



Civil & Structural Engineers  
Building Surveyors  
Geo-Environmentalists

**Site Specific Flood Risk Assessment**  
**of**  
**Tobacco Warehouse**  
**Great Howard Street**  
**Liverpool, L3 7DT**

**Liverpool**

T: 0151 227 3155

**Manchester**

T: 0161 817 5180

**Wrexham**

T: 01978 664071

**London**

T: 020 74 584136

**Head Office**

18-20 Harrington Street  
Liverpool L2 9QA

T: 0151 227 3155

F: 0151 227 3156

E: [enquiries@sutcliffe.co.uk](mailto:enquiries@sutcliffe.co.uk)

[www.sutcliffe.co.uk](http://www.sutcliffe.co.uk)

**Client Name: Harcourt Construction**  
**Our ref: LRD27586**  
**Date: June 2015**

# SUTCLIFFE

## Flood Risk Assessment

### DOCUMENT VERIFICATION

Report Reference: LRD27586

Issue: 1

Date: June 2015

Prepared by:

Name:	Simon Brady
Title:	Associate
Qualifications:	BSc (Hons)

Checked / Approved by:

Name:	Martin Pocock
Title:	Executive Associate
Qualifications:	BEng(Hons) CEng MICE MCIHT C.WEM MCIWEM

Revision History:

Rev	Date	Description	Prepared	Checked	Approved
1	June 2015	Issued for Comments	SB	MP	MP

This document has been prepared by Sutcliffe within the terms of the Contract with the Client to whom this document is addressed. Sutcliffe disclaims any responsibility to the Client and others in respect of matters outside the scope of the said contract. No person other than the Client shall rely on it in any respect and Sutcliffe shall owe no duty of care to any such third party.

## **Table of Contents**

1.	Introduction .....	4
2.	Development Description and Location .....	4
3.	Definition of the Flood Hazard.....	4
4.	Probability .....	6
5.	Climate Change .....	7
6.	Detailed Development Proposals .....	7
7.	Flood Risk Management Measures.....	8
8.	Off Site Impacts.....	8
9.	Residual Risks .....	9
10.	Conclusion.....	9
11.	Appendices.....	10
11.1.	Appendix A .....	11
11.2.	Appendix B .....	12
11.3.	UU Sewer Record .....	15

## **1. Introduction**

- 1.1 As part of the planning process it is necessary to prepare a site specific flood risk assessment for Tobacco Warehouse, Great Howard Street, Liverpool. The site area is approximately 15,000m<sup>2</sup> (1.5 ha).
- 1.2 The site area is greater than 1 hectare an FRA is required to fulfil the requirements of the National Planning Policy Framework and the Lead Local Flood Authority.
- 1.3 The site is situated in a zone of low flood risk as defined by the Environment Agency (EA) and the EA flood risk map is provided in Appendix B.
- 1.4 The National Planning Policy Framework (NPPF) seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. The purpose of this site specific flood risk assessment is to demonstrate that the site falls within an area of low annual probability and assess the risk to the site from all sources of flooding.
- 1.5 Although PPS25 has been replaced by the National Planning Policy Framework (NPPF) the guidance remains relevant for assessing the flood risk to a site. In particular, Appendix C of the Planning Policy Statement 25 (PPS25) Practice Guide provides a proforma, for assessing flood risk which has been used as the basis of this report.

## **2. Development Description and Location**

- 2.1 The existing site is occupied by the Tobacco Warehouse and associated hard standing. The building is to be refurbished with no change in the impermeable cover.
- 2.2 The proposed development involves the conversion of the warehouse to ground floor retail space and 538 apartments with below ground car park and internal road way.
- 2.3 According to the NPPF Technical Guide, Table 2 the development falls within the 'more vulnerable' risk classification. The 'more vulnerable' classification covers hospitals, residential institutions, dwelling houses etc. and is used during the sequential test to direct development to the appropriate flood risk zone. As the site is in Flood Zone 1 it is suitable for all vulnerability classification zones.
- 2.4 The proposed development is consistent with Local Development Documents. It is in a low flood risk area and therefore satisfies the sequential test as it is in a zone with a low probability of flooding.
- 2.5 The site is located in Flood Zone 1 and therefore satisfies the requirements of the Sequential Test, whose aim is to direct development to these areas. The Exception Test is not required as all land uses are permitted in this zone.

## **3. Definition of the Flood Hazard**

- 3.1 The NPPF outlines the forms of flooding that may affect development as fluvial (rivers), tidal, surface water, ground water, and infrastructure failure. From Figure 3.2. of PPS25:

Development and Practice Guide the following have been identified as potential sources of flooding and will be discussed below: surface water and infrastructure failure. The following have been identified as sources of flooding not affecting the site: fluvial, tidal and groundwater sources.

### 3.2 Sources of Flooding

#### 3.2.1 Surface Water

The Environment Agency Flood Map (Appendix B) indicates that surface water flooding does affect the site. The surface water flooding on the EA flood map is restricted the yard area between the existing warehouse buildings. Sources of surface water flooding are typically sheet flow from adjacent land or surface flow caused by surcharged sewers, block road gullies or other surface drainage features. As the existing site drainage is to be retained it will need to be modelled to evaluate the mitigation options to alleviate the potential flooding. As the refurbishment will not be altering the impermeable area there is no increase in surface water flood risk associated with the redevelopment. However as the access to the below ground car park is from the area susceptible to surface water flooding care should be taken when designing the access points to prevent water ingress from surface flooding.

The Liverpool Strategic Flood Risk Assessment (June 2011) does not indicate any additional risks of surface water flooding.

#### 3.2.2 Flooding from Groundwater

The Environment Agency Flood Map indicates that the ground water is not a significant risk in the area.

The Liverpool Strategic Flood Risk Assessment (June 2011) indicates that the site is adjacent to an area of increased groundwater flooding but the site itself is not at increased risk.

The Catchment Management Plan for the Mersey Estuary states that there is no recorded incident of ground water flooding in the Mersey Estuary.

#### 3.2.3 Flooding from Sewers

Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development is not likely to increase the risk posed by sewer flooding as the surface water runoff, a primary cause of sewer surcharging, from the site is to be managed in accordance with the requirements of the NPPF. Surface water from the site, where it discharges to the public sewer, will be discharged to the public sewer in line with the requirements of the statutory undertaker. The statutory undertaker for this area is United Utilities.

As the site is located adjacent to Stanley Dock it is likely that the surface water from the site discharges to the tidally regulated dock. The connectivity between the site surface water drainage and the dock should be proved by means of a drainage survey.

United Utilities should be consulted as part of the drainage design for scheme so that permissible discharge rates can be assessed. Depending on the outcome of this consultation on site surface water attenuation may be required if surface water is not discharged to the Dock.

As the surrounding sewer network is managed by United Utilities the site is deemed to be at low risk of sewer flooding.

- 3.3 There are no other known risks to the site. The NPPF and Lead Local Flood Authority (LLFA) require that the proposed drainage plan ensure that the runoff caused by the development does not contribute to flooding offsite. The proposed drainage should be designed to mitigate the surface water flooding between the two warehouse buildings thus reducing the likelihood of offsite surface flooding attributed to the site.
- 3.4 Existing drainage for the site and the surrounds is via the public sewer network operated by United Utilities. The United Utility safe dig plans are included in the Appendix. The plans show that the public sewers surrounding the site are combined water sewers.

There are public sewers in Great Howard Street, Saltney Street and Regent Street.

In line with current best practice and the requirement of the statutory undertaker the proposed drainage system, where a new system is required, must be designed as a separate system.

#### **4. Probability**

- 4.1 The site is located within flood zone 1, the lowest risk category and the zone to which development is directed by NPPF guidelines.
- 4.2 The site is covered in the Liverpool SFRA (June 2011). The SFRA shows the site to be outside of any areas of historic flooding or ground water flooding. The SFRA indicates that the site is susceptible surface water flooding and the extent is commensurate with EA surface water flood map.
- 4.3 The Environment Agency's flood map indicates that the area is at low risk of flooding (Zone 1) from the river and sea. An extract from the Environment Agency's website is included in the appendix for reference. As the site is in a low flood risk area no further information is available from the Environment Agency.
- 4.4 Overall the probability of flooding on the site is low although drainage to internal roadway should be reviewed to alleviate the surface water flooding noted in the SFRA and on the EA flood map.

## 5. Climate Change

- 5.1 The main risk from climate change is the projected increase in frequency of extreme rainfall events. These events will likely lead to short-term capacity exceedance of the gullies and roof outlets serving the site and surrounds. Current guidance within the NPPF is to allow for a 30% increase in rainfall intensity over existing rainfall intensities.
- 5.2 The UK Climate Projections 2009 (UKCP09) report notes that due to climate change mean sea levels will increase. For the North West of England these projects, depending on climate change scenario, are likely to be in the region of 0.1m – 0.63m. There is negligible risk posed to the site from these increases.

## 6. Detailed Development Proposals

- 6.1 Details of the development layout are provided in Appendix A. The proposed development involves the redevelopment of the Tobacco Warehouse. The Tobacco Warehouse is situated within a World Heritage Site and is Listed, these statuses will restrict SuDS opportunities.
- 6.2 The site is located in Flood Zone 1 and, is therefore, suitable for all types of development, no further evidence is required.
- 6.3 United Utilities should be consulted to ascertain the maximum surface water discharge for the development, should a connection to the public sewer be required. The imposed discharge rate may require attenuation to mitigate the risk of flooding and ensure the discharge rate is not exceeded for the design storms.
- 6.4 The existing surface water discharges to the dock.
- 6.5 The proposed development has same impermeable area as the previous development; as the overall building footprint and external hard standing remain unchanged.
- 6.6 Existing runoff for the development site has been estimated using the FEH method and data available from the FEH CD-ROM, the results, based on a site area of 1.5ha, are tabulated below:

Return Period (yr)	6hr FEH Rainfall (mm)	Storm Volume (m <sup>3</sup> )	Average Flow (l/s)
2	22.9	343.5	15.9
5	30.8	462.0	21.4
10	37.0	555.0	25.7
25	46.0	690.0	31.9
50	54.8	822.0	38.0
100	65.1	976.5	45.2

Table 1: Existing Estimated Runoff Volumes and Rates

As the pre- and post-development impermeable areas are the same, and remain unchanged, the data in Table 1 is reflective of the discharge rates and volumes post-development. The data in Table 1 does not include the 30% allowance for climate change, this figure should be

allowed for in all new drainage design but as all surface water will be discharged to Stanley Dock it will not contribute to flood risk.

- 6.7 As part of the redevelopment the basement of the warehouse will be converted in to car park. Surface water drainage in this area will need to be provided to drain water carried in on vehicles. As the number of parking space and vehicle area exceed the trigger value in the Environment Agency's Pollution Prevention Guidance Note 3 (PPG3) it will be necessary to route this drainage through an oil interceptor prior to discharge. The oil interceptor should be inspected regularly and fitted with an alarm to enable remote monitoring.
- 6.8 Foul water from the development will connect to the public sewer operated by United Utilities. As the building was formerly a warehouse, internally, new foul drainage will be required. Given that there is a basement car park it envisaged that the new foul drainage will be under slung within the building and then routed to existing foul drains external to the building. A drainage survey should be undertaken to confirm the size, location and connectivity of the existing site drainage.

## **7. Flood Risk Management Measures**

- 7.1 The site, specifically the buildings, are protected from flooding by providing a finished floor level higher than the ground level adjacent to the building except as required for access.
- 7.2 The ingress and egress points to the below ground car park should be protected from surface water flows through the provision of adequate external drainage and consideration of slight ramping of the entrances and exits.
- 7.3 The development proposals do not alter the baseline condition of the site so no additional protection measures are required.
- 7.3 The site is in Flood Zone 1, as defined by the Environment Agency, no additional measures are required to mitigate flood risk.

## **8. Off Site Impacts**

- 8.1 No offsite impacts are envisaged as a result of this development as no structural measures are required to defend the site against flooding. The development does not lead to displacement of potential floodwaters through the provision of physical barriers and therefore does not require compensatory storage to mitigate off-site flood risk.
- 8.2 Run-off from the proposed development is discharged to the dock thereby mitigating off site impacts.
- 8.3 Surface water discharge to the dock has negligible impact on water level within the dock.



## **9. Residual Risks**

9.1 No residual flood risks are anticipated for the site following development.

## **10. Conclusion**

10.1 The site-specific flood risk assessment for the development shows that the proposed development site is located in Zone 1 and is at low risk of flooding from all sources.

10.2 Based on this evaluation the development satisfies the requirements of the NPPF and has addressed the flood risk posed to and stemming from the development.

10.3 The proposed drainage should be designed in accordance current best practice and utilise SuDS components where possible.

10.4 The proposed development should continue to be drained on a separate system with the surface water discharging to the dock and the foul water discharging to the public sewer.

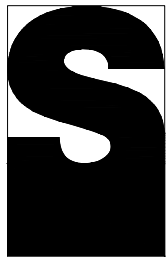
## 11. Appendices

## **11.1. Appendix A**

Drawings:

Existing Site Plan and Drained Areas

Proposed Site Plan and Drained Areas



# Sutcliffe

18-20 Harrington Street, Liverpool, L2 9QA  
t: 0151 227 3155 f: 0151 227 3156  
e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

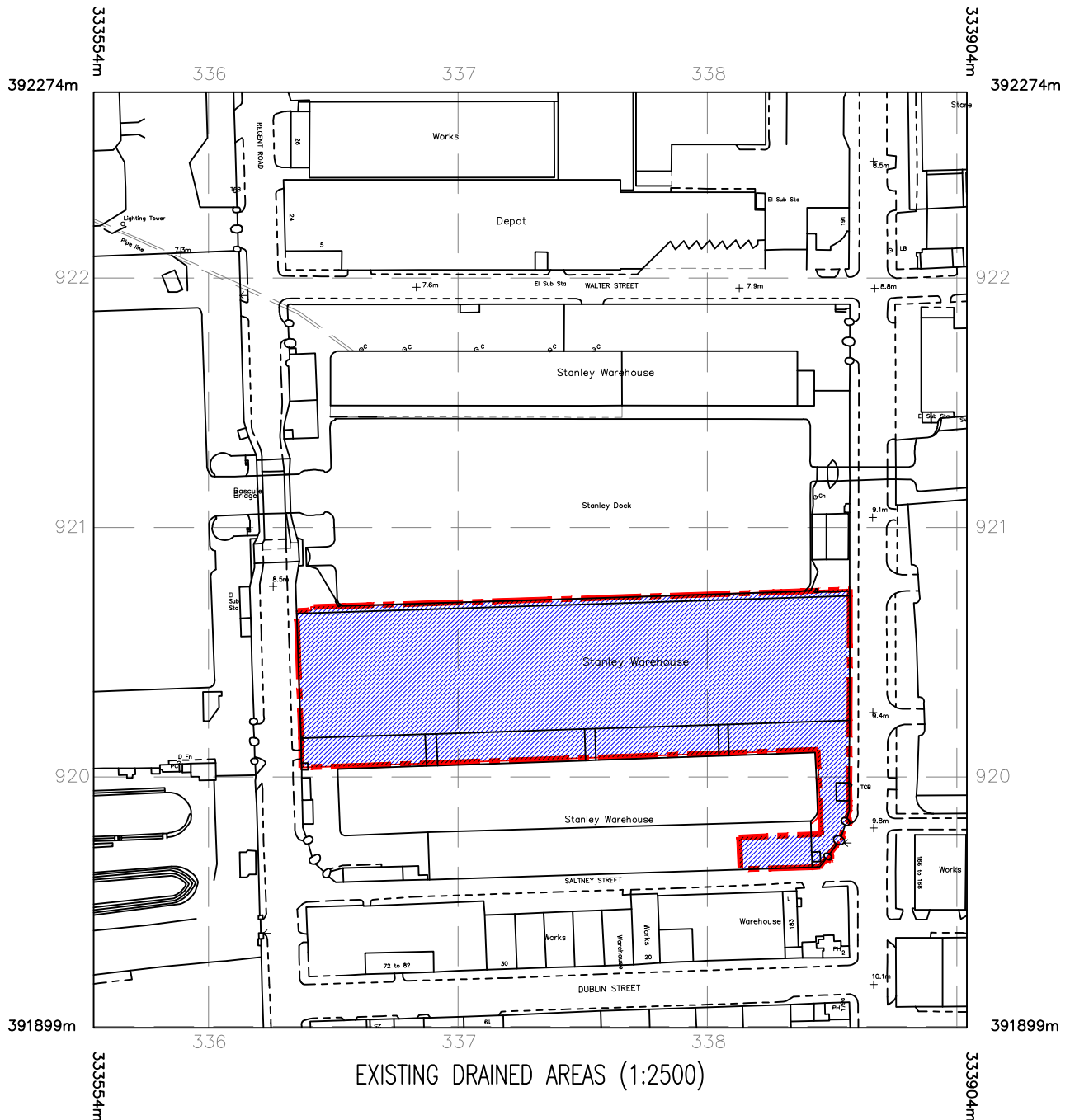
SHEET NO.

6001

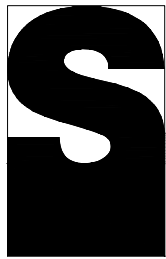
REVISION

P1

PROJECT	TOBACCO WAREHOUSE	DATE	27586	REF	27586
	STANLEY DOCK, LIVERPOOL	PREPARED	CR	CHECKED	SB



DO NOT SCALE OFF THIS DRAWING		KEY	EXTG (SQ. m)	PROP (SQ. m)
GENERAL NOTES  THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.	SITE AREAS:		14997	14997
	TOTAL SITE AREA:		14997	14997
	PERMEABLE AREA:		0	0
	IMPERMEABLE AREA:		14997	14997



# Sutcliffe

18-20 Harrington Street, Liverpool, L2 9QA  
t: 0151 227 3155 f: 0151 227 3156  
e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

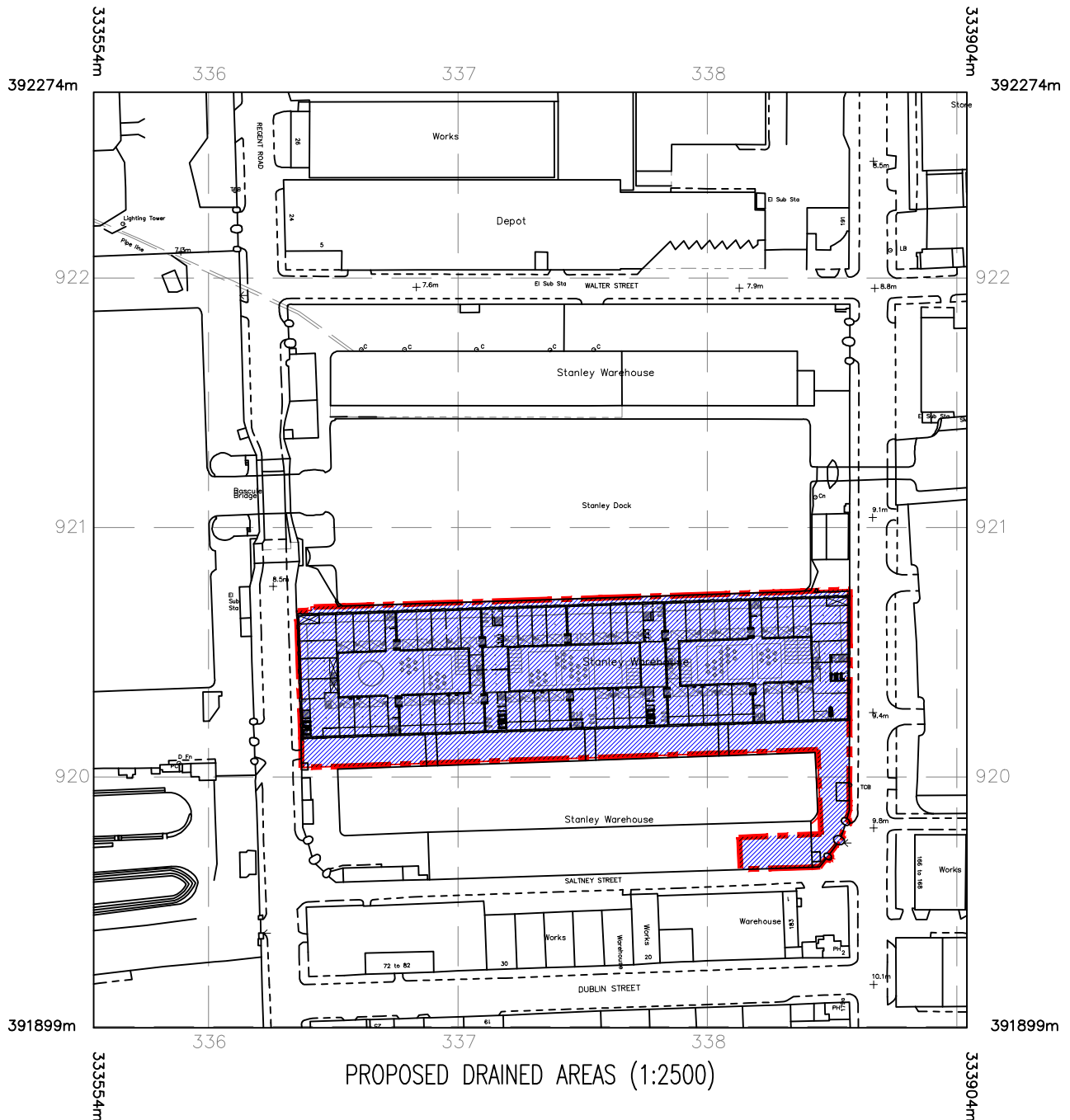
SHEET NO.

6002

REVISION

P1

PROJECT	TOBACCO WAREHOUSE	DATE	27586	REF	27586
	STANLEY DOCK, LIVERPOOL	PREPARED	CR	CHECKED	SB



DO NOT SCALE OFF THIS DRAWING		KEY	EXTG (SQ. m)	PROP (SQ. m)
GENERAL NOTES  THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.	SITE AREAS:		14997	14997
	TOTAL SITE AREA:		14997	14997
	PERMEABLE AREA:		0	0
	IMPERMEABLE AREA:		14997	14997

## **11.2. Appendix B**

Environment Agency Flood Maps



Enter a postcode or place name:

L3 7DT

Go

Other topics for this area...

Flood Map for Planning (Rivers and Sea)

Flood Map for Planning (Rivers and Sea)

**Map legend**

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

☐ Flood Map for Planning (Rivers and Sea) ⓘ

☒ Flood Zone 3

☒ Flood Zone 2

☒ Flood defences (Not all may be shown\*)

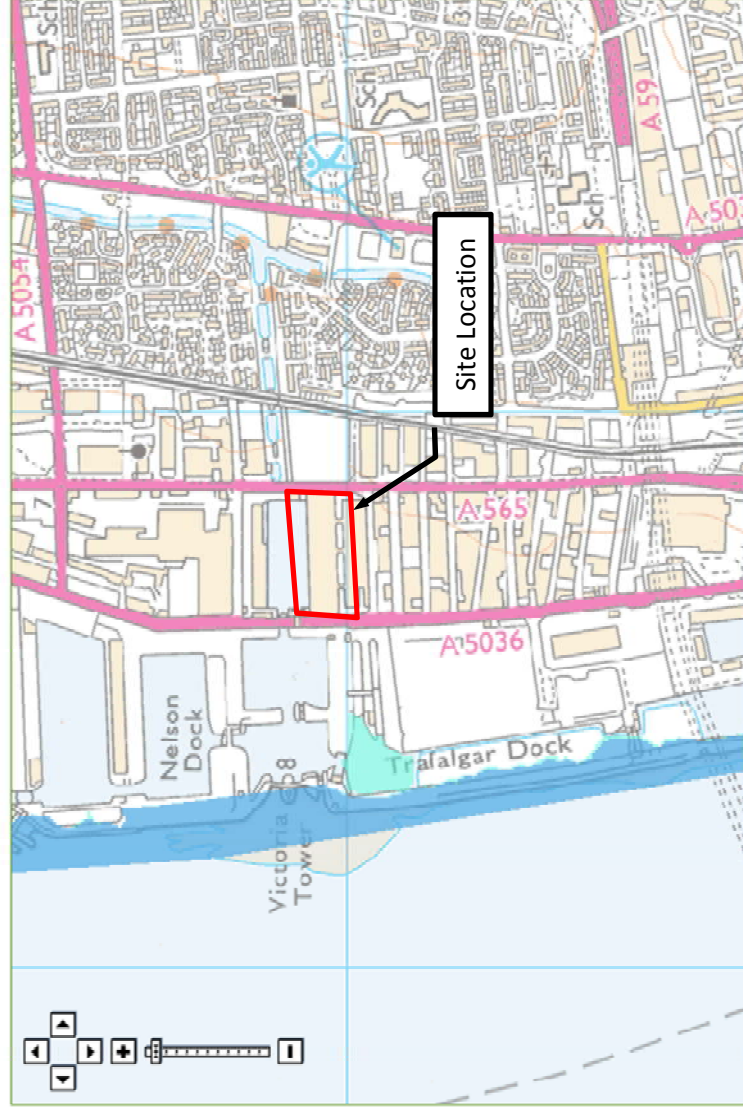
☒ Areas benefiting from flood defences (Not all may be shown\*)

☒ Main Rivers ⓘ

☐ River line

L3 7DT at scale 1:10,000

Other maps Data search Text only version



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) has taken over the responsibilities of the Environment Agency in Wales.  
© Environment Agency copyright and database rights 2015. © Ordnance Survey Crown copyright. All rights reserved. Environment Agency. 100025380.  
Contains Royal Mail data © Royal Mail copyright and database right 2015.  
This service is designed to inform members of the public, in line with our terms and conditions. For business or commercial use, please contact us.



Enter a postcode or place name:

Other topics for this area...



Risk of Flooding from Surface Water

[View other Interactive Maps](#)

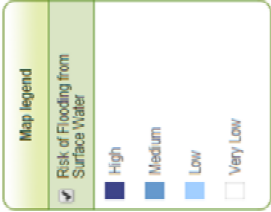
## Risk of Flooding from Surface Water

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

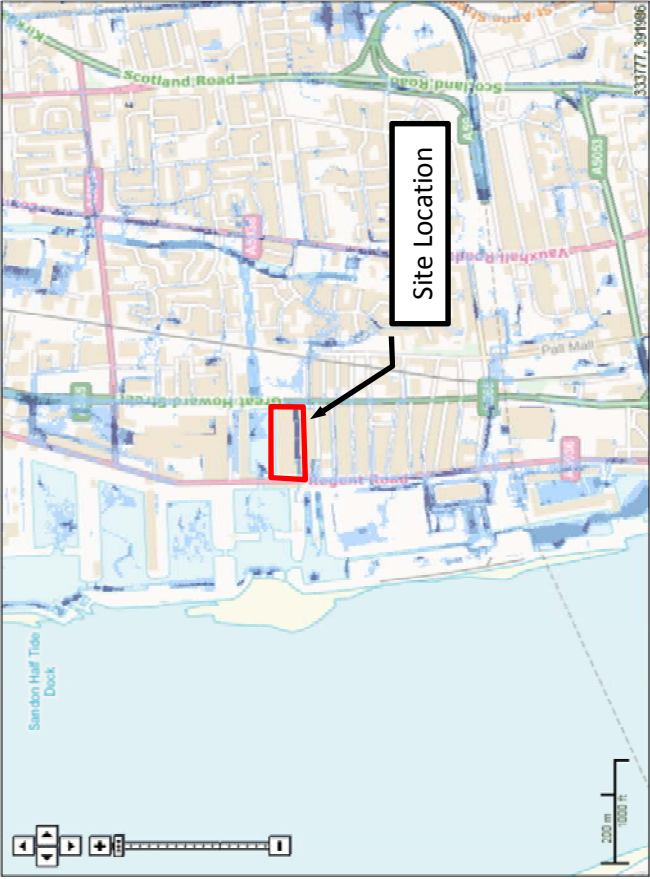
The shading on the map shows the risk of flooding from surface water in this particular area.

[Click on the map for a more detailed explanation.](#)

Map of X: 333,752; Y: 394,937 at scale 1:10,000



Data search

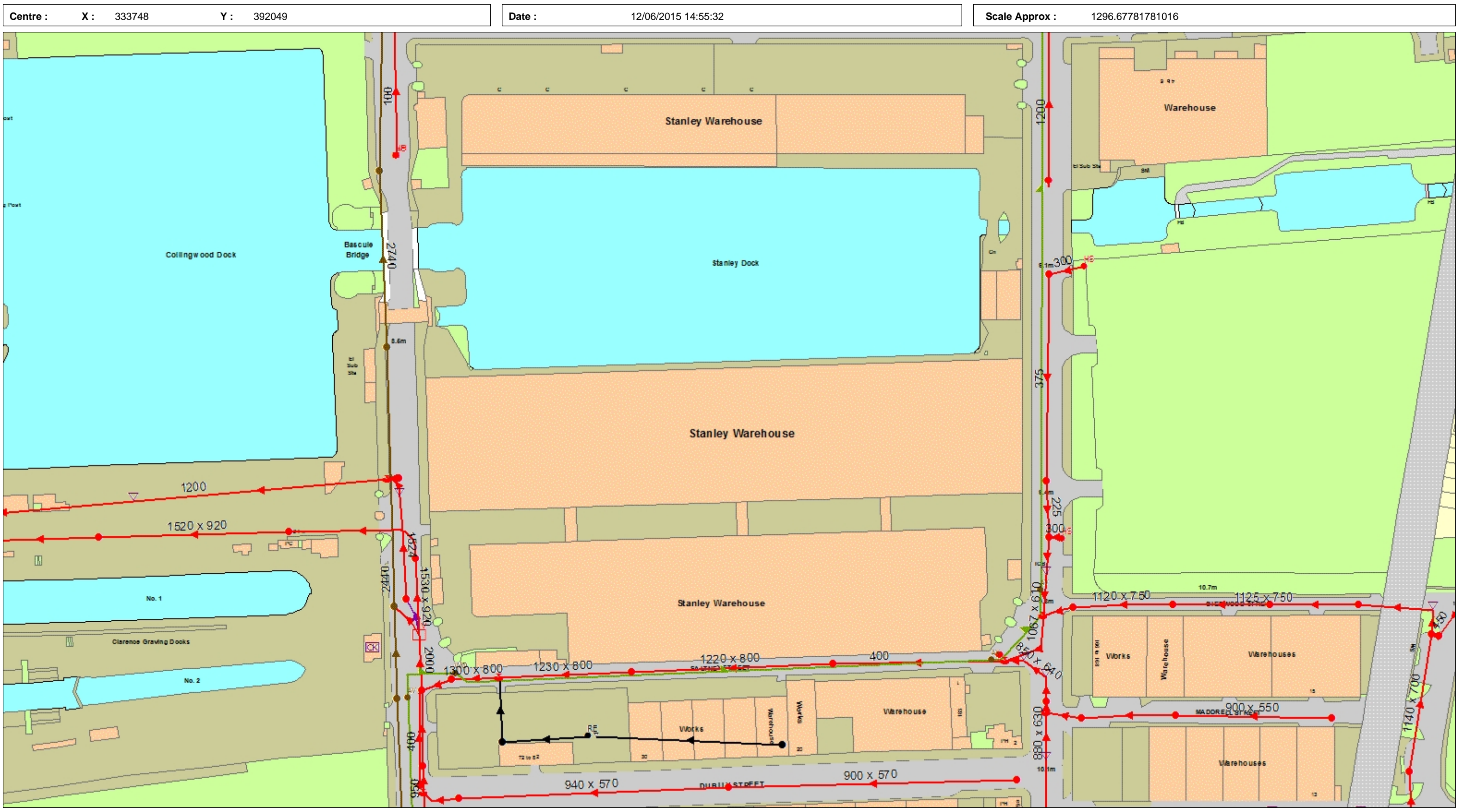


Customers in Wales - From 1 April 2013 Natural Resources Wales (NRF) will take over the responsibilities of the Environment Agency in Wales.  
© Environment Agency copyright and database rights 2015. © Ordnance Survey Crown copyright. All rights reserved. Environment Agency, 100020380.  
Contains Royal Mail data © Royal Mail copyright and database right 2015.  
This service is designed to inform members of the public, in line with our terms and conditions. For business or commercial use, please contact us.



### 11.3. UU Sewer Record

UU Maps for Safe Dig



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

Copyright UU 2012. This plan is based on the Ordnance Survey Map with the sanction of the Controller of H.M. Stationary Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.

