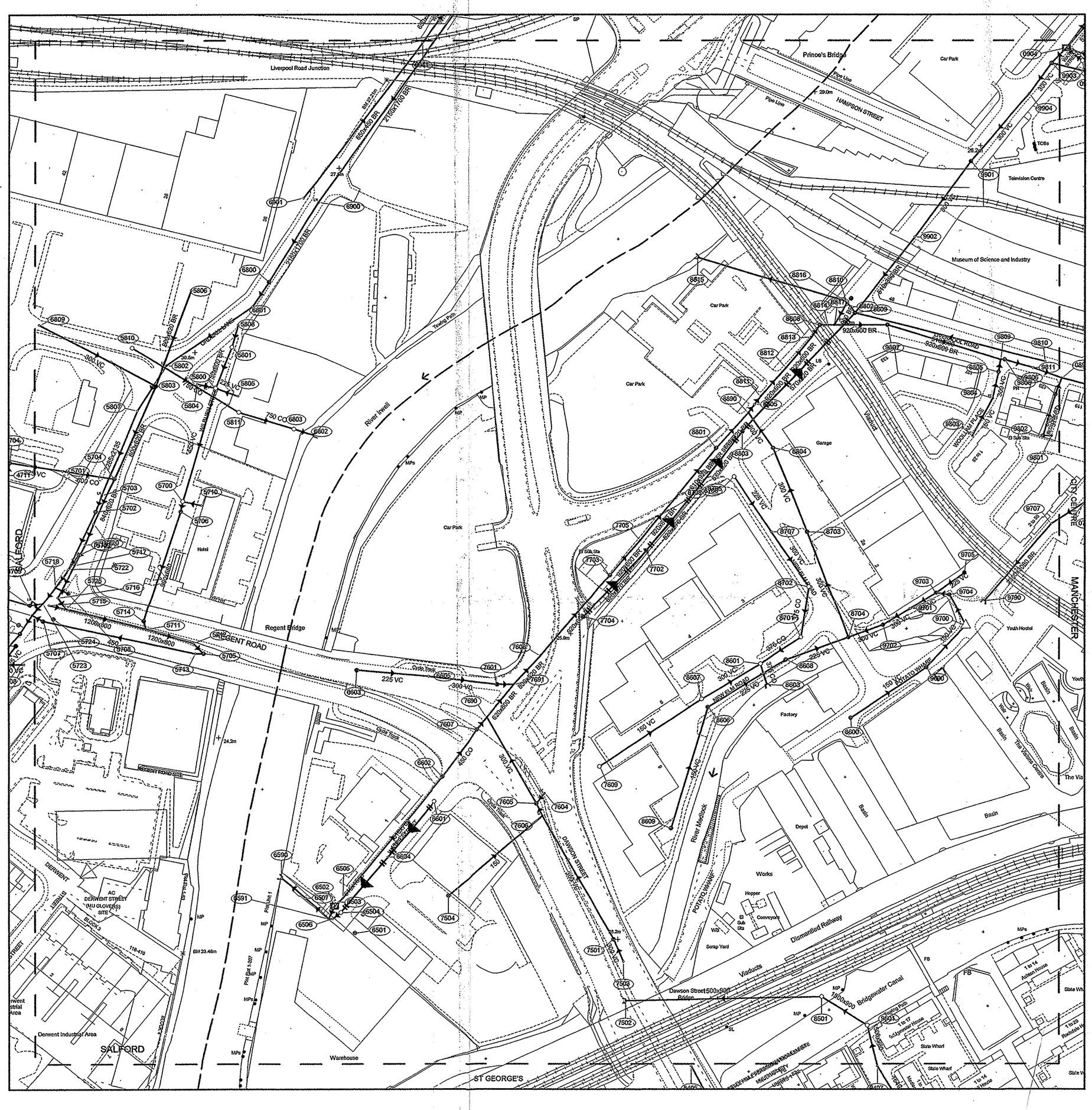
Contract	POTATO WHARF	Drawing No	Rev	Scale	Checked
		C1114-106	A	1/500	
Title	MASTERPLAN		Date	Drawn	Approved
			29.05.2015	DR	

SHEPHERD•GILMOUR
Infrastructure Limited

NQA ISO 9001 REGISTERED COMPANY

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX C



OS Sheet No: SJ8297NE

Scale 1:1250 Date: 21-Jun-2006

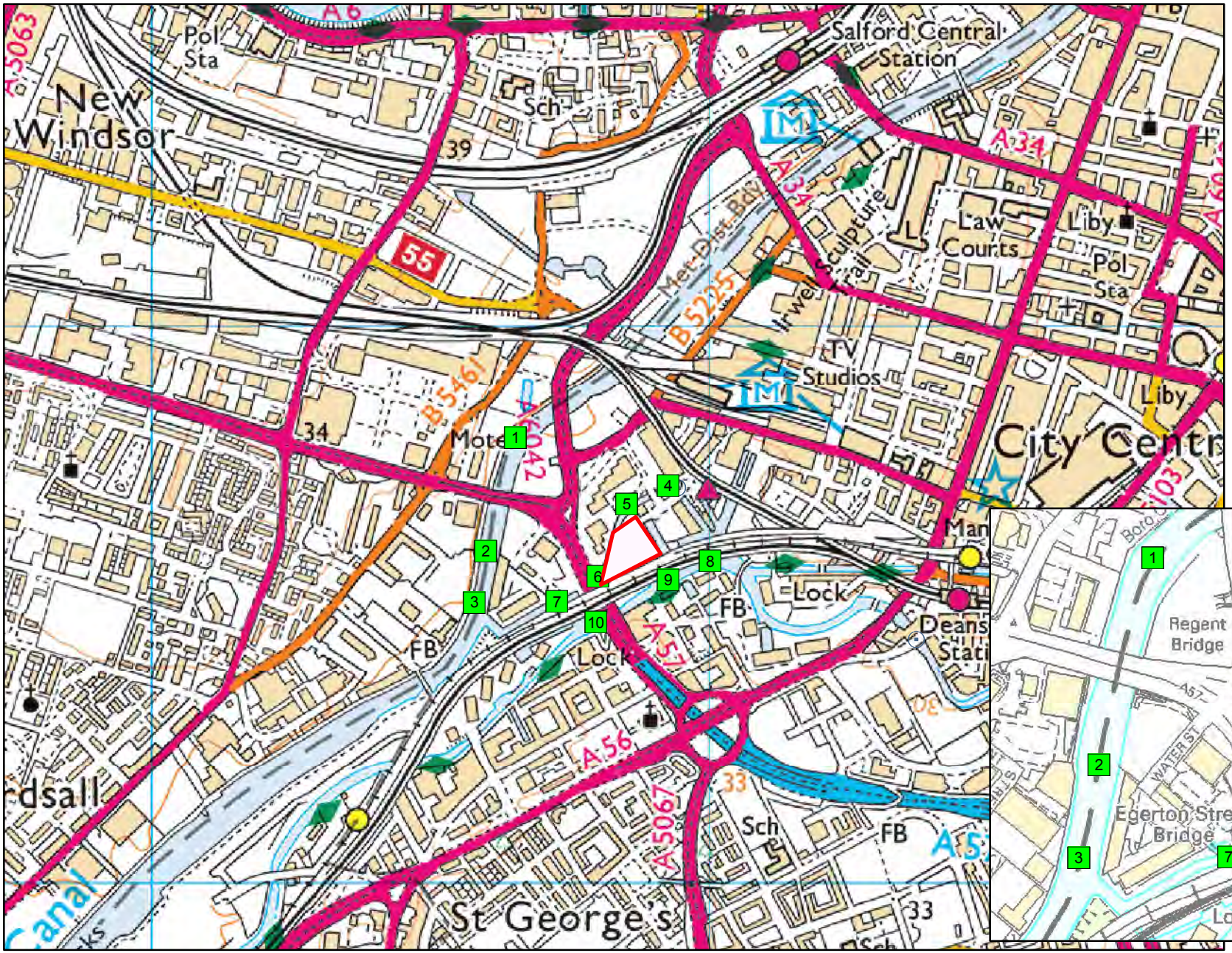
Printed by: Frank Turner

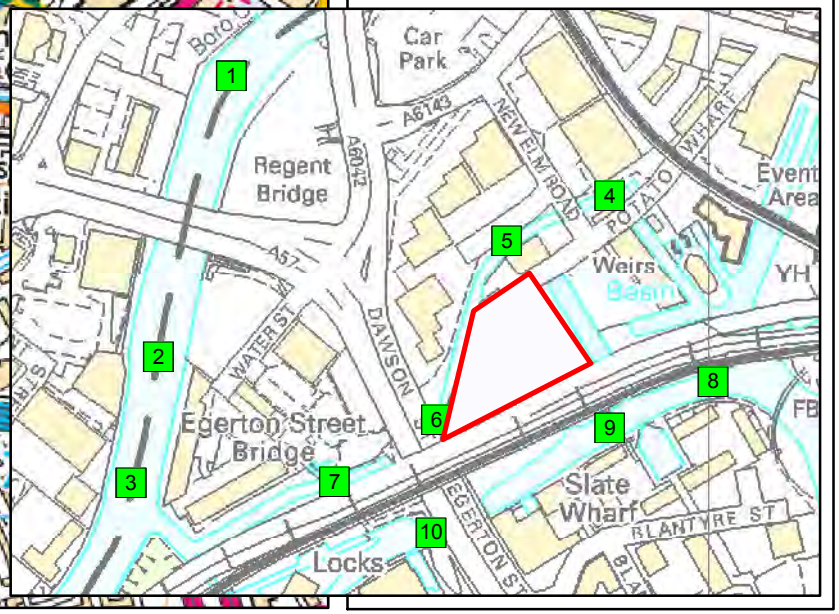
Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
5700	28.88	S	M	25.1	750	600	R	BR		5.1
5701		C	Q	27.84	600		C	CO	25	25.32
5702	30.68	C	M	19.73						30.87
5703		C	L							8.54
5704	30.74	C	M	26.5	840	620	E	BR		24.17
5705		C	M		450		C			4
5706		C	M		990	680	E			56.92
5707		C	M							5.83
5708		C	M							6.71
5709		C	M		150		C	VC		0.6
5710		S	G		150		C	VC		9.22
5711		C	J		1200	800	E			24.04
5712		C	G		1200	600	E			7.07
5713		C	G		450		C			74.73
5714		C	M		1200	800	E			4.12
5715		C	G		1200	800	E			3.25
5716		C	G							7.21
5717		C	J							17.89
5718		C	J							10
5719		C	Q		1000	880	E			11.16
5720		C	G		840	620	E	BR		10.77
5722		C	G							10.62
5723		C	J							7.81
5724		C	M							
5725		C	J		1200	800	E			39.29
5800	29.06	S	M	25.86	450		C	VC	83	57.28
5801	29.21	S	M		750	600	R	BR		21.54
5802		C	L							26.08
5803	30.93	F	M	27.03	600	620	E	BR	115	49.24
5804		S	G		225		C	VC		9.22
5805		S	G		225		C	VC		11.7
5806		F	G		900	620	E	BR		49.98
5807		C	G		2285	2135	E			44.38
5808		S	G		750	600	R	BR		11.4
5809		F	G		300		C	VC		63.63
5810	30.67	S	M		750		C	CO		60.57
5811	29	S	M		750		C	CO		28
6501	25.1	C	M							
6502		C	V	23.19	470	430	R	BR		2.79
6502		C	V		300		C	VC		6.81
6503		C	Q		450		C	CO		2.83
6504	25	S	M	21.55	610	1550	H	BR		5
6505		C	J		450		C	CO		76.69
6506		S	G		610	1550	H	BR		2
6507		O	Q		610	1550	H	BR		15.62
6590		O	F							
6591		O	J		610	1550	E	BR		14.97
6601

SHEPHERD • GILMOUR SHEPHERD • GILMOUR SHEPHERD • GILMOUR

APPENDIX D

Detailed Flood Map centred on Potato Wharf Site, Manchester. Created 23rd April 2015 [GMMC4699AB]





Environment Agency

1:10,000

N

Legend

- Site_Location
- Model_Measurements
- Flood Zone 3
- Flood Zone 2
- Main River

© Environment Agency copyright and / or database rights 2014. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2015.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

					Model run is representative of present conditions and all gates are operational as per the agreed automated protocol. Maximum gate opening height is set to 2.4m. This run is the same as used in the flood map products.			Model run is representative of a single gate failure on every set of sluice structures. Maximum gate opening height is set to 2.4m			River Medlock_Undefended Levels			Undefended Levels		
Map Reference	Model Node Reference	Easting	Northing	Data	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate Change*	0.1 % AEP (1 in 1000 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate Change*	0.1 % AEP (1 in 1000 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate	0.1 % AEP (1 in 1000 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate	0.1 % AEP (1 in 1000 year)
1	ea013_Model_MSCC08_0479	382653	397800	Modelled Water Level (m aodN)	24.38	25.10	28.82	24.78	25.60	28.86						
				Modelled Flow (cumecs)	581.61	698.00	1190.47	581.87	694.93	1193.15						
2	ea013_Model_MSCC08_0268	382600	397596	Modelled Water Level (m aodN)	24.12	24.79	27.72	24.57	25.33	27.74						
				Modelled Flow (cumecs)	581.79	699.05	1189.70	582.08	694.83	1192.55						
3	ea013_Model_MSCC08_0173	382580	397504	Modelled Water Level (m aodN)	24.07	24.76	27.68	24.53	25.30	27.69						
				Modelled Flow (cumecs)	581.86	699.12	1189.50	582.17	694.76	1192.41						
4	ea013_Model_0128_MEDZ01_0454i	382928	397713	Modelled Water Level (m aodN)							25.78	26.2	28.9			
				Modelled Flow (cumecs)							32.76	33.9	38.6			
5	ea013_Model_MEDZ01_00006	382853	397680	Modelled Water Level (m aodN)							24.08	24.2	24.3			
				Modelled Flow (cumecs)							32.59	33.9	36.4			
6	ea013_Model_0128_MEDZ01_0230	382802	397550	Modelled Water Level (m aodN)							25.75	26.2	28.7			
				Modelled Flow (cumecs)							32.75	33.9	90.2			
7	ea013_Model_0128_MEDZ01_0145i	382728	397505	Modelled Water Level (m aodN)							25.73	26.1	28.3			
				Modelled Flow (cumecs)							32.74	33.9	102.2			
8	ea013_Model_BRGW01_00014	383003	397578	Modelled Water Level (m aodN)										25.7	25.9	26.1
				Modelled Flow (cumecs)										29.8	34.8	42.3
9	ea013_Model_BRGW01_00011	382928	397544	Modelled Water Level (m aodN)										25.7	25.8	26.1
				Modelled Flow (cumecs)										29.8	34.84	42.25
10	ea013_Model_BRGW01_00009	382798	397468	Modelled Water Level (m aodN)										25.54	25.64	25.81
				Modelled Flow (cumecs)										29.79	34.84	42.24

Model data taken from the Manchester Ship Canal Study 2010 and River Medlock SFRM 2009

Notes:

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

*Climate Change Scenario - 20% increase in flow