



## Drainage Strategy

Bevington Bush/  
Gardner's Row  
Liverpool

19<sup>th</sup> August 2015

4/5758

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*Prepared for:* Jamworks

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*Definition of Version Code:*

- D. Applied during initial drafting of the report before it has been reviewed.
  - C Applied after the report has been reviewed but before it has been approved by the Project Manager.
  - B. Applied after the Project Manager has approved the report ready for issue to the client.
  - A Applied to reports after external/internal review.
- The version number starts at "0" and is raised by "1" at each re-type.

*Prepared by:*

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**Structural Engineer**  
for and on behalf of CLANCY CONSULTING LTD

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Appendix A – United Utilities Sewer Records.

Appendix B – Surface Water Runoff Estimates for Existing and Proposed Developments.

Appendix C – Drainage Strategy Plan.

## **1.0 INTRODUCTION**

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### **1.1 General**

- 1.1.1 This document outlines the initial drainage design philosophy in relation to the proposed residential accommodation development at Bevington Bush/ Gardner's Row, Liverpool.
- 1.1.2 The site is located adjacent Leeds Street/ Scotland Road junction. The site is bordered by Bevington Bush along its North boundary, Gardner's Row to its West boundary and Edgar Street to its South boundary. The East boundary is currently a grassed area adjacent to Scotland Road.
- 1.1.3 The development covers an area of approximately 0.4 hectares.
- 1.1.4 The site currently comprises of a large warehouse building with concrete hardstanding and overgrown vegetation to all sides.
- 1.1.5 The proposal includes the demolition of the warehouse building and concrete hardstandings and the construction of three new residential accommodation buildings ranging between 7 to 14 storeys high. The internal courtyard and the access to it will be paved, with all other areas landscaped.
- 1.1.6 Existing Service plans have been provided by United Utilities. (Appendix A).

### **1.2 Background Information**

- 1.2.1 General guidance for Liverpool City Council's drainage requirements for surface water runoff on brownfield sites indicates if a site has been previously developed, it should be demonstrated that the drainage system is still operation for it to be classed as brownfield.
- 1.2.2 Information should be obtained on the system (pipe diameters, levels, gradients, lengths, hydraulic controls, etc).
- 1.2.3 A drainage model should be developed utilising these details in order to evaluate peak flow rates at the outfalls from the existing site for the design return period events.
- 1.2.4 The maximum allowed flow from the site has been derived using the 1:2 year critical rainfall event. Following previous earlier conversations with United Utilities, they have indicated a 10% 'betterment' of the existing runoff would be acceptable.
- 1.2.5 The limiting discharge figure for the proposed development should be used in the design of the drainage system for the minimum requirement that flows for up to the 1:30yr critical rainfall event, are retained within the system and that for the 1:100yr+30% climate change allowance critical rainfall event there will be no flooding to any buildings and any excess volumes of water will be retained on site.

the area being drained, it would have a maximum flow capacity which may be lower than any proposed flows calculated using the above criteria, assuming a free discharge. Therefore discharge to the existing drainage system from the development would be effectively increased from the existing situation which is contrary to Environment Agency and National Planning Policy Framework guidance for flood risk and surface water management.

## 2.0 SITE CHARACTERISTICS

---

### 2.1 Location

2.1.1 The development is located as detailed as below.

OS X (Eastings)	334734
OS Y (Northings)	391323
Nearest Post Code	L69 3RB
Lat (WGS84)	N53:24:53 (53.414661)
Long (WGS84)	W-2:59:00 (- 2.9834022)
LR	SD347913

2.1.2 The total planning application development area is approximately 4,000 m<sup>2</sup>.

2.1.3 A review of United Utility record drawings indicates there are two combined foul and surface water drainage runs; the first begins on Gardners Row and runs clockwise around the perimeter of the development, whilst the second runs West to East along Edgar Street. Both of these runs converge in the South West corner of the site before running South away from the development.

2.1.4 There are no known watercourses on or in the immediate vicinity of the development.

### 2.2 Development Proposals

2.2.1 The proposal includes the demolition of the existing warehouse building and concrete hardstandings and the construction of three new residential accommodation buildings ranging between 7 to 14 storeys high. The internal courtyard and the access to it will be paved, with all other areas landscaped.

2.2.2 The proposed development results in an increase of approximately 250m<sup>2</sup> to the impermeable drained areas of the development.

### 3.0 DRAINAGE STRATEGY

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#### 3.1 Surface Water Drainage

- 3.1.1 The development provides the opportunity for drainage improvements on site which will help to decrease the risk of the surface water flooding. It is proposed to develop surface water drainage designs to ensure that all water is stored on site for rainfall events up to 1 in 100 years with an allowance for climate change.
- 3.1.2 The existing development has an impermeable area of approximately 3240m<sup>2</sup> with the proposed development increasing to 3490m<sup>2</sup>. Based upon a 15 minute storm duration, the existing and proposed discharge rates for a number of storm events are as follows (Calculations based upon Wallingford procedure – Appendix B):

Storm Event	Existing Development (l/s)	Proposed Development (l/s)
<b>1 in 2 year</b>	34	37
<b>1 in 30 year</b>	65	70
<b>1 in 100 year</b>	84	91
<b>1 in 100 year + 30% climate change</b>	112	121

- 3.1.3 In accordance with Liverpool City Council surface water drainage requirements, the existing site is considered to be 'Brownfield'. The United Utilities' suggested 10% 'betterment' of the existing surface water runoff has been considered for the proposed development. This reduces the maximum allowable discharge to 30.6 l/s.
- 3.1.4 To achieve the 10% betterment, a flow control will be installed prior to any surface water leaving the development with surface water attenuated in storage tanks below the internal courtyard area.
- 3.1.5 Initial calculations based upon a 1 in 100 year storm event with an allowance of 30% for climate change, indicates that the required storage volume would be 111m<sup>3</sup>. – Refer to Drainage Strategy Plan - Appendix C.
- 3.1.6 The surface water drainage system will remain separate from the foul water drainage system whilst on the development and will be discharged into a newly formed connection on the combined system along the the Western boundary.
- 3.1.7 During the detailed design phase, all storm durations up to and including 6 hour storm events will be modelled to determine the final storage requirements for the development.
- 3.1.8 All proposed restricted flow rates and connection points will be subject to United Utilities agreement and approval.

### 3.2 Foul Water Drainage

- 3.2.1 The foul water drainage system will be collected in a separate system to the surface water. This will be collected via pipes and inspection chambers and will be positioned between the development boundary and the outer elevations of the three buildings.
- 3.2.2 Two runs of foul water drainage system are proposed on the development; the first will collect from Buildings B and C and discharge into the existing manhole along Edgar Street. The second will collect from Building A and discharge into the existing manhole on Bevington Bush.
- 3.2.3 All proposed below ground foul water drainage will comply with Building Regulations Part H:2010, BS EN 12056-2:2000 and BS EN 752:2008.
- 3.2.4 The proposed foul water flow rates for the development have been conservatively estimated using BS EN 752:2008.

<b>SUMMARY</b>	<b>Discharge Unit</b>	<b>Totals</b>	<b>Total DU</b>
<i>Shower</i>	0.6	416	249.6
<i>Washbasin</i>	0.6	419	251.4
<i>WCs (4l - 9l cistern)</i>	2.5	419	1047.5
<i>Kitchen Sink</i>	1.3	413	536.9
<i>Dishwasher</i>	0.8	75	60
<i>Floor drains (50mm - 100mm)</i>	2	8	16
<i>Washing Machine (Commercial)</i>	1.5	28	42
			2203.4
<i>Peak Flow Discharge</i>	32.9	l/s	

- 3.2.5 The proposed foul water system will be designed for peak flow rates.
- 3.2.6 The combined surface and foul water system which cuts across the North east corner of the development will need to be diverted to accommodate the new buildings. The flows through this drainage run will need to be maintained during the proposed development works.
- 3.2.7 United Utilities approval for the flow rate entering the public sewer will be required to proceed with detailed design.

## **APPENDIX A**

### **United Utilities Sewer Records**

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**FAO: J GENDALL**

**United Utilities Water PLC**

Property Searches  
Ground Floor Grasmere House  
Lingley Mere Business Park  
Great Sankey  
Warrington  
WA5 3LP

DX 715568 Warrington  
Telephone 0870 751 0101  
Fax Number 0870 7510102

[Property.searches@uuplc.co.uk](mailto:Property.searches@uuplc.co.uk)

Your Ref: 4/5309  
Our Ref: 13/ 969539  
Date: 07/10/2013

Dear Sirs

**Location: ADJACENT TO THE JUNCTION BETWEEN SCOTLAND ROAD AND LEEDS STREET  
LIVERPOOL**

I acknowledge with thanks your request dated 03/10/13 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.

I attach General Condition Information sheets, which details contact numbers for additional services (i.e. new supplies, connections, diversions) which we are unable to deal with at this office. In addition you should ensure they are made available to anyone carrying out any works which may affect our apparatus.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0870 7510101.

Yours Faithfully,



Sue McManus  
Operations Manager  
Property Searches

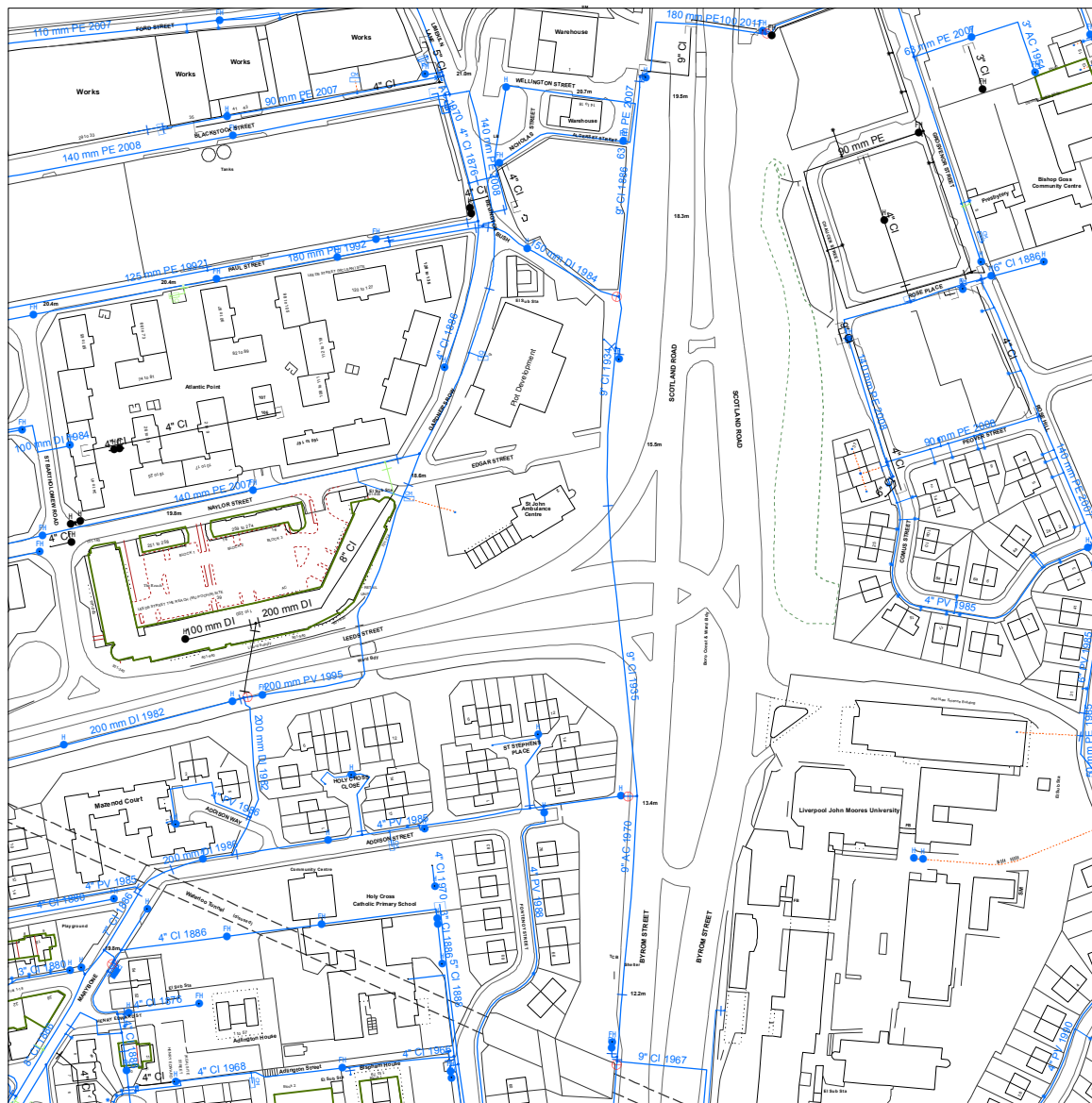
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These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUW apparatus) of United Utilities Water PLC ("UUW").

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1. This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
2. This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
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5. The position and depth of UUW apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
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7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUW apparatus by reason of the actual position and/or depths of UUW apparatus being different from those shown on the Map and any information supplied with it.
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9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUW from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.





## Legend

### PIPE WORK

Live	Proposed
Trunk Main - PressurisedMain	Raw Water Aqueduct - PressurisedMain
Raw Water Aqueduct - GravityMain	LDTM Raw Water Distribution - PressurisedMain
LDTM Raw Water Distribution - GravityMain	LDTM Raw Water Distribution - GravityMain
LDTM Treated Water Distribution - PressurisedMain	LDTM Treated Water Distribution - GravityMain
LDTM Treated Water Distribution - GravityMain	Private Pipe - LateralLine
Distribution Main - PressurisedMain	Comms Pipe - LateralLine
Concessionary Service - LateralLine	

### ABANDONED PIPE

Trunk Main	Raw Water Aqueduct
LDTM Raw Water Distribution	LDTM Treated Water Distribution
Private Pipe	Distribution Main
Comms Pipe	Concessionary Service

### NODES/ FURNITURE

Live	Proposed
End Cap	CC Valve
AC Valve	Air Valve
Sluice Valve	Non Return Valve
Pressure Management Valve	Change of Characteristic
Anode	Chlorination Point
De Chlorination Point	Bore Hole
Inlet Point	Bulk Supply Point
Fire Hydrant	Hydrant
Private Fire Hydrant	Pump
Site Termination	Service Start
Service End	Process Meter
Stop Tap	Monitor Location
Strainer Point	Access Point
Hatch Box	IP Point
Route Marker	Sampling Station
Logger Box	

### Property Types

Live	Proposed
Condition Report	Pipe Bridges
Tunnels (non carrier)	Pumping Station
Water Treatment Works	Private Treatment Works
Valve House	Water Tower
Service Reservoir	Supply Reservoir
Abstraction Point	Domestic meter
Commercial meter	Telemetry Outstation

### Material Types

AC ASBESTOS CEMENT	OT OTHERS
CI CAST IRON	PB LEAD
CU COPPER	PV uPVC
CO CONCRETE	SI SPUN IRON
DI DUCTILE IRON	ST STEEL
GI GALVANISED IRON	UN UNKNOWN
GR GREY IRON	PE POLYETHYLENE

### Lining Types

CL CEMENT LINING	ERL EPOXY RESIN
TB TAR OR BITUMEN	

### Insertion Types

DD DIE DRAWN	MO MOLING
DR DIRECTIONAL DRILLING	PI PIPELINE
	SL SLIP LINED

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Ref	Code	Flow	Invert	Size	Material	Depth	Length	Class	Ref	Code	Flow	Invert	Size	Material	Depth	Length	Class
8901	2449 CO		27.4	600	EG	BR	28.07	1	8916	CO							
8902	2449 CO								8917	CO							
8903	2449 CO								8918	CO							
8904	2449 CO								8919	CO							
8905	2449 CO								8920	CO							
8906	2449 CO								8921	CO							
8907	2449 CO								8922	CO							
8908	2449 CO								8923	CO							
8909	2449 CO								8924	CO							
8910	2449 CO								8925	CO							
8911	2449 CO								8926	CO							
8912	2449 CO								8927	CO							
8913	2449 CO								8928	CO							
8914	2449 CO								8929	CO							
8915	2449 CO								8930	CO							
8916	2449 CO								8931	CO							
8917	2449 CO								8932	CO							
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8998	2449 CO																
8999	2449 CO																
9000	2449 CO																

### WASTE WATER SYMBOLLOGY

Foul	Surface	Combined	Overflow

### ABANDONED PIPE

	Main Sewer



































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### WASTE WATER SYMBOLOLOGY

Foul	Surface	Combined	Overflow	Manhole
				Manhole, Side Entry
				Mainsewer, Public
				Mainsewer, Private
				Mainsewer, S104
				Rising Main, Public
				Rising Main, Private
				Rising Main, S104
				Highway Drain, Private

Four	Surface	Combined	
WW Site Termination			Sludge Main, Public
Air Valve			Sludge Main, Private
Cascade			Sludge Main, S104
Non Return Valve			
Extent of Survey			
Flow Meter			
Gully			
Hatch Box			

**ABANDONED PPE**

- Main Sewer
- Rising Main
- Highway Drain
- Sludge Main

	Head of System
	Hydroblake / Vortex
	Inlet
	Inspection Chamber
	Bifurcation
	Catchpit
	Contaminated Surface Water
	WW Pumping Station
	Sludge Pumping Station
	Sewer Overflow
	T Junction/Saddle
	Lamp Hole
	Oil Interceptor
	Penstock
	Pump
	Rodding Eye
	Soak away
	Summit
	Valve
	Valve Chamber
	Washout Chamber
	Dropshaft
	WW Treatment Works
	Septic Tank
	Vent Column
	Network Storage Tank
	Orifice Plate
	Vortex Chamber
	Penstock Chamber
	Blind Manhole
	Foul Surface
	Combined Overflow
	Screen Chamber
	Discharge Point
	Control Kiosk
	Unspecified

LEGEND

**MANHOLE FUNCTION**

FO Foul  
SW Surface Water  
CO Combined  
OV Overflow

## SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

## SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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217 Nodes  
Sheet 1 of 1

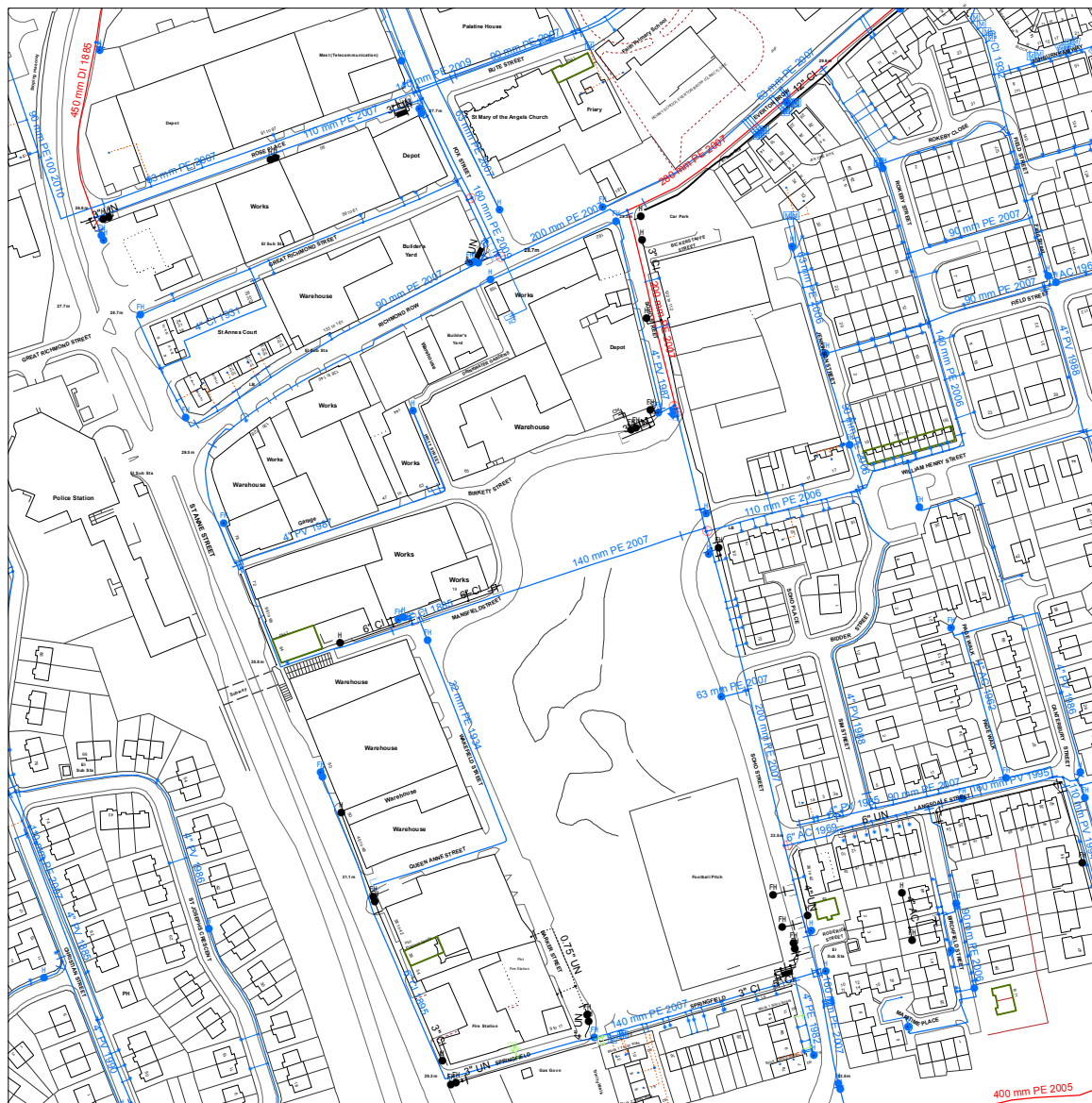






United Utilities

## SEWER RECORDS



## Legend

### PIPE WORK

Live	Proposed	
		Trunk Main - Pressurised Main
		Raw Water Aqueduct - Pressurised Main
		Raw Water Aqueduct - Gravity Main
		LDTM Raw Water Distribution - Pressurised Main
		LDTM Raw Water Distribution - Gravity Main
		LDTM Treated Water Distribution - Pressurised Main
		LDTM Treated Water Distribution - Gravity Main
		Private Pipe - Lateral Line
		Distribution Main - Pressurised Main
		Comms Pipe - Lateral Line
		Concessionary Service - Lateral Line

### ABANDONED PIPE

	Trunk Main
	Raw Water Aqueduct
	LDTM Raw Water Distribution
	LDTM Treated Water Distribution
	Private Pipe
	Distribution Main
	Comms Pipe
	Concessionary Service

### NODES/ FURNITURE

Live	Proposed	
		End Cap
		CC Valve
		AC Valve
		Air Valve
		Sluice Valve
		Non Return Valve
		Pressure Management Valve
		Change of Characteristic
		Anode
		Chlorination Point
		De Chlorination Point
		Bore Hole
		Inlet Point
		Bulk Supply Point
		Fire Hydrant
		Hydrant
		Private Fire Hydrant
		Pump
		Site Termination
		Service Start
		Service End
		Process Meter
		Stop Tap
		Monitor Location
		Strainer Point
		Access Point
		Hatch Box
		IP Point
		Route Marker
		Sampling Station
		Logger Box

### Property Types

Live	Proposed	
		Condition Report
		Pipe Bridges
		Tunnels (non carrier)
		Pumping Station
		Water Treatment Works
		Private Treatment Works
		Valve House
		Water Tower
		Service Reservoir
		Supply Reservoir
		Abstraction Point
		Domestic meter
		Commercial meter
		Telemetry Outstation

### Material Types

AC ASBESTOS CEMENT	OT OTHERS
CI CAST IRON	PB LEAD
CU COPPER	PV uPVC
CO CONCRETE	SI SPUN IRON
DI DUCTILE IRON	ST STEEL
GI GALVANISED IRON	UN UNKNOWN
GR GREY IRON	PE POLYETHYLENE

### Lining Types

CL CEMENT LINING	ERL EPOXY RESIN
TB TAR OR BITUMEN	

### Insertion Types

DD DIE DRAWN	MO MOLING
DR DIRECTIONAL DRILLING	PI PIPELINE
	SL SLIP LINED

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Scale: 1: 1250

Date: 07/10/2013

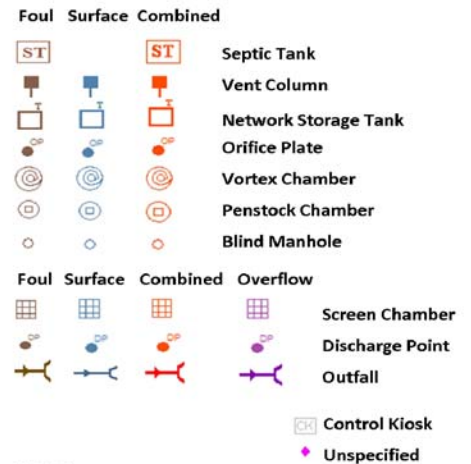
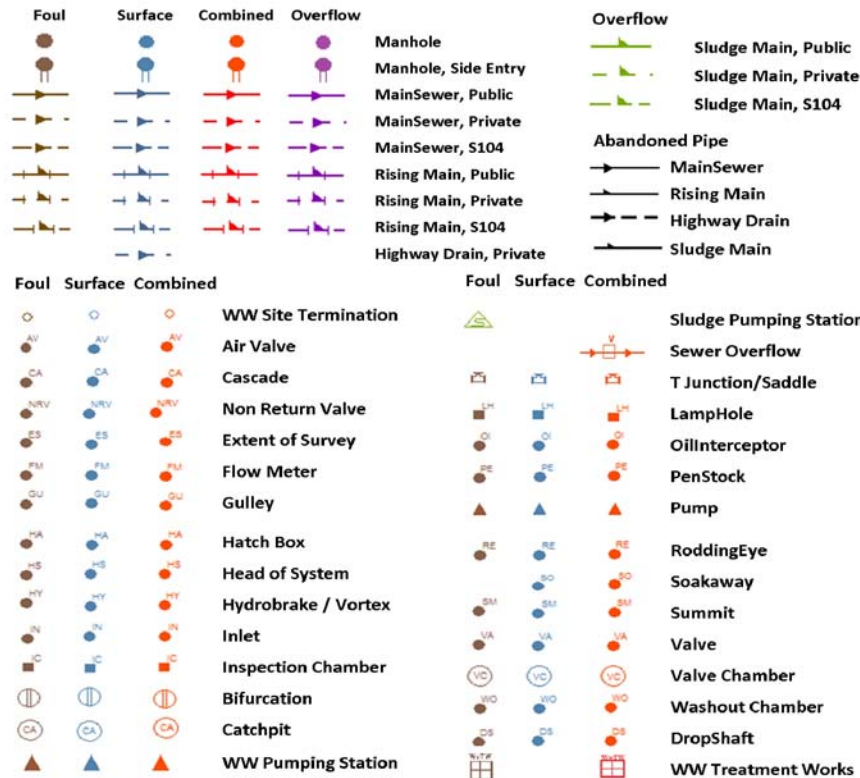


OS Sheet No: SJ3591SW

Scale: 1: 1250 Date: 07/10/2013

Printed By: Rachel Acton

## WASTE WATER SYMBOLOGY



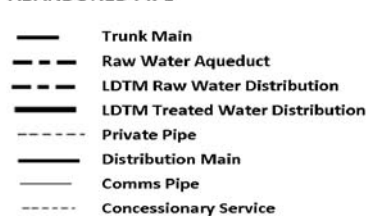
Legend			
MANHOLE FUNCTION		SEWER SHAPE	
FO Foul	CI Circular	TR Trapezoidal	
SW Surface Water	EO Egg	AR Arch	
CO Combined	OV Oval	BA Barrel	
OV Overflow	FT Flat Top	HO HorseShoe	
	RE Rectangular	UN Unspecified	
	SQ Square		
SEWER MATERIAL			
AC Asbestos Cement	DI Ductile Iron		
BR Brick	VC Vitrified Clay		
CO Concrete	PP Polypropylene		
CSB Concrete Segment	PF Pitched Fibre		
CSU Concrete Segment	MA Masonry, Coursed		
CC Concrete Box Culverted	MA Masonry, Random		
PSC Plastic / Steel	RP Reinforced Plastic		
GR Glass Reinforced	CI Cast Iron		
GRP Glass Reinforced	SI Spun Iron		
PVC Polyvinyl Chloride	ST Steel		
PE Polyethylene	U Unspecified		

## CLEAN WATER SYMBOLOGY

### PIPE WORK



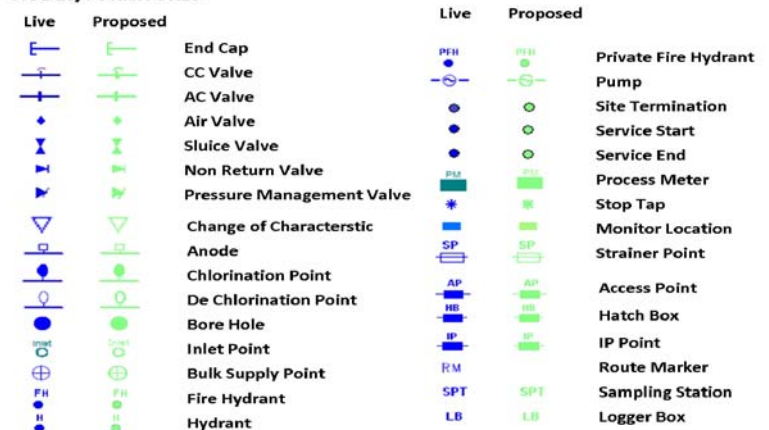
### ABANDONED PIPE



### PROPERTY TYPES



### NODES/FURNITURES



Legend	
MATERIAL TYPES	LINING TYPES
AC ASBESTOS CEMENT	CL CEMENT LINING
CI CAST IRON	TB TAR OR BITUMEN
CU COPPER	ERL EPOXY RESIN
CO CONCRETE	
DI DUCTILE IRON	INSERTION TYPES
GI GALVANISED IRON	DD DIE DRAWN
GR GREY IRON	DR DIRECTIONAL DRILLING
OT OTHERS	MO MOLING
PB LEAD	PI PIPELINE
PV UPVC	SL SLIP LINED
SI SPUN IRON	
ST STEEL	
UN UNKNOWN	
PE POLYETHYLENE	

## These general conditions and precautions apply to the water distribution system of United Utilities.

**Please ensure that a copy of these conditions is passed to your representative and contractor on site.**

1. United Utilities provides approximate locations of its water mains or apparatus according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of private service pipes from the mains to properties. Where service pipes are shown, a blue broken line indicates their approximate position. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated.

2. Special requirements relative to our apparatus may be indicated. United Utilities employees will visit any site at reasonable notice to assist in the location of its underground water apparatus and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, future proposals for construction of company apparatus or any notification required under these General Conditions, please telephone us on **0845 746 2200** or write to United Utilities, PO Box 453, Warrington, WA5 3QN.

3. In order to achieve safe working conditions adjacent to any water apparatus the following should be observed;

(a) All water apparatus should be located by hand digging prior to the use of mechanical excavation.

(b) During construction work where heavy plant may have to cross the line of a water main, and the main is not under a carriageway of adequate standard of construction, crossing points should be suitably reinforced with sleepers, steel plates or a specially constructed reinforced concrete raft as necessary. These crossing points should be clearly indicated and crossing the line of the water main at other places should be prevented. United Utilities employees will advise on the type of reinforcement necessary. This is particularly important on agricultural or open land, where tilling or erosion may have significantly reduced the original cover.

(c) No explosive should be used within 32 metres of any United Utilities apparatus without prior consultation with United Utilities.

(d) Where it is proposed to carry out piling within 15 metres of any water main United Utilities should be consulted so that the affected main may be surveyed.

4. During any excavation, it is important that measures should be taken to ensure continued support for any water main:

(a) Where excavation of trenches adjacent to any water main is likely to affect its support, the main must be supported to the satisfaction of United Utilities.

(b) Where a trench is excavated crossing or parallel to the line of a water main, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the main. In special cases it may be necessary to provide permanent support to a main which has been exposed over the length of the excavation before back-filling and reinstatement is carried out. No back-filled concrete should contact the main.

5. No other apparatus should be laid over and along the line of a water main irrespective of clearance. A minimum clearance of 450 millimetres should be allowed between any plant being installed and an existing main, to facilitate maintenance and repair, whether the adjacent plant is parallel to or crossing the main. No manhole, chamber, or other obstruction should be built over or around a water main.

6. Where a water main is coated with special wrapping and the wrapping is damaged, even to a minor extent, United Utilities must be notified, and the excavation must be left open for ready access so that repairs can be made. In case of any material damage to the main itself causing leakage, or weakening of the mechanical strength of the pipe, the person or body responsible should immediately notify United Utilities in order that the necessary remedial work can be carried out. The full cost of the necessary remedial work will be charged to the person or body responsible for the damage.

7. If you propose to change existing levels over water mains you will need to inform us. We will need specific locations to be identified together with precise details as to the scale of the proposed changes to existing ground levels. Changes to existing levels may require the diversion of our apparatus at your cost. However, in certain circumstances we may wish to leave our apparatus where it is. On these occasions you will usually be required to protect our apparatus by means of a concrete raft and either raise or lower any surface boxes affected.

8. Under no circumstances should our surface boxes be either buried or left in a situation where they are raised above finished ground levels. You should re-use and re-set any surface boxes affected by your works into the new surface so that they align over the water apparatus below. You will be responsible for the cost of repairing any damage to our apparatus as a result of your works.

9. Where proposals involve resurfacing, you must notify United Utilities if your excavation will be greater than 750mm in the highway and 300mm in a footpath, verge or other location.

10. For information regarding easements, deeds, grants, licences or wayleaves, please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (Tel 01925 731 365).

### Tree planting restrictions over water mains

a) Poplar and willow trees have extensive root systems and should not be planted within 10 metres of any water main.

b) The following trees and those of a similar size, whether they are deciduous or evergreen, should not be planted within six metres of any water main:

- Ash, beech, birch, elm, horse chestnut, lime, oak, sycamore;
- Apple trees and pear trees;
- Most conifers.

c) United Utilities requires access to the route of its mains at all times to inspect for leaks and carry out surveys.

We recommend that no shrubs or bushes which might obstruct or interfere with our access should be planted within one metre of the centre line of any water main.

d) There may be instances when both United Utilities and the landowner will wish to plant shrubs or bushes close to the water main for screening or other purposes. The following shallow rooting shrubs would be suitable for this purpose:

- Blackthorn, broom, cotoneaster, elder;
- Hazel, laurel, privet, quickthorn, snowberry;
- Most ornamental flowering shrubs.

e) In areas where soft fruit is grown, blackcurrant, raspberries and gooseberries may be planted close to the main, provided that a path is left clear for inspection access and surveys. United Utilities can give additional advice where required in particular circumstances.

## These general conditions and precautions apply to the wastewater network of United Utilities.

**Please ensure that a copy of these conditions is passed to your representative and contractor on site.**

1. United Utilities provides the approximate locations of its sewers according to its records. These records are not necessarily accurate or complete nor do they normally show the positions of every sewer culvert or drain, private connections from properties to the public sewers or the particulars of any private system. No person or company shall be relieved from liability for any damage caused by reason of the actual positions and/or depths being different from those indicated. The records do indicate the position of the nearest known public sewer from which the likely length of private connections can be estimated together with the need for any off site drainage rights or easements.

2. Special requirements relative to our sewers may be indicated. United Utilities employees or its contractors will visit any site at reasonable notice to assist in the location of its underground sewers and advise any precautions that may be required to obviate any damage. To arrange a visit or for further information regarding new supplies, connections, diversions, costing, or any notification required under these General Conditions, please call us on **0845 746 2200**.

3. Where public sewers are within a site which is to be developed and do not take any drainage from outside the area, they are from an operational viewpoint redundant. The developer must identify all redundant sewers affected by the development and apply to United Utilities in writing for these sewers to be formally closed. The developer shall bear all related costs of the physical abandonment work.

4. Public sewers within the site that are still live outside the area will be subject to a "Restricted Building zone". This would normally be a surface area equivalent to the depth of the sewer measured from the centre line of the sewer on either side. No construction will be permitted within that zone. The developer should also note that deep and wide rooted trees must not be planted in close proximity to live sewers. Access to public sewers must be maintained at all times and no interference to manholes will be permitted during construction work.

5. Where there is a public sewer along the line of a proposed development/building, arrangements shall be made by the developer at his cost to divert the sewer around the development. Where this is not possible and as a last resort, a "Building Over Agreement" will need to be completed under section 18 of the Building Act 1984. The developer shall design building foundations to ensure that no additional loading is transferred to the sewer and submit such details both to the Local Authority's Building Control Officer and to United Utilities for approval/acceptance. United Utilities on a rechargeable basis would normally undertake all aspects of design work associated with the diversion of any part of the operational wastewater network. For further advice please call asset protection on **01925 678 306**

6. Where there is a non-main river watercourse/culvert passing through the site, the landowner has the responsibility of a riparian owner for the watercourse/culvert and is responsible for the maintenance of the fabric of the culvert and for all works involved in maintaining the unrestricted flow through it. Building over the watercourse/culvert is not recommended. The developer must contact the local authority before any works are carried out on the watercourse/culvert. Where it is necessary to discharge surface water from the site into the watercourse/culvert the developer shall make an assessment of the available capacity of the watercourse/culvert (based on a 1 in 50 year event) and ensure that the additional flow to be discharged into the watercourse/culvert will not cause any flooding. In appropriate cases, flooding may be prevented by on-site storage. The developer shall submit the relevant details required to substantiate his development proposals. Details of any outfall proposed shall also be submitted to the Environment Agency, PO Box 12, Richard Fairclough House, Knutsford Road, Warrington, Cheshire, WA4 1HT for their approval.

7. Where there is a main river watercourse/culvert passing through the site, the developer shall submit all proposals affecting the river to the Environment Agency at the address stated in paragraph 6 for approval/acceptance.

8. Your attention is drawn also to the following:

• **Private drains or sewers which may be within the site.**

On 1 October 2011 all privately owned sewers and lateral drains which communicate with (that is drain to) an existing public sewer as at 1 July 2011 will become the responsibility of the sewerage undertaker. This includes private sewers upstream of pumping stations that have yet to transfer, but excludes lengths of sewer or drain that are the subject of an on-going appeal or which have been excluded from transfer as a result of an appeal or which are on or under land opted-out by a Crown body. The transfer specifically excludes sewers and lateral drains owned by a railway undertaker. Sewers upstream of such assets, however, are transferred. Such assets may not be recorded on the public sewer record currently as it was not a requirement to keep records of previously private sewers and drains.

• **Applications to make connections to the public sewer.**

The developer must write to United Utilities requesting an application form that must be duly completed and returned. No works on the public sewer shall be carried out until a letter of consent is received from United Utilities.

• **Sewers for adoption.**

If an agreement for the adoption of sewers under Section 104 of the Water Industry Act 1991 is being contemplated, a submission in accordance with "Sewers for Adoption", Seventh Edition, published by the Water Research Centre (2001) Plc, Henley Road, Medmenham, PO Box 16, Marlow, Buckinghamshire, SL7 2HD will be required, taking into consideration any departures from the general guide stipulated by United Utilities.

• **Further consultation with United Utilities.**

Developers wishing to seek advice or clarification regarding sewer record information provided should contact United Utilities to arrange an appointment. A consultation fee may be charged, details of which will be made available at the time of making an appointment.

9. Combined sewers, foul sewers, surface water sewers, and pumped mains. These are shown separately in a range of colours or markings to distinguish them on our drawings, which are extracts from the statutory regional sewer map. A legend and key is provided on each extract for general use, although not all types of sewer will be shown on every extract.

**Combined sewers shown coloured red** carries both surface water and foul sewage, especially in areas where there is no separate surface water sewerage system.

**Foul sewers coloured brown** may also carry surface water and there may be no separate surface water system indicated in the immediate area. Both combined and foul sewers carry wastewater to our treatment works before it can safely be returned to the environment.

**Surface water sewers coloured blue** on our drawings are intended only to carry uncontaminated surface water (e.g. rainfall from roofs, etc) and they usually discharge into local watercourses. It is important for the protection of the environment and water quality that only uncontaminated surface water is connected to the surface water sewers. Improper connections to surface water sewers from sink wastes, washing machines and other domestic use of water can cause significant pollution of watercourses.

**Pumped mains, rising mains and sludge mains** will all be subject to pumping pressures and are neither suitable nor available for making new connections.

**Highway drains, when included, show as blue and black dashed lines.** Highway drains are not assets belonging to United Utilities and are the responsibility of local authorities.

10. For information regarding future proposals for construction of company apparatus please write to United Utilities, PO Box 453, Warrington, WA5 3QN.

11. For information regarding easements, deeds, grants or wayleaves please write to United Utilities Property Solutions, Coniston Buildings, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3UU (Tel: 01925 731 365).

## **A P P E N D I X   B**

### **Surface Water Runoff Estimates for Existing and Proposed Developments**

Project: BEVINGTON BUSH / GARDNERS ROW

Title: SURFACE WATER RUNOFF CALCULATIONS

Client: JAM WORKS

Sheet No.: 1

Rev: A

By: MD

Checked: BRH

## DESIGN RAINFALL - EXISTING DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 2 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 0.79$   
Rainfall for 15min storm with 2 year return period  $M2\_15min = Z2 \times M5\_15min_i = 9.6$  mm  
Design rainfall intensity  $I_{max} = M2\_15min / D = 38.2$  mm/hr

### Maximum surface water runoff

Catchment area  $A_{catch} = 3240$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 34.4$  l/s

## DESIGN RAINFALL - EXISTING DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 30 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 1.50$   
Rainfall for 15min storm with 30 year return period  $M30\_15min = Z2 \times M5\_15min_i = 18.1$  mm  
Design rainfall intensity  $I_{max} = M30\_15min / D = 72.4$  mm/hr

### Maximum surface water runoff

Catchment area  $A_{catch} = 3240$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 65.2$  l/s

Project: BEVINGTON BUSH / GARDNERS ROW

Title: SURFACE WATER RUNOFF CALCULATIONS

Client: JAM WORKS

Sheet No.: 2

Rev: A

By: MD

Checked: BRH

### DESIGN RAINFALL - EXISTING DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = **100** yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 1.94$   
Rainfall for 15min storm with 100 year return period  $M100\_15min = Z2 \times M5\_15min_i = 23.4$  mm  
Design rainfall intensity  $I_{max} = M100\_15min / D = 93.5$  mm/hr

#### Maximum surface water runoff

Catchment area  $A_{catch} = 3240$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 84.2$  l/s

### DESIGN RAINFALL - EXISTING DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = **100** yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 30$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min \times (1 + p_{climate}) = 15.6$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 2.00$   
Rainfall for 15min storm with 100 year return period  $M100\_15min = Z2 \times M5\_15min_i = 31.2$  mm  
Design rainfall intensity  $I_{max} = M100\_15min / D = 124.8$  mm/hr

#### Maximum surface water runoff

Catchment area  $A_{catch} = 3240$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 112.4$  l/s

Project: BEVINGTON BUSH / GARDNERS ROW

Title: SURFACE WATER RUNOFF CALCULATIONS

Client: JAM WORKS

Sheet No.: 3

Rev: A

By: MD

Checked: BRH

### DESIGN RAINFALL - PROPOSED DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 2 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 0.79$   
Rainfall for 15min storm with 2 year return period  $M2\_15min = Z2 \times M5\_15min_i = 9.6$  mm  
Design rainfall intensity  $I_{max} = M2\_15min / D = 38.2$  mm/hr

#### Maximum surface water runoff

Catchment area  $A_{catch} = 3490$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 37.1$  l/s

### DESIGN RAINFALL - PROPOSED DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 30 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 1.50$   
Rainfall for 15min storm with 30 year return period  $M30\_15min = Z2 \times M5\_15min_i = 18.1$  mm  
Design rainfall intensity  $I_{max} = M30\_15min / D = 72.4$  mm/hr

#### Maximum surface water runoff

Catchment area  $A_{catch} = 3490$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 70.2$  l/s

Project: BEVINGTON BUSH / GARDNERS ROW

Title: SURFACE WATER RUNOFF CALCULATIONS

Client: JAM WORKS

Sheet No.: 4

Rev: A

By: MD

Checked: BRH

### DESIGN RAINFALL - PROPOSED DEVELOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 100 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 0$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min = 12.0$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 1.94$   
Rainfall for 15min storm with 100 year return period  $M100\_15min = Z2 \times M5\_15min_i = 23.4$  mm  
Design rainfall intensity  $I_{max} = M100\_15min / D = 93.5$  mm/hr

#### Maximum surface water runoff

Catchment area  $A_{catch} = 3490$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 90.6$  l/s

### DESIGN RAINFALL - PROPOSED DEVLEOPMENT

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

#### Design rainfall intensity

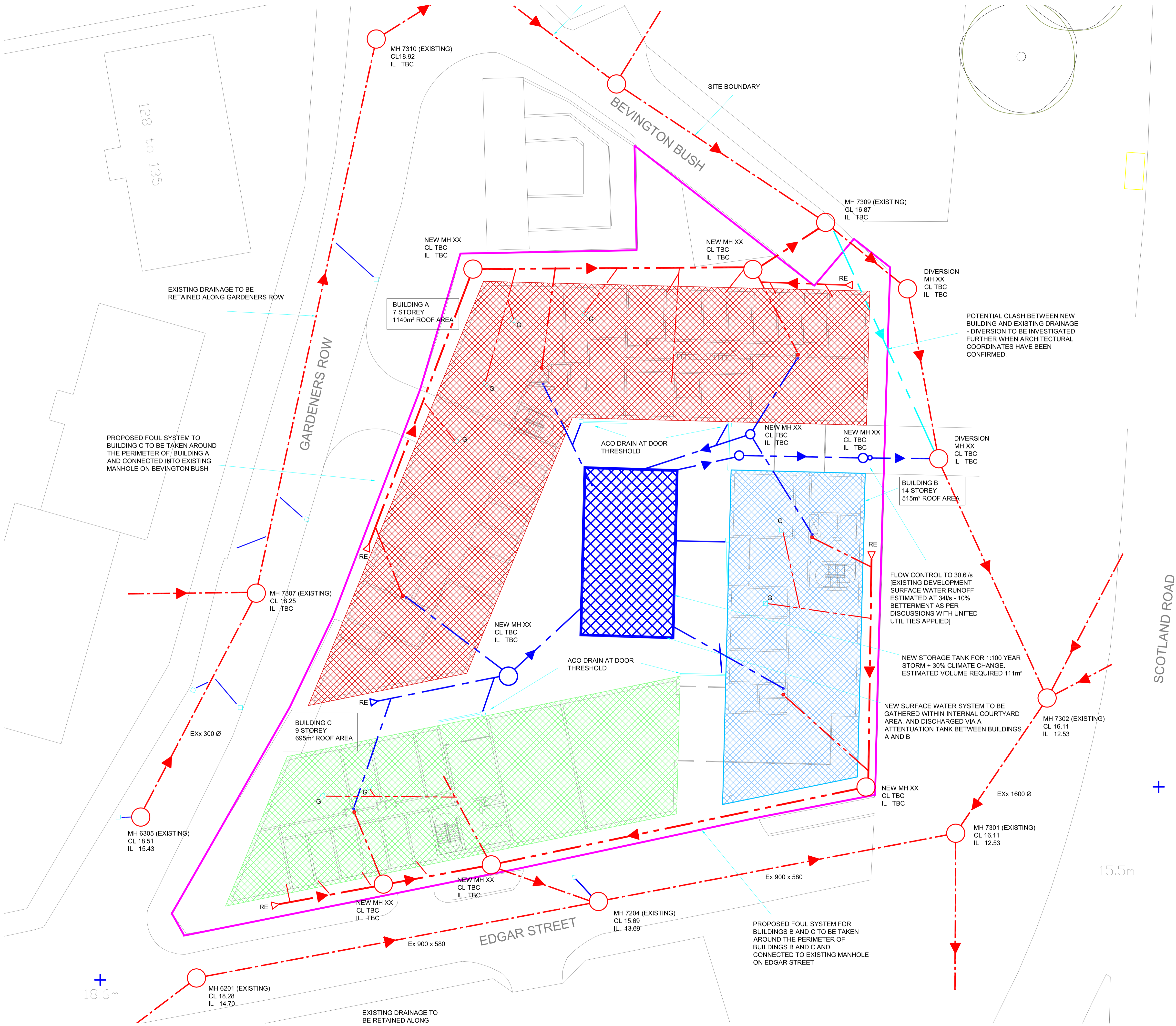
Location of catchment area Liverpool  
Storm duration  $D = 15$  min  
Return period Period = 100 yr  
Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.400$   
5-year return period rainfall of 60 minutes duration  $M5\_60min = 19.0$  mm  
Increase of rainfall intensity due to global warming  $p_{climate} = 30$  %  
Factor Z1 (Wallingford procedure)  $Z1 = 0.63$   
Rainfall for 15min storm with 5 year return period  $M5\_15min_i = Z1 \times M5\_60min \times (1 + p_{climate}) = 15.6$  mm  
Factor Z2 (Wallingford procedure)  $Z2 = 2.00$   
Rainfall for 15min storm with 100 year return period  $M100\_15min = Z2 \times M5\_15min_i = 31.2$  mm  
Design rainfall intensity  $I_{max} = M100\_15min / D = 124.8$  mm/hr

#### Maximum surface water runoff

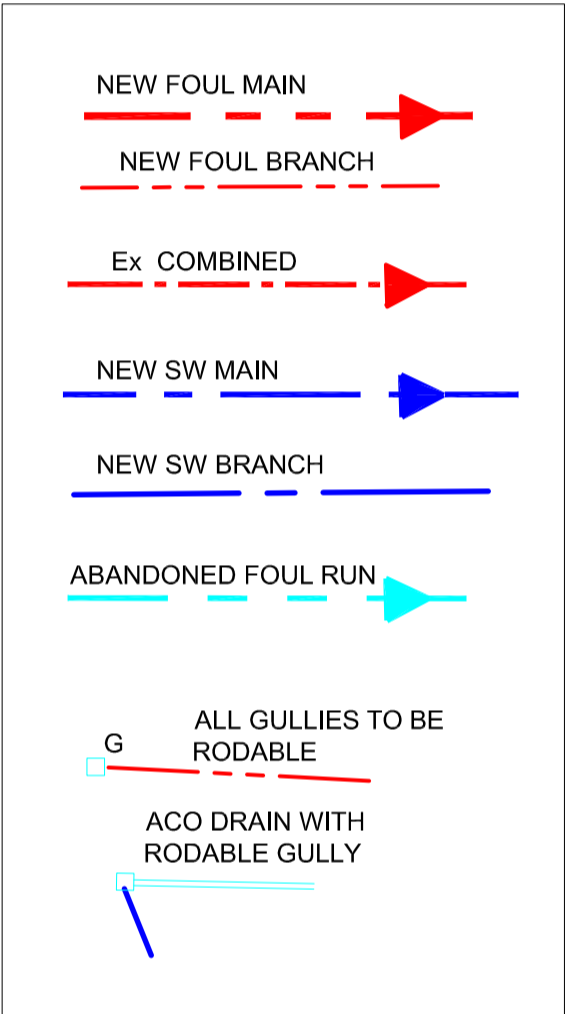
Catchment area  $A_{catch} = 3490$  m<sup>2</sup>  
Percentage of area that is impermeable  $p = 100$  %  
Maximum surface water runoff  $Q_{max} = A_{catch} \times p \times I_{max} = 121.0$  l/s

## **APPENDIX C**

### **Drainage Strategy Plan**



- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS AND SPECIFICATIONS.
  2. OWNERSHIP OF PIPE NETWORKS ARE TO BE CONFIRMED PRIOR TO ANY DIVERSION WORKS.
  3. THIS DRAWING INDICATES DRAINAGE PRINCIPLES AND STRATEGY ONLY AND FURTHER DETAIL DESIGN IS REQUIRED FOLLOWING CONFIRMATION OF BUILDING SET OUT, PROPOSED LEVELS, PROPOSED INTERNAL POP UPS, ETC INCLUDING COMMUNICATIONS WITH RELEVANT PARTIES.
  4. AS AGREED WITH UNITED UTILITIES, A 10% REDUCTION ON EXISTING DISCHARGE IS PROPOSED FOR THE EXISTING BROWNFIELD SITE.
  5. EXISTING DISCHARGE BASED UPON A 15 MIN PEAK PERIOD FOR A 1 IN 2 YEAR STORM.
  6. DURING THE DETAILED DESIGN PHASE, ALL STORM DURATIONS UP TO AND INCLUDING 6 HOUR STORM EVENTS WILL BE MODELLED TO DETERMINE THE FINAL STORAGE REQUIREMENT FOR THE DEVELOPMENT.
  7. ALL PROPOSED RESTRICTED FLOW RATES AND CONNECTION POINTS WILL BE SUBJECT TO UNITED UTILITIES AGREEMENT AND APPROVAL.
  8. FOUL WATER FLOW RATES ESTIMATED IN ACCORDANCE WITH BS EN 752:2008 AND DESIGNED FOR PEAK FLOW RATES.
  9. UNITED UTILITIES CONFIRMATION OF APPROVAL FOR THE FLOW RATE ENTERING THE PUBLIC SEWER WILL BE REQUIRED TO PROCEED WITH DETAILED DESIGN.



Rev	Date	Description	By	Check	App.

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Client	JAMWORKS
Project	BEVINGTON BUSH/ GARDNERS ROW
Office	LIVERPOOL 0151 227 5300
Discipline	CIVIL
Title	PROPOSED FOUL AND SURFACE WATER DRAINAGE STRATEGY
Scale @ A1	1:200
Status	PRELIMINARY

Originator	Job Number	Discipline	Building/Zone
CCL	4/5758	C	ALL
Type	Level	Drawing No.	Revision
DRN	GND	000001	03

Birmingham 0121 200 7800 London 020 227 5300 Glasgow 0141 222 1725 Liverpool 0151 227 5300 Newcastle 0191 221 0702 Norwich 01603 269160 Plymouth 01202 472075 Reading 0118 941 7888 www.clancy.co.uk