

- Infrastructure Design
- Development Planning
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**Factory Extension
British Bakels
Granville Way
Bicester**

Flood Risk Assessment

**Revision 0: February 2023
R-FRA-25992-01-0**

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Flood Risk Assessment

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Revision	Date	Description	Prepared	Reviewed
0	17 th February 2023	Initial Issue	Izzy How	Katherine Rose



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1.0 Introduction

1.1 Background

1.1.1 This report is a Flood Risk Assessment which has been prepared by JPP Consulting Limited on behalf of APC Architects for two proposed extensions to the existing Factory building. The benefit of this report is to our instructing Client.

1.1.2 The Factory is located at Granville Way, Bicester, as shown in Figure 1.1 below and enclosed in **Appendix A**. Bicester is located to the north-east of Oxford and just east of the M40. The National Grid Reference for the site is E459375 N222765.

1.1.3 The proposed extension locations are indicated in red and blue for the western and northern extensions respectively.

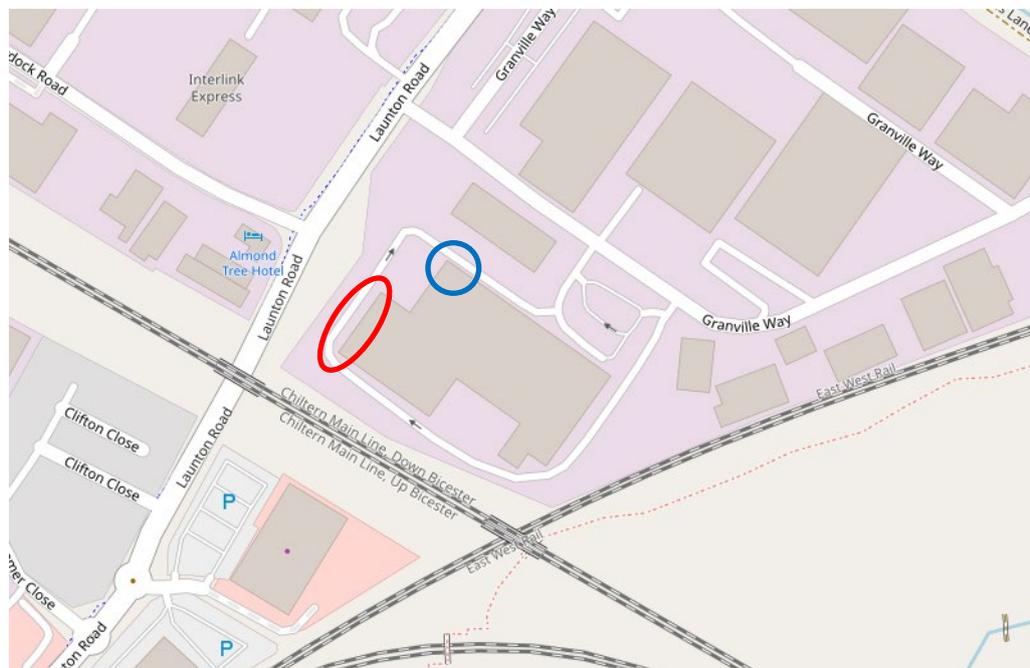


Figure 1.1 Site Location Plan

Source: www.openstreetmap.org

1.2 Objectives

1.2.1 The objective of this report is to advise interested parties regarding the potential risk of flooding for the proposals.

1.2.2 This report has been prepared to support a full planning application.

1.3 Reference documents

1.3.1 This report has been prepared with reference to the following publications:-

- Ministry of Housing, Communities and Local Government (March 2012, updated July 2021), National Planning Policy Framework
- Ministry of Housing, Communities and Local Government (March 2014, updated August 2021), Planning Practice Guidance 'Flood Risk and Coastal Change'
- Department for Environment, Food and Rural Affairs (March 2015), Non-statutory technical standards for sustainable drainage systems
- Environment Agency (September 2013), Climate Change Allowances for Planners: Guidance to support the National Planning Policy Framework
- Environment Agency (October 2013), Delivering benefits through evidence: Rainfall runoff management for developments
- HM Government (2010), The Building Regulations (2010), Drainage and Waste Disposal, Approved Document H, The NBS, Newcastle Upon Tyne
- Wilson, Bray, Cooper (2004), Sustainable drainage systems: Hydraulic, structural and water quality advise, C609, CIRIA, London
- Woods-Ballard et al (2015), The SUDS Manual, C753, CIRIA, London
- CIRIA Report C624 Development and flood risk
- National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage Systems,
- Institute of Hydrology (1999), Flood Estimation Handbook, Institute of Hydrology, Wallingford
- BS EN 752:2008 Drain and sewer systems outside buildings. Hydraulic design and environmental considerations
- BS 8533:2011 Assessing and managing flood risk in development – Code of Practice
- CIRIA Report C635 Designing for exceedance in urban drainage – good practice
- Cherwell Level 1 Strategic Flood Risk Assessment Updated (May 2017)

2.0 Description and history of the site and development proposals

2.1 Location and description of the site

2.1.1 The Factory is located at Granville Way, Bicester, as shown in Figure 1.1 above and enclosed in **Appendix A**. The site is bound by existing industrial units to the north and west, and two railway lines to the east and south. The two proposed extensions are located within the western and northern parts of the wider site.

2.2 History of the site

2.2.1 The site currently comprises an existing Factory and associated car park operated by British Bakels Limited. The most recent aerial imagery available, dated May 2022, is shown in Figure 2.1 below.



Figure 2.1 Aerial imagery dated May 2022. Obtained: Google Earth Pro February 2023

2.2.2 Aerial imagery dating back to 2004 shows that the site has remained consistent during this time, see Figure 2.2 below.



Figure 2.2 Aerial imagery dated December 2004. Obtained: Google Earth Pro February 2023

2.3 Proposed development

- 2.3.1 The proposed development will comprise two extensions to the existing factory building. One extension (smaller footprint) to the northern side of the existing building and a second (larger footprint) to the western side. Both of the proposed extensions will be built on areas of existing hardstanding adjacent to the current building. The proposed development layout is shown on the plan enclosed in **Appendix A**.

2.4 Site topography

- 2.4.1 The topographical survey indicates that overall site levels fall from the western side (at approximately 70.6m) towards the eastern side (lowest point of approximately 68.9m).
- 2.4.2 The existing levels in the vicinity the northern (smaller) extension are in the region of 69.1m to 69.4m.
- 2.4.3 The existing levels in the vicinity of the western (larger) extension are in the region of 69.85m to 70.30m.

2.5 Existing drainage infrastructure

- 2.5.1 Thames Water's asset plan is enclosed in **Appendix C**. The asset plan identifies existing storm, foul and combined water sewers located both within and outside of the site wider site boundary.

2.5.2 Within the site boundary, based on the Thames Water Asset plan there are:

- To the north is a foul water sewer. This discharges a combined water sewer that outfalls to a Pumping Station. The Rising Main from this pumping station connects to a Thames Water foul water gravity sewer in Launton Road to the west; and
A foul water rising main follows to southern boundary of the wider site. There is a Thames Water Pumping Station to the south-east, and the rising main connects to the Thames Water foul water gravity sewer in Launton Road to the west.

2.6 Geology of the site and ground investigation data

2.6.1 Inspection of the geological maps show that the bedrock geology which underlies the site is Kellaways Clay Member comprising Mudstone.

2.7 Development proposals and flood risk vulnerability

2.7.1 With reference to Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF), the proposed Factory extension would be classed as Less Vulnerable development.

2.7.2 An extract from Table 2 of the PPG for Flood Risk and Coastal Change is replicated below in Table 2.1 with the proposed development type highlighted.

Flood Risk Vulnerability Classification	
Vulnerability	Development Types
Less Vulnerable	Police, ambulance and fire stations which are not required to be operational during flooding.
	Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution ; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
	Land and buildings used for agriculture and forestry.
	Waste treatment (except landfill and hazardous waste facilities).
	Minerals working and processing (except for sand and gravel working).
	Water treatment works which do not need to remain operational during times of flood.
	Sewage treatment works, if adequate measures to control pollution and manage sewage during flood events are in place.
Source: Planning Practice Guidance - 2014	

Table 2.1 Flood Risk Vulnerability Classification

3.0 Flood risk

3.1 Fluvial / Tidal flooding

3.1.1 An extract of the Environment Agency’s Flood Map for Planning (Rivers and Sea) is provided below in Figure 3.1. The flood map was extracted from the GOV.UK website on 16th December 2022. The approximate application site boundary is shown in red. The map indicates that the development site as a whole is mostly located within Flood Zone 1 (Low Probability) and Flood Zone 2 (Medium Probability). The eastern part of the site is located within Flood Zone 3 (High Probability).

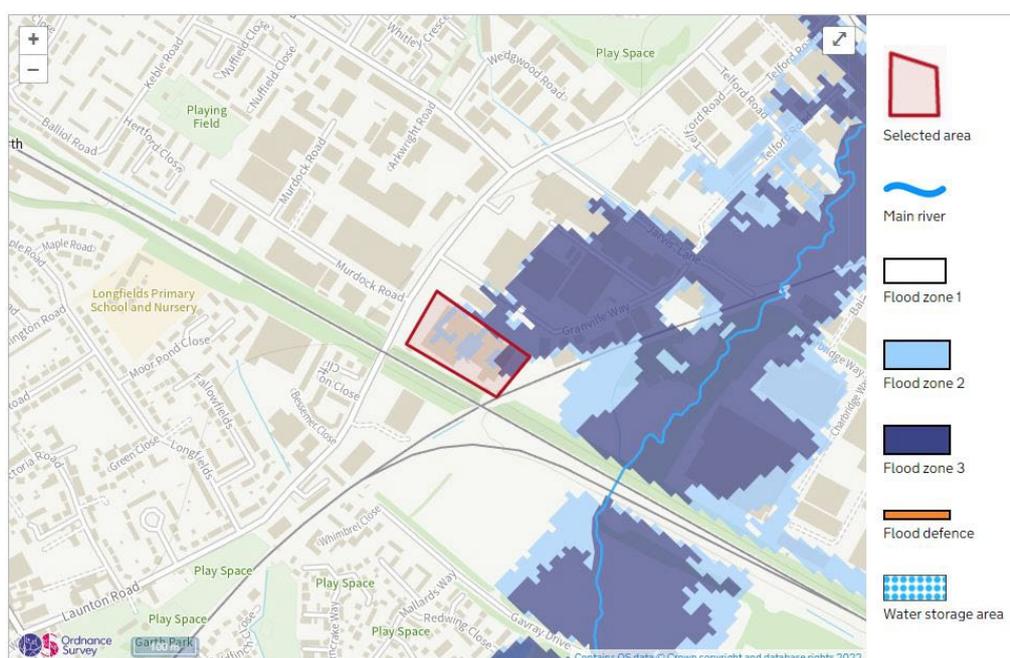


Figure 3.1 Flood Map for Planning (Rivers and Sea)
Source: GOV.UK website – 16th December 2022

3.1.2 Flood level information has been obtained from the Environment Agency dated the 31.01.2023, see **Appendix C**. The source of the data is the Langford Brook (Bicester) & Pingle-Back-Bure 2010. The most relevant node for the site is Flood Point 5 located centrally within the wider site, and is the closest node to the extension locations. Flood level information is summarised in Table 3.1 below.

Flood Levels (Langford Brook (Bicester) & Pingle Back Bure 2010 Model)				
Annual Exceedance Probability Maximum Water Levels (mODN)				
Node	1 in 20 year	1 in 100 year	1 in 100 year +20%	1 in 1000 year
Flood Point 5	No data	No data	69.17	69.21

Source: Environment Agency dated 31.01.2023

Table 3.1 Flood Level Information

3.1.3 The peak river flow climate change requirements are shown in Table 3.2 below, as obtained from GOV.UK for the relevant management catchment.

Peak River Flow Allowances by Management Catchment			
Cherwell and Ray Management Catchment	Central	Higher	Upper
2020s	6%	11%	24%
2050s	4%	10%	27%
2080s	15%	25%	49%

Source: GOV.UK website, 17.02.2023

Table 3.2 Peak River Flow Allowances by River Basin District

- 3.1.4 As the wider site is partially within Flood Zones 2 and 3a, the proposals are for Less Vulnerable and located within the Cherwell & Ray Management Catchment, the Central climate change allowance is applicable. This requires climate change increases of 15%.
- 3.1.5 As above, the required climate change allowance is 15%. The flood level data from the Environment Agency includes a climate change allowance of 20%. This value will therefore be utilised within the assessment of Flood Zone 3 extents, and therefore offers a marginal worst-case assessment with the 15% requirement.
- 3.1.6 The proposed site layout has been overlaid with the topographical survey of the site. Extracts of this are provided below in Figure 3.2 and Figure 3.3 for the western and northern extensions respectively, and discussed further below.
- 3.1.7 Western (larger) extension**
- 3.1.7.1 The existing levels in the vicinity of the western (larger) extension are in the region of 69.85m to 70.30m, see Figure 3.2 below. Please note that the extract has been orientated such that the levels are legible within the report.

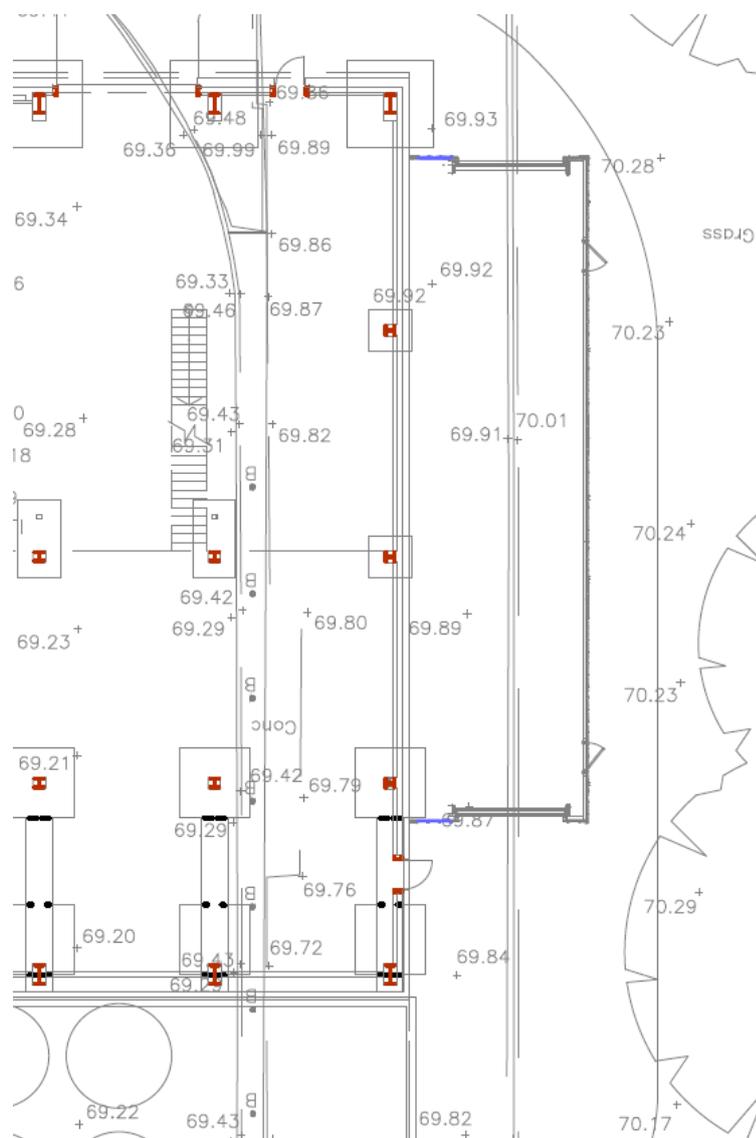


Figure 3.2 Extract of Topographical Survey and Site Layout Overlay: Western Extension

- 3.1.7.2 These levels are all above the 1 in 100 year + 20% climate change flood level of 69.17m. The extension is therefore shown to be located outside of Flood Zone 3.
- 3.1.7.3 These levels are all above the 1 in 1000 year flood level of 69.21m. The extension is therefore shown to be located outside of Flood Zone 2.
- 3.1.7.4 As such, the western extension is considered to be located within Flood Zone 1 and at a low risk of fluvial flooding.

3.1.8 Northern (smaller) extension

3.1.8.1 The existing levels in the vicinity the northern (smaller) extension are in the region of 69.1m to 69.4m, see Figure 3.3 below. Please note that the text colour of some of the levels has been altered to improve the legibility of the text.

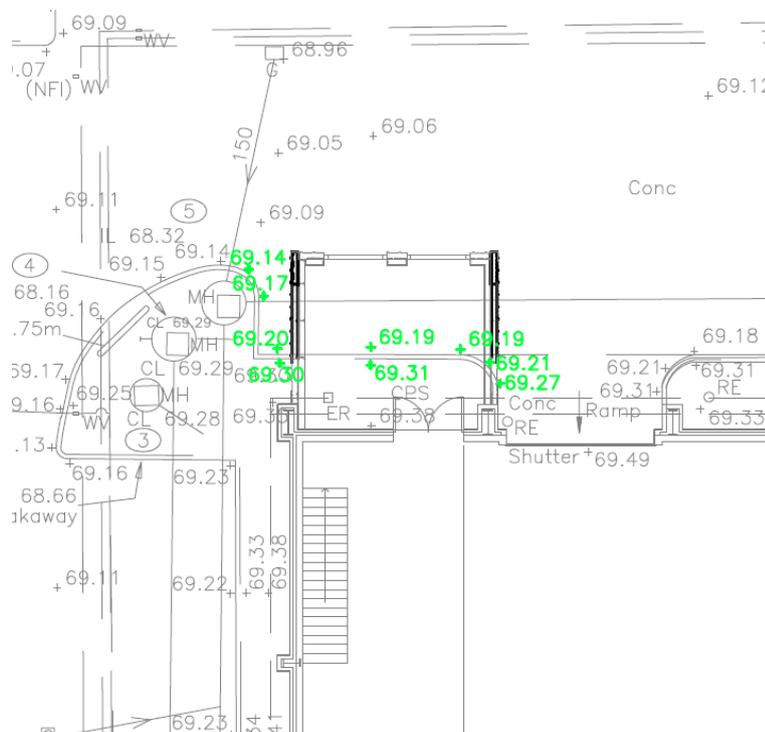


Figure 3.3 Extract of Topographical Survey and Site Layout Overlay: Northern Extension

3.1.8.2 These levels show that the northern extension extends marginally into the 1 in 100 year + 20% climate change flood extent of 69.17m. It should be noted that this offers a worst-case assessment, with an additional 5% allowance for climate change than the required 15%.

3.1.8.3 Some of these levels are above the 1 in 1000 year flood level of 69.21m. The northern extension is therefore shown to be partially located within Flood Zones 1 and 2.

3.1.9 Flood zone definitions

3.1.9.1 Table 3.4 below is a copy of Table 1 from Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework which defines Flood Zones. The proposed development, which is located within Flood Zone 1,2 and 3, for which the definitions are summarised in table 3.4 below.

Flood Zone Definitions

Flood Zone	Definition
Zone 1: Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Zone 2: Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a: High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b: The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

Source: Planning Practice Guidance - 2014

Table 3.3 Flood Zone Definitions

3.1.10 Flood mitigation and warnings

- 3.1.10.1 Finished floor levels will be in accordance with the existing building.
- 3.1.10.2 The Cherwell Level 1 Strategic Flood Risk Assessment (SFRA) includes the Environment Agency’s Flood Warning and Flood Alert Areas Map. Based on the scale of the mapping, the site appears to be within a Flood Warning Area and Flood Alert Area.
- 3.1.10.3 As part of the wider site is located with Flood Zone 3 occupants of the site will be advised about the Environment Agency flood warning system and how to check for any flood warnings which may affect them.

3.2 Flooding from surface water

3.2.1 An extract of the Environment Agency map 'Risk of Flooding from Surface Water' is provided below in Figure 3.2. The approximate application site boundary is shown in red. The majority of the site is shown to be located in an area of very low (less than 1 in 1000) to low (1 in 100 to 1 in 1000) risk of surface water flooding in a given year. A small area, between the existing factory and Granville Way, is shown to be located within an area of medium (1 in 30 to 1 in 100) risk of surface water flooding in a given year.

3.2.2 Whilst considering the existing wider site levels, the levels within the vicinity of the proposed extensions will be designed such that the buildings are not at risk of surface water flooding.



Figure 3.4 Risk of Flooding from Surface Water
Source: GOV.UK website – 16th December 2022

3.2.3 It should be noted that this map is generated using a broad methodology applied at the national scale. The model utilises generalised information on infiltration, sewerage infrastructure, rainfall events and catchment topography to route rainfall over a ground surface model. As such, the analysis does not take account of site-scale factors / characteristics that may exert an influence upon surface water flood depths and extents. The map therefore only provides a guide regarding the areas that may be vulnerable to this source of flooding.

3.3 Flooding from groundwater

3.3.1 The Cherwell SFRA has been reviewed with regards to groundwater flooding. The Areas Susceptible to Groundwater Flooding Map (as enclosed within **Appendix D**), shows *‘the proportion of each 1km grid square where geological and hydrogeological conditions suggest that ground water might emerge... it does not show the likelihood of groundwater flooding occurring’*. The map shows that the 1km grid square where the site is located is categorised as *‘<25%’*.

3.3.2 The information available at the time of preparing this report, suggests that groundwater emergence at the surface is unlikely, such that groundwater flood risk does not constitute a constraint in this instance.

3.4 Flooding from sewers

3.4.1 We are aware of number of combined water and foul water sewers within the wider site, including pumping stations and associated rising mains. These are shown on the Thames Water sewer enclosed in **Appendix B**.

3.4.2 The Cherwell SFRA has been reviewed with regards to sewer flooding. As shown on the map enclosed **Appendix E**. The site is located within a postcode region with 0 – 5 records of sewer flooding. This is based on the Thames Water DG5 Sewer Incident Register.

3.4.3 We therefore do not consider the risk of flooding from sewers to be a significant risk to the proposed development.

3.5 Flooding from reservoirs, canals and other artificial sources

3.5.1 We are not aware of any canals or artificial water sources that may result in flooding of this site.

3.5.2 The EA provides maps (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/>) showing the area that may be affected by flooding as a result of a breach of a large, raised reservoir (i.e. capable of storing over 25,000 cubic metres of water above the natural level of any part of the surrounding land).

3.5.3 An extract of the Environment Agency map ‘Risk of Flooding from Reservoirs’ is provided below in Figure 3.5. It can be seen that the proposed development site, shown in red, is not at a risk of flooding from reservoirs.



Figure 3.5 Risk of Flooding from Reservoirs

Source: GOV.UK website – February 2023

3.5.4 It can therefore be concluded that the risk of flooding from reservoirs and other artificial sources is low.

3.6 Historic flooding

3.6.1 As set out above, the SFRA identifies that the site is located within a post code region with 0 – 5 records of sewer flooding.

3.6.2 We do not have any records of flooding from other sources.

3.7 Flood risk vulnerability and flood zone compatibility

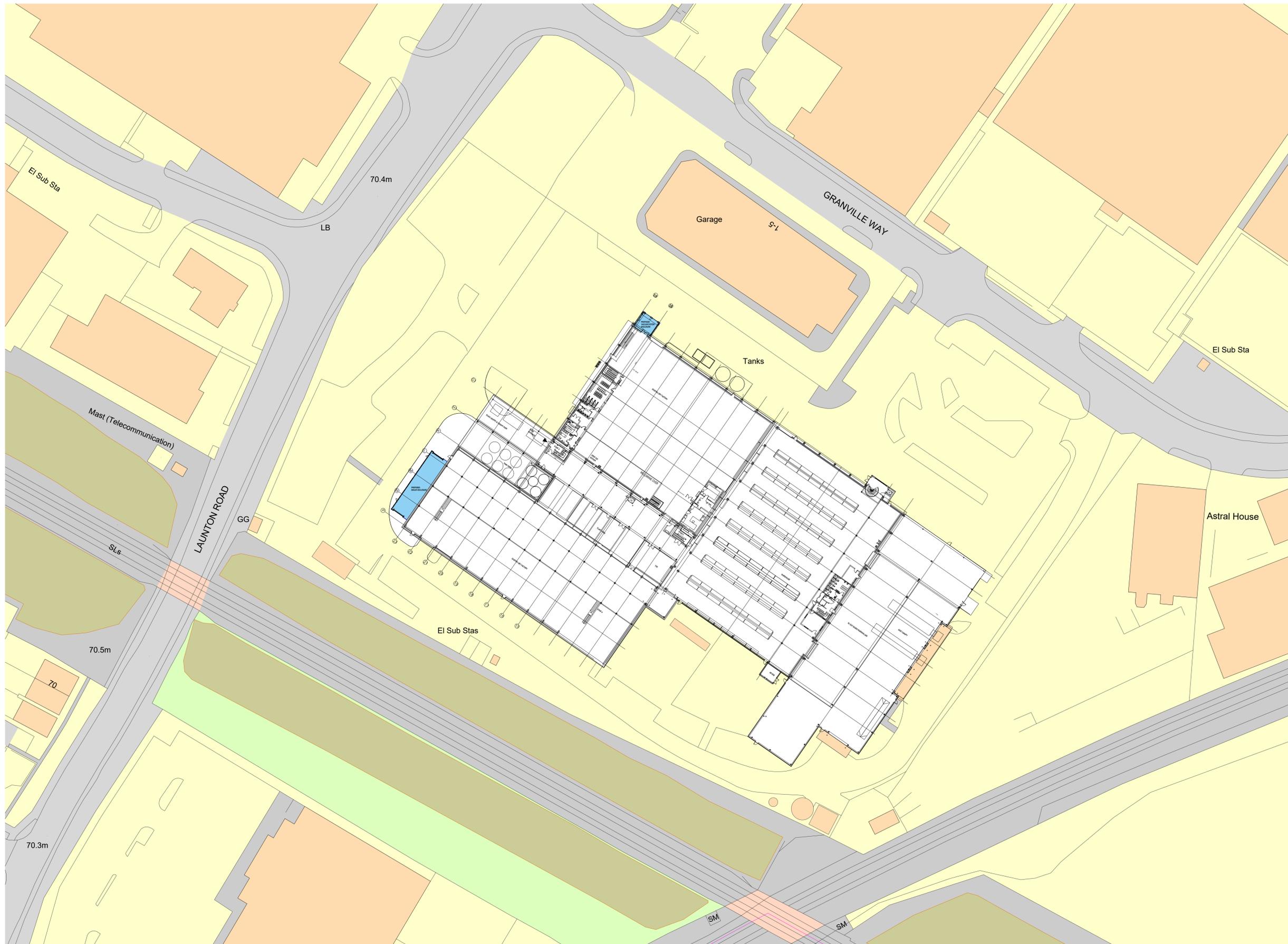
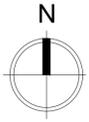
3.7.1 Based on the above assessment of the site being located within Flood Zones 1, 2 and 3 and classified as both a More and Less Vulnerable development, and with reference to Table 3.5 below (Planning Practice Guidance for ‘Flood Risk and Coastal Change’ to the National Planning Policy Framework, Table 3), the proposed development of this site would be considered "appropriate". A copy of Table 3 is presented below highlighting the above. A Sequential Test is required but an Exception Test will not be required.

4.0 Summary and conclusions

- 4.1 The proposed factory extension located at British Bakels, Granville Way, Bicester. The site is bound by existing industrial units to the north and west and an existing railway to the east and south. The site currently comprises an existing factory and existing car park operated by British Bakels Limited.
- 4.2 The proposed development will comprise of two extensions to the existing factory building. One extension to the northern side of the factory and one to the western side. Both extensions will be built on the existing factory car park.
- 4.3 The western (larger) extension is shown to be wholly located within Flood Zone 1 and at a low risk of fluvial flooding. The eastern (smaller) extension is shown to marginally extend into Flood Zone 3. This is based on a worst-case assessment, with an additional 5% allowance for climate change than the required 15%, based on the data available from the Environment Agency. The footprint of this extension located within Flood Zone 3 is therefore considered negligible, and as such, flood compensation measures are not required.
- 4.4 The site is shown to be at a low risk of flooding from surface water, groundwater and artificial sources such as reservoirs.
- 4.5 National, Regional and Local planning policy requires that:
- Development is directed to sites at the lowest probability of flooding;
 - Development accommodates the potential impacts of climate change;
 - Development should not be permitted if it would be at an unacceptable risk of flooding or create an unacceptable risk elsewhere; and
 - New development should facilitate safe access and exit during flood conditions.
- 4.6 The proposals for the factory extension at British Bakels are therefore fully compliant with policy in respect of development and flood risk, such that flood risk considerations do not constitute a barrier to the granting of planning consent.

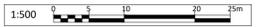


**Appendix A
Proposed Site / Block Plan
APC Architects drawing no. OX106-200**



PROPOSED SITE PLAN 1:500

PLANNING



CLIENT
BRITISH BAKELS

DRAWING TITLE
PROPOSED SITE/BLOCK PLAN

DETAIL

BRITISH BAKELS
BICESTER
OXFORDSHIRE



DATE
14/11/2022

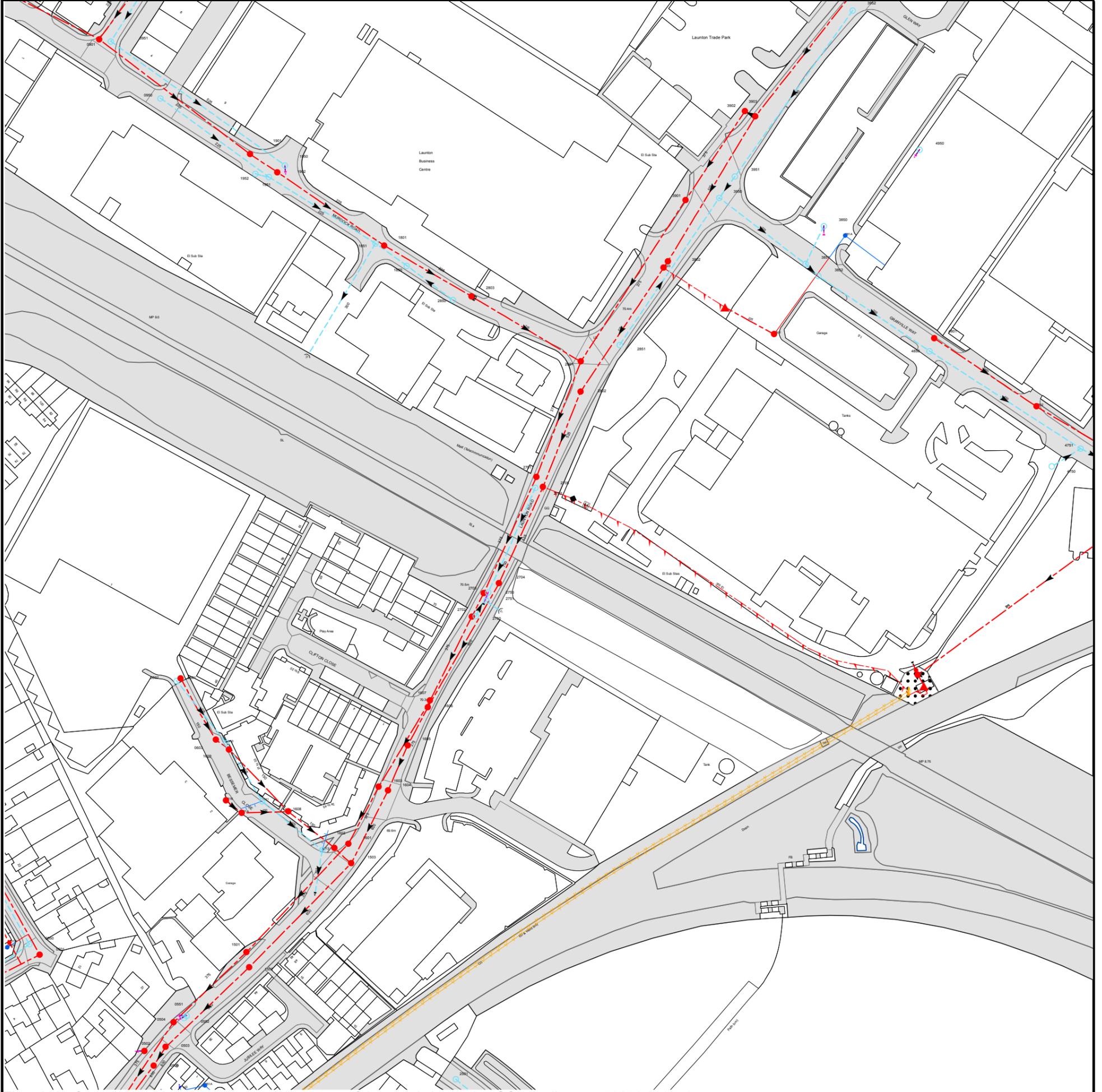
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SCALE
1:500@ A1

DRAWING NO.
OX106-200

REVISION

**Appendix B
Thames Water Asset Plans
Ref. 4787819**



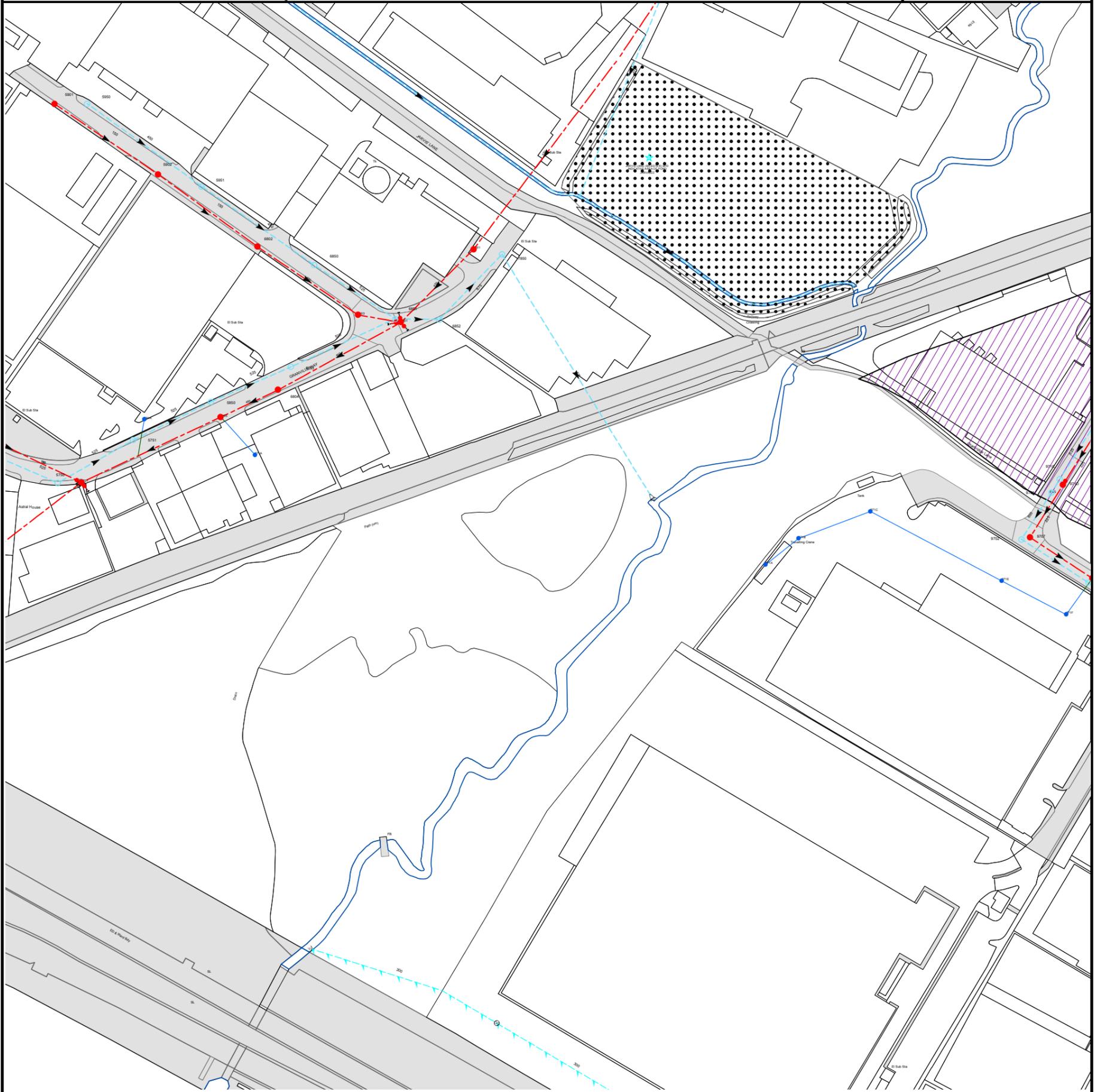
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 459250,222750
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
3801	69.36	66.88
3851	69.44	68.38
3852	69.36	68.35
3850	69.38	68.33
381A	n/a	n/a
3952	70.34	69.24
4950	69.7	69.19
4850	69.19	67.97
4801	69.16	67.55
4802	69.29	66.96
4750	69.03	68.15
4751	69.14	67.86
2501	69.25	67.68
1604	70.26	67.74
1603	70.24	67.92
1605	70.3	67.8
1606	70.42	67.95
1607	70.48	68.04
4604	69.58	63
2702	70.48	68.07
2750	70.52	68.66
2751	n/a	n/a
2703	70.54	n/a
2753	70.56	68.15
2704	70.6	68.02
1801	70.41	69.06
1850	70.33	n/a
2850	70.3	n/a
2803	70.24	68.84
2752	70.61	68.41
2701	70.89	n/a
2705	70.56	68.14
2802	70.49	68.22
2801	70.43	68.47
2851	70.36	n/a
3803	n/a	n/a
3802	70.31	68.47
3901	70.43	69.02
3950	70.15	68.57
3951	70.1	68.55
3902	70.48	69.21
3903	70.34	68.575
1851	70.44	69.46
1951	70.97	69.89
1952	71.08	70.13
1902	70.97	69.39
1950	71.02	69.68
1901	71.05	69.42
0950	71.64	70.52
0951	72.02	69.88
0901	72.06	69.8
0504	68.82	67.83
0552	68.81	n/a
0551	68.76	68.16
1502	69.08	67.58
0501	69.84	68.2
1501	68.99	67.85
051B	n/a	n/a
0550	69.78	68.94
051D	n/a	n/a
1503	70	67.66
1612	n/a	n/a
1602	69.75	67.74
1601	69.95	67.94
161A	n/a	n/a
1608	n/a	n/a
1611	n/a	n/a
161B	n/a	n/a
1609	n/a	n/a
1610	n/a	n/a
0603	n/a	n/a
0602	n/a	n/a
0601	n/a	n/a
0502	68.87	67.12
0505	68.75	67.485
0503	68.78	67.46
051A	68.81	68

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 459750,222750

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
9703	68.26	65.72
971C	68.83	65.74
971D	68.8	65.33
971F	n/a	n/a
971A	n/a	n/a
971E	n/a	n/a
971B	n/a	n/a
871A	n/a	n/a
9702	68.37	65.65
871B	n/a	n/a
9707	68.37	65
871C	n/a	n/a
671A	n/a	n/a
6805	n/a	n/a
5850	68.85	67.65
6804	68.84	64.41
6853	68.81	67.51
6801	68.96	64.62
6852	69.11	n/a
6851	68.81	67.38
6803	68.81	65.69
6850	68.8	67.57
7850	69.1	67.31
7801	69.08	64.73
6802	69	66.12
5951	68.99	67.68
5902	69.17	66.77
5901	69.09	67.4
5750	n/a	n/a
5701	69.05	63.88
5950	69.23	67.93
5751	n/a	n/a
581A	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.



Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

-  **Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water Sewer:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  Storm Sewer
-  Sludge Sewer
-  Foul Trunk Sewer
-  Surface Trunk Sewer
-  Combined Trunk Sewer
-  Foul Rising Main
-  Surface Water Rising Main
-  Combined Rising Main
-  Vacuum
-  Thames Water Proposed
-  Vent Pipe
-  Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

-  Sewer
-  Culverted Watercourse
-  Proposed
-  Decommissioned Sewer
-  Content of this drainage network is currently unknown
-  Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

-  Air Valve
-  Meter
-  Dam Chase
-  Vent
-  Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

-  Ancillary
-  Drop Pipe
-  Control Valve
-  Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

-  Inlet
-  Outfall
-  Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

-  Change of Characteristic Indicator
-  Public / Private Pumping Station
-  Invert Level
-  Summit

Areas

Lines denoting areas of underground surveys, etc.

-  Agreement
-  Chamber
-  Operational Site

Ducts or Crossings

-  Casement
 -  Conduit Bridge
 -  Subway
 -  Tunnel
- Ducts may contain high voltage cables. Please check with Thames Water.

5) 'na' or '0f' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

**Appendix C
Environment Agency Flood Level Data
Ref. THM293881**

Product 4 (Detailed Flood Risk) for OX26 4JT

Our Ref: THM293881

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

- i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and
- ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;

Statutory (Sealed) Main River (where available within map extents);

A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please request our guidance which sets out the requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at:

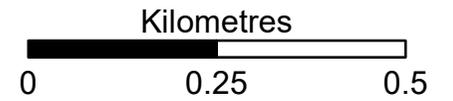
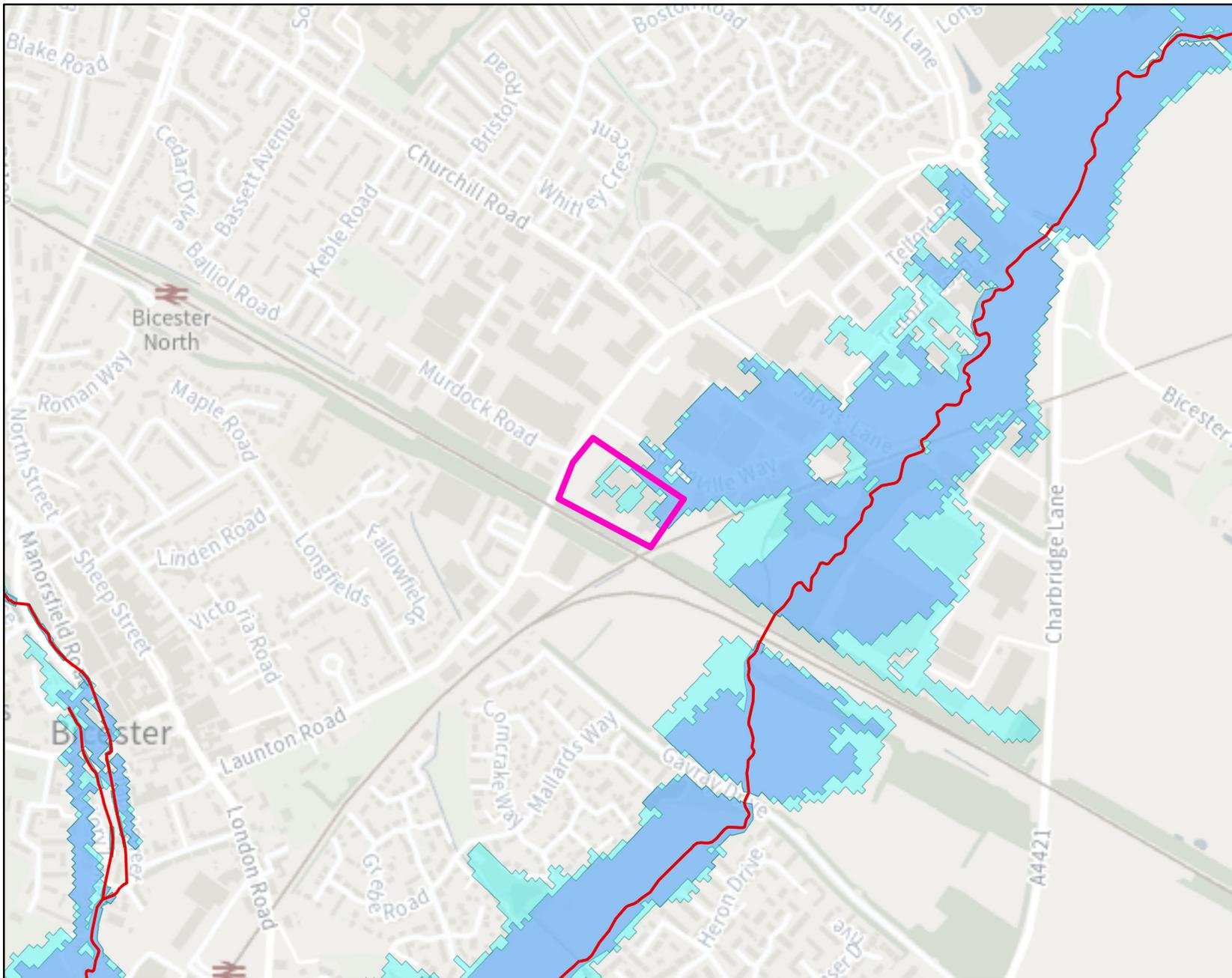
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Flood Map for Planning centred on OX26 4JT

Created on 31/01/2023 REF: THM293881



Legend

- Site
- Main River
- Flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM293881

Model: **Langford Brook (Bicester) & Pingle-Back-Bure 2010**

Description: The information provided is from the Langford Brook (Bicester) & Pingle-Back-Bure 2010 detailed mapping project. The study was carried out using 2D modelling software (ISIS-Tuflow).

Model design runs:

1 in 5 / 20% Annual Exceedance Probability (AEP); 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; 1 in 100+20% / 1% AEP plus 20% increase in flows and 1 in 1000 / 0.1% AEP

Mapped Outputs:

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP and 1 in 1000 / 0.1% AEP

Model accuracy:

Levels \pm 250mm

Modelled in-channel flood flows and levels

THM293881

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

Node label	Model	Easting	Northing	Flood Levels (mAOD)								
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
061_14_2010_00106114MN_2009001_LA.4998	Langford Brook (Bicester) & Pingle-Back-Bure 2010	460391	223573	69.65	69.83	69.95	70.01					70.07
061_14_2010_00106114MN_2009001_LA.4323	Langford Brook (Bicester) & Pingle-Back-Bure 2010	460038	223128	68.62	68.92	69.18	69.23					69.28
061_14_2010_00106114MN_2009001_LA.4005	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459941	222926	68.37	68.79	69.15	69.19					69.24
061_14_2010_00106114MN_2009001_LA.3764	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459805	222774	67.60	67.77	67.86	68.00					68.29
061_14_2010_00106114MN_2009001_LA.3597	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459725	222646	67.26	67.49	67.66	67.91					68.28
061_14_2010_00106114MN_2009001_LA.3439	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459638	222565	67.05	67.33	67.64	67.91					68.27
061_14_2010_00106114MN_2009001_LA.3372	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459605	222509	66.83	66.99	67.09	67.12					67.25
061_14_2010_00106114MN_2009001_LA.3178	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459590	222328	66.64	66.78	66.89	66.98					67.11
061_14_2010_00106114MN_2009001_LA.2933	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459499	222157	66.47	66.58	66.67	66.73					66.83
061_14_2010_00106114MN_2009001_BU.1274	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458418	222437	70.18	70.45	70.58	70.63					70.66
061_14_2010_00106114MN_2009001_BU.1059	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458460	222236	69.67	69.82	69.89	69.91					69.92
061_14_2010_00106114MN_2009001_BU.847	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458438	222053	67.35	67.47	67.53	67.56					67.59

Node label	Model	Easting	Northing	Flood Flows (m3/s)								
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
061_14_2010_00106114MN_2009001_LA.4998	Langford Brook (Bicester) & Pingle-Back-Bure 2010	460391	223573	3.10	4.73	5.60	6.10					6.66
061_14_2010_00106114MN_2009001_LA.4323	Langford Brook (Bicester) & Pingle-Back-Bure 2010	460038	223128	3.08	5.02	5.57	5.25					4.91
061_14_2010_00106114MN_2009001_LA.4005	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459941	222926	2.32	2.35	3.78	3.92					4.17
061_14_2010_00106114MN_2009001_LA.3764	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459805	222774	3.39	5.15	7.12	8.03					8.91
061_14_2010_00106114MN_2009001_LA.3597	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459725	222646	3.39	4.63	5.18	5.22					5.37
061_14_2010_00106114MN_2009001_LA.3439	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459638	222565	3.38	4.39	4.45	4.45					4.47
061_14_2010_00106114MN_2009001_LA.3372	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459605	222509	3.38	5.15	7.76	10.22					13.57
061_14_2010_00106114MN_2009001_LA.3178	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459590	222328	3.38	4.95	5.53	5.66					5.86
061_14_2010_00106114MN_2009001_LA.2933	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459499	222157	3.36	4.14	4.52	4.92					4.91
061_14_2010_00106114MN_2009001_BU.1274	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458418	222437	1.27	1.44	1.56	1.62					1.66
061_14_2010_00106114MN_2009001_BU.1059	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458460	222236	1.27	1.45	1.52	1.52					1.51
061_14_2010_00106114MN_2009001_BU.847	Langford Brook (Bicester) & Pingle-Back-Bure 2010	458438	222053	1.85	2.61	3.09	3.39					3.68

Note:

Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Modelled floodplain flood levels

THM293881

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)								
				20% AEP	5% AEP	1% AEP	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP	
Flood Point 1	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459643	222636	NoData	67.34	67.65	67.91					68.28
Flood Point 2	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459651	222792	NoData	NoData	69.14	69.18					69.20
Flood Point 3	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459433	222745	NoData	NoData	69.13	69.18					69.21
Flood Point 4	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459368	222762	NoData	NoData	NoData	NoData					69.08
Flood Point 5	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459326	222782	NoData	NoData	NoData	69.17					69.21
Flood Point 6	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459517	222774	NoData	NoData	69.14	69.18					69.21
Flood Point 7	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459558	222851	NoData	NoData	69.14	68.18					69.21
Flood Point 8	Langford Brook (Bicester) & Pingle-Back-Bure 2010	459521	222931	NoData	NoData	69.14	69.18					69.21

This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:

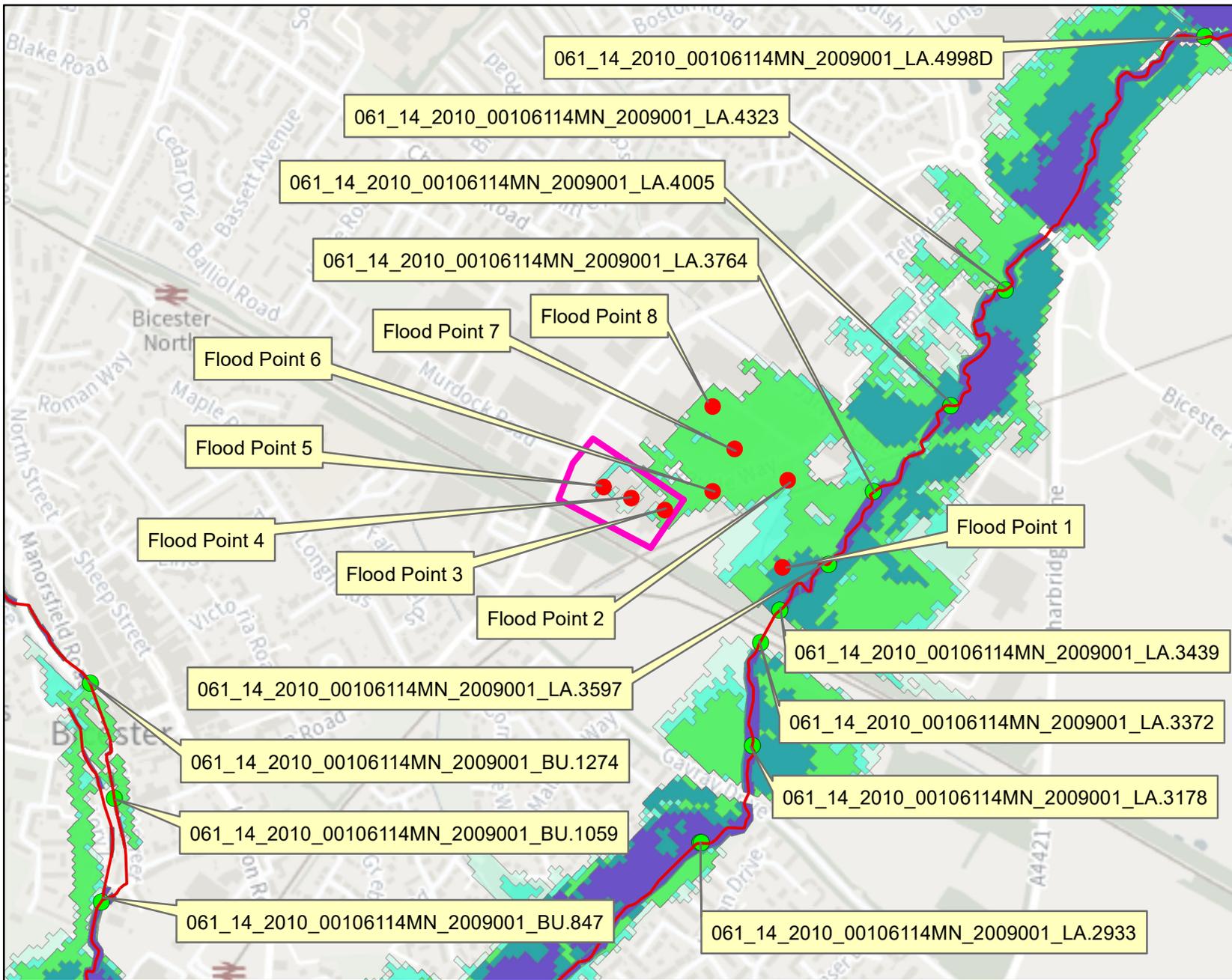
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer to be used for development design purposes. The data included in this Product can be used for interpolation of levels as part of an intermediate level assessment.

For further advice on the new allowances please visit

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Detailed FRA Map centred on OX26 4JT

Created on 31/01/2023 REF: THM293881



Legend

- Site
- Main River
- Model Nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 1% AEP Flood Outline
- 1%+20% Flood Outline
- 0.1% AEP Flood Outline

AEP = Annual Exceedance Probability
 The probability of a flood of a particular magnitude, or greater, occurring in any given year

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Historic flood data

THM293881

Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

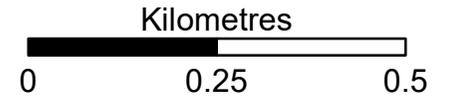
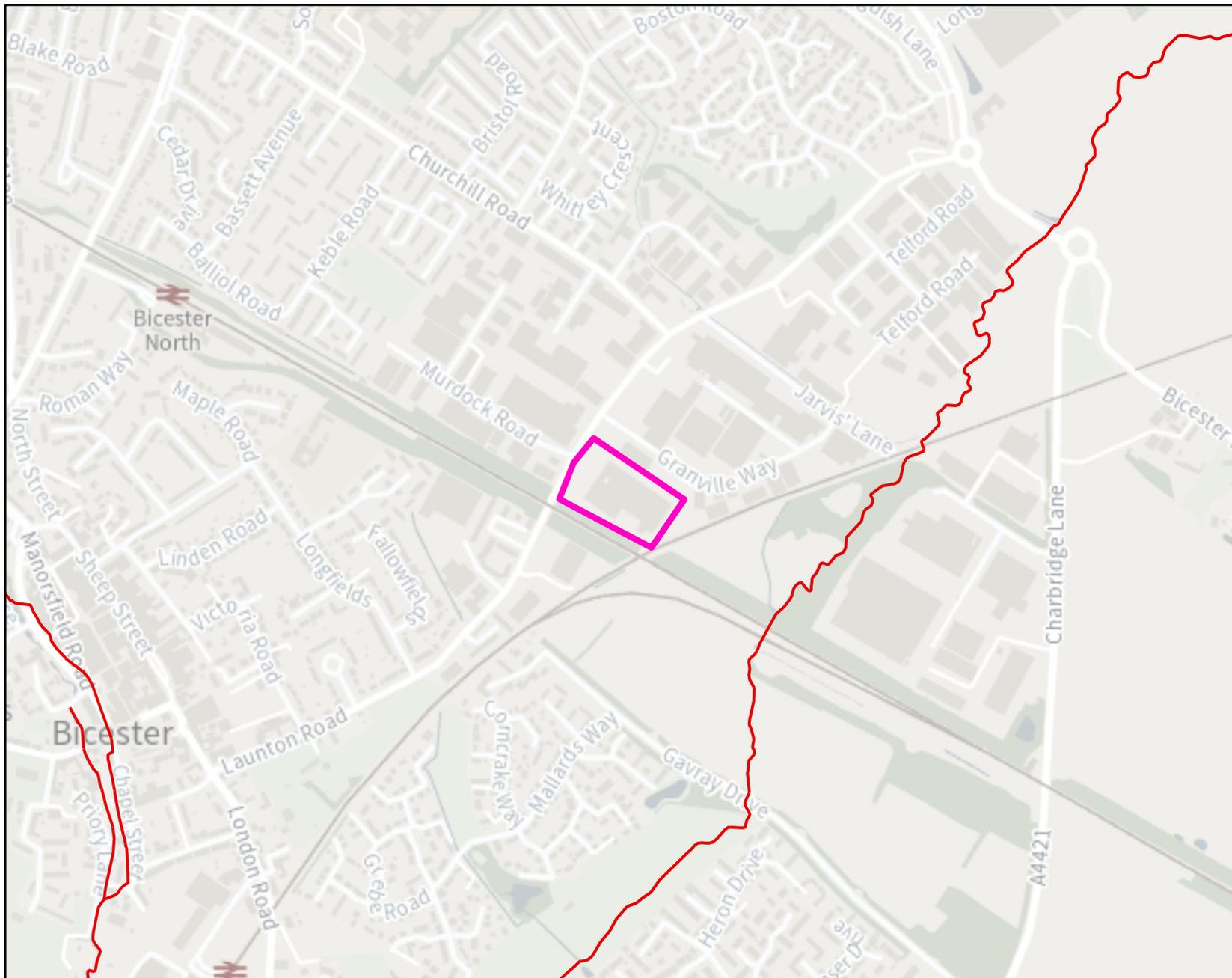
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
No Historic Information					

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

Historic Flood Map centred on OX26 4JT

Created on 31/01/2023 REF: THM293881



Legend

-  Site
-  Main River

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Hazard Mapping (for the 1%+35% climate change scenario) THM293881

Hazard Mapping methodology:

To calculate flood hazard with the debris factor we have used the supplementary note to Flood Risk to People Methodology (see below).

The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

Where HR = flood hazard rating

d = depth of flooding (m)

v = velocity of floodwaters (m/sec)

DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)

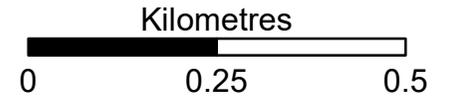
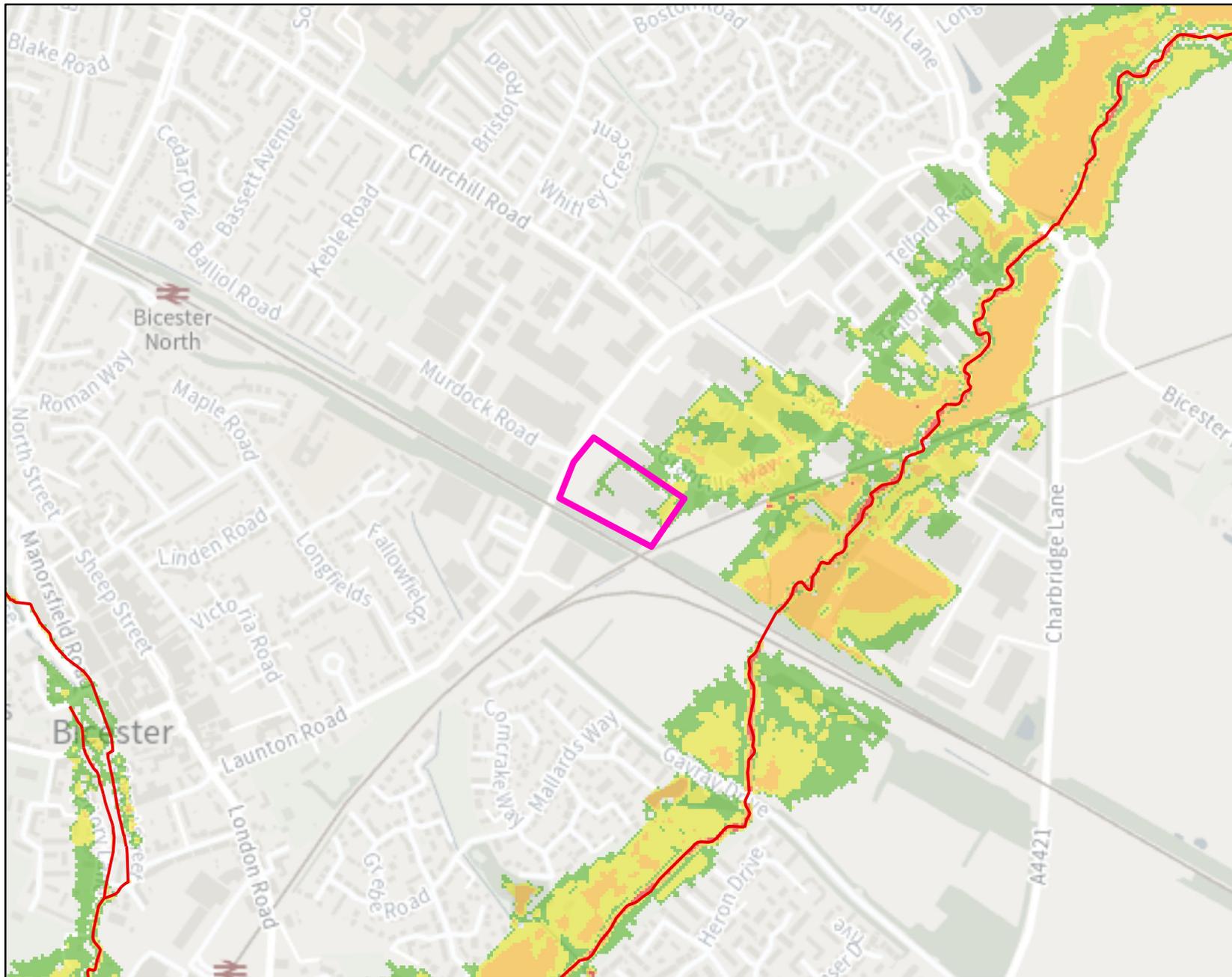
The resultant hazard rating is then classified according to:

Flood Hazard	Colour	Hazard to People Classification
Less than 0.75	Green	Very low hazard - Caution
0.75 to 1.25	Yellow	Danger for some - includes children, the elderly and the infirm
1.25 to 2.0	Orange	Danger for most - includes the general public
More than 2.0	Red	Danger for all - includes the emergency services

REF: HR Wallingford and Environment Agency (May 2008) Supplementary note of flood hazard ratings and thresholds for development planning and control purpose – Clarification of the Table 113.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1

Hazard Map centred on OX26 4JT

Created on 31/01/2023 REF: THM293881



Legend

- Site
- Main River
- Low hazard
- Danger for some
- Danger for most
- Danger for all

For hazard and debris factor we used HR Wallingford and Environment Agency (May 2008) supplementary note on flood hazard ratings and thresholds for development planning and control purpose. The following calculation is used:

$$HR = d \times (v+0.5) + DF$$

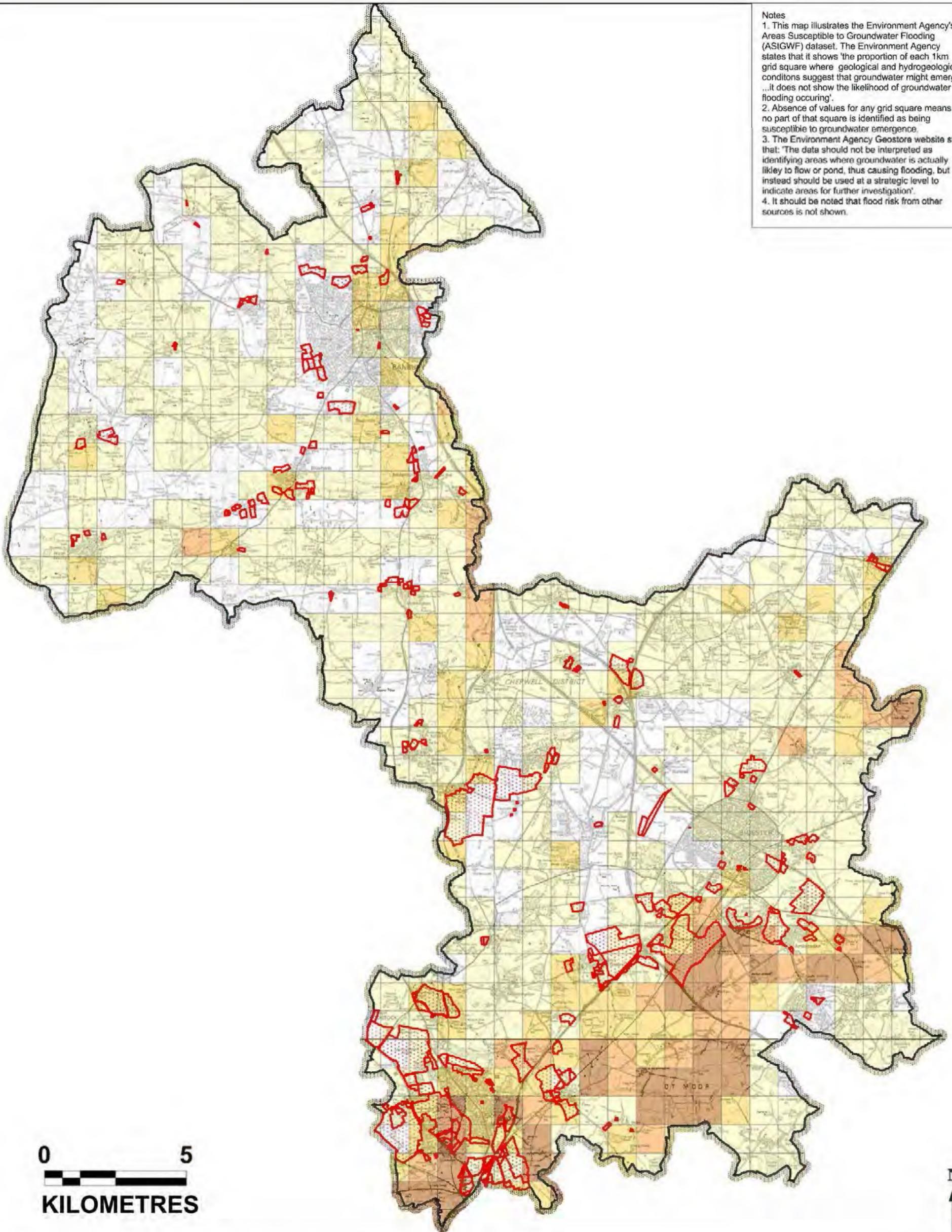
HR = flood hazard rating
 d = depth of flooding (m)
 v = velocity of floodwaters (m/sec)
 DF = debris factor calculated (0, 0.5, 1 depending on probability that debris will lead to a hazard)



**Appendix D
Areas Susceptible to Groundwater Flooding
Cherwell SFRA Figure B8**

Notes

1. This map illustrates the Environment Agency's Areas Susceptible to Groundwater Flooding (ASIGWF) dataset. The Environment Agency states that it shows 'the proportion of each 1km grid square where geological and hydrogeological conditions suggest that groundwater might emerge ...it does not show the likelihood of groundwater flooding occurring'.
2. Absence of values for any grid square means that no part of that square is identified as being susceptible to groundwater emergence.
3. The Environment Agency Geostore website states that: 'The data should not be interpreted as identifying areas where groundwater is actually likely to flow or pond, thus causing flooding, but instead should be used at a strategic level to indicate areas for further investigation'.
4. It should be noted that flood risk from other sources is not shown.



Legend

Cherwell District Boundary

Level 1 SFRA Sites

Areas Susceptible to Groundwater Flooding

<25 percent

>=25 percent <50 percent

>=50 percent <75 percent

>=75 percent

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Client **Cherwell**
DISTRICT COUNCIL
NORTH OXFORDSHIRE

Drawing Status
FINAL

Revision Details By Date Suffix AECOM Infrastructure & Environment UK Ltd

Job Title
CHERWELL LEVEL 1 STRATEGIC FLOOD RISK ASSESSMENT UPDATE

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Drawing Title
AREAS SUSCEPTIBLE TO GROUNDWATER FLOODING (ASTGWF)

Scale at A3: **AS SHOWN**

Drawn RS Approved MT Date 05-2017

Notes
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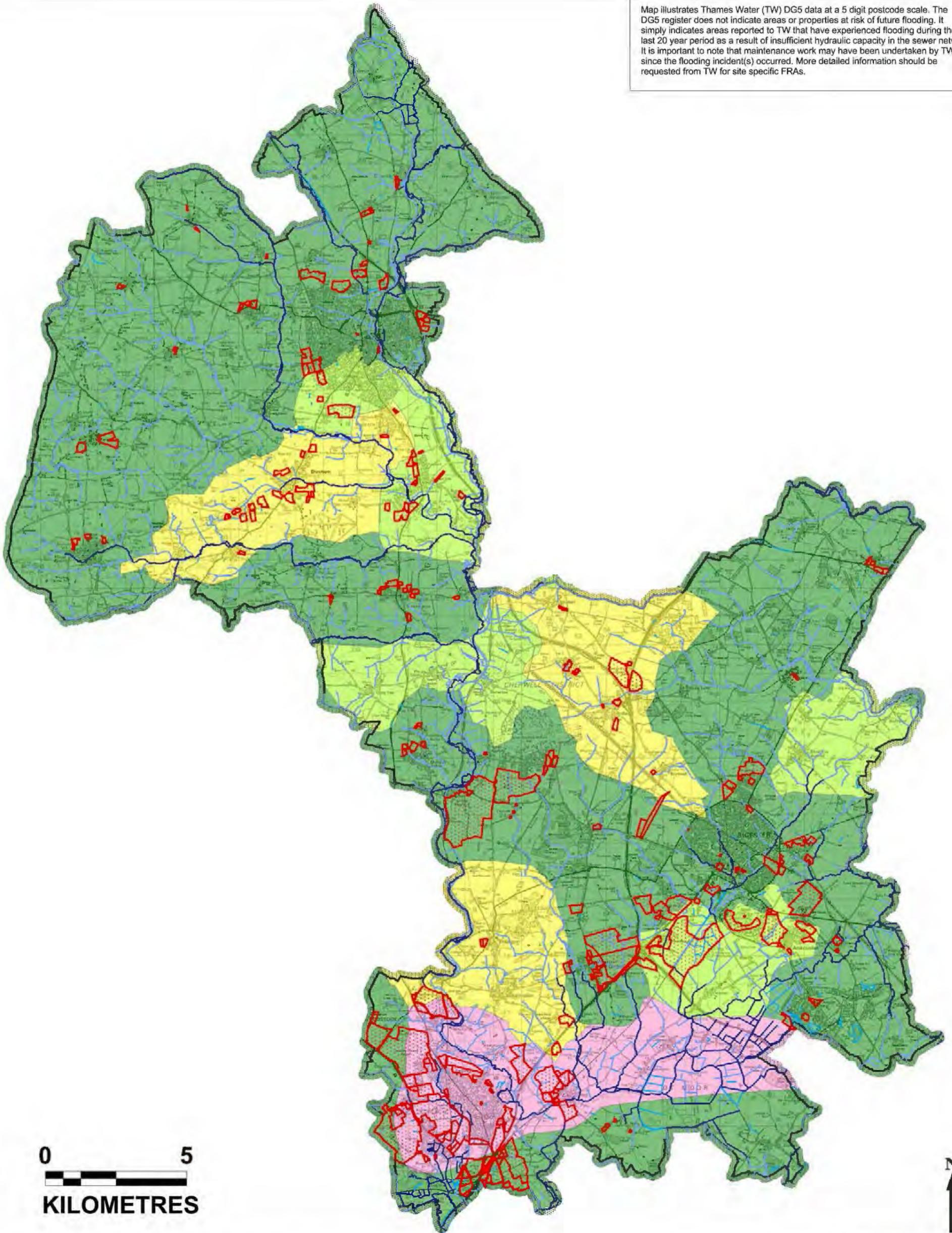
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Royal Court, Bassett Close, Chatterfield, Derbyshire, S44 7SR
www.aecom.com
Tel 01246 209 221 Fax 01246 209 229

Drawing Number **FIGURE B8** Rev



**Appendix E
TW DG5 Sewer Flooding Incident Register
Cherwell SFRA Figure B10**

Map illustrates Thames Water (TW) DG5 data at a 5 digit postcode scale. The DG5 register does not indicate areas or properties at risk of future flooding. It simply indicates areas reported to TW that have experienced flooding during the last 20 year period as a result of insufficient hydraulic capacity in the sewer network. It is important to note that maintenance work may have been undertaken by TW since the flooding incident(s) occurred. More detailed information should be requested from TW for site specific FRAs.



<p>Legend</p> <ul style="list-style-type: none"> Cherwell District Council Level 1 SFRA Sites 	<p>Detailed River Network</p> <ul style="list-style-type: none"> Main River Ordinary Watercourse Offline Waterbody 	<p>TW DG5 Sewer Flooding Incident Register (reported per postcode region)</p> <ul style="list-style-type: none"> 0 to 5 5 to 10 10 to 15 20 to 25 	<p>THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF AECOM'S APPOINTMENT WITH ITS CLIENT AND IS AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED. © AECOM INFRASTRUCTURE & ENVIRONMENT UK LTD 2017</p>	<p>Client: Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE</p> <p>Drawing Status: FINAL</p>
<p>Job Title: CHERWELL LEVEL 1 STRATEGIC FLOOD RISK ASSESSMENT UPDATE</p>	<p>Copyright: © Copyright. All rights reserved. Environment Agency 2016. © Copyright. All rights reserved. Thames Water 2016. This map is based upon Ordnance Survey material with the 'behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Cherwell District Council. Licence No. 100024316, 2016.</p>	<p>Drawing Title: HISTORICAL SEWER FLOODING INCIDENTS</p>	<p>Scale at A3: AS SHOWN</p> <p>Drawn RS Approved MT Date 05-2017</p> <p>Notes: THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED</p>	<p>AECOM</p> <p>Drawing Number: FIGURE B10</p>



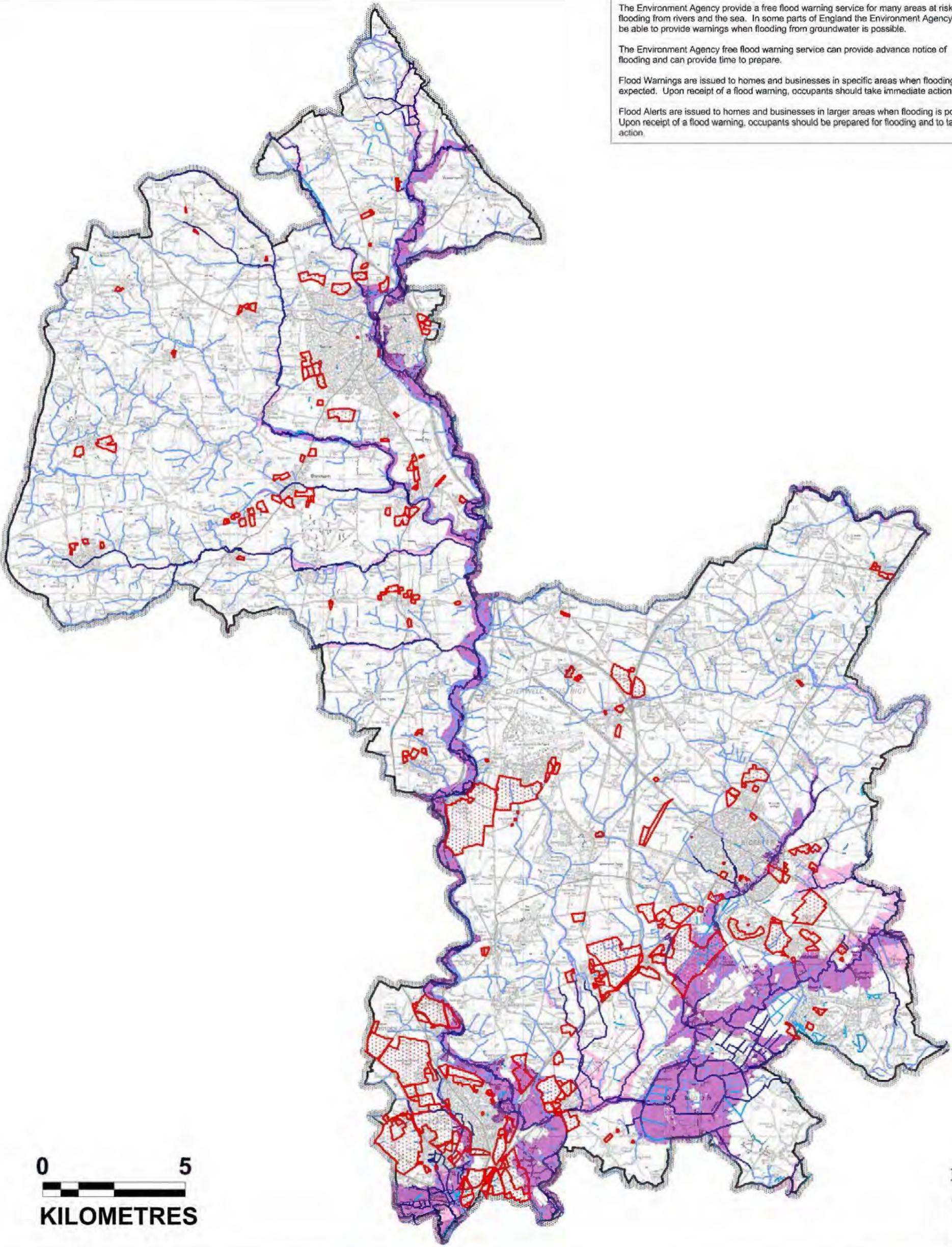
**Appendix F
EA Flood Warning & Flood Alert Areas
Cherwell SFRA Figure B11**

The Environment Agency provide a free flood warning service for many areas at risk of flooding from rivers and the sea. In some parts of England the Environment Agency may be able to provide warnings when flooding from groundwater is possible.

The Environment Agency free flood warning service can provide advance notice of flooding and can provide time to prepare.

Flood Warnings are issued to homes and businesses in specific areas when flooding is expected. Upon receipt of a flood warning, occupants should take immediate action.

Flood Alerts are issued to homes and businesses in larger areas when flooding is possible. Upon receipt of a flood warning, occupants should be prepared for flooding and to take action.



Legend Cherwell District Boundary Level 1 SFRA Sites Detailed River Network Ordinary Watercourse Offline Waterbody Environment Agency Flood Warning Area Environment Agency Flood Alert Area		THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF AECOM'S APPOINTMENT WITH ITS CLIENT AND IS AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED. © AECOM INFRASTRUCTURE & ENVIRONMENT UK LTD 2017		Client Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE Drawing Status FINAL	
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Plot Date: 17/05/2017 Filepath: \\Ch-wip-001\CH_Water\Projects\60494538 - Cherwell L1 SFRA Update\0000 GIS_Data\01-WIP\01_02-Data_Working\WOR\Fig B11 Flood Warning and Alert Areas.wor		Scale at A3: AS SHOWN Drawn RS Approved MT Date 05-2017 Notes THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED		Revision Details By: _____ Date: _____ Suffix: _____ AECOM Infrastructure & Environment UK Ltd Royal Court, Bass Close, Chesterfield, Derbyshire, S41 7SL AECOM www.aecom.com Tel 01246 209 221 Fax 01246 209 229 Drawing Number FIGURE B11 Rev _____	