

Appendix F3

Environment Agency Data

Our ref: ENQ22/DCIS/247725

Your ref:

Date: 27th January 2022

Dear James,

Enquiry regarding *Product 4, 5 & 6*

Thank you for your enquiry which was received on 17th January 2022.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

Abstract

Name	Product 4
Description	Detailed Flood Risk Assessment Map for Exeter
Licence	Open Government Licence
Information Warnings	
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Name	Product 5
Description	<i>Exeter Model Report 2011</i>
Licence	Environment Agency Conditional Licence
Conditions	<ol style="list-style-type: none">1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you.2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice.

	<p>3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights.</p> <p>4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.</p> <p>4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.</p> <p>5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km². Information about the operation of flood assets should not be published..</p> <p>6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”.</p> <p>6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.</p>
Information Warnings	
Attribution	<p>Contains Environment Agency information © Environment Agency and/or database rights.</p> <p>May contain Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.</p>

Name	Product 6
Description	Model Output Data <i>for Exeter 2011</i>
Licence	Environment Agency Conditional Licence
Conditions	<ol style="list-style-type: none"> 1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. <p>4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.</p> <p>4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.</p> <p>5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km². Information about the operation of flood assets should not be published.</p> <p>6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”.</p> <p>6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its</p>

	internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#), ,)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Hannah
Hannah Dolley
Flood and Coastal Risk Management Officer
Partnerships and Strategic Overview
Devon, Cornwall & Isles of Scilly

 DCISEnquiries@environment-agency.gov.uk

Flood risk assessment data

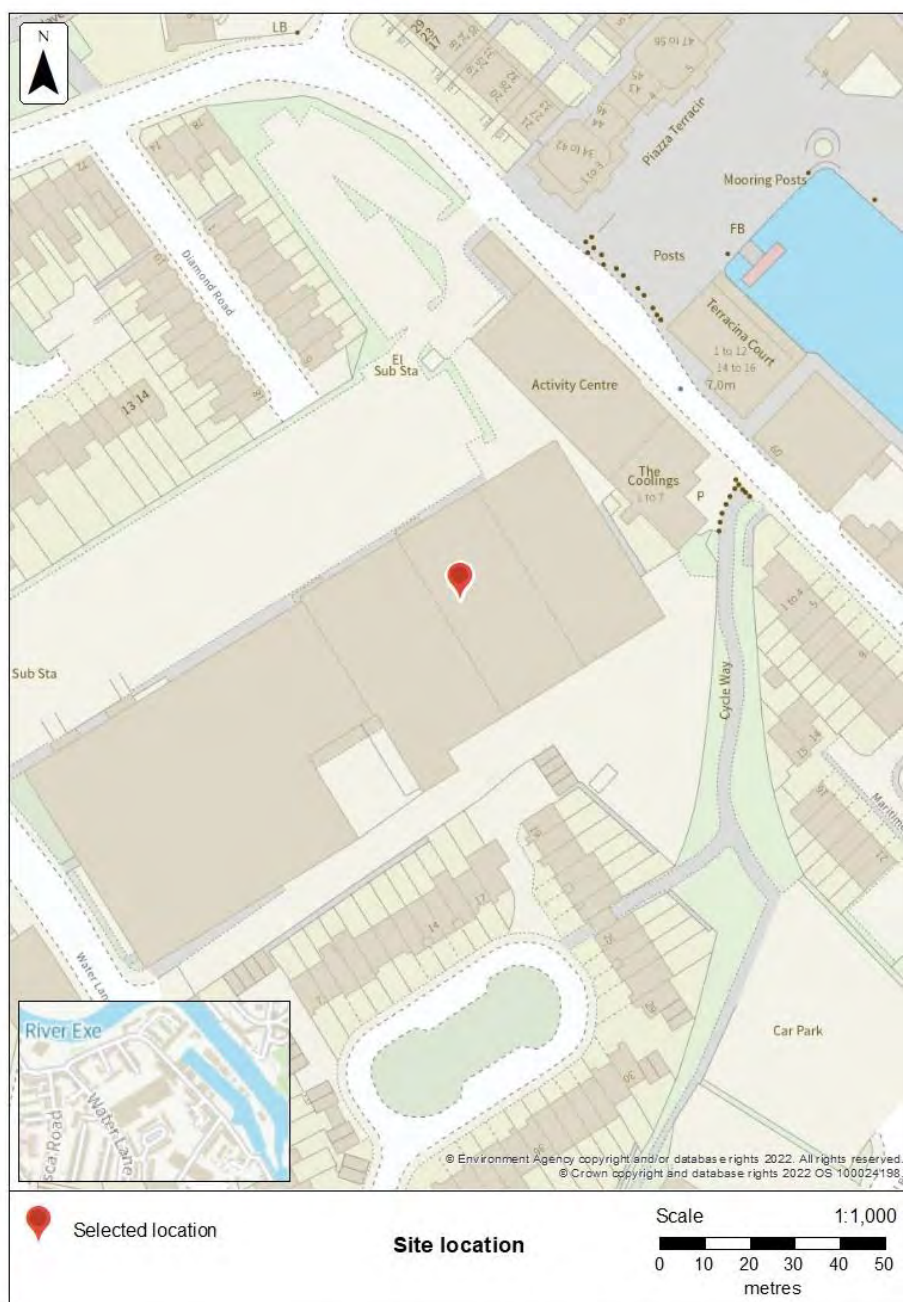
Location of site: 292003 / 91840 (shown as easting and northing coordinates)

Document created on: 27 January 2022

This information was previously known as a product 4.

Customer reference number: ENQ22/DCIS/247725

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to produce your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- flood defences and attributes
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits help and advice

You will need to consider the [latest flood risk assessment climate change allowances](#) and factor in the new allowances to demonstrate the development will be safe from flooding.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Exeter 2D Mapping & Modelling
Scenario(s): Defended fluvial
Date: 2011

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your development is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.

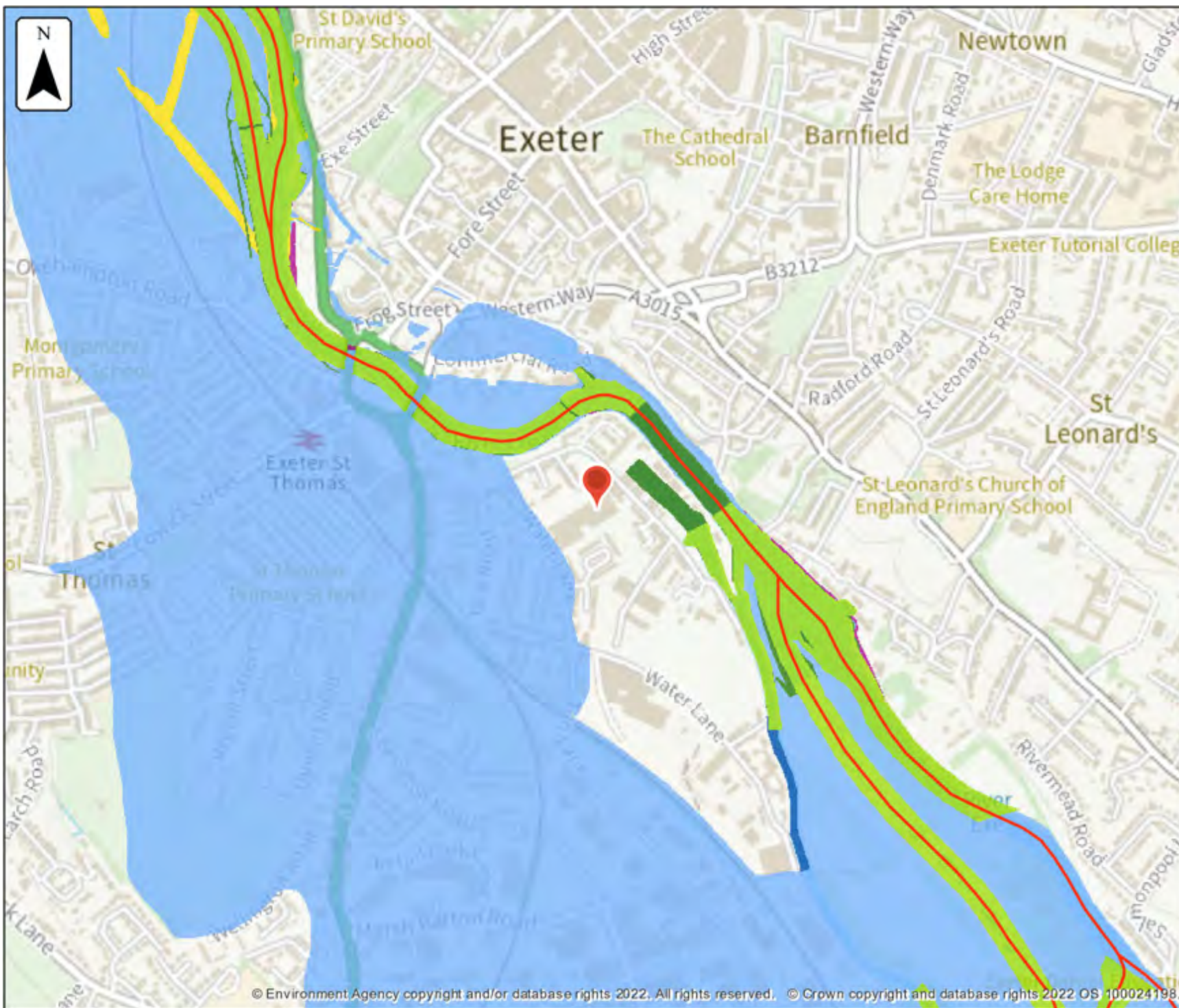
Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources

You can also contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

[Download recorded flood outlines in GIS format](#)



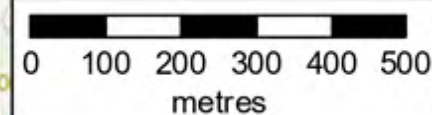
Historic flood map

Location (easting/northing)
292003/91840

Scale
1:10,000

Created
27 Jan 2022

-  Selected location
-  Main river
- Date of flood event
 -  December, 1993
 -  December, 1979
 -  January, 1971
 -  December, 1960
 -  October, 1960
 -  September, 1960
 -  November, 1950



Historic flood event data

Historic outlines in the above may not be visible where they overlap. You can download the outlines separately via the link above.

Start date	End date	Source of flood	Affects location
December 1993	December 1993	main river	No
December 1979	December 1979	main river	No
26 January 1971	26 January 1971	main river	No
4 December 1960	4 December 1960	main river	No
October 1960	October 1960	main river	No
30 September 1960	1 October 1960	main river	No
21 November 1950	21 November 1950	main river	No

Please see attached/photographs were available.

Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences and their condition. It shows the height above sea level of the top of the flood defence (crest level). The height is in mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis.

The information here is based on the best available data.






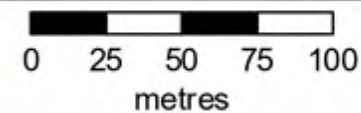
Flood defences

Location (easting/northing)
292003/91840

Scale
1:2,500

Created
27 Jan 2022

-  Selected location
-  Main river
-  Flood defence



Flood defences data

Label	Asset ID	Asset Type	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	56345	wall	Good	8.78	8.95	
2	535165	wall	Very good	9	9.15	
3	40348	wall	Fair	8.46	8.79	
4	535175	flood gate	Very good	9.46	9.46	
5	4025	bridge abutment	Fair	9.06	8.99	
6	4024	embankment	Fair	8.46	9.04	
7	535254	flood gate	Very good	8.10	8.10	
8	535234	wall		7.85	8.40	

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

outline maps showing the area at risk from flooding in different modelled scenarios

modelled node point map showing the points used to get the data to model the scenarios

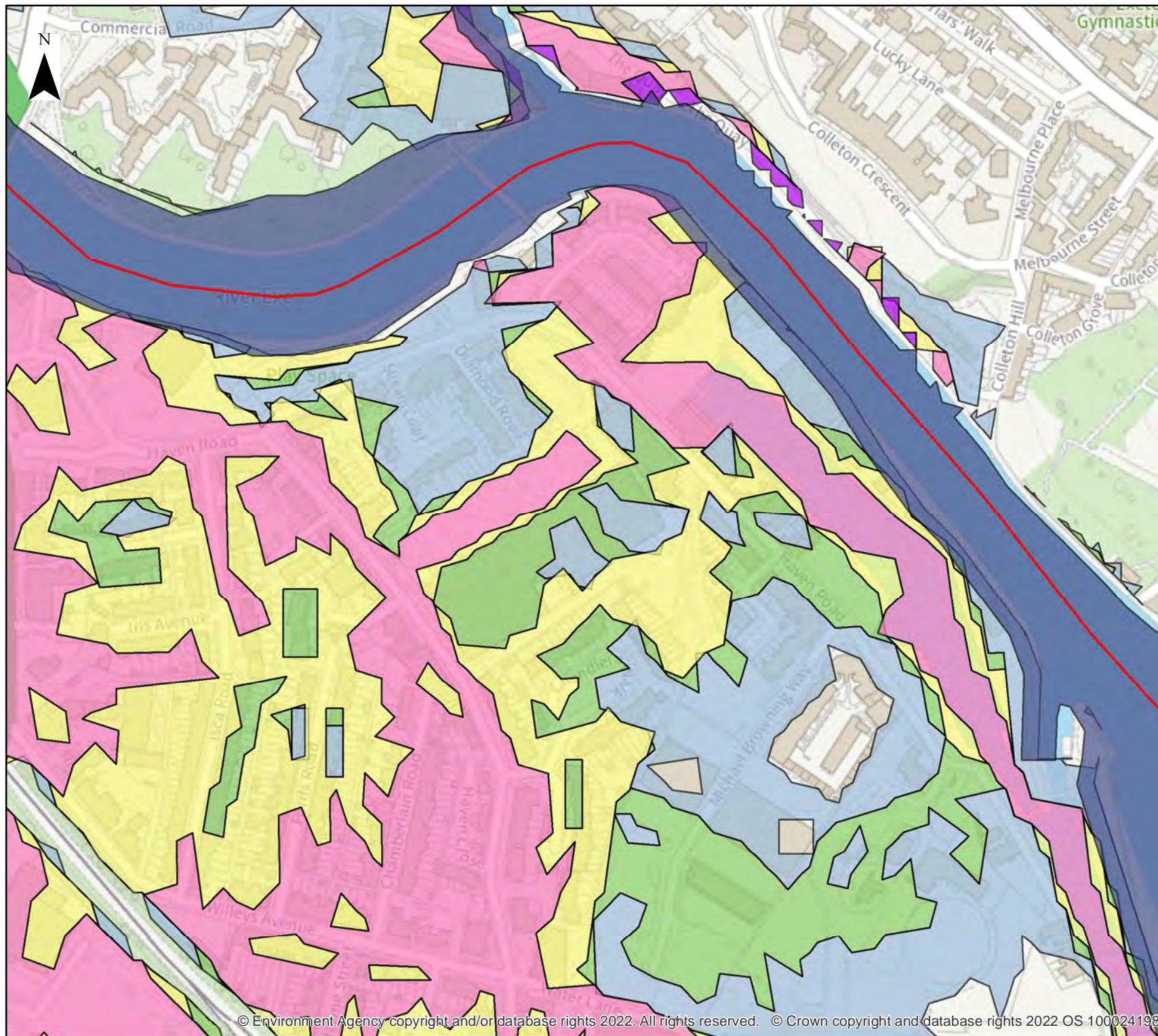
node point tables providing details of the flood risk for different return periods

Modelled scenario maps

Maps for the following scenarios are included:

- Defended modelled fluvial

Please see our up to date guidance on climate change allowance which is available on the GOV.uk website [here](#)



Defended Modelled Fluvial Extent Map

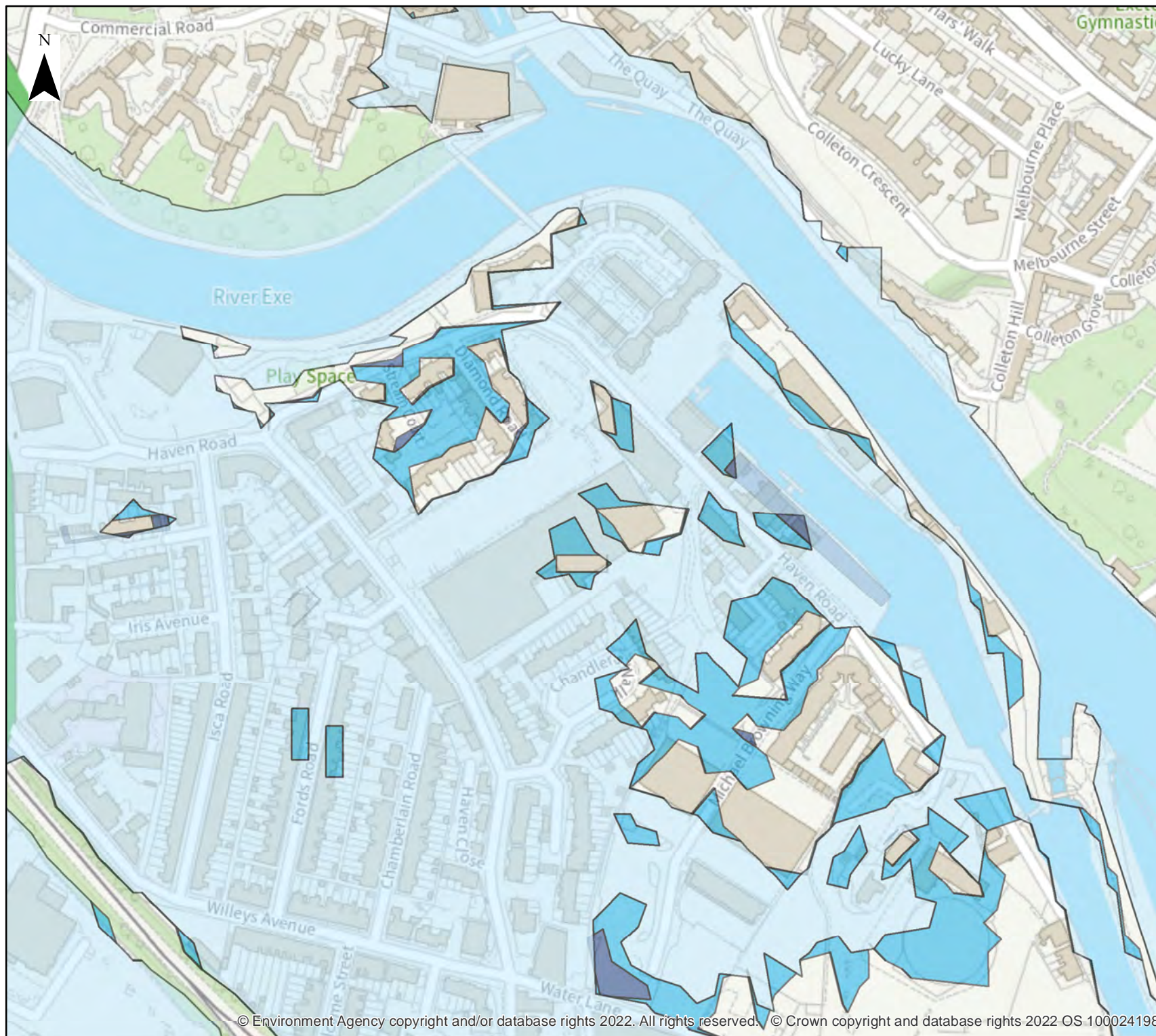
Location (easting/northing)
292003 / 91840

Scale Created
1:3,000 27 Jan 2022

Model name
Exeter 2011

Legend

- Main River
- 10% AEP Flood
- 5% AEP Flood
- 2% AEP Flood
- 1.33% AEP Flood
- 1% AEP Flood
- 0.1% AEP Flood



Defended Modelled Fluvial Extent Map plus CC

Location (easting/northing)
292003 / 91840

Scale Created
1:3,000 27 Jan 2022

Model name
Exeter 2011

Legend

- Exeter 2D 1%
- Exeter 2D 1% AEP plus CC to
- Exeter 2D 1% AEP plus CC to

Modelled node locations data

Node Reference	X	Y	Modelled Flood Flows, in m ³ /s (defended model run)											Modelled Flood Flows, in m ³ /s (undefended model run)	
			50% AEP	10% AEP	5% AEP	2% AEP	1.33% AEP	1% AEP	0.1% AEP	1% AEP plus CC to 2070	0.1% AEP plus CC to 2070	1% AEP plus CC to 2115	0.1% AEP plus CC to 2115	1% AEP	0.1% AEP
61	291512	92141	310.16	529.94	629.67	747.44	817.75	820.64	906.34	784.52	856.51	784.60	854.99	726.34	828.38
62	291534	92133	310.16	529.94	629.67	747.44	817.75	820.64	906.34	784.52	856.51	784.60	854.99	726.34	828.38
63	291642	92059	310.17	529.95	629.70	747.42	817.74	820.82	928.51	784.44	882.13	784.52	881.30	726.31	842.44
64	291659	92037	310.17	529.95	629.70	747.42	817.74	820.82	928.51	784.44	882.13	784.52	881.30	726.31	842.44
65	291820	91981	310.16	529.95	629.39	740.22	803.77	806.34	962.00	782.83	927.89	782.81	927.97	722.14	859.01
66	291932	92035	310.16	529.95	629.44	740.20	803.82	806.30	958.40	782.86	928.80	782.82	929.27	722.11	868.35
67	292144	91956	310.20	529.98	629.49	739.32	798.25	800.54	901.39	779.97	884.15	780.01	883.60	722.21	859.49
68	292221	91863	310.19	529.98	629.50	739.34	798.90	801.30	931.26	780.31	911.24	780.30	911.62	722.20	862.10
69	292329	91739	310.19	529.98	629.48	739.32	798.90	801.36	998.88	780.33	969.89	780.27	970.53	722.19	876.61
70	292436	91621	206.64	291.06	327.30	366.44	387.38	388.23	526.68	380.87	509.33	380.85	510.13	420.73	465.60
71	292520	91487	206.62	291.04	327.27	366.39	387.26	388.16	526.17	380.69	509.29	380.75	509.75	420.51	463.49
155	292354	91638	103.55	238.92	302.18	372.88	411.53	413.12	476.11	399.46	463.82	399.42	463.33	301.54	412.08
Node Reference	X	Y	Modelled Flood Levels, in mAOD (defended model run)											Modelled Flood Levels, in mAOD (undefended model run)	
			50% AEP	10% AEP	5% AEP	2% AEP	1.33% AEP	1% AEP	0.1% AEP	1% AEP plus CC to 2070	0.1% AEP plus CC to 2070	1% AEP plus CC to 2115	0.1% AEP plus CC to 2115	1% AEP	0.1% AEP
61	291512	92141	7.12	8.19	8.69	9.27	9.59	9.78	10.77	9.86	10.68	9.86	10.69	9.48	10.28
62	291534	92133	7.07	7.99	8.41	8.88	9.12	9.13	10.06	9.21	9.98	9.21	9.99	8.91	9.64
63	291642	92059	7.03	7.93	8.35	8.81	9.06	9.07	9.97	9.15	9.89	9.15	9.89	8.86	9.57
64	291659	92037	6.95	7.73	8.07	8.42	8.60	8.61	9.25	8.57	9.21	8.57	9.22	8.33	8.96
65	291820	91981	6.80	7.46	7.78	8.13	8.31	8.32	8.91	8.25	8.86	8.25	8.86	8.02	8.64
66	291932	92035	6.72	7.31	7.59	7.90	8.07	8.07	8.61	8.02	8.56	8.02	8.56	7.79	8.32
67	292144	91956	6.55	6.91	7.07	7.25	7.36	7.36	8.14	7.32	8.05	7.32	8.05	7.14	7.59
68	292221	91863	6.49	6.75	6.84	6.91	6.94	6.94	7.51	6.93	7.43	6.93	7.44	6.91	7.23
69	292329	91739	6.51	6.81	6.93	7.06	7.13	7.13	7.53	7.10	7.48	7.10	7.49	6.93	7.16
70	292436	91621	4.92	5.55	5.85	6.11	6.26	6.30	7.08	6.30	7.02	6.30	7.02	6.17	6.69
71	292520	91487	4.77	5.37	5.67	5.92	6.07	6.12	6.88	6.12	6.83	6.12	6.83	5.92	6.48
155	292354	91638	5.13	5.96	6.24	6.51	6.67	6.71	7.40	6.71	7.34	6.71	7.35	6.31	6.94

Data in this table comes from the Exeter 2D Mapping & Modelling model.

Defended Modelled Fluvial Node Map 1D

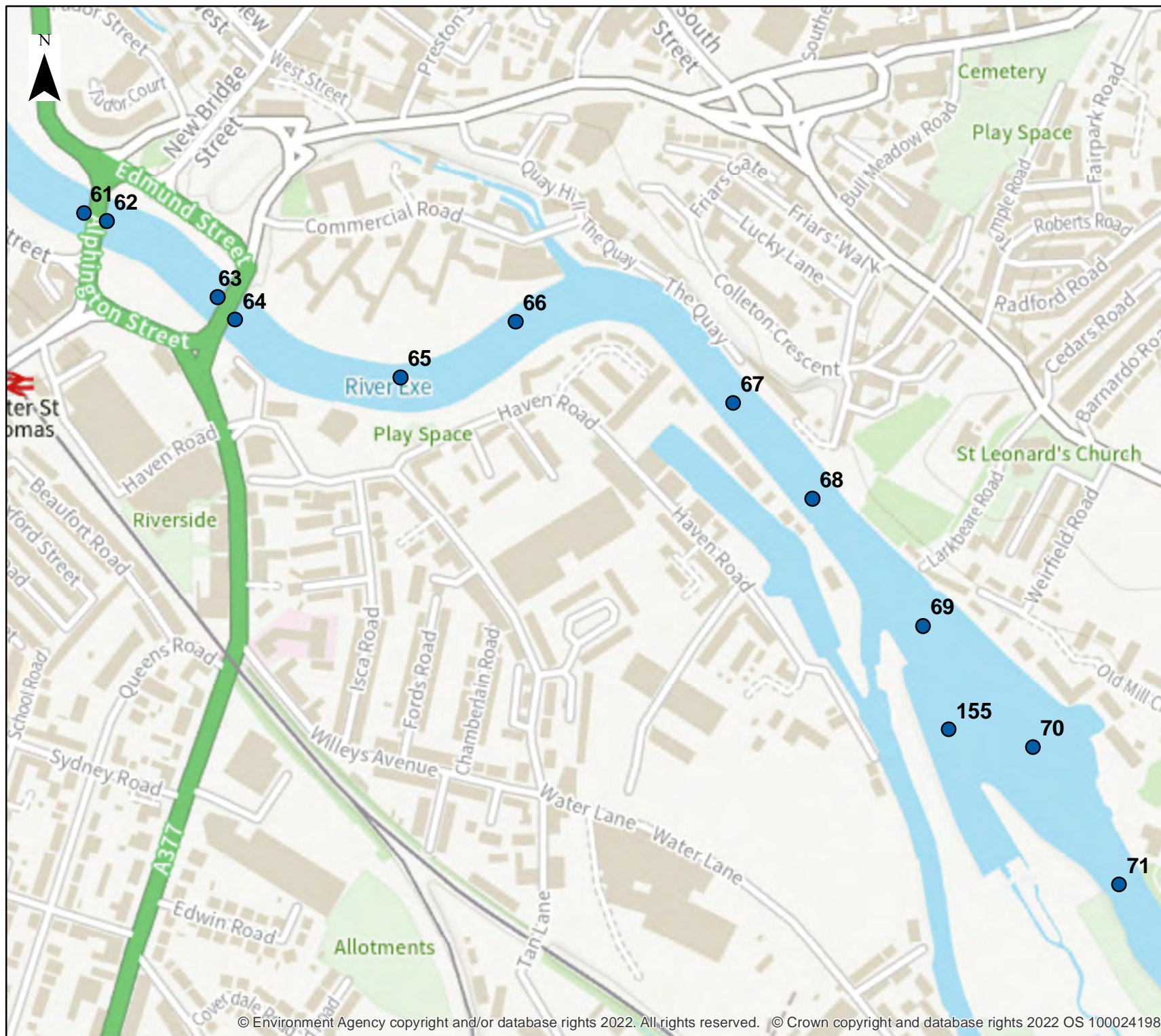
Location (easting/northing)
292003 / 91840

Scale Created
1:5,000 27 Jan 2022

Model name
Exeter 2011

Legend

 Fluvial_Nodes_2011



Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Devon Cornwall and the Isles of Scilly team at DCISEnquiries@environment-agency.gov.uk for:

- more information about getting a [product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

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

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

<https://www.gov.uk/flood-risk-assessment-standing-advice>
<http://planningguidance.planningportal.gov.uk/>

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.



Devon Cornwall and Isles of Scilly Area

Preliminary Opinion Advice Note

January 2019

This document sets out the environmental issues we will consider when providing our planning application consultation advice to Local Planning Authorities. It can be used by applicants, developers and consultants at the pre-planning stage.

Further pre-application options

We are able to provide detailed and bespoke advice and answer technical questions for a charged fee which equates to £100 per hour plus VAT.

If you are interested in finding out more about this service, please email:

SPDC@environment-agency.gov.uk

We can explain this service and provide you with a bespoke quote for further pre-application advice that you may require.

Fluvial/Tidal Flood Risk

Development must be safe and should not increase the risk of flooding.

You can view a site's flood zone on the Flood Map for Planning on the .gov.uk website

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

If your proposed development is located within flood zone 2 or 3 you should consult the Flood Risk and Coastal Change pages of the National Planning Policy Guidance (NPPG)

<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

Here you can determine whether the flood risk vulnerability of your proposed development and the flood zone are compatible. You can also establish if there are flood risk sequential test and exception test requirements for your proposed development.

If your proposed development is located within flood zone 2 or 3 and its vulnerability and flood zone are considered acceptable under the NPPG then a site specific Flood Risk Assessment (FRA) is required to support any subsequent planning application. This is required by paragraph 103 of the National Planning Policy Framework (NPPF)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Guidance on the content of a site specific FRA can be found on the NPPG and the .gov website:

<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

We are in the process of making the majority of our data open source. Flood risk data is available from .gov.uk <https://data.gov.uk/data/search?q=Flood&publisher=environment-agency&unpublished=false>

However, if you need more detailed flood risk modelling data to help you produce a FRA then please contact our Customers and Engagement team at DCISEnquiries@environment-agency.gov.uk

Climate Change Allowances

On 19 February 2016, we published new guidance for planners and developers on how to use climate change allowances in a site-specific FRA: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

If you have any questions regarding this guidance, please contact our Customers and Engagement team:

DCISEnquiries@environment-agency.gov.uk

Groundwater Quality

Development must not cause pollution to the water environment.

Source Protection Zones

These zones indicate that an area is very sensitive to pollution risks due to the proximity of drinking water sources and the way groundwater flows. In these areas we may consider it inappropriate for development to discharge foul or surface water into the ground.

To see if your proposed development is located within a Source Protection Zone, please use our online map: <http://apps.environment-agency.gov.uk/wiyby/37833.aspx>

Contaminated land

The NPPF takes a precautionary approach to land contamination. Before the principle of development can be determined, land contamination should be investigated to see whether it could preclude certain development due to environmental risk or cost of remediation.

Where contamination is known or suspected, a desk study, site investigation, remediation and other works may be required to enable safe development (paragraph 121 of the NPPF). Minimum requirements for submission with a planning application are a preliminary risk assessment, such as a site walkover or desk top study.

Site investigation and remediation strategy reports may be required for submission with a planning application for sensitive land use types or where significant contamination, or uncertainty, is found. When dealing with land affected by contamination, developers should follow the risk management framework provided in the CLR11, Model Procedures for the Management of Land Contamination:

<https://www.gov.uk/guidance/land-contamination-risk-management>

Pollution

If the proposed development use has the potential to pollute ground or surface water receptors then an assessment to establish whether the risk of pollution is acceptable or can be satisfactorily mitigated for will be required within any planning application.

Foul Drainage

When drawing up wastewater treatment proposals for any new development, the first presumption is to provide a system of foul drainage discharging into a public sewer to be treated at a public sewage treatment works (those provided and operated by the water and sewerage companies). This should be done in consultation with the sewerage company of the area prior to the submission of a formal planning application.

If connection to the public sewerage system is not feasible, a private foul drainage system may be considered. Under the Environmental Permitting Regulations 2010 any discharge of sewage or trade effluent made to either surface water or groundwater will need to be registered as an exempt discharge activity or hold a permit issued by the Environment Agency, in addition to planning permission. This applies to any discharge to inland freshwaters, coastal waters or relevant territorial waters.

Further guidance is available at:

<https://www.gov.uk/government/publications/small-sewage-discharges-in-england-general-binding-rules>.

Main Rivers

Ecology

If a Main River is located on or within 8 metres of your proposed development site an ecological survey is required to establish whether development is likely to have a detrimental impact on the biodiversity of the watercourse. We would not support development proposals if there was shown to be a likely detrimental impact on the water environment. In accordance with the National Planning Policy Framework (NPPF), any development proposal should avoid significant harm to biodiversity and seek to protect and enhance it. Opportunities to incorporate biodiversity in and around the development will be encouraged.

Your scheme should be designed with a naturalised buffer zone of at least 8 metres from the main river to protect and enhance the conservation value of the watercourse and ensure access for flood defence maintenance.

This buffer zone should be managed for the benefit of biodiversity for example by the planting of locally appropriate, UK native species. The buffer zone should be undisturbed by development with no fencing, footpaths or other structures. This buffer zone will help provide more space for flood waters, provide improved habitat for local biodiversity and allows access for any maintenance requirements.

To identify any Main Rivers in proximity to your proposed development please see our Main Rivers Consultation Map: <http://apps.environment-agency.gov.uk/wiyby/151293.aspx>

Water Framework Directive (WFD)

With any development alongside watercourses, consideration should be given to the requirements of the Water Framework Directive (WFD) <http://ec.europa.eu/environment/water/water-framework/> . This includes preventing overall deterioration in water quality and promoting improvement in the ecological status of any water body. Actions to achieve this are listed in the South West River Basin Management Plan (RBMP) <https://www.gov.uk/search?q=River+Basin+Management+Plans>.

Where appropriate, a WFD Assessment (<http://planningguidance.communities.gov.uk/blog/guidance/water-supply-wastewater-and-water-quality/water-supply-wastewater-and-water-quality-considerations-for-planning-applications/>) should assess any potential impacts on the watercourse and demonstrate that the required enhancements will be delivered. In some cases the requirements of a WFD assessment can be incorporated into an Environmental Impact Assessment (EIA). Any development that has the potential to cause deterioration in classification under WFD or that precludes the recommended actions from being delivered in the future is likely to be considered unacceptable to us.

Environmental Permitting Regulations

To see if your proposed development requires an Environmental Permit under the Environment Permitting Regulations please refer to our website:

<https://www.gov.uk/guidance/check-if-you-need-an-environmental-permit>

From 6 April 2016 an Environmental Permit is required for any proposed works or structures, in, under, over or within 8 metres of the top of the bank of a designated Main River and within 16 metres of a tidal defence.

Please note

This document is a response to a pre-application enquiry only and does not represent our final view in relation to any future planning application made in relation to any site. You should seek your own expert advice in relation to technical matters relevant to any planning application before submission.

If you have any questions please contact the Sustainable Places team:

SPDC@environment-agency.gov.uk

Appendix F4

Reservoir Flood Risk

Learn more about this area's flood risk

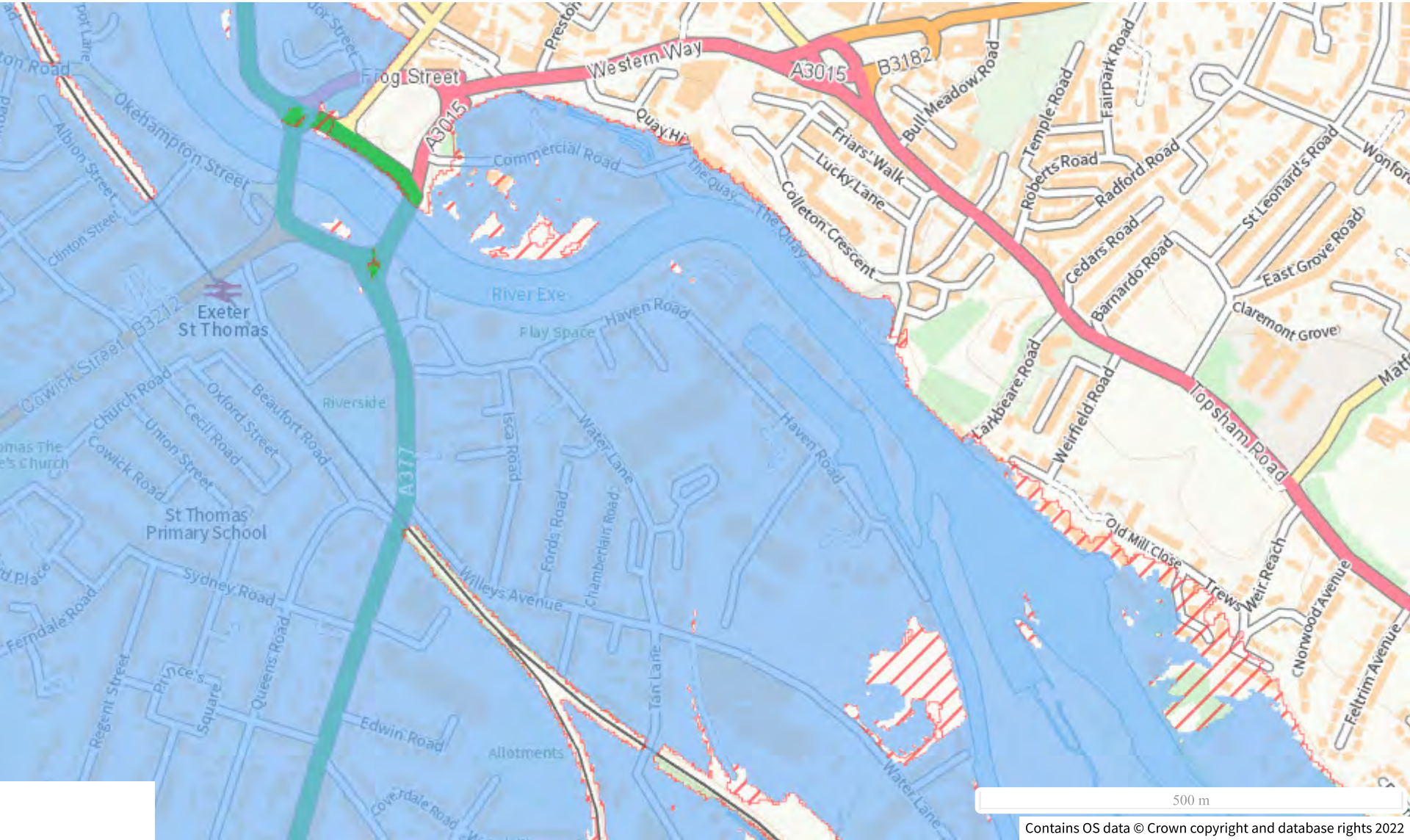
Select the type of flood risk information you're interested in. The map will then update.

Flood risk

Extent of flooding

Location

EX2 8BY



Maximum extent of flooding from reservoirs:

☐ when river levels are normal ☒ when there is also flooding from rivers ☐ Location you selected

[View the flood risk information for another location \(/postcode\)](#)

This information meets the requirements of the EU Floods Directive 2007/60/EC

Appendix G

Flood Risk & Evacuation Plan



FLOOD WARNING & EVACUATION PLAN

Haven Road, Exeter

Welbeck CP

June 2022

Project no: 61645

Document Review Sheet: -

Document
prepared by: - *Stedroy Allen EngTech TIStructE*
on behalf of Richard Jackson Ltd

Date: - 27/ 02 / 2022

Document
checked by: - *Mark Geddes*
on behalf of Richard Jackson Ltd

Date: - 27/ 02 / 2022

Document
Approved by: - *Mark Geddes*
on behalf of Richard Jackson Ltd

Date: - 27 / 02 / 2022

Document Status

DRAFT



FINAL



Revision Status

Issue	Date	Description	Prepared	Checked	Approved
01	27/06/22	Pre-planning	SJA	MG	MG

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Title: FLOOD WARNING & EVACUATION PLAN
Project: Haven Road, Exeter
Client: Welbeck CP
Project No.: 61645

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Appendix

- Appendix A: Environment Agency Flood Data
- Appendix B: Emergency Flood Evacuation Route Plan
- Appendix C: Personal Flood Plan Proforma
- Appendix D: Service Cut Off Locations TBC

1. INTRODUCTION

Important Information

- 1.1. This Flood Warning and Evacuation Plan (FWEP) has been prepared for the use of the management, staff and residents at Haven Road, Exeter. This site is shown by the Environment Agency flood mapping as located in flood zone 3 (FZ3).
- 1.2. If residents are referring to this plan after receiving a Flood Warning from the Environment Agency, turn directly to sections 3 to 6 where advice is given on what actions to take. ***If in doubt, unless you are instructed to evacuate the site by the emergency services, be prepared to evacuate if the situation worsens. If a Severe Flood Warning has been issued by the Environment Agency, reference 6.0 below, then act immediately, you do not have to wait for advice or instruction to do so from the emergency services.***
- 1.3. If the residents are referring to this plan because flooding has occurred without warning at or near to the site, contact Devon County Council for an update on the situation for advice on what action to take and await further information from the emergency services via local radio. ***Do not walk through flood water, unless instructed by the emergency services. Even shallow water can be dangerous!***

Background

- 1.4. This FWEP is a live document and will require annual review to ensure that the contact details are relevant and up to date. The plan may need to be updated following changes to the proposed evacuation routes, Local Authority emergency plans or other matters beyond the control of the residents. A full copy or summary of this document should be kept in a safe place in a location known to the staff and residents.
- 1.5. The purpose of this plan is to provide guidance on the emergency response and procedures which residents should undertake after Environment Agency Flood Warnings have been issued. During a flood event the advice of emergency services on the ground should always take precedence over the

advice contained within this document. However, if a Severe Flood Warning has been issued, reference 6.0 below then you should act immediately following the advice given below.

- 1.6. At times of widespread flooding local services may have difficulty providing for large number of evacuees. If possible, the residents should make arrangements for themselves and any visitors.

2. ACCESS AND EGRESS

- 2.1. The EA mapping shows that the site is in flood zone 3 for fluvial / tidal risk, this is in Appendix A. If the EA's modelled water levels are used to assess risk at this site, then the potential water depths within the site are as shown in Table 1 using typical site level of 7.55m AOD:

Event	1:20 (5%)	1:75 (1.33%)	1:100 (1%)	1:1000 (0.1%)	1:100 + CC
Level (m AOD)	7.59	8.07	8.07	8.61	8.02
Depth (m)	0.04	0.52	0.52	1.06	0.47

Table 1 – Water levels of node 66 during a defended scenario using a site level of 7.55m AOD

- 2.2. Undefended data has only been provided for the 1 in 100 and 1 in 1000-year events:

Event	1:100 (1%)	1:1000 (0.1%)
Level (m AOD)	7.79	8.32
Depth (m)	0.24	0.77

Table 2 – Water levels of node 66 during a breach scenario using a site level of 7.55m AOD

- 2.3. The data shows that in the event of a defence failure, flood depths at the site will reduce, this is likely due to a large dissipation of flood water away from the site.
- 2.4. The enhanced defences in this area have a crest level of between 9.00m AOD 9.46m AOD.
- 2.5. Currently this site sit in flood zone 3 with the benefit of the forecasted enhanced defences which area expected to be modelled with output data

circa September 2022. It is envisaged that the new model will provide a reduced flood risk hazard due to the new/enhanced defence scheme with medium to low residual risk.

Evacuation with Flood Warning

- 2.6. The level of risk of flooding, identified by flood warning codes, reference 5 and 6 below, will be issued by the Environment Agency.
- 2.7. Early evacuation of residents by independent means before flooding becomes an issue, is the responsibility of the residents. With sufficient warning it is feasible that residents would be able to safely leave the site before flooding becomes an issue.

Evacuation for Limited or No Flood Warning

- 2.8. If the local defence system is breached or overtopped, then there may be little time to react for the residents. If it is safe to do so, leave the site and head for high ground to the northwest via the footbridge north of the River Exe and continue north towards Cathedral Quay Car Park. See map in Appendix B.

3. ENVIRONMENT AGENCY FLOODLINE WARNINGS DIRECT SERVICE

- 3.1. The Environment Agency's Flood Warning Direct Service provides real-time Flood Warning information throughout England and Wales. The service covers designated Flood Warning Areas.
- 3.2. When there is a risk of flooding the Environment Agency also issues warnings through the media. The warnings are broadcasted on TV weather bulletins and on radio weather and travel reports.
- 3.3. The site is in the following Flood Warning and Flood Alert areas:
- 3.4. Flood Warning Area: The River Exe at Exeter

Residents and staff can sign up for alerts here:

[HTTPS://WWW.GOV.UK/SIGN-UP-FOR-FLOOD-WARNINGS](https://www.gov.uk/sign-up-for-flood-warnings)

- 3.5. Flood procedures following Flood Warning Codes are provided in sections 4 to 7 below, further information can be found in Appendix E.

4. FLOOD ALERT



What it means:

- Flooding is possible
- Be prepared

When it's used:

- Two hours to two days in advance of flooding

5. FLOOD WARNING



What it means:

- Flooding is expected
- Immediate action required

When it's used:

- Half an hour to one day in advance of flooding

6. SEVERE FLOOD WARNING



What it means:

- Severe flooding
- Danger to life

When it's used:

- When flooding poses a significant risk to life or a significant disruption to communities

If you receive a severe flood warning and overtopping and/or a breach of the defences is forecasted, residents should take the following actions:

- Evacuate and take your flood kit. **Do not wait for the flood water to arrive!** Follow the local advice at the time.

Close down procedures:

- Inspect non-return valves on drainage systems.
- Shut off the gas/electric/water supplies, see services plan in Appendix D.
- Ensure any hazardous materials like bleach etc. are safe and secure and do not create any additional risks by encountering flood waters. Large quantities of hazardous materials should be taken out of the flood zone and stored in a safe place, prior to the flood. Valuable computers and laptops and important documents should be taken to upper floors.
- Tie or anchor down equipment that could potentially float and cause an additional hazard (e.g., containers used for storage).
- While closing down the premises tune in to a local radio station and listen to local news and weather forecasts.
- If sufficient time is available notify potential visitors that it is not safe to come to the site.
- Check that all residents have safely left and do not remain on the site.

- 6.1. A Severe Flood Warning code is not necessarily preceded by a Flood Warning code.

- 6.2. If a severe flood warning is issued the Environment Agency considers it likely that there will be widespread severe flooding in the area which will cause a major disruption to infrastructure in and around the area.
- 6.3. The advice given by the Emergency Services on the ground should always take precedence over this Flood Warning & Evacuation Plan. However, residents do not have to wait for instructions or advice before evacuating, ***if a Severe Flood Warning has been issued, that could over top the defences then Evacuate immediately.***
- 6.4. At this stage the local authority, the emergency services and the Environment Agency will be managing the situation, with widespread flooding potentially occurring over a large area, they will endeavour to provide advice on an evacuation route, shelter and assistance to evacuees. The local authority has a legal obligation to aid evacuees under Homelessness Act 2002. This would normally be provided in rest centres (school, halls etc.).

7. ACTIONS AFTER WARNINGS ARE NO LONGER IN FORCE

- 7.1. Residents who have sought safe refuge (after an un-warned event) should wait there until the emergency services or statutory bodies have advised that it is safe to leave.
- 7.2. For residents who have been evacuated, it may now be safe to return to the site. Local emergency service advice should be followed as it may still not be safe to return after flood waters have started to recede.
- 7.3. The local authority will continue to provide rest centres or other suitable emergency accommodation for those who are unable to return to their homes (or those who do not have suitable insurance provision) and will assist for as long as necessary.
- 7.4. The Emergency Services should be consulted before re-occupying the site to ensure that it is safe to do so. If there are any doubts, professional opinion should be sought. Check with your insurance company before re-occupying the premises.

- 7.5. Before switching the electrical power, gas and water services back on these MUST be checked by accredited engineers from the utility companies. Contact the relevant insurance company as soon as possible to get their approval and advice before arranging any clean-up or repairs, or for the disposal of damaged property.
- 7.6. An accurate record of damaged property should be kept, including photographs for insurance purposes and any other details required by your insurance policy or advisor.

8. REVIEW AND AWARENESS

- 8.1. It is recommended that residents take responsibility for updating this plan annually (say at the beginning of autumn), so that it continues to provide relevant advice over the long term. The following actions are advised:
- Check the contacts list and update contact names and telephone numbers if necessary.
 - Contact the Environment Agency Floodline Service on 0345 988 1188 to check that the flood risk to the property has not changed.
 - ensure that non-return valves are serviced annually or as recommended in the manufacturer's guidelines.
 - The Environment Agency should be kept informed of the outcome of the annual review and any changes that are made.
- 8.2. General public health advice and information following a flooding event can be found on the Health Protection Agency website: -

<http://www.hpa.org.uk/Topics/EmergencyResponse/ExtremeWeatherEventsAndNaturalDisasters/EffectsOfFlooding/>

In particular, the website provides the following health advice.

- General information following floods.
- How to clean up safely following floods.
- Coping without mains water

9. RESPONSIBILITIES

- 9.1. The response to a major flood event will involve several organisations working together at a local level including the emergency services, the local authority, utilities companies and the Environment Agency. Other bodies that may lay a major role in the response are communications media, voluntary organisations and the public.
- 9.2. The role and responsibilities of the main bodies in Devon are summarised below.
- 9.3. The Environment Agency will be responsible for:
- Issuing flood warning messages to Devon Police, Devon County Fire and Rescue Service and the general public.
 - Notifying Devon Police, Devon Fire and Rescue Service and Devon County Council of the failure of the defence.
 - Maintaining the Environment Agency's own Operational Flood Plans.
- 9.4. The Devon Police will be responsible for:
- Protection of life and property, provision of public warnings if called upon by the Environment Agency.
 - Co-ordination and initial control of all activities within the flooded area, including evacuation where necessary.
 - Control of traffic and ensuring all strategic routes are kept available for essential vehicles.
 - Maintaining the security of flooded areas.
 - Notifying other emergency services.
 - Activation of the Strategic Co-ordination Centre
- 9.5. The Devon County Fire and Rescue Service will respond to flood emergencies in order to:
- Save life and rescue people that are trapped by flood water
 - Carrying out pumping of water as part of the essential damage control
 - Assist other agencies to minimise the effect of major flooding on the community

9.6. Utility Companies roles are:

- In the event of a flood, they will attempt to secure their services and equipment to ensure continuation of supply.
- Repair services disrupted by flood.
- Provide alternative means of supply during service disruption if life and health risks are identified.

10. PERSONAL FLOOD PLAN PROFORMA

10.1. Appendix C provides a form to be used for important contacts and key information to hand in the event of an emergency. This form should be kept with the FWEP.

10.2. **Contact for Devon County Council:**

Office Hours: Tel 0345 155 1015

Information on flooding can be found at the Devon Resilience forum website.

<https://www.devon.gov.uk/floodriskmanagement/flood-resilience/>

11. EMERGENCY SERVICES

11.1. If there is a danger to life always **dial 999** and ask for the appropriate emergency service.

Service	Telephone Number (non-emergency)
Devon County Fire and Rescue Service	101
Devon Police	101
Southwestern Ambulance Service NHS Trust	01392 261500

12. PREPARE A FLOOD KIT

12.1. Essential items in a flood kit should be available to Management.

- Copies of your building insurance documents.
- List of prescription medication if required.
- A torch with spare batteries.

- A wind-up or battery radio.
- Warm, waterproof clothing and blankets.
- A first aid kit and prescription medication.
- Bottled water and non-perishable foods.
- Baby food and baby care items if required.
- Pet food if required
- Wellington boots.
- A copy of this plan.
- A watertight box in which to store the above.
- Cash and credit cards.
- Spare building keys.

13. FURTHER INFORMATION

Environment Agency Website

www.environment-agency.gov.uk

BBC DEVON

<https://www.bbc.co.uk/news/england/Devon>

Local Radio stations in Devon can be found on the following frequencies:

BBC RADIO Devon – 95.7FM

Heart FM Exeter – 96.2FM

Local television stations are:

ITV – Westcountry

BBC – Spotlight

Appendix A

Environment Agency Flood Data

Our ref: ENQ22/DCIS/247725

Your ref:

Date: 27th January 2022

Dear James,

Enquiry regarding **Product 4, 5 & 6**

Thank you for your enquiry which was received on 17th January 2022.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

Abstract

Name	Product 4
Description	Detailed Flood Risk Assessment Map for Exeter
Licence	Open Government Licence
Information Warnings	
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Name	Product 5
Description	<i>Exeter Model Report 2011</i>
Licence	Environment Agency Conditional Licence
Conditions	<ol style="list-style-type: none">1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you.2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice.

	<p>3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights.</p> <p>4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.</p> <p>4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.</p> <p>5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km². Information about the operation of flood assets should not be published..</p> <p>6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”.</p> <p>6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.</p>
Information Warnings	
Attribution	<p>Contains Environment Agency information © Environment Agency and/or database rights.</p> <p>May contain Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.</p>

Name	Product 6
Description	Model Output Data <i>for Exeter 2011</i>
Licence	Environment Agency Conditional Licence
Conditions	<ol style="list-style-type: none"> 1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. <p>4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.</p> <p>4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.</p> <p>5. The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km². Information about the operation of flood assets should not be published.</p> <p>6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”.</p> <p>6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its</p>

	internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#), ,)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Hannah
Hannah Dolley
Flood and Coastal Risk Management Officer
Partnerships and Strategic Overview
Devon, Cornwall & Isles of Scilly

 DCISEnquiries@environment-agency.gov.uk

Flood risk assessment data

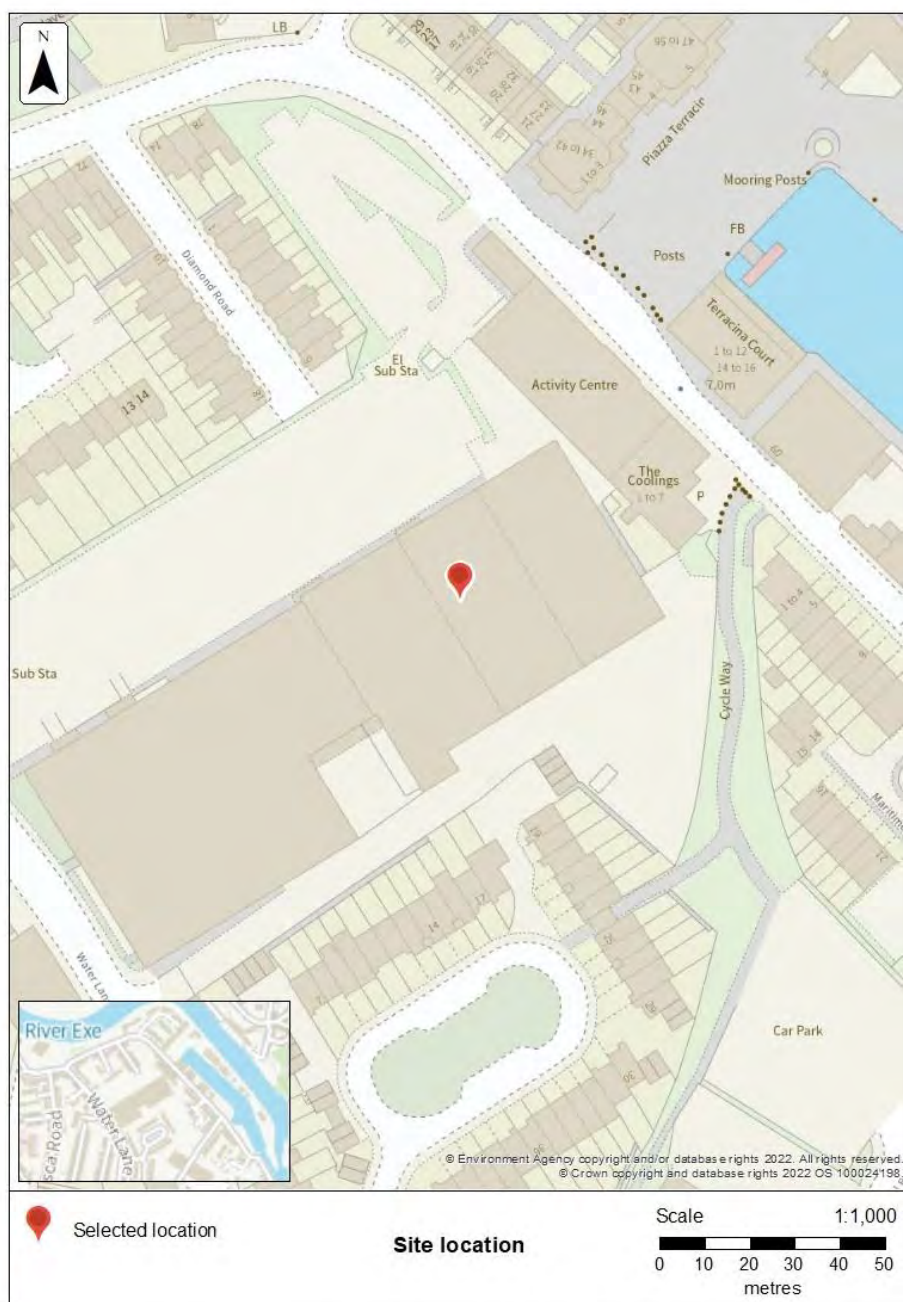
Location of site: 292003 / 91840 (shown as easting and northing coordinates)

Document created on: 27 January 2022

This information was previously known as a product 4.

Customer reference number: ENQ22/DCIS/247725

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to produce your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- flood defences and attributes
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits help and advice

You will need to consider the [latest flood risk assessment climate change allowances](#) and factor in the new allowances to demonstrate the development will be safe from flooding.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Exeter 2D Mapping & Modelling
Scenario(s): Defended fluvial
Date: 2011

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occurring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your development is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

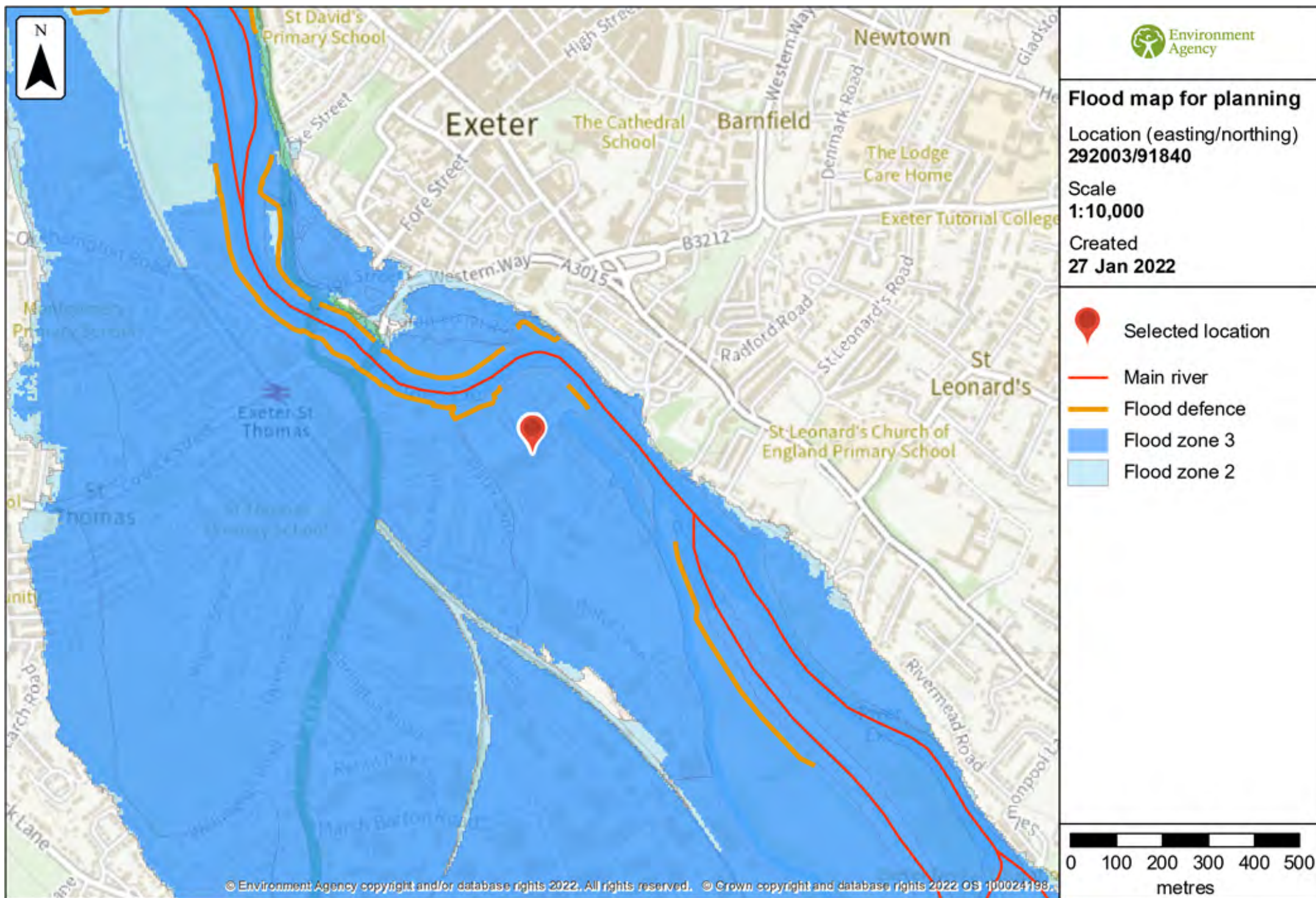
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.



Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources

You can also contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

[Download recorded flood outlines in GIS format](#)

Historic flood event data

Historic outlines in the above may not be visible where they overlap. You can download the outlines separately via the link above.

Start date	End date	Source of flood	Affects location
December 1993	December 1993	main river	No
December 1979	December 1979	main river	No
26 January 1971	26 January 1971	main river	No
4 December 1960	4 December 1960	main river	No
October 1960	October 1960	main river	No
30 September 1960	1 October 1960	main river	No
21 November 1950	21 November 1950	main river	No

Please see attached/photographs were available.

Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences and their condition. It shows the height above sea level of the top of the flood defence (crest level). The height is in mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis.

The information here is based on the best available data.






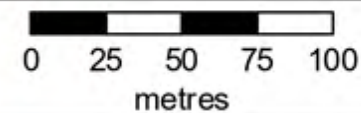
Flood defences

Location (easting/northing)
292003/91840

Scale
1:2,500

Created
27 Jan 2022

-  Selected location
-  Main river
-  Flood defence



Flood defences data

Label	Asset ID	Asset Type	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	56345	wall	Good	8.78	8.95	
2	535165	wall	Very good	9	9.15	
3	40348	wall	Fair	8.46	8.79	
4	535175	flood gate	Very good	9.46	9.46	
5	4025	bridge abutment	Fair	9.06	8.99	
6	4024	embankment	Fair	8.46	9.04	
7	535254	flood gate	Very good	8.10	8.10	
8	535234	wall		7.85	8.40	

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

outline maps showing the area at risk from flooding in different modelled scenarios

modelled node point map showing the points used to get the data to model the scenarios

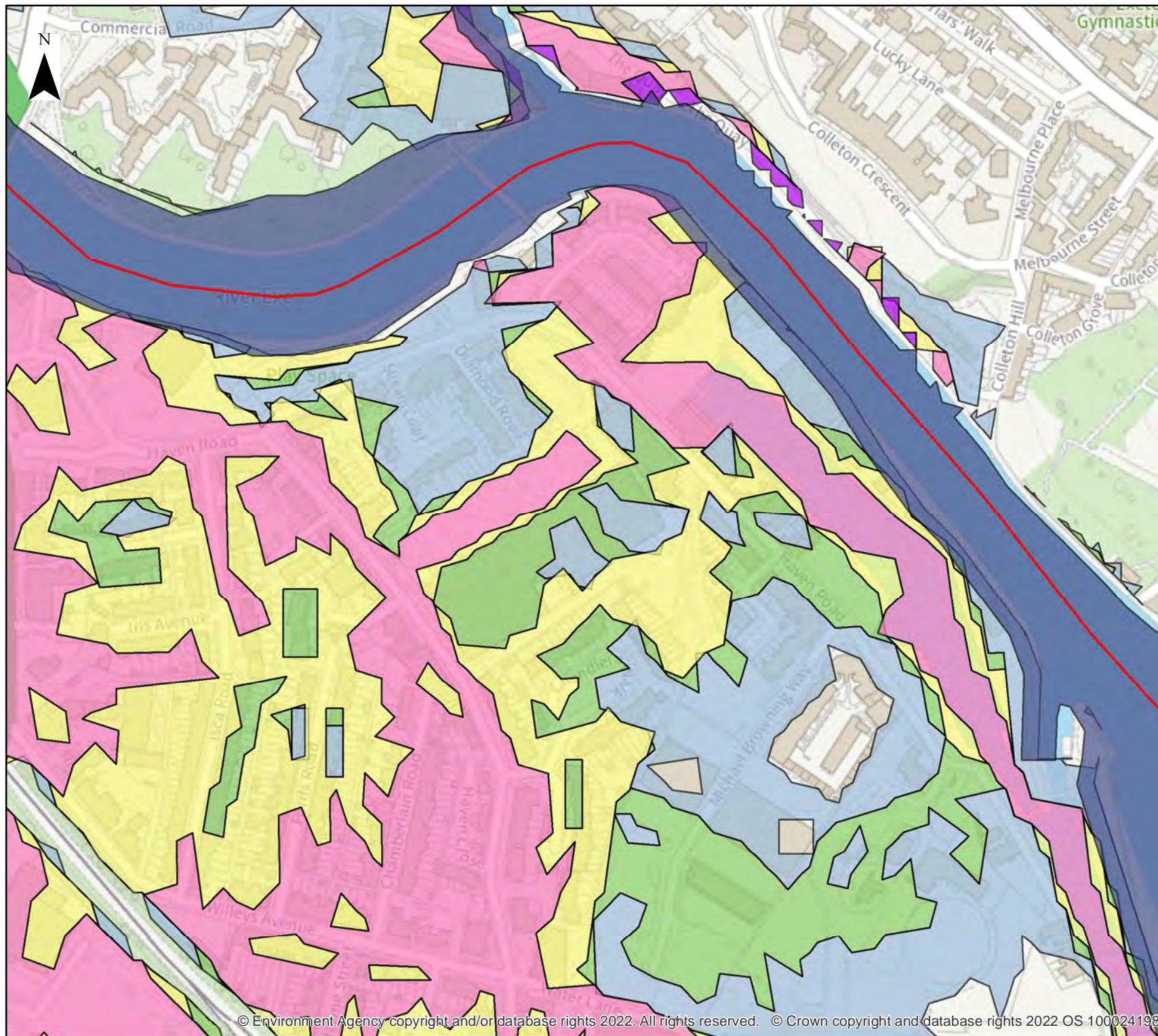
node point tables providing details of the flood risk for different return periods

Modelled scenario maps

Maps for the following scenarios are included:

- Defended modelled fluvial

Please see our up to date guidance on climate change allowance which is available on the GOV.uk website [here](#)



Defended Modelled Fluvial Extent Map

Location (easting/northing)
292003 / 91840

Scale Created
1:3,000 27 Jan 2022

Model name
Exeter 2011

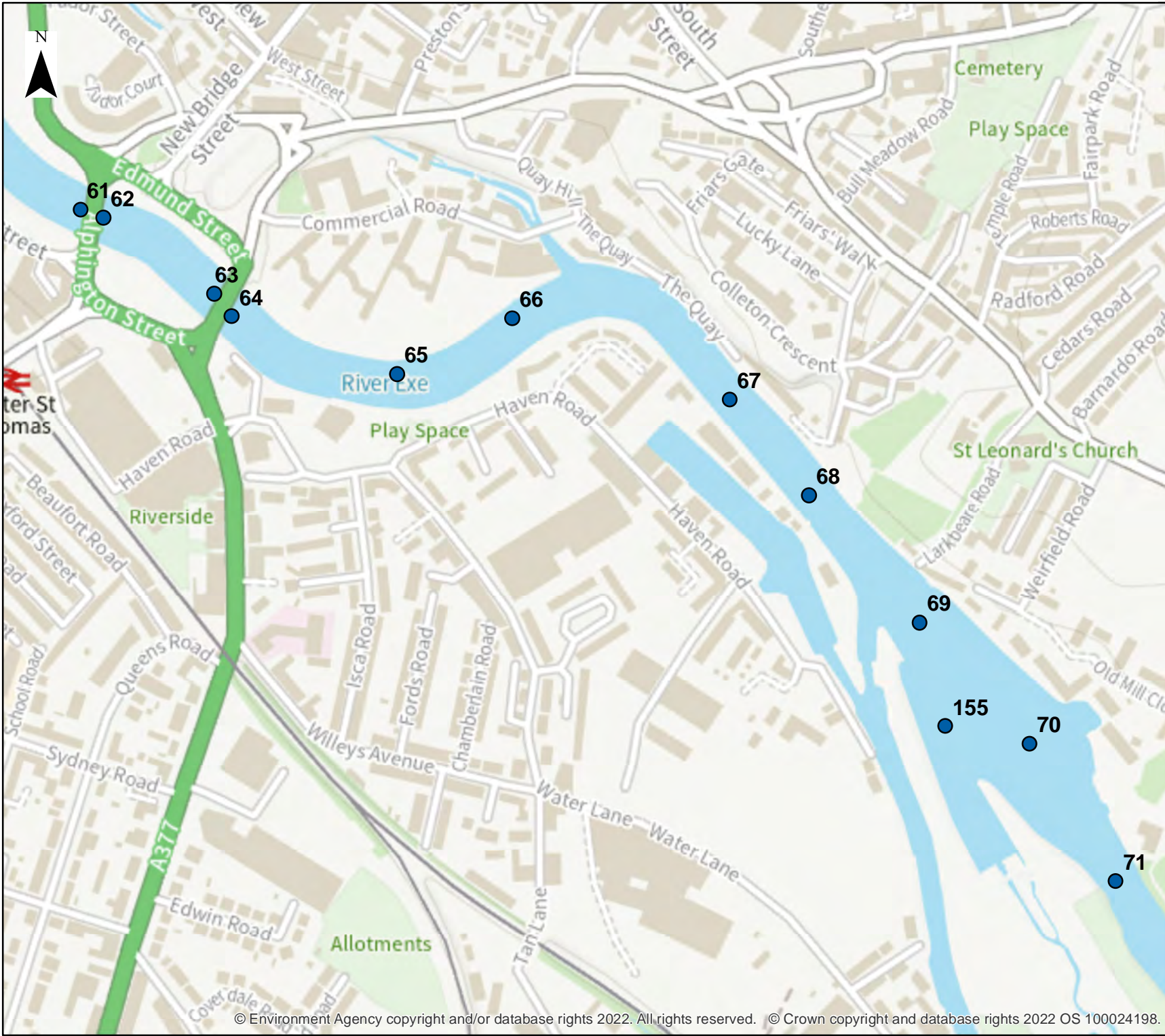
Legend

- Main River
- 10% AEP Flood
- 5% AEP Flood
- 2% AEP Flood
- 1.33% AEP Flood
- 1% AEP Flood
- 0.1% AEP Flood

Modelled node locations data

Node Reference	X	Y	Modelled Flood Flows, in m ³ /s (defended model run)											Modelled Flood Flows, in m ³ /s (undefended model run)	
			50% AEP	10% AEP	5% AEP	2% AEP	1.33% AEP	1% AEP	0.1% AEP	1% AEP plus CC to 2070	0.1% AEP plus CC to 2070	1% AEP plus CC to 2115	0.1% AEP plus CC to 2115	1% AEP	0.1% AEP
61	291512	92141	310.16	529.94	629.67	747.44	817.75	820.64	906.34	784.52	856.51	784.60	854.99	726.34	828.38
62	291534	92133	310.16	529.94	629.67	747.44	817.75	820.64	906.34	784.52	856.51	784.60	854.99	726.34	828.38
63	291642	92059	310.17	529.95	629.70	747.42	817.74	820.82	928.51	784.44	882.13	784.52	881.30	726.31	842.44
64	291659	92037	310.17	529.95	629.70	747.42	817.74	820.82	928.51	784.44	882.13	784.52	881.30	726.31	842.44
65	291820	91981	310.16	529.95	629.39	740.22	803.77	806.34	962.00	782.83	927.89	782.81	927.97	722.14	859.01
66	291932	92035	310.16	529.95	629.44	740.20	803.82	806.30	958.40	782.86	928.80	782.82	929.27	722.11	868.35
67	292144	91956	310.20	529.98	629.49	739.32	798.25	800.54	901.39	779.97	884.15	780.01	883.60	722.21	859.49
68	292221	91863	310.19	529.98	629.50	739.34	798.90	801.30	931.26	780.31	911.24	780.30	911.62	722.20	862.10
69	292329	91739	310.19	529.98	629.48	739.32	798.90	801.36	998.88	780.33	969.89	780.27	970.53	722.19	876.61
70	292436	91621	206.64	291.06	327.30	366.44	387.38	388.23	526.68	380.87	509.33	380.85	510.13	420.73	465.60
71	292520	91487	206.62	291.04	327.27	366.39	387.26	388.16	526.17	380.69	509.29	380.75	509.75	420.51	463.49
155	292354	91638	103.55	238.92	302.18	372.88	411.53	413.12	476.11	399.46	463.82	399.42	463.33	301.54	412.08
Node Reference	X	Y	Modelled Flood Levels, in mAOD (defended model run)											Modelled Flood Levels, in mAOD (undefended model run)	
			50% AEP	10% AEP	5% AEP	2% AEP	1.33% AEP	1% AEP	0.1% AEP	1% AEP plus CC to 2070	0.1% AEP plus CC to 2070	1% AEP plus CC to 2115	0.1% AEP plus CC to 2115	1% AEP	0.1% AEP
61	291512	92141	7.12	8.19	8.69	9.27	9.59	9.78	10.77	9.86	10.68	9.86	10.69	9.48	10.28
62	291534	92133	7.07	7.99	8.41	8.88	9.12	9.13	10.06	9.21	9.98	9.21	9.99	8.91	9.64
63	291642	92059	7.03	7.93	8.35	8.81	9.06	9.07	9.97	9.15	9.89	9.15	9.89	8.86	9.57
64	291659	92037	6.95	7.73	8.07	8.42	8.60	8.61	9.25	8.57	9.21	8.57	9.22	8.33	8.96
65	291820	91981	6.80	7.46	7.78	8.13	8.31	8.32	8.91	8.25	8.86	8.25	8.86	8.02	8.64
66	291932	92035	6.72	7.31	7.59	7.90	8.07	8.07	8.61	8.02	8.56	8.02	8.56	7.79	8.32
67	292144	91956	6.55	6.91	7.07	7.25	7.36	7.36	8.14	7.32	8.05	7.32	8.05	7.14	7.59
68	292221	91863	6.49	6.75	6.84	6.91	6.94	6.94	7.51	6.93	7.43	6.93	7.44	6.91	7.23
69	292329	91739	6.51	6.81	6.93	7.06	7.13	7.13	7.53	7.10	7.48	7.10	7.49	6.93	7.16
70	292436	91621	4.92	5.55	5.85	6.11	6.26	6.30	7.08	6.30	7.02	6.30	7.02	6.17	6.69
71	292520	91487	4.77	5.37	5.67	5.92	6.07	6.12	6.88	6.12	6.83	6.12	6.83	5.92	6.48
155	292354	91638	5.13	5.96	6.24	6.51	6.67	6.71	7.40	6.71	7.34	6.71	7.35	6.31	6.94

Data in this table comes from the Exeter 2D Mapping & Modelling model.



Defended Modelled Fluvial Node Map 1D

Location (easting/northing)
292003 / 91840

Scale Created
1:5,000 27 Jan 2022

Model name
Exeter 2011

Legend

● Fluvial_Nodes_2011

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

[Find out more about flood risk activity permits](#)

Help and advice

Contact the Devon Cornwall and the Isles of Scilly team at DCISEnquiries@environment-agency.gov.uk for:

- more information about getting a [product 5, 6, 7 or 8](#)
- general help and advice about the site you're requesting data for

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

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

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

<https://www.gov.uk/flood-risk-assessment-standing-advice>
<http://planningguidance.planningportal.gov.uk/>

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.



Devon Cornwall and Isles of Scilly Area

Preliminary Opinion Advice Note

January 2019

This document sets out the environmental issues we will consider when providing our planning application consultation advice to Local Planning Authorities. It can be used by applicants, developers and consultants at the pre-planning stage.

Further pre-application options

We are able to provide detailed and bespoke advice and answer technical questions for a charged fee which equates to £100 per hour plus VAT.

If you are interested in finding out more about this service, please email:

SPDC@environment-agency.gov.uk

We can explain this service and provide you with a bespoke quote for further pre-application advice that you may require.

Fluvial/Tidal Flood Risk

Development must be safe and should not increase the risk of flooding.

You can view a site's flood zone on the Flood Map for Planning on the .gov.uk website

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

If your proposed development is located within flood zone 2 or 3 you should consult the Flood Risk and Coastal Change pages of the National Planning Policy Guidance (NPPG)

<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

Here you can determine whether the flood risk vulnerability of your proposed development and the flood zone are compatible. You can also establish if there are flood risk sequential test and exception test requirements for your proposed development.

If your proposed development is located within flood zone 2 or 3 and its vulnerability and flood zone are considered acceptable under the NPPG then a site specific Flood Risk Assessment (FRA) is required to support any subsequent planning application. This is required by paragraph 103 of the National Planning Policy Framework (NPPF)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Guidance on the content of a site specific FRA can be found on the NPPG and the .gov website:

<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

We are in the process of making the majority of our data open source. Flood risk data is available from .gov.uk <https://data.gov.uk/data/search?q=Flood&publisher=environment-agency&unpublished=false>

However, if you need more detailed flood risk modelling data to help you produce a FRA then please contact our Customers and Engagement team at DCISEnquiries@environment-agency.gov.uk

Climate Change Allowances

On 19 February 2016, we published new guidance for planners and developers on how to use climate change allowances in a site-specific FRA: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

If you have any questions regarding this guidance, please contact our Customers and Engagement team:

DCISEnquiries@environment-agency.gov.uk

Groundwater Quality

Development must not cause pollution to the water environment.

Source Protection Zones

These zones indicate that an area is very sensitive to pollution risks due to the proximity of drinking water sources and the way groundwater flows. In these areas we may consider it inappropriate for development to discharge foul or surface water into the ground.

To see if your proposed development is located within a Source Protection Zone, please use our online map: <http://apps.environment-agency.gov.uk/wiyby/37833.aspx>

Contaminated land

The NPPF takes a precautionary approach to land contamination. Before the principle of development can be determined, land contamination should be investigated to see whether it could preclude certain development due to environmental risk or cost of remediation.

Where contamination is known or suspected, a desk study, site investigation, remediation and other works may be required to enable safe development (paragraph 121 of the NPPF). Minimum requirements for submission with a planning application are a preliminary risk assessment, such as a site walkover or desk top study.

Site investigation and remediation strategy reports may be required for submission with a planning application for sensitive land use types or where significant contamination, or uncertainty, is found. When dealing with land affected by contamination, developers should follow the risk management framework provided in the CLR11, Model Procedures for the Management of Land Contamination:

<https://www.gov.uk/guidance/land-contamination-risk-management>

Pollution

If the proposed development use has the potential to pollute ground or surface water receptors then an assessment to establish whether the risk of pollution is acceptable or can be satisfactorily mitigated for will be required within any planning application.

Foul Drainage

When drawing up wastewater treatment proposals for any new development, the first presumption is to provide a system of foul drainage discharging into a public sewer to be treated at a public sewage treatment works (those provided and operated by the water and sewerage companies). This should be done in consultation with the sewerage company of the area prior to the submission of a formal planning application.

If connection to the public sewerage system is not feasible, a private foul drainage system may be considered. Under the Environmental Permitting Regulations 2010 any discharge of sewage or trade effluent made to either surface water or groundwater will need to be registered as an exempt discharge activity or hold a permit issued by the Environment Agency, in addition to planning permission. This applies to any discharge to inland freshwaters, coastal waters or relevant territorial waters.

Further guidance is available at:

<https://www.gov.uk/government/publications/small-sewage-discharges-in-england-general-binding-rules>.

Main Rivers

Ecology

If a Main River is located on or within 8 metres of your proposed development site an ecological survey is required to establish whether development is likely to have a detrimental impact on the biodiversity of the watercourse. We would not support development proposals if there was shown to be a likely detrimental impact on the water environment. In accordance with the National Planning Policy Framework (NPPF), any development proposal should avoid significant harm to biodiversity and seek to protect and enhance it. Opportunities to incorporate biodiversity in and around the development will be encouraged.

Your scheme should be designed with a naturalised buffer zone of at least 8 metres from the main river to protect and enhance the conservation value of the watercourse and ensure access for flood defence maintenance.

This buffer zone should be managed for the benefit of biodiversity for example by the planting of locally appropriate, UK native species. The buffer zone should be undisturbed by development with no fencing, footpaths or other structures. This buffer zone will help provide more space for flood waters, provide improved habitat for local biodiversity and allows access for any maintenance requirements.

To identify any Main Rivers in proximity to your proposed development please see our Main Rivers Consultation Map: <http://apps.environment-agency.gov.uk/wiyby/151293.aspx>

Water Framework Directive (WFD)

With any development alongside watercourses, consideration should be given to the requirements of the Water Framework Directive (WFD) <http://ec.europa.eu/environment/water/water-framework/>. This includes preventing overall deterioration in water quality and promoting improvement in the ecological status of any water body. Actions to achieve this are listed in the South West River Basin Management Plan (RBMP) <https://www.gov.uk/search?q=River+Basin+Management+Plans>.

Where appropriate, a WFD Assessment (<http://planningguidance.communities.gov.uk/blog/guidance/water-supply-wastewater-and-water-quality/water-supply-wastewater-and-water-quality-considerations-for-planning-applications/>) should assess any potential impacts on the watercourse and demonstrate that the required enhancements will be delivered. In some cases the requirements of a WFD assessment can be incorporated into an Environmental Impact Assessment (EIA). Any development that has the potential to cause deterioration in classification under WFD or that precludes the recommended actions from being delivered in the future is likely to be considered unacceptable to us.

Environmental Permitting Regulations

To see if your proposed development requires an Environmental Permit under the Environment Permitting Regulations please refer to our website:

<https://www.gov.uk/guidance/check-if-you-need-an-environmental-permit>

From 6 April 2016 an Environmental Permit is required for any proposed works or structures, in, under, over or within 8 metres of the top of the bank of a designated Main River and within 16 metres of a tidal defence.

Please note

This document is a response to a pre-application enquiry only and does not represent our final view in relation to any future planning application made in relation to any site. You should seek your own expert advice in relation to technical matters relevant to any planning application before submission.

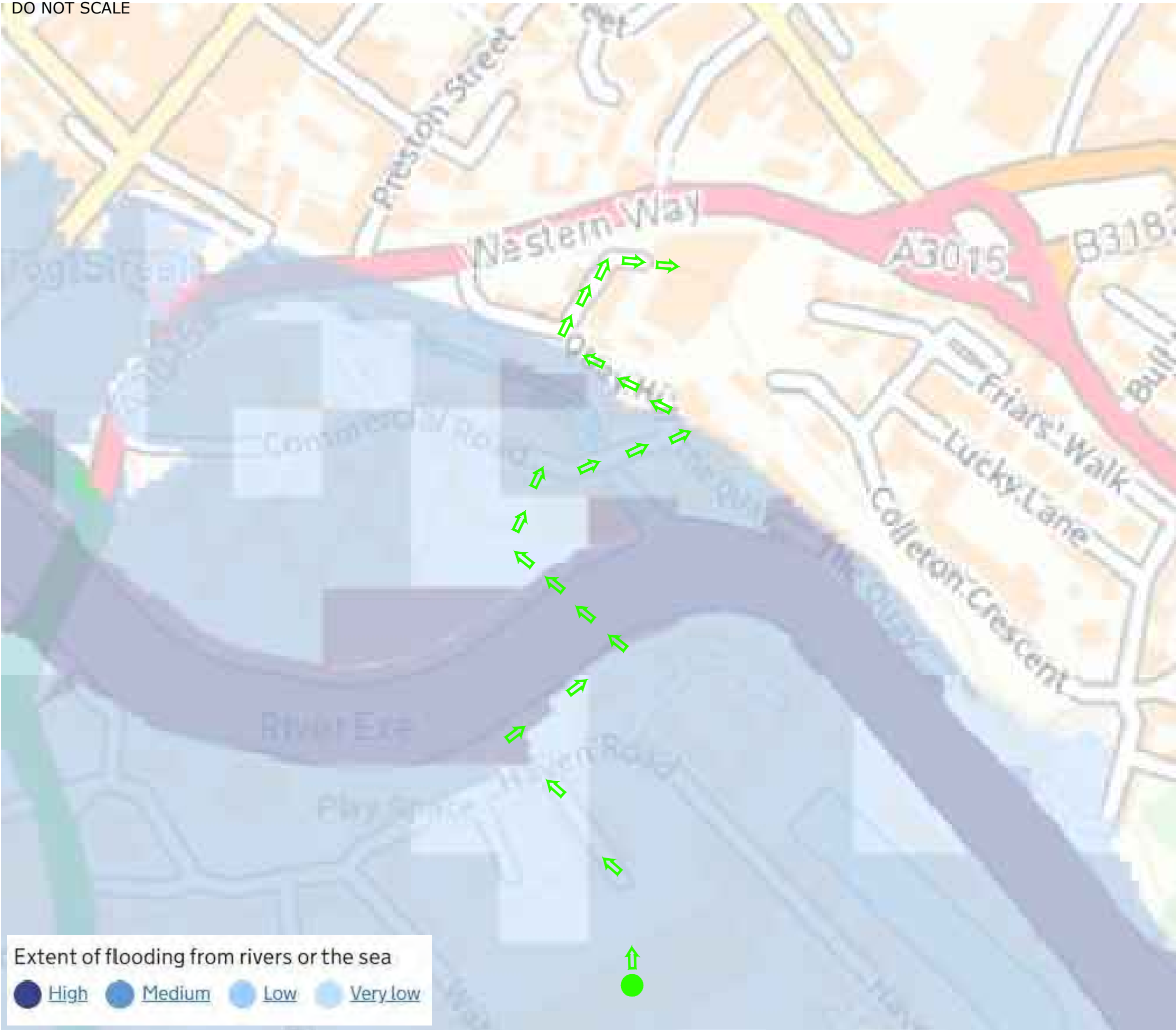
If you have any questions please contact the Sustainable Places team:

SPDC@environment-agency.gov.uk

Appendix B

Flood Evacuation Plan

DO NOT SCALE



KEY:

SITE

ESCAPE ROUTE DIRECTION

P1	27.06.22	PRELIMINARY ISSUE	SJA	MG
REV	DATE	DESCRIPTION	DRAWN	CHKD

REVISIONS

This drawing is to be read in conjunction with all other Engineer's drawings and all other project information. Any discrepancy between the Engineer's drawings and other project information is to be reported to the Engineer immediately.



Project

HAVEN ROAD, EXETER

Title

EMERGENCY FLOOD EVACUATION ROUTE PLAN

Client

WELBECK CP

Richard Jackson
Engineering Consultants

847 The Crescent, Colchester, Essex CO4 9YQ
Unit 06C130, 6th Floor, 1 St. Katherine's Way, London, E1W 1UN
5 Quern House, Mill Court, Great Shelford, Cambs CB22 5LD
4 The Old Church, St. Matthews Road, Norwich, Norfolk NR1 1SP
The Wheelhouse, Bonds Mill, Stonehouse, Gloucestershire GL10 3RF
Email Address: mail@rj.uk.com

Tel: 01206 228800
Tel: 020 7448 9910
Tel: 01223 314794
Tel: 01603 230240
Tel: 01172 020070
Website: http://www.rj.uk.com

Scale	Drawn	Date					
NTS	SJA	27/06/22					
Project Manager	Checked	Approved					
MG	MG	MG					
Status	Suitability Description	RJL Project No :					
S2	FOR INFORMATION	61645					
project	originator	zone	level	type	role	number	revision
61645	RJL	XX	XX	DR	C	0002	P1

Appendix C

Personal Flood Plan Proforma

Title:	FLOOD WARNING & EVACUATION PLAN
Project:	Haven Road, Exeter
Client:	Welbeck CP
Project No.:	61645

Personal flood plan

Name



Are you signed up to receive flood warnings?

If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

☐

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188**. This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?



Put important documents out of flood risk and protect in polythene

☐

Look at the best way of stopping floodwater entering your property

☐

Find out where you can get sandbags

☐

Identify what you would need to take with you if you had to leave your home

☐

Check your insurance covers you for flooding

☐

Make a flood plan and prepare a flood kit

☐

Identify who can help you/ who you can help

☐

Understand the flood warning codes

☐

What can you do if a flood is expected in your area?

Actions	Location
Home	
• Move furniture and electrical items to safety	
• Put flood boards, polythene and sandbags in place	
• Make a list now of what you can move away from the risk	
• Turn off electricity, water and gas supplies	
• Roll up carpets and rugs	
• Unless you have time to remove them hang curtains over rods	
• Move sentimental items to safety	
• Put important documents in polythene bags and move to safety	
Garden and outside	
• Move your car out of the flood risk area	
• Move any large or loose items or weigh them down	
Business	
• Move important documents, computers and stock	
• Alert staff and request their help	
• Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
• Inform your family or friends that you may need to leave your home	
• Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now

Appendix D

Service Cut off Locations TBC



Colchester
01206 228800



London
020 7448 9910



Norwich
01603 230240



Cambridge
01223 314794



Bristol
01172 020070

www.rj.uk.com

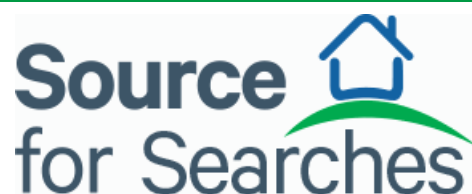
Appendix H

Southwest Water Sewer Map



PNC

,



UNDERGROUND ASSET INFORMATION

PUBLIC DRAINAGE & WATER

Location: EX2 8BY

Report Reference: GIS/PY/EX2/24032022/11

Your Reference:

Date: 24 March 2022

For the Attention of: STEDROY ALLEN

Further to your request for information dated 24 March 2022, the Company's apparatus for the above site is shown herewith. South West Water Limited has made all reasonable efforts to ensure the accuracy of this information, but provides it subject to the following conditions:

- Service pipes and drainage connections may not be shown.
- No liability whatsoever is accepted for any inaccuracies or omissions in the information.
- If no reference is made in the information to any interest or right of the Company on any land, this is not to be taken as conclusive evidence that no such interest or right exists.

These reservations are in addition to any statutory regulations which apply.

Source for Searches - A South West Water Service contactus@sourceforsearches.co.uk 0845 330 3401

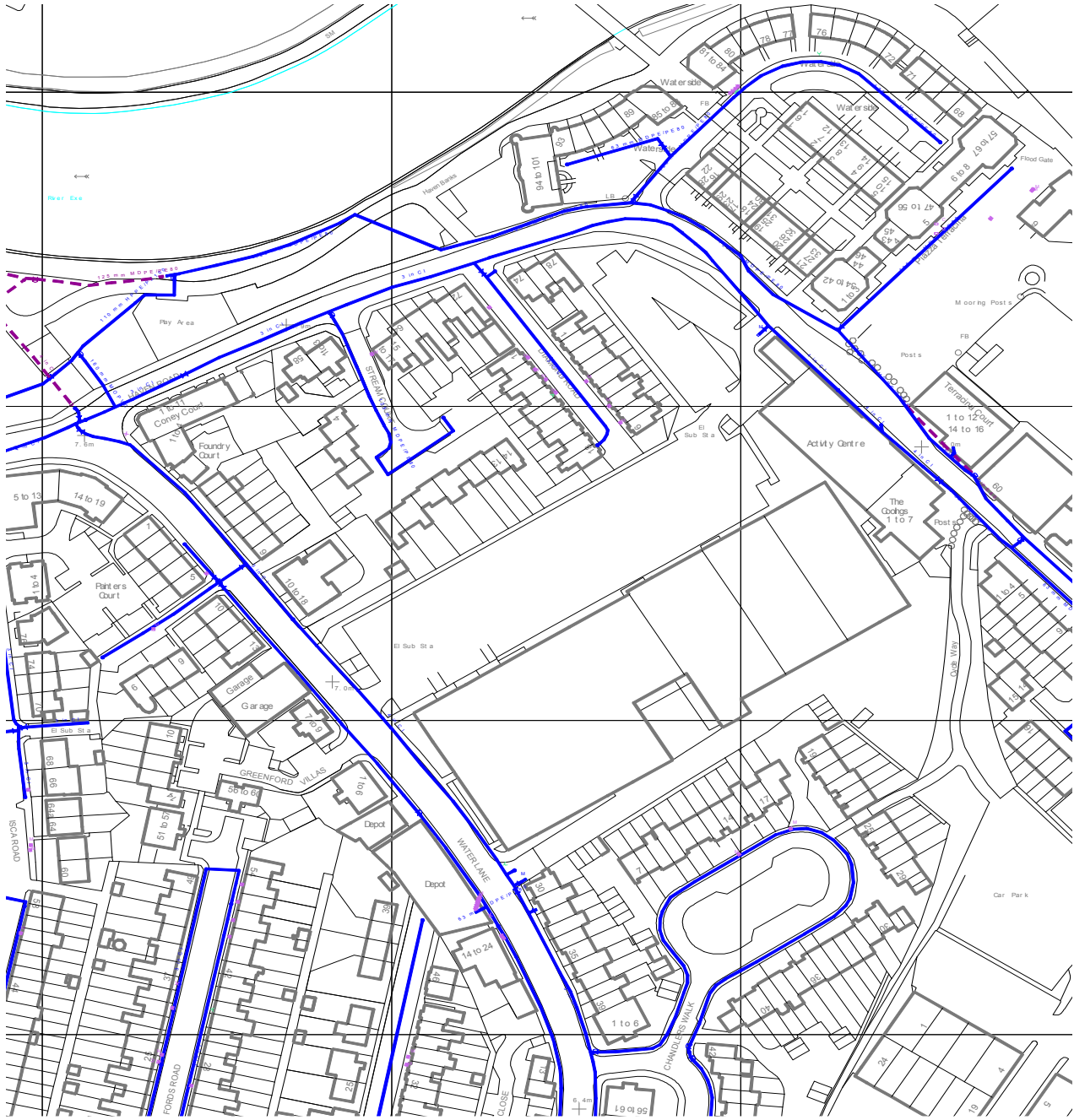
**ASSETS NOT SHOWN? THEY MAY BE PRIVATE
HOMEOWNERS RESPONSABILITY
PRIVATE SEWER CCTV SURVEYS AVAILABLE
GO TO [SOURCEFORSEARCHES.CO.UK](https://sourceforsearches.co.uk)**

USEFUL CONTACTS:
LEAKS / PIPE COLLAPSE 0344 346 2020
NEW CONNECTIONS 0800 083 1821
SOUTH WEST WATER 0344 346 2020









WATER

EX2 8BY



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Water Pipe Details

Distribution	
Trunk	
Communication	
Untreated	
Private	
Abandoned	

Common Materials

Cast Iron	CI	High Density Polyethylene	HDPE
Spun Iron	SI	Medium Density Polyethylene	MDPE
Ductile Iron	DI	High Pressure Polyethylene	HPPE
Steel	ST	Polyethylene	
Asbestos Cement	AC		
Plastic	UPVC		

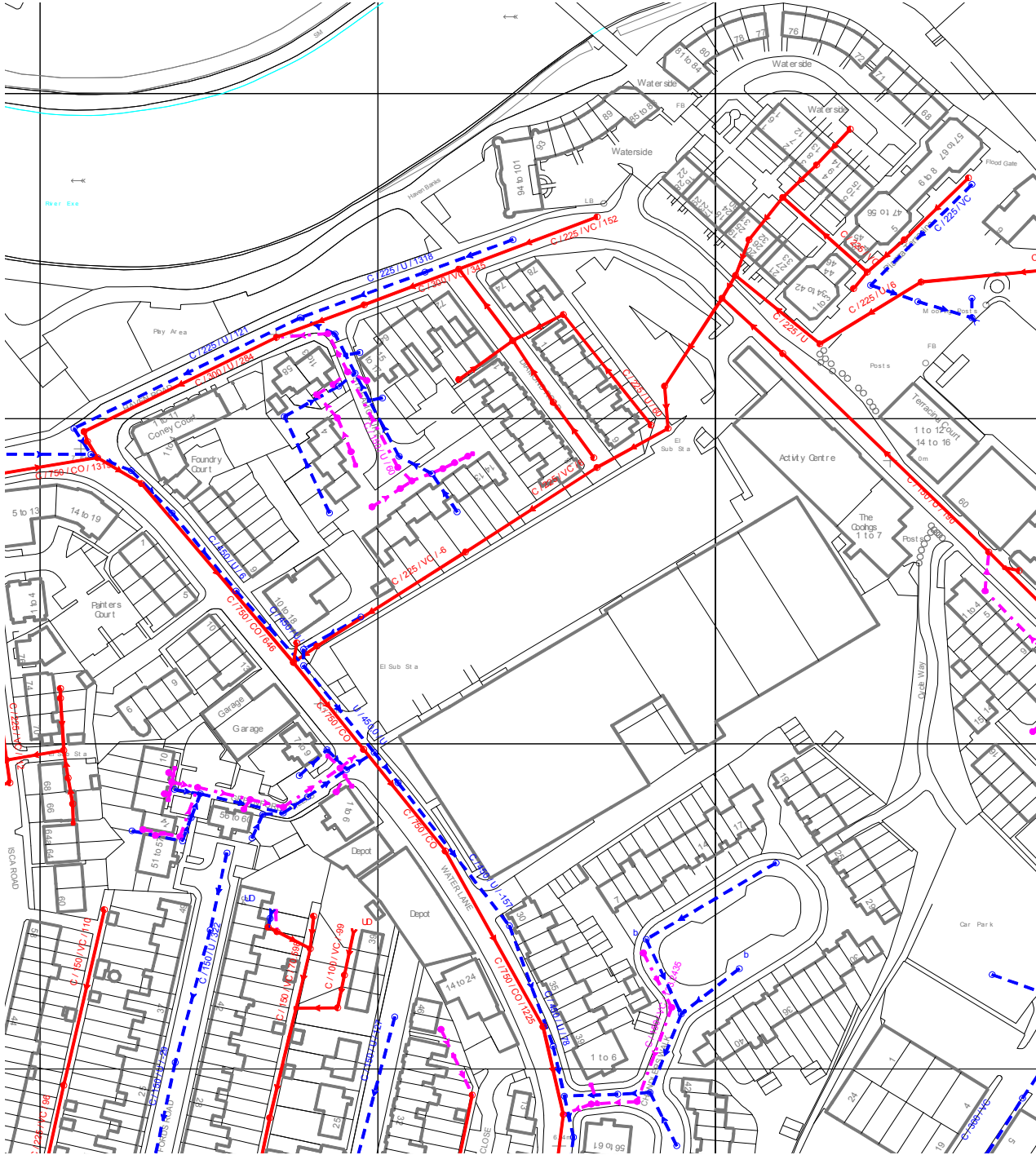
Water Features

Washout		Hatchbox		Customer Meter	
Hydrant		Pump		Mains Meter	
Washout Hydrant		Sluice Valve Open (AC)		Relief Valve	
Air Valve (Single)		Sluice Valve Closed		Pressure Reducing Valve	
Air Valve (Double)		Sluice Valve (CC)		Pressure Sustaining Valve	
Stop Turn		Stop Turn		Non Return Valve / Reflux	
				Relief Valve	



DRAINAGE

EX2 8BY



100 m

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Sewer Pipe Details

Public - Foul	
Public - Surface	
Public - Combined	
Public - Treated	
Pumping Main	
Elevated	
Unverified	
Abandoned	
Highway	

Common Shapes

Circular	C	Barrel	B	U Shaped	US
Rectangular	R	Trapezoidal	T	Horseshoe	H
Unknown	U	Egg Shape	E	Oval	OV

Common Materials

Vitrified Clay	VC	Alkathene	AK	Medium Density Polyvinylchloride	MDPE
Pre Cast Concrete	PCO	Asbestos Cement	AC	Unplasticised Polyvinylchloride	UPVC
Concrete	CO	Polyvinylchloride	PVC	Unknown	U

Sewerage Structures

Manhole Foul		Manhole Surface	
Manhole Combined		Manhole Private	
Soakaway		Catchpit	CP
Washout		Hatchbox	HB
Buried		Unable to Locate	UL

REQUIREMENTS AND DEVELOPMENT/TREE PLANTING GUIDANCE



In accordance with the provisions of Clause 26 of South West Water's Code of Practice, you are advised that in order to maintain adequate future access to the pipeline and to avoid interference with it, it is necessary to ensure that the following guidelines are observed:

1. Buildings And Permanent Structures

Clear working strip:

A clear working strip along the pipe is required between buildings and permanent structures and this must be:-

Pipes up to 150mm diameter	6.0 metres
Pipes 151-600mm diameter	7.0 metres
Pipes 601mm diameter and over	9.0 metres

If a building or permanent structure is planned within these limits please contact our Development Planning team as Build Over consent may be required. Development Planning developerservices@southwestwater.co.uk.

Proximity of buildings:

No buildings or permanent structures should be placed within 3 metres of pipes below 300mm in diameter or within 3.5 metres of pipes of 300mm or over in diameter (distances measured from the centre of the pipe), and in addition, buildings and permanent structures must be constructed so as to ensure that no additional loads are transmitted to the pipe.

(N.B: Pipe sizes refer to the internal diameter / bore of the pipe).

2. Trees And Shrubs

Roots can damage pipelines over time and extensive root systems will limit access to the pipeline in breach of the Company's right to access for repair or replacement. As a rule of thumb, the root spread of a tree is approximately the same as its eventual canopy spread. To help you avoid damage or interference to the pipeline, the Company suggests the following guidelines:

- No large or forest trees should be planted with 7 metres of the pipeline (examples include Oak, Ash, Beech, Douglas Fir, Sitka Spruce etc.)
- Medium to small sized trees should always be planted in such a way as to ensure that the eventual root spread reaches no closer than 1 metre of the pipeline, in practice, if trees are planted a distance of 5 metres away from the pipeline, this should be sufficient.
- Bushes and shrubs should never be planted closer than 2 metres from the pipeline.
- Closer than 2 metres either side of the pipeline may be planted with hedge plants and ground cover only.
- The measurements and distances set out are for guidance only and there will always be exception, for example: Poplars and Willows, which have a particularly invasive root system. If you are unsure of any individual case, then specialist advice should always be sought prior to planting.
- The guidelines set out above are based on the Company's standard access requirements for its apparatus. If, for engineering reasons, the distances set out need to be varied at particular locations, you will be advised of this before compensation for works is finalised. If you need to know the precise underground location of a new water main / sewer after its installation, please contact any of the Company's local offices, and Company staff will be pleased to mark out the position of the pipeline within your land.
- If the Company finds any infringement of its legal rights of access, or any damage being caused to the pipeline, the Company reserves the right to take appropriate action to ensure that there is no interference with its statutory apparatus.

Requirements to be met by persons carrying out works near to water mains and sewers:

1. The precise position of water mains and sewers must be ascertained by hand digging trial holes after first contacting South West Water, who will give such information as is available regarding the general location of the mains and sewer in the area. No liability is accepted for the accuracy of any information given as to the position or existence of water mains and sewers. In particular, service pipes and drainage connection are not generally shown on mains records, but their presence should be anticipated and precautions taken to avoid damage.
2. Notices of intent must be given to South West Water before any works are carried out in the vicinity, except in cases of emergency when our Operations Centre should be contacted as soon as possible.
3. Unless prior written approval has been obtained, mechanical excavation may not be permitted around, or within, 3 metres of the water main or sewer. Excavation may be necessary by hand.
4. Concrete haunches or surrounds to sewers must not be disturbed without prior written consent from South West Water.
5. Before backfilling, the mains and sewers will be inspected and any flaws or damage to the pipe or wrapping, if found, will be repaired by South West Water. All such flaws or damage must be immediately reported to the Company as soon as they are discovered. The carrying out of such repair by South West Water shall not affect the question of liability, should any damage found to have resulted from the acts of those undertaking the works, their contractors, servants or agents.
6. Approved backfill will be used immediately around or over the mains and sewers to a minimum cover of 300mm and the remainder of the backfill shall be to the appropriate Highways Authority Specification for the Reinstatement of Openings in Highways.
7. Both the existing main or sewer and the new works shall be suitably supported to prevent future settlement and any subsequent damage to equipment.
8. Ground adjacent to concrete thrust blocks supporting the main(s) and sewer(s) must not be disturbed.
9. Adequate support must be given to all water mains and sewers where these are likely to be undermined, and to all trenches in the vicinity of these, during the process of the works.
10. No apparatus shall be laid on or over any land within 300mm measured horizontally from any part of a water main or sewer or other apparatus belonging to the Company. Provided always that this clause shall not prevent any pipe, cable or conducting medium being laid at an angle of between 45 and 90 degrees across the line of the Company's apparatus, with a vertical clearance in excess of 300mm. In exceptional circumstances this clause may be varied or deleted with the prior written consent from South West Water.
11. South West Water must be consulted before any work representing an increased risk to the integrity of the mains or sewers (e.g., piling, using explosives, thrust boring, pipe bursting etc.) is carried out.
12. Facilities for inspecting all work carried out shall be given to South West Water with adequate notice

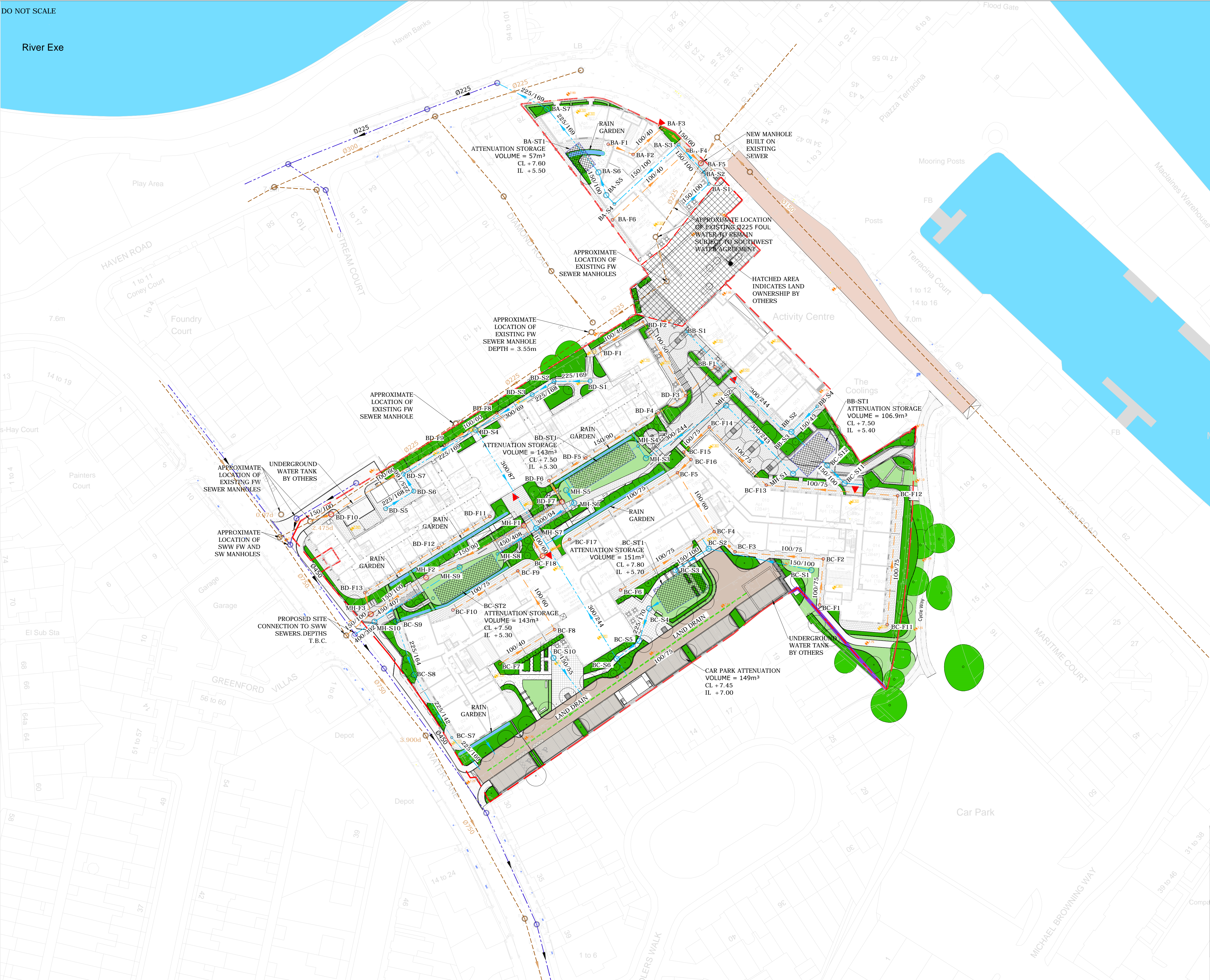
IN THE EVENT OF A LEAK OR PIPE COLLAPSE PLEASE CONTACT SOUTH WEST WATER IMMEDIATELY ON 0344 346 2020 (24 HOURS)

Appendix I

Drainage Strategy

DO NOT SCALE

River Exe



DRAINAGE NOMENCLATURE	
	SWW SURFACE WATER SEWER
	SURFACE WATER DRAIN
	SWW FOUL WATER SEWER
	FOUL WATER DRAIN
	FOUL WATER MANHOLE/INSPECTION CHAMBER
	SURFACE WATER MANHOLE/INSPECTION CHAMBER
	PROPRIETARY ATTENUATION
	RAIN GARDEN

REV	DATE	DESCRIPTION	DRAWN	CHKD
P2	15.07.19	PLANNING ISSUE	SJA	MG
P1	27.06.19	PRE-PLANNING ISSUE	SJA	MG

REVISIONS

This drawing is to be read in conjunction with all other Engineer's drawings and all other project information. Any discrepancy between the Engineer's drawings and other project information is to be reported to the Engineer immediately.



Project

HAVEN BANKS, EXETER

Title

DRAINAGE STRATEGY

Client

WELBECK CP

847 The Crescent, Colchester, Essex CO4 9YQ
Unit 06C130, 6th Floor, 1 St. Katharine's Way, London, E1W 1UN
5 Quern House, Mill Court, Great Shelford, Cambs CB22 3LD
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Website: <http://www.rj.co.uk>

Scale 1:500 @ A1	Drawn SJA	Date 27/06/22
Project Manager MG	Checked MG	Approved MG
Status S2	Suitability Description FOR INFORMATION	RJL Project No : 61645
61645	RJL	XX XX DR C 0001 P2

Appendix J

Surface Water Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.500
Ratio-R	0.300	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
BB-S1	0.083	5.00	7.680	1200	291993.868	91884.195	1.200
BB-S2	0.077	5.00	7.770	1200	292021.524	91855.993	1.452
BB-S3			7.750	1200	292024.410	91855.093	1.445
BB-S4	0.057	5.00	7.750	1200	292031.886	91862.525	1.050
BB-ST1			7.750	1350	292030.670	91848.643	1.482
BC-S1	0.048	5.00	7.800	1200	292030.222	91815.029	1.050
BC-S2	0.047	5.00	7.800	1200	292000.452	91821.217	1.352
BC-S3			7.800	1200	291990.784	91815.014	1.466
BC-ST1			7.800	1200	291992.406	91809.574	1.523
BC-S4	0.075	5.00	7.800	1200	291983.192	91803.897	1.706
BC-S5	0.084	5.00	7.800	1200	291980.282	91794.506	1.764
BC-S6			7.800	1200	291973.746	91789.323	1.889
BC-S7			7.800	1200	291925.946	91766.493	0.900
BC-S8			7.750	1200	291915.020	91784.695	0.700
BC-S9	0.026	5.00	7.750	1200	291909.764	91800.250	0.600
BC-S10	0.026	5.00	7.800	1200	291955.411	91789.573	0.600
BC-S11	0.050	5.00	7.800	1200	292039.820	91840.223	1.050
BC-S12			7.750	1200	292034.750	91845.392	1.072
BC-ST2			7.770	1350	291930.349	91812.443	2.253
BC-CP	0.126	5.00	7.800	1200	291976.683	91784.558	1.218
BD-S1	0.050	5.00	7.700	1200	291966.042	91869.840	1.125
BD-S2	0.050	5.00	7.700	1200	291955.552	91869.750	1.187
BD-S3	0.100	5.00	7.600	1200	291949.274	91865.882	1.206
BD-S4	0.100	5.00	7.550	1350	291932.821	91855.744	1.437
BD-S5	0.050	5.00	7.550	1200	291906.797	91832.870	1.125
BD-S6	0.023	5.00	7.600	1200	291914.946	91837.923	1.232
BD-S7			7.600	1200	291911.906	91842.857	1.267
BD-ST1			7.750	1350	291969.559	91844.638	1.812
MH-S1			7.500	1350	292024.884	91842.968	1.266
MH-S2	0.033	5.00	7.500	1350	292005.486	91862.747	1.380
MH-S3	0.022	5.00	7.700	1350	291982.239	91847.494	1.694
MH-S4			7.750	1200	291979.934	91851.004	1.762
MH-S5			7.750	1200	291959.127	91838.212	1.863
MH-S6	0.011	5.00	7.750	1200	291961.435	91834.466	1.881
MH-S7	0.032	5.00	7.750	1350	291950.421	91827.180	2.171
MH-S8			7.700	1350	291939.202	91819.740	2.154
MH-S9			7.500	1500	291928.216	91815.906	1.993

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	39.499	243.8	300	Circular	7.680	6.480	0.900	7.770	6.318	1.152
1.001	3.023	232.5	300	Circular	7.770	6.318	1.152	7.750	6.305	1.145
2.000	10.542	43.0	150	Circular	7.750	6.700	0.900	7.750	6.455	1.145
1.002	8.988	242.9	300	Circular	7.750	6.305	1.145	7.750	6.268	1.182
1.003	8.105	238.4	300	Circular	7.750	6.268	1.182	7.500	6.234	0.966
6.000	30.406	100.7	150	Circular	7.800	6.750	0.900	7.800	6.448	1.202
6.001	11.487	100.8	150	Circular	7.800	6.448	1.202	7.800	6.334	1.316
6.002	5.677	99.6	150	Circular	7.800	6.334	1.316	7.800	6.277	1.373
6.003	10.822	100.2	150	Circular	7.800	6.277	1.373	7.800	6.169	1.481
6.004	9.832	169.5	225	Circular	7.800	6.094	1.481	7.800	6.036	1.539
6.005	8.342	166.8	225	Circular	7.800	6.036	1.539	7.800	5.986	1.589
4.004	44.466	244.3	300	Circular	7.800	5.911	1.589	7.750	5.729	1.721
4.000	16.419	164.2	225	Circular	7.750	7.150	0.375	7.750	7.050	0.475
4.001	21.229	141.5	225	Circular	7.750	7.050	0.475	7.800	6.900	0.675
4.002	53.857	169.4	225	Circular	7.800	6.900	0.675	7.800	6.582	0.993
5.000	21.855	54.6	150	Circular	7.800	7.200	0.450	7.800	6.800	0.850
1.013	4.067	406.7	450	Circular	7.770	5.517	1.803	7.500	5.507	1.543
3.000	7.240	100.6	150	Circular	7.800	6.750	0.900	7.750	6.678	0.922
3.001	5.217	20.1	150	Circular	7.750	6.678	0.922	7.750	6.418	1.182
4.003	5.597	169.6	225	Circular	7.800	6.582	0.993	7.800	6.549	1.026
8.000	10.490	169.2	225	Circular	7.700	6.575	0.900	7.700	6.513	0.962
8.001	7.374	167.6	225	Circular	7.700	6.513	0.962	7.600	6.469	0.906



Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	BB-S1	1200	Manhole	Adoptable	BB-S2	1200	Manhole	Adoptable
1.001	BB-S2	1200	Manhole	Adoptable	BB-S3	1200	Manhole	Adoptable
2.000	BB-S4	1200	Manhole	Adoptable	BB-S3	1200	Manhole	Adoptable
1.002	BB-S3	1200	Manhole	Adoptable	BB-ST1	1350	Manhole	Adoptable
1.003	BB-ST1	1350	Manhole	Adoptable	MH-S1	1350	Manhole	Adoptable
6.000	BC-S1	1200	Manhole	Adoptable	BC-S2	1200	Manhole	Adoptable
6.001	BC-S2	1200	Manhole	Adoptable	BC-S3	1200	Manhole	Adoptable
6.002	BC-S3	1200	Manhole	Adoptable	BC-ST1	1200	Manhole	Adoptable
6.003	BC-ST1	1200	Manhole	Adoptable	BC-S4	1200	Manhole	Adoptable
6.004	BC-S4	1200	Manhole	Adoptable	BC-S5	1200	Manhole	Adoptable
6.005	BC-S5	1200	Manhole	Adoptable	BC-S6	1200	Manhole	Adoptable
4.004	BC-S6	1200	Manhole	Adoptable	MH-S7	1350	Manhole	Adoptable
4.000	BC-S9	1200	Manhole	Adoptable	BC-S8	1200	Manhole	Adoptable
4.001	BC-S8	1200	Manhole	Adoptable	BC-S7	1200	Manhole	Adoptable
4.002	BC-S7	1200	Manhole	Adoptable	BC-CP	1200	Manhole	Adoptable
5.000	BC-S10	1200	Manhole	Adoptable	BC-CP	1200	Manhole	Adoptable
1.013	BC-ST2	1350	Manhole	Adoptable	MH-S9	1500	Manhole	Adoptable
3.000	BC-S11	1200	Manhole	Adoptable	BC-S12	1200	Manhole	Adoptable
3.001	BC-S12	1200	Manhole	Adoptable	BB-ST1	1350	Manhole	Adoptable
4.003	BC-CP	1200	Manhole	Adoptable	BC-S6	1200	Manhole	Adoptable
8.000	BD-S1	1200	Manhole	Adoptable	BD-S2	1200	Manhole	Adoptable
8.001	BD-S2	1200	Manhole	Adoptable	BD-S3	1200	Manhole	Adoptable

Pipeline Schedule

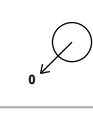

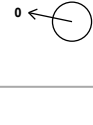










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8.002	19.326	68.8	300	Circular	7.600	6.394	0.906	7.550	6.113	1.137
7.000	9.588	168.2	225	Circular	7.550	6.425	0.900	7.600	6.368	1.007
7.001	5.795	165.6	225	Circular	7.600	6.368	1.007	7.600	6.333	1.042
7.002	24.566	169.4	225	Circular	7.600	6.333	1.042	7.550	6.188	1.137
7.003	33.551	87.4	300	Circular	7.550	6.113	1.137	7.750	5.729	1.721
1.004	27.704	243.0	300	Circular	7.500	6.234	0.966	7.500	6.120	1.080
1.005	27.804	243.9	300	Circular	7.500	6.120	1.080	7.700	6.006	1.394
1.006	4.199	233.3	300	Circular	7.700	6.006	1.394	7.750	5.988	1.462
1.007	12.172	243.4	300	Circular	7.750	5.988	1.462	7.750	5.938	1.512
1.008	12.252	240.2	300	Circular	7.750	5.938	1.512	7.750	5.887	1.563
1.009	4.400	244.4	300	Circular	7.750	5.887	1.563	7.750	5.869	1.581
1.010	13.206	94.3	300	Circular	7.750	5.869	1.581	7.750	5.729	1.721
1.011	13.462	407.9	450	Circular	7.750	5.579	1.721	7.700	5.546	1.704
1.012	11.473	395.6	450	Circular	7.700	5.546	1.704	7.770	5.517	1.803
1.014	29.314	407.1	450	Circular	7.500	5.507	1.543	7.550	5.435	1.665
1.015	6.671	392.4	450	Circular	7.550	5.435	1.665	7.170	5.418	1.302

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
8.002	BD-S3	1200	Manhole	Adoptable	BD-S4	1350	Manhole	Adoptable
7.000	BD-S5	1200	Manhole	Adoptable	BD-S6	1200	Manhole	Adoptable
7.001	BD-S6	1200	Manhole	Adoptable	BD-S7	1200	Manhole	Adoptable
7.002	BD-S7	1200	Manhole	Adoptable	BD-S4	1350	Manhole	Adoptable
7.003	BD-S4	1350	Manhole	Adoptable	MH-S7	1350	Manhole	Adoptable
1.004	MH-S1	1350	Manhole	Adoptable	MH-S2	1350	Manhole	Adoptable
1.005	MH-S2	1350	Manhole	Adoptable	MH-S3	1350	Manhole	Adoptable
1.006	MH-S3	1350	Manhole	Adoptable	MH-S4	1200	Manhole	Adoptable
1.007	MH-S4	1200	Manhole	Adoptable	BD-ST1	1350	Manhole	Adoptable
1.008	BD-ST1	1350	Manhole	Adoptable	MH-S5	1200	Manhole	Adoptable
1.009	MH-S5	1200	Manhole	Adoptable	MH-S6	1200	Manhole	Adoptable
1.010	MH-S6	1200	Manhole	Adoptable	MH-S7	1350	Manhole	Adoptable
1.011	MH-S7	1350	Manhole	Adoptable	MH-S8	1350	Manhole	Adoptable
1.012	MH-S8	1350	Manhole	Adoptable	BC-ST2	1350	Manhole	Adoptable
1.014	MH-S9	1500	Manhole	Adoptable	MH-S10	1500	Manhole	Adoptable
1.015	MH-S10	1500	Manhole	Adoptable	SWW-S1	1350	Manhole	Adoptable

























Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
BB-S1	291993.868	91884.195	7.680	1.200	1200		0	1.000	6.480	300
BB-S2	292021.524	91855.993	7.770	1.452	1200		1	1.000	6.318	300
							0	1.001	6.318	300












Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
BB-S3	292024.410	91855.093	7.750	1.445	1200		1	2.000	6.455	150
						2	1.001	6.305	300	
						0	1.002	6.305	300	
BB-S4	292031.886	91862.525	7.750	1.050	1200		0	2.000	6.700	150
BB-ST1	292030.670	91848.643	7.750	1.482	1350		1	3.001	6.418	150
						2	1.002	6.268	300	
						0	1.003	6.268	300	
BC-S1	292030.222	91815.029	7.800	1.050	1200		0	6.000	6.750	150
BC-S2	292000.452	91821.217	7.800	1.352	1200		1	6.000	6.448	150
						0	6.001	6.448	150	
BC-S3	291990.784	91815.014	7.800	1.466	1200		1	6.001	6.334	150
						0	6.002	6.334	150	
BC-ST1	291992.406	91809.574	7.800	1.523	1200		1	6.002	6.277	150
						0	6.003	6.277	150	
BC-S4	291983.192	91803.897	7.800	1.706	1200		1	6.003	6.169	150
						0	6.004	6.094	225	
BC-S5	291980.282	91794.506	7.800	1.764	1200		1	6.004	6.036	225
						0	6.005	6.036	225	
BC-S6	291973.746	91789.323	7.800	1.889	1200		1	6.005	5.986	225
						2	4.003	6.549	225	
						0	4.004	5.911	300	
BC-S7	291925.946	91766.493	7.800	0.900	1200		1	4.001	6.900	225
						0	4.002	6.900	225	
BC-S8	291915.020	91784.695	7.750	0.700	1200		1	4.000	7.050	225
						0	4.001	7.050	225	
BC-S9	291909.764	91800.250	7.750	0.600	1200		0	4.000	7.150	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
BC-S10	291955.411	91789.573	7.800	0.600	1200	<div></div> <div>0</div>	5.000	7.200	150
BC-S11	292039.820	91840.223	7.800	1.050	1200	<div></div> <div>0</div>	3.000	6.750	150
BC-S12	292034.750	91845.392	7.750	1.072	1200	<div></div> <div>1</div>	3.000	6.678	150
						<div></div> <div>0</div>	3.001	6.678	150
BC-ST2	291930.349	91812.443	7.770	2.253	1350	<div></div> <div>1</div>	1.012	5.517	450
						<div></div> <div>0</div>	1.013	5.517	450
BC-CP	291976.683	91784.558	7.800	1.218	1200	<div></div> <div>1</div>	5.000	6.800	150
						<div></div> <div>2</div>	4.002	6.582	225
						<div></div> <div>0</div>	4.003	6.582	225
BD-S1	291966.042	91869.840	7.700	1.125	1200	<div></div> <div>0</div>	8.000	6.575	225
BD-S2	291955.552	91869.750	7.700	1.187	1200	<div></div> <div>1</div>	8.000	6.513	225
						<div></div> <div>0</div>	8.001	6.513	225
BD-S3	291949.274	91865.882	7.600	1.206	1200	<div></div> <div>1</div>	8.001	6.469	225
						<div></div> <div>0</div>	8.002	6.394	300
BD-S4	291932.821	91855.744	7.550	1.437	1350	<div></div> <div>1</div>	8.002	6.113	300
						<div></div> <div>2</div>	7.002	6.188	225
						<div></div> <div>0</div>	7.003	6.113	300
BD-S5	291906.797	91832.870	7.550	1.125	1200	<div></div> <div>0</div>	7.000	6.425	225
BD-S6	291914.946	91837.923	7.600	1.232	1200	<div></div> <div>1</div>	7.000	6.368	225
						<div></div> <div>0</div>	7.001	6.368	225
BD-S7	291911.906	91842.857	7.600	1.267	1200	<div></div> <div>1</div>	7.001	6.333	225
						<div></div> <div>0</div>	7.002	6.333	225
BD-ST1	291969.559	91844.638	7.750	1.812	1350	<div></div> <div>1</div>	1.007	5.938	300
						<div></div> <div>0</div>	1.008	5.938	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
MH-S1	292024.884	91842.968	7.500	1.266	1350	<div></div>	1	1.003	6.234	300
							0	1.004	6.234	300
MH-S2	292005.486	91862.747	7.500	1.380	1350	<div></div>	1	1.004	6.120	300
							0	1.005	6.120	300
MH-S3	291982.239	91847.494	7.700	1.694	1350	<div></div>	1	1.005	6.006	300
							0	1.006	6.006	300
MH-S4	291979.934	91851.004	7.750	1.762	1200	<div></div>	1	1.006	5.988	300
							0	1.007	5.988	300
MH-S5	291959.127	91838.212	7.750	1.863	1200	<div></div>	1	1.008	5.887	300
							0	1.009	5.887	300
MH-S6	291961.435	91834.466	7.750	1.881	1200	<div></div>	1	1.009	5.869	300
							0	1.010	5.869	300
MH-S7	291950.421	91827.180	7.750	2.171	1350	<div></div>	1	7.003	5.729	300
							2	4.004	5.729	300
							3	1.010	5.729	300
							0	1.011	5.579	450
MH-S8	291939.202	91819.740	7.700	2.154	1350	<div></div>	1	1.011	5.546	450
							0	1.012	5.546	450
MH-S9	291928.216	91815.906	7.500	1.993	1500	<div></div>	1	1.013	5.507	450
							0	1.014	5.507	450
MH-S10	291903.540	91800.081	7.550	2.115	1500	<div></div>	1	1.014	5.435	450
							0	1.015	5.435	450
SWW-S1	291897.924	91796.480	7.170	1.752	1350	<div></div>	1	1.015	5.418	450

Simulation Settings

Rainfall Methodology FSR
FSR Region England and Wales
M5-60 (mm) 20.000
Ratio-R 0.300
Summer CV 0.750
Winter CV 0.840

Analysis Speed Normal
Skip Steady State x
Drain Down Time (mins) 240
Additional Storage (m³/ha) 0.0
Check Discharge Rate(s) ✓
1 year (l/s) 5.4

Simulation Settings

30 year (l/s)	12.5	Check Discharge Volume	✓
100 year (l/s)	15.6	1 year 360 minute (m³)	111

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.98
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	1.670	Betterment (%)	50
SAAR (mm)	820	QBar	12.6
Soil Index	5	Q 1 year (l/s)	5.4
SPR	0.53	Q 30 year (l/s)	12.5
Region	8	Q 100 year (l/s)	15.6
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	1
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	1.670	Storm Duration (mins)	360
Soil Index	5	Betterment (%)	50
SPR	0.53	PR	0.525
CWI	122.963	Runoff Volume (m³)	111

Node BC-CP Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	6.582	Product Number	CTL-SHE-0113-5000-0450-5000
Design Depth (m)	0.450	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node MH-S9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	5.507	Product Number	CTL-SHE-0096-5000-1620-5000
Design Depth (m)	1.620	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node BC-CP Carpark Storage Structure

BRE-365: Volume (m³)	1.000	Side Inf Coefficient (m/hr)	0.00000	Width (m)	11.000
BRE-365: Area (m²)	5.000	Safety Factor	2.0	Length (m)	100.000
BRE-365: Time (hrs)	4.000	Porosity	0.30	Slope (1:X)	1000.0
BRE-365: Inf Coef (m/hr)	0.05000	Invert Level (m)	6.582	Depth (m)	0.450
Base Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1560	Inf Depth (m)	

Node BB-ST1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	6.268
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1152

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	106.9	0.0	1.500	106.9	0.0	1.501	0.0	0.0

Node BC-ST1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	6.277
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1140

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	103.3	0.0	1.500	103.3	0.0	1.501	0.0	0.0

Node BC-ST2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.517
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	84.2	0.0	1.500	84.2	0.0	1.501	0.0	0.0

Node BD-ST1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.938
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	84.2	0.0	1.500	84.2	0.0	1.501	0.0	0.0

Node BD-S1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	6.575
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	885

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	85.0	0.0	1.000	85.0	0.0	1.001	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	BB-S1	10	6.557	0.077	10.6	0.0865	0.0000	OK
15 minute winter	BB-S2	8	6.483	0.165	20.2	0.1868	0.0000	OK
15 minute winter	BB-S3	7	6.473	0.168	27.5	0.1900	0.0000	OK
15 minute winter	BB-S4	10	6.758	0.058	7.3	0.0661	0.0000	OK
600 minute winter	BB-ST1	555	6.431	0.163	4.8	16.7365	0.0000	OK
15 minute winter	BC-S1	10	6.810	0.060	6.2	0.0684	0.0000	OK
15 minute winter	BC-S2	10	6.750	0.302	12.1	0.3414	0.0000	SURCHARGED
15 minute winter	BC-S3	10	6.674	0.340	13.6	0.3847	0.0000	SURCHARGED
600 minute winter	BC-ST1	570	6.422	0.145	3.4	14.3753	0.0000	OK
600 minute winter	BC-S4	570	6.421	0.327	2.9	0.3698	0.0000	SURCHARGED
600 minute winter	BC-S5	570	6.420	0.384	4.4	0.4347	0.0000	SURCHARGED
600 minute winter	BC-S6	570	6.420	0.509	5.8	0.5753	0.0000	SURCHARGED
15 minute winter	BC-S7	12	6.942	0.042	3.2	0.0477	0.0000	OK
15 minute winter	BC-S8	11	7.093	0.043	3.2	0.0484	0.0000	OK
15 minute winter	BC-S9	10	7.195	0.045	3.3	0.0510	0.0000	OK
15 minute winter	BC-S10	10	7.238	0.038	3.3	0.0433	0.0000	OK
15 minute winter	BC-S11	10	6.822	0.072	6.4	0.0809	0.0000	OK
15 minute winter	BC-S12	10	6.725	0.047	6.3	0.0526	0.0000	OK
600 minute winter	BC-ST2	570	6.420	0.903	12.4	73.4859	0.0000	SURCHARGED
240 minute winter	BC-CP	172	6.688	0.106	5.6	18.6059	0.0000	OK
60 minute winter	BD-S1	41	6.610	0.035	3.7	2.8834	0.0000	OK
15 minute winter	BD-S2	11	6.583	0.070	6.9	0.0796	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	BB-S1	1.000	BB-S2	10.3	0.416	0.146	1.0032	
15 minute winter	BB-S2	1.001	BB-S3	20.2	0.596	0.279	0.1214	
15 minute winter	BB-S3	1.002	BB-ST1	27.6	1.395	0.389	0.2046	
15 minute winter	BB-S4	2.000	BB-S3	7.2	1.216	0.265	0.0626	
600 minute winter	BB-ST1	1.003	MH-S1	4.7	0.539	0.066	0.3561	
15 minute winter	BC-S1	6.000	BC-S2	6.1	0.541	0.344	0.3687	
15 minute winter	BC-S2	6.001	BC-S3	13.6	0.791	0.767	0.2022	
15 minute winter	BC-S3	6.002	BC-ST1	15.6	1.340	0.875	0.0576	
600 minute winter	BC-ST1	6.003	BC-S4	-2.4	0.603	-0.133	0.1895	
600 minute winter	BC-S4	6.004	BC-S5	2.9	0.466	0.072	0.3910	
600 minute winter	BC-S5	6.005	BC-S6	4.3	0.613	0.108	0.3318	
600 minute winter	BC-S6	4.004	MH-S7	5.6	0.528	0.079	3.1313	
15 minute winter	BC-S7	4.002	BC-CP	3.1	0.463	0.078	0.4014	
15 minute winter	BC-S8	4.001	BC-S7	3.2	0.644	0.074	0.1092	
15 minute winter	BC-S9	4.000	BC-S8	3.2	0.598	0.080	0.0891	
15 minute winter	BC-S10	5.000	BC-CP	3.2	0.929	0.133	0.0755	
15 minute winter	BC-S11	3.000	BC-S12	6.3	0.983	0.357	0.0468	
15 minute winter	BC-S12	3.001	BB-ST1	6.3	1.485	0.157	0.0220	
600 minute winter	BC-ST2	1.013	MH-S9	9.4	0.147	0.059	0.6444	
240 minute winter	BC-CP	4.003	BC-S6	2.1	0.482	0.053	0.0245	
60 minute winter	BD-S1	8.000	BD-S2	2.1	0.409	0.054	0.0640	
15 minute winter	BD-S2	8.001	BD-S3	6.8	0.696	0.169	0.0720	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	BD-S3	10	6.472	0.078	19.4	0.0887	0.0000	OK
600 minute winter	BD-S4	570	6.419	0.306	6.7	0.4379	0.0000	SURCHARGED
15 minute winter	BD-S5	10	6.491	0.066	6.4	0.0747	0.0000	OK
15 minute winter	BD-S6	11	6.454	0.086	9.2	0.0970	0.0000	OK
600 minute winter	BD-S7	570	6.419	0.086	1.3	0.0976	0.0000	OK
600 minute winter	BD-ST1	585	6.421	0.483	6.2	39.3316	0.0000	SURCHARGED
600 minute winter	MH-S1	555	6.431	0.197	4.7	0.2813	0.0000	OK
600 minute winter	MH-S2	555	6.430	0.310	5.3	0.4439	0.0000	SURCHARGED
600 minute winter	MH-S3	555	6.436	0.430	5.7	0.6157	0.0000	SURCHARGED
600 minute winter	MH-S4	570	6.420	0.432	5.4	0.4890	0.0000	SURCHARGED
600 minute winter	MH-S5	555	6.428	0.541	9.6	0.6120	0.0000	SURCHARGED
600 minute winter	MH-S6	600	6.419	0.550	9.8	0.6222	0.0000	SURCHARGED
600 minute winter	MH-S7	570	6.422	0.843	14.6	1.2063	0.0000	SURCHARGED
600 minute winter	MH-S8	570	6.418	0.872	13.0	1.2475	0.0000	SURCHARGED
600 minute winter	MH-S9	585	6.417	0.910	9.4	1.6075	0.0000	SURCHARGED
30 minute summer	MH-S10	33	5.491	0.056	4.7	0.0998	0.0000	OK
30 minute summer	SWW-S1	33	5.463	0.045	4.7	0.0000	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	BD-S3	8.002	BD-S4	19.3	0.862	0.144	0.4404	
600 minute winter	BD-S4	7.003	MH-S7	6.7	0.741	0.056	2.3626	
15 minute winter	BD-S5	7.000	BD-S6	6.3	0.537	0.158	0.1130	
15 minute winter	BD-S6	7.001	BD-S7	9.0	0.712	0.224	0.0750	
600 minute winter	BD-S7	7.002	BD-S4	1.3	0.458	0.033	0.6605	
600 minute winter	BD-ST1	1.008	MH-S5	9.6	0.476	0.135	0.8628	
600 minute winter	MH-S1	1.004	MH-S2	4.7	0.533	0.067	1.6529	
600 minute winter	MH-S2	1.005	MH-S3	5.3	0.497	0.075	1.9579	
600 minute winter	MH-S3	1.006	MH-S4	5.4	0.496	0.074	0.2957	
600 minute winter	MH-S4	1.007	BD-ST1	5.2	0.531	0.073	0.8571	
600 minute winter	MH-S5	1.009	MH-S6	9.8	0.546	0.138	0.3098	
600 minute winter	MH-S6	1.010	MH-S7	9.9	0.643	0.086	0.9300	
600 minute winter	MH-S7	1.011	MH-S8	13.0	0.357	0.081	2.1330	
600 minute winter	MH-S8	1.012	BC-ST2	12.4	0.490	0.077	1.8178	
600 minute winter	MH-S9	Hydro-Brake®	MH-S10	4.7				
30 minute summer	MH-S10	1.015	SWW-S1	4.7	0.477	0.029	0.0657	69.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	BB-S1	705	6.919	0.439	2.7	0.4965	0.0000	SURCHARGED
720 minute winter	BB-S2	705	6.920	0.602	5.2	0.6804	0.0000	SURCHARGED
600 minute winter	BB-S3	555	6.920	0.615	7.3	0.6958	0.0000	SURCHARGED
720 minute winter	BB-S4	705	6.918	0.218	1.8	0.2465	0.0000	SURCHARGED
720 minute winter	BB-ST1	705	6.916	0.648	7.9	66.6997	0.0000	SURCHARGED
15 minute winter	BC-S1	11	7.500	0.750	15.1	0.8485	0.0000	FLOOD RISK
15 minute winter	BC-S2	11	7.264	0.816	27.8	0.9229	0.0000	SURCHARGED
720 minute winter	BC-S3	690	6.901	0.567	3.0	0.6413	0.0000	SURCHARGED
720 minute winter	BC-ST1	690	6.901	0.624	7.3	61.9343	0.0000	SURCHARGED
720 minute winter	BC-S4	690	6.900	0.806	4.7	0.9119	0.0000	SURCHARGED
720 minute winter	BC-S5	675	6.900	0.864	6.4	0.9769	0.0000	SURCHARGED
720 minute winter	BC-S6	675	6.903	0.992	8.4	1.1214	0.0000	SURCHARGED
15 minute winter	BC-S7	11	6.967	0.067	8.0	0.0760	0.0000	OK
15 minute winter	BC-S8	10	7.119	0.069	8.1	0.0778	0.0000	OK
15 minute winter	BC-S9	10	7.224	0.074	8.2	0.0832	0.0000	OK
15 minute winter	BC-S10	10	7.263	0.063	8.2	0.0717	0.0000	OK
720 minute winter	BC-S11	705	6.916	0.166	1.6	0.1874	0.0000	SURCHARGED
720 minute winter	BC-S12	705	6.916	0.238	1.6	0.2688	0.0000	SURCHARGED
720 minute winter	BC-ST2	675	6.902	1.385	13.5	112.7598	0.0000	SURCHARGED
960 minute winter	BC-CP	960	6.894	0.312	4.7	86.7500	0.0000	SURCHARGED
720 minute winter	BD-S1	690	6.900	0.325	5.1	26.6412	0.0000	SURCHARGED
720 minute winter	BD-S2	645	6.900	0.387	3.6	0.4380	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	BB-S1	1.000	BB-S2	2.7	0.288	0.038	2.7815	
720 minute winter	BB-S2	1.001	BB-S3	6.0	0.391	0.083	0.2129	
600 minute winter	BB-S3	1.002	BB-ST1	7.0	0.545	0.099	0.6329	
720 minute winter	BB-S4	2.000	BB-S3	1.8	0.847	0.066	0.1856	
720 minute winter	BB-ST1	1.003	MH-S1	6.4	0.576	0.090	0.5707	
15 minute winter	BC-S1	6.000	BC-S2	14.2	0.809	0.805	0.5353	
15 minute winter	BC-S2	6.001	BC-S3	28.1	1.597	1.589	0.2022	
720 minute winter	BC-S3	6.002	BC-ST1	2.8	0.685	0.158	0.0999	
720 minute winter	BC-ST1	6.003	BC-S4	-4.6	0.620	-0.259	0.1905	
720 minute winter	BC-S4	6.004	BC-S5	4.1	0.462	0.104	0.3910	
720 minute winter	BC-S5	6.005	BC-S6	6.3	0.607	0.158	0.3318	
720 minute winter	BC-S6	4.004	MH-S7	8.3	0.493	0.117	3.1313	
15 minute winter	BC-S7	4.002	BC-CP	7.8	0.637	0.197	0.7470	
15 minute winter	BC-S8	4.001	BC-S7	8.0	0.808	0.184	0.2143	
15 minute winter	BC-S9	4.000	BC-S8	8.1	0.751	0.200	0.1767	
15 minute winter	BC-S10	5.000	BC-CP	8.0	1.182	0.333	0.1484	
720 minute winter	BC-S11	3.000	BC-S12	1.6	0.733	0.090	0.1275	
720 minute winter	BC-S12	3.001	BB-ST1	1.6	1.051	0.040	0.0918	
720 minute winter	BC-ST2	1.013	MH-S9	7.4	0.144	0.047	0.6444	
960 minute winter	BC-CP	4.003	BC-S6	3.0	0.523	0.075	0.2226	
720 minute winter	BD-S1	8.000	BD-S2	-3.6	0.349	-0.090	0.4172	
720 minute winter	BD-S2	8.001	BD-S3	3.2	0.571	0.079	0.2933	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	BD-S3	645	6.900	0.506	6.4	0.5725	0.0000	SURCHARGED
720 minute winter	BD-S4	645	6.900	0.787	10.9	1.1263	0.0000	SURCHARGED
720 minute winter	BD-S5	690	6.901	0.476	1.6	0.5381	0.0000	SURCHARGED
720 minute winter	BD-S6	690	6.901	0.533	2.3	0.6025	0.0000	SURCHARGED
720 minute winter	BD-S7	690	6.901	0.568	2.2	0.6420	0.0000	SURCHARGED
960 minute winter	BD-ST1	810	6.908	0.970	6.9	78.9900	0.0000	SURCHARGED
720 minute winter	MH-S1	705	6.916	0.682	6.4	0.9755	0.0000	SURCHARGED
720 minute winter	MH-S2	705	6.914	0.794	6.8	1.1365	0.0000	SURCHARGED
600 minute winter	MH-S3	555	6.923	0.917	7.4	1.3127	0.0000	SURCHARGED
960 minute winter	MH-S4	810	6.912	0.924	6.8	1.0445	0.0000	SURCHARGED
960 minute winter	MH-S5	810	6.919	1.032	12.2	1.1673	0.0000	SURCHARGED
720 minute winter	MH-S6	570	6.916	1.047	8.4	1.1840	0.0000	SURCHARGED
720 minute winter	MH-S7	675	6.901	1.322	17.7	1.8915	0.0000	SURCHARGED
720 minute winter	MH-S8	675	6.902	1.356	13.6	1.9402	0.0000	SURCHARGED
720 minute winter	MH-S9	675	6.903	1.396	7.4	2.4670	0.0000	SURCHARGED
720 minute summer	MH-S10	285	5.491	0.056	4.7	0.0998	0.0000	OK
240 minute winter	SWW-S1	88	5.463	0.045	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	BD-S3	8.002	BD-S4	6.1	0.655	0.045	1.3609	
720 minute winter	BD-S4	7.003	MH-S7	10.8	0.717	0.090	2.3626	
720 minute winter	BD-S5	7.000	BD-S6	1.6	0.397	0.040	0.3813	
720 minute winter	BD-S6	7.001	BD-S7	2.2	0.493	0.055	0.2305	
720 minute winter	BD-S7	7.002	BD-S4	2.1	0.503	0.053	0.9770	
960 minute winter	BD-ST1	1.008	MH-S5	12.2	0.443	0.171	0.8628	
720 minute winter	MH-S1	1.004	MH-S2	6.0	0.548	0.085	1.9509	
720 minute winter	MH-S2	1.005	MH-S3	5.9	0.497	0.084	1.9579	
600 minute winter	MH-S3	1.006	MH-S4	6.7	0.524	0.092	0.2957	
960 minute winter	MH-S4	1.007	BD-ST1	6.3	0.512	0.089	0.8571	
960 minute winter	MH-S5	1.009	MH-S6	12.3	0.521	0.174	0.3098	
720 minute winter	MH-S6	1.010	MH-S7	8.3	0.615	0.073	0.9300	
720 minute winter	MH-S7	1.011	MH-S8	13.6	0.385	0.086	2.1330	
720 minute winter	MH-S8	1.012	BC-ST2	13.5	0.605	0.083	1.8178	
720 minute winter	MH-S9	Hydro-Brake®	MH-S10	4.7				
720 minute summer	MH-S10	1.015	SWW-S1	4.7	0.477	0.029	0.0657	229.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	BB-S1	312	7.506	1.026	6.7	1.1607	0.0000	FLOOD RISK
1440 minute winter	BB-S2	1230	7.507	1.189	5.6	1.3453	0.0000	FLOOD RISK
360 minute winter	BB-S3	248	7.506	1.201	21.3	1.3580	0.0000	FLOOD RISK
480 minute winter	BB-S4	312	7.509	0.809	4.6	0.9146	0.0000	FLOOD RISK
360 minute winter	BB-ST1	248	7.504	1.236	25.3	127.2426	0.0000	FLOOD RISK
15 minute winter	BC-S1	9	7.800	1.050	28.3	1.1876	3.8440	FLOOD
15 minute winter	BC-S2	10	7.714	1.266	36.1	1.4313	0.0000	FLOOD RISK
600 minute winter	BC-S3	405	7.532	1.198	6.1	1.3547	0.0000	FLOOD RISK
600 minute winter	BC-ST1	405	7.528	1.251	13.6	124.1952	0.0000	FLOOD RISK
600 minute winter	BC-S4	405	7.522	1.428	7.6	1.6156	0.0000	FLOOD RISK
600 minute winter	BC-S5	405	7.520	1.484	8.5	1.6788	0.0000	FLOOD RISK
600 minute winter	BC-S6	405	7.515	1.604	13.9	1.8145	0.0000	FLOOD RISK
720 minute winter	BC-S7	465	7.750	0.850	1.5	0.9616	0.0000	FLOOD RISK
720 minute winter	BC-S8	465	7.750	0.700	1.5	0.7917	1.0416	FLOOD
960 minute winter	BC-S9	585	7.750	0.600	1.3	0.6786	0.9619	FLOOD
480 minute winter	BC-S10	336	7.753	0.553	2.2	0.6250	0.0000	FLOOD RISK
480 minute winter	BC-S11	312	7.507	0.757	4.0	0.8567	0.0000	FLOOD RISK
360 minute winter	BC-S12	248	7.505	0.827	4.8	0.9356	0.0000	FLOOD RISK
480 minute summer	BC-ST2	424	7.503	1.986	22.2	122.8664	0.0000	FLOOD RISK
720 minute winter	BC-CP	465	7.751	1.169	15.5	133.4921	0.0000	FLOOD RISK
600 minute winter	BD-S1	390	7.519	0.944	11.8	77.2607	0.0000	FLOOD RISK
600 minute winter	BD-S2	390	7.518	1.005	8.6	1.1368	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	BB-S1	1.000	BB-S2	6.5	0.314	0.092	2.7815	
1440 minute winter	BB-S2	1.001	BB-S3	5.3	0.375	0.074	0.2129	
360 minute winter	BB-S3	1.002	BB-ST1	20.8	0.733	0.292	0.6329	
480 minute winter	BB-S4	2.000	BB-S3	4.4	0.964	0.163	0.1856	
360 minute winter	BB-ST1	1.003	MH-S1	13.8	0.637	0.192	0.5707	
15 minute winter	BC-S1	6.000	BC-S2	16.0	0.909	0.904	0.5353	
15 minute winter	BC-S2	6.001	BC-S3	36.8	2.090	2.080	0.2022	
600 minute winter	BC-S3	6.002	BC-ST1	6.0	0.742	0.336	0.0999	
600 minute winter	BC-ST1	6.003	BC-S4	-7.7	0.622	-0.433	0.1905	
600 minute winter	BC-S4	6.004	BC-S5	5.7	0.468	0.143	0.3910	
600 minute winter	BC-S5	6.005	BC-S6	8.7	0.602	0.217	0.3318	
600 minute winter	BC-S6	4.004	MH-S7	13.4	0.528	0.190	3.1313	
720 minute winter	BC-S7	4.002	BC-CP	1.5	0.160	0.038	2.1420	
720 minute winter	BC-S8	4.001	BC-S7	1.5	0.495	0.034	0.8443	
960 minute winter	BC-S9	4.000	BC-S8	1.3	0.466	0.032	0.6530	
480 minute winter	BC-S10	5.000	BC-CP	2.1	0.826	0.087	0.3848	
480 minute winter	BC-S11	3.000	BC-S12	3.8	0.889	0.217	0.1275	
360 minute winter	BC-S12	3.001	BB-ST1	4.6	1.239	0.114	0.0918	
480 minute summer	BC-ST2	1.013	MH-S9	11.5	0.258	0.072	0.6444	
720 minute winter	BC-CP	4.003	BC-S6	-5.1	0.523	-0.128	0.2226	
600 minute winter	BD-S1	8.000	BD-S2	-8.4	0.367	-0.210	0.4172	
600 minute winter	BD-S2	8.001	BD-S3	-5.2	0.613	-0.129	0.2933	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	BD-S3	390	7.517	1.123	8.9	1.2704	0.0000	FLOOD RISK
600 minute winter	BD-S4	390	7.515	1.402	15.6	2.0069	0.0000	FLOOD RISK
600 minute winter	BD-S5	390	7.517	1.092	3.4	1.2353	0.0000	FLOOD RISK
600 minute winter	BD-S6	390	7.517	1.149	5.1	1.2995	0.0000	FLOOD RISK
600 minute winter	BD-S7	390	7.517	1.184	5.3	1.3386	0.0000	FLOOD RISK
240 minute winter	BD-ST1	216	7.504	1.566	24.6	122.2665	0.0000	FLOOD RISK
1440 minute winter	MH-S1	870	7.500	1.266	7.8	1.8116	96.7626	FLOOD
720 minute winter	MH-S2	450	7.500	1.380	9.0	1.9748	48.2429	FLOOD
1440 minute summer	MH-S3	900	7.514	1.508	6.4	2.1582	0.0000	FLOOD RISK
240 minute winter	MH-S4	216	7.511	1.523	14.6	1.7226	0.0000	FLOOD RISK
960 minute winter	MH-S5	945	7.506	1.619	6.3	1.8315	0.0000	FLOOD RISK
240 minute winter	MH-S6	212	7.525	1.656	19.2	1.8729	0.0000	FLOOD RISK
720 minute winter	MH-S7	465	7.507	1.928	27.8	2.7586	0.0000	FLOOD RISK
720 minute winter	MH-S8	480	7.504	1.958	21.3	2.8018	0.0000	FLOOD RISK
1440 minute winter	MH-S9	870	7.500	1.993	18.7	3.5216	113.1774	FLOOD
240 minute winter	MH-S10	204	5.496	0.061	5.5	0.1084	0.0000	OK
240 minute winter	SWW-S1	204	5.467	0.049	5.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	BD-S3	8.002	BD-S4	8.5	0.653	0.063	1.3609	
600 minute winter	BD-S4	7.003	MH-S7	15.2	0.789	0.128	2.3626	
600 minute winter	BD-S5	7.000	BD-S6	3.5	0.408	0.088	0.3813	
600 minute winter	BD-S6	7.001	BD-S7	5.3	0.530	0.131	0.2305	
600 minute winter	BD-S7	7.002	BD-S4	5.4	0.485	0.135	0.9770	
240 minute winter	BD-ST1	1.008	MH-S5	-18.6	0.547	-0.261	0.8628	
1440 minute winter	MH-S1	1.004	MH-S2	5.9	0.483	0.084	1.9509	
720 minute winter	MH-S2	1.005	MH-S3	-7.2	0.477	-0.102	1.9579	
1440 minute summer	MH-S3	1.006	MH-S4	6.7	0.454	0.092	0.2957	
240 minute winter	MH-S4	1.007	BD-ST1	14.3	0.777	0.202	0.8571	
960 minute winter	MH-S5	1.009	MH-S6	6.5	0.517	0.092	0.3098	
240 minute winter	MH-S6	1.010	MH-S7	-18.0	0.751	-0.158	0.9300	
720 minute winter	MH-S7	1.011	MH-S8	21.3	0.419	0.134	2.1330	
720 minute winter	MH-S8	1.012	BC-ST2	21.4	0.663	0.132	1.8178	
1440 minute winter	MH-S9	Hydro-Brake®	MH-S10	5.5				
240 minute winter	MH-S10	1.015	SWW-S1	5.5	0.498	0.034	0.0741	482.0

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.250
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
BA-S1	0.014	5.00	7.600	1200	292000.446	91926.969	1.050
BA-S2	0.002	5.00	7.600	1200	291999.097	91930.370	1.087
BA-S3	0.012	5.00	7.600	1200	291991.740	91938.348	1.195
BA-S4	0.023	5.00	7.600	1200	291973.111	91921.169	1.447
BA-S5	0.022	5.00	7.600	1200	291970.734	91923.747	1.482
BA-S6			7.650	1200	291968.498	91930.378	1.602
STORAGE	0.064	5.00	7.650		291964.541	91935.292	1.740
BA-S7			7.700	1350	291953.632	91948.841	1.893
SWW-SW2			7.790	1500	291939.139	91956.279	2.079

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	BA-S1	BA-S2	3.659	0.600	6.550	6.513	0.037	98.9	150	5.06	50.0
1.001	BA-S2	BA-S3	10.852	0.600	6.513	6.405	0.108	100.5	150	5.24	50.0
1.002	BA-S3	BA-S4	25.341	0.600	6.405	6.153	0.252	100.6	150	5.66	50.0
1.003	BA-S4	BA-S5	3.507	0.600	6.153	6.118	0.035	100.2	150	5.72	50.0
1.004	BA-S5	BA-S6	6.998	0.600	6.118	6.048	0.070	100.0	150	5.84	50.0
1.005	BA-S6	STORAGE	6.309	0.600	6.048	5.985	0.063	100.1	150	5.94	50.0
1.006	STORAGE	BA-S7	17.395	0.600	5.910	5.807	0.103	168.9	225	6.23	49.5
1.007	BA-S7	SWW-SW2	16.290	0.600	5.807	5.711	0.096	169.7	225	6.50	48.5








Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.010	17.9	1.9	0.900	0.937	0.014	0.0	33	0.660
1.001	1.002	17.7	2.2	0.937	1.045	0.016	0.0	35	0.681
1.002	1.002	17.7	3.8	1.045	1.297	0.028	0.0	47	0.800
1.003	1.004	17.7	6.9	1.297	1.332	0.051	0.0	65	0.940
1.004	1.005	17.8	9.9	1.332	1.452	0.073	0.0	80	1.031
1.005	1.004	17.7	9.9	1.452	1.515	0.073	0.0	80	1.030
1.006	1.003	39.9	18.4	1.515	1.668	0.137	0.0	107	0.981
1.007	1.001	39.8	18.0	1.668	1.854	0.137	0.0	106	0.975

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	3.659	98.9	150	Circular	7.600	6.550	0.900	7.600	6.513	0.937
1.001	10.852	100.5	150	Circular	7.600	6.513	0.937	7.600	6.405	1.045
1.002	25.341	100.6	150	Circular	7.600	6.405	1.045	7.600	6.153	1.297
1.003	3.507	100.2	150	Circular	7.600	6.153	1.297	7.600	6.118	1.332
1.004	6.998	100.0	150	Circular	7.600	6.118	1.332	7.650	6.048	1.452
1.005	6.309	100.1	150	Circular	7.650	6.048	1.452	7.650	5.985	1.515
1.006	17.395	168.9	225	Circular	7.650	5.910	1.515	7.700	5.807	1.668
1.007	16.290	169.7	225	Circular	7.700	5.807	1.668	7.790	5.711	1.854

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	BA-S1	1200	Manhole	Adoptable	BA-S2	1200	Manhole	Adoptable
1.001	BA-S2	1200	Manhole	Adoptable	BA-S3	1200	Manhole	Adoptable
1.002	BA-S3	1200	Manhole	Adoptable	BA-S4	1200	Manhole	Adoptable
1.003	BA-S4	1200	Manhole	Adoptable	BA-S5	1200	Manhole	Adoptable
1.004	BA-S5	1200	Manhole	Adoptable	BA-S6	1200	Manhole	Adoptable
1.005	BA-S6	1200	Manhole	Adoptable	STORAGE		Junction	
1.006	STORAGE		Junction		BA-S7	1350	Manhole	Adoptable
1.007	BA-S7	1350	Manhole	Adoptable	SWW-SW2	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
BA-S1	292000.446	91926.969	7.600	1.050	1200					
						0	1.000	6.550	150	
BA-S2	291999.097	91930.370	7.600	1.087	1200		1	1.000	6.513	150
						0	1.001	6.513	150	
BA-S3	291991.740	91938.348	7.600	1.195	1200		1	1.001	6.405	150
						0	1.002	6.405	150	
BA-S4	291973.111	91921.169	7.600	1.447	1200		1	1.002	6.153	150
						0	1.003	6.153	150	
BA-S5	291970.734	91923.747	7.600	1.482	1200		1	1.003	6.118	150
						0	1.004	6.118	150	
BA-S6	291968.498	91930.378	7.650	1.602	1200		1	1.004	6.048	150
						0	1.005	6.048	150	
STORAGE	291964.541	91935.292	7.650	1.740			1	1.005	5.985	150
						0	1.006	5.910	225	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
BA-S7	291953.632	91948.841	7.700	1.893	1350	<div><div><div><div><div></div><div>0</div></div><div><div></div><div>1</div></div></div></div></div>	1	1.006	5.807	225
						<div><div><div><div><div></div><div>0</div></div><div><div></div><div>1</div></div></div></div></div>	0	1.007	5.807	225
SWW-SW2	291939.139	91956.279	7.790	2.079	1500	<div><div><div><div><div></div><div>1</div></div><div><div></div><div>1</div></div></div></div></div>	1	1.007	5.711	225
						<div><div><div><div><div></div><div>1</div></div><div><div></div><div>1</div></div></div></div></div>				

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.4
Summer CV	0.750	30 year (l/s)	1.0
Winter CV	0.840	100 year (l/s)	1.3
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	✓	100 year 360 minute (m³)	24

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.98
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	0.137	Betterment (%)	50
SAAR (mm)	820	QBar	1.0
Soil Index	5	Q 1 year (l/s)	0.4
SPR	0.53	Q 30 year (l/s)	1.0
Region	8	Q 100 year (l/s)	1.3
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.137	Storm Duration (mins)	360
Soil Index	5	Betterment (%)	50
SPR	0.53	PR	0.565
CWI	122.963	Runoff Volume (m³)	24

Node BA-S7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	5.807	Product Number	CTL-SHE-0098-5000-1500-5000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node STORAGE Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	5.910
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	20

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	105.2	0.0	1.000	105.2	0.0	1.001	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	BA-S1	10	6.589	0.039	2.0	0.0436	0.0000	OK
15 minute winter	BA-S2	10	6.551	0.038	2.3	0.0434	0.0000	OK
15 minute winter	BA-S3	11	6.453	0.048	3.9	0.0539	0.0000	OK
15 minute winter	BA-S4	11	6.250	0.097	7.0	0.1093	0.0000	OK
15 minute winter	BA-S5	11	6.214	0.096	9.9	0.1084	0.0000	OK
15 minute winter	BA-S6	11	6.135	0.087	9.9	0.0988	0.0000	OK
60 minute winter	STORAGE	45	5.984	0.074	10.0	7.4109	0.0000	OK
60 minute winter	BA-S7	46	6.005	0.198	8.9	0.2840	0.0000	OK
15 minute summer	SWW-SW2	1	5.711	0.000	4.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	BA-S1	1.000	BA-S2	2.0	0.554	0.111	0.0130	
15 minute winter	BA-S2	1.001	BA-S3	2.3	0.542	0.127	0.0453	
15 minute winter	BA-S3	1.002	BA-S4	3.9	0.471	0.220	0.2129	
15 minute winter	BA-S4	1.003	BA-S5	7.0	0.583	0.392	0.0419	
15 minute winter	BA-S5	1.004	BA-S6	9.9	0.875	0.555	0.0788	
15 minute winter	BA-S6	1.005	STORAGE	9.8	0.977	0.553	0.0634	
60 minute winter	STORAGE	1.006	BA-S7	8.9	0.413	0.223	0.4194	
60 minute winter	BA-S7	Hydro-Brake®	SWW-SW2	4.4				14.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	BA-S1	10	6.615	0.065	4.8	0.0741	0.0000	OK
15 minute winter	BA-S2	12	6.583	0.070	5.5	0.0792	0.0000	OK
15 minute winter	BA-S3	12	6.570	0.165	9.9	0.1871	0.0000	SURCHARGED
15 minute winter	BA-S4	11	6.497	0.344	15.7	0.3892	0.0000	SURCHARGED
15 minute winter	BA-S5	11	6.422	0.304	21.5	0.3443	0.0000	SURCHARGED
15 minute winter	BA-S6	12	6.244	0.196	21.1	0.2216	0.0000	SURCHARGED
60 minute winter	STORAGE	53	6.137	0.227	24.1	22.6977	0.0000	SURCHARGED
60 minute winter	BA-S7	53	6.135	0.328	8.1	0.4697	0.0000	SURCHARGED
15 minute summer	SWW-SW2	1	5.711	0.000	4.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	BA-S1	1.000	BA-S2	4.8	0.707	0.268	0.0266	
15 minute winter	BA-S2	1.001	BA-S3	5.7	0.649	0.321	0.1393	
15 minute winter	BA-S3	1.002	BA-S4	8.8	0.550	0.497	0.4461	
15 minute winter	BA-S4	1.003	BA-S5	14.6	0.828	0.822	0.0617	
15 minute winter	BA-S5	1.004	BA-S6	21.1	1.199	1.189	0.1232	
15 minute winter	BA-S6	1.005	STORAGE	21.0	1.197	1.186	0.1073	
60 minute winter	STORAGE	1.006	BA-S7	8.1	0.359	0.203	0.6917	
60 minute winter	BA-S7	Hydro-Brake®	SWW-SW2	4.8				34.9

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.24%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	BA-S1	13	7.259	0.709	9.1	0.8020	0.0000	FLOOD RISK
15 minute winter	BA-S2	13	7.249	0.736	7.8	0.8330	0.0000	FLOOD RISK
15 minute winter	BA-S3	13	7.217	0.812	13.9	0.9185	0.0000	FLOOD RISK
15 minute winter	BA-S4	12	7.079	0.926	22.9	1.0471	0.0000	SURCHARGED
15 minute winter	BA-S5	12	6.898	0.780	34.3	0.8826	0.0000	SURCHARGED
15 minute winter	BA-S6	13	6.459	0.411	33.4	0.4653	0.0000	SURCHARGED
120 minute winter	STORAGE	106	6.422	0.512	27.2	51.1942	0.0000	SURCHARGED
120 minute winter	BA-S7	106	6.420	0.613	7.3	0.8777	0.0000	SURCHARGED
15 minute summer	SWW-SW2	1	5.711	0.000	4.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	BA-S1	1.000	BA-S2	6.8	0.751	0.382	0.0644	
15 minute winter	BA-S2	1.001	BA-S3	8.4	0.652	0.473	0.1910	
15 minute winter	BA-S3	1.002	BA-S4	13.2	0.752	0.747	0.4461	
15 minute winter	BA-S4	1.003	BA-S5	22.3	1.268	1.258	0.0617	
15 minute winter	BA-S5	1.004	BA-S6	33.4	1.897	1.880	0.1232	
15 minute winter	BA-S6	1.005	STORAGE	33.3	1.891	1.876	0.1111	
120 minute winter	STORAGE	1.006	BA-S7	7.3	0.327	0.182	0.6918	
120 minute winter	BA-S7	Hydro-Brake®	SWW-SW2	4.9				80.2

Appendix K

Foul Water Drainage Calculations

PRELIMINARY FOUL WATER RUNOFF

Project No: **61645**

Project Name: **Havering Road, Exeter**

Block	Use type	No off	Unit	l/h/day	Volume (m ³)	Flow Rates (l/s)		
						24 hrs	8 hrs	6 hrs
A	Residential	75	no	150	11250.00	0.130	0.391	0.521
B	Residential	56	no	150	8400.00	0.097	0.292	0.389
C	Residential	642	no	150	96300.00	1.115	3.344	4.458
D	Residential	380	no	150	57000.00	0.660	1.979	2.639
Total					172950.00	2.002	6.005	8.007
Peak Discharge				6 x DWF		12.010	36.031	48.042

Calculation based on the values within British Water Flow and Loads - 4

Appendix L

Maintenance Plan

SUDS Feature	Regular Maintenance Activity	Frequency	Occasional Maintenance Activity	Frequency	Responsibility
Pipes and Manholes	Visual inspection	Monthly or as required	Cleaning/jetting when silt accumulation occurs replacement of upper layer of drainage material may be required	Annually or as required	Land owner
Gullies, Channels and Catchpits	Visual inspection	Monthly or as required	Gully pots and catch pits to be emptied	Annually or more frequently if required	Land owner
Control Structures	Inspect control structures for blockages and remove blockage if found	Monthly or as required	Maintenance in accordance with manufacturers recommendations	Annually or as required	Land owner
Proprietary Pollution Control; Device	Visual inspection	Monthly or as required by manufacturer	Cleaning/jetting. Replace filters	Annually or as recommended by manufacturer	Land Owner
Below Ground tank	Visual inspection	Monthly or as required	Remove debris	Annually or as required	Land owner
Floodplain Compensation Area	Visual inspection and remove rubbish	Monthly or as required	Ensure airspace is available	Annually or as required	Land owner

Title: SITE SPECIFIC FLOOD RISK ASSESSMENT
 Project: Haven Road, Exeter
 Client: Welbeck CP
 Project No.: 61645

Appendix M

Mitigation Indices for Stormwater Treatment Device



SDS Limited mitigation indices for stormwater treatment devices November 2018

The pollution mitigation indices are as follows:

Device	Total suspended solids mitigation index	Total metals mitigation index	Soluble metals mitigation index ¹	Hydrocarbons ³
Aqua-swirl™ vortex grit separator	0.8 (0.5 on trunk roads and motorways where the suspended solids level is very high)	0.5 ⁴	The Aquaswirl™ is not designed to remove soluble pollutants	0.7 ³
Aqua-filter™ stormwater filtration unit	0.8	0.8	0.6	0.7 ³
Aqua-swirl™ and Aqua-filter™ in sequence	1.2 ²	0.9	0.6	1.0 ^{2,3}
Aqua-Xchange™	0.8 when installed as a layer in a filter drain	0.9	1.0	0.6 when installed as a layer in a filter drain

These indices can only be assumed when the treatment device is properly sized for the anticipated rate of runoff and the level of pollution in the runoff is not unusually high.

¹ When drainage schemes are designed for road developments in accordance with the Design Manual for Roads and Bridges, the mitigation index for soluble metals is required because particulate metals are considered separately in the total suspended solids assessment

² When designing in accordance with the SuDS Manual (Ciria C753), when two devices are used in sequence to target the same pollutant, half of the mitigation index of the second component should be allowed in the calculation.

³ The test procedures applied to manufactured treatment devices do not include measurement of hydrocarbon removal. Therefore, we have estimated that the Aqua-swirl™ removes free-phase hydrocarbons by flotation, and also removes hydrocarbons that are adhered to suspended solids. However, hydrocarbons are known to preferentially adhere to the smaller particles so the Aqua-filter™ will also remove a high proportion of those hydrocarbons as it is more effective at removing smaller suspended particles.

⁴ Where metals are present in the runoff in particulate form, particularly from vehicle emissions, the Aqua-swirl™ will effectively remove those particles in admixture with other suspended solids.

Appendix N

EA Communication for New Flood Modelling

Brigitte Coles

From: SW_Exeter-PSO <SW_Exeter-PSO@environment-agency.gov.uk>
Sent: 26 April 2022 11:01
To: Stedroy Allen
Cc: SPDC
Subject: RE: 61645 - Haven Banks Retail Park, Exeter, EX2 8BY

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Stedroy,

Many thanks for your enquiry regarding the Exeter flood modelling. Unfortunately there have been further delays to the modelling meaning it is not currently available for us to send out. There have been further improvements to the hydrology and the model is expected to be re-run. We are now hoping to have results ready to share by the end of Summer 2022. Please check in to our PSO email address (SW_Exeter-PSO@environment-agency.gov.uk) closer to this time for the data/an update.

Apologies for any inconvenience this has caused.

Many thanks,

Hannah

Hannah Dolley

Flood and Coastal Risk Management Officer

Partnership and Strategic Overview Team (East)

Devon, Cornwall & Isles of Scilly

Environment Agency | Manley House, Sowton Industrial Estate, Exeter, EX2 7LQ

Team email : SW_Exeter-PSO@environment-agency.gov.uk

Pronouns: she/her (*Why is this here?*)



From: SPDC <SPDC@environment-agency.gov.uk>
Sent: 19 April 2022 17:30
To: SW_Exeter-PSO <SW_Exeter-PSO@environment-agency.gov.uk>
Subject: FW: 61645 - Haven Banks Retail Park, Exeter, EX2 8BY

Hi Team,

Please can you confirm to the customer whether the new flood modelling for this site is available?

Kind regards

Sarah Squire MRTPI

Sustainable Places – Planning Advisor

Environment Agency – Devon, Cornwall and the Isles of Scilly Area

Tel: 0208 474 6316
Email: SPDC@environment-agency.gov.uk

Sir John Moore House, Victoria Square, Bodmin, Cornwall, PL31 1EB
Manley House, Kestrel Way, Exeter, Devon, EX2 7LQ

From: Stedroy Allen <StedroyAllen@rj.uk.com>
Sent: 13 April 2022 10:22
To: SPDC <SPDC@environment-agency.gov.uk>
Cc: Mark Geddes <MarkGeddes@rj.uk.com>
Subject: 61645 - Haven Banks Retail Park, Exeter, EX2 8BY

You don't often get email from stedroyallen@rj.uk.com. [Learn why this is important](#)

FAO: Harriet Fuller

Hi Harriet,

I trust that you are well.

Regarding the above-named site, we were advised by the EA that a new flood modelling exercise would have been undertaken over and above the 2011 modelling to consider new developments. It was suggested in your letter to Mr Jonathon Rowlett, dated 09 February 2022 that the new flood modelling would have been complete by the end of February this year, albeit "low confidence".

Can you please confirm if the new modelling was carried out and if those results are available? The scheme has move on somewhat, and it would be great/beneficial, even if the outcome is similar to the 2011 results, to have a set of updated data for our Flood Risk Assessment.

I attach a copy of your letter for reference.

Many thanks

Stedroy Allen TIStructE
Civil Engineer



 Colchester
01206 228800

 London
020 7448 9910

 Norwich
01603 230240

 Cambridge
01223 314794

 Bristol
01172 020070

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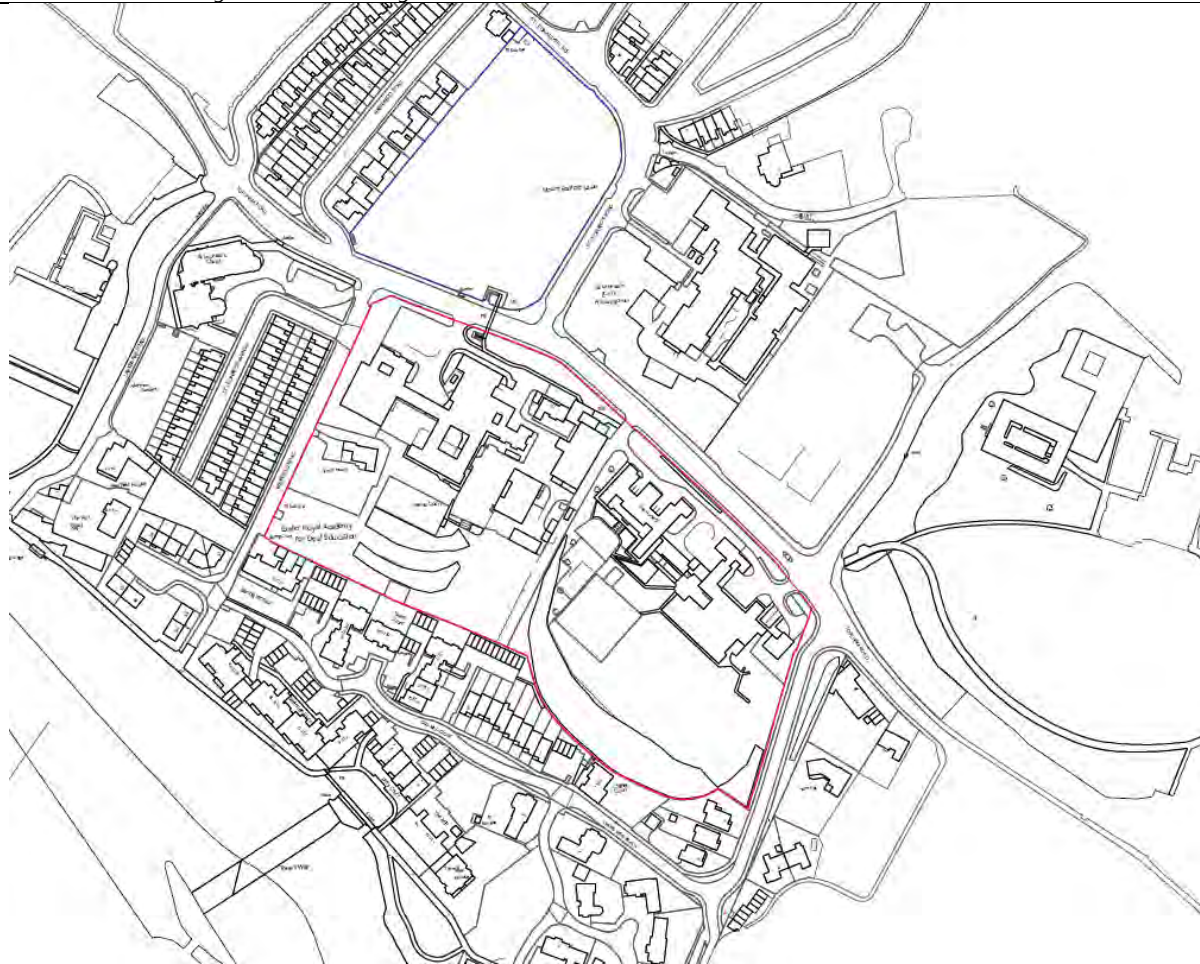
Appendix O

Exeter Sequential Test Search Area

Exeter Sequential Sites



1. Exeter Royal Academy



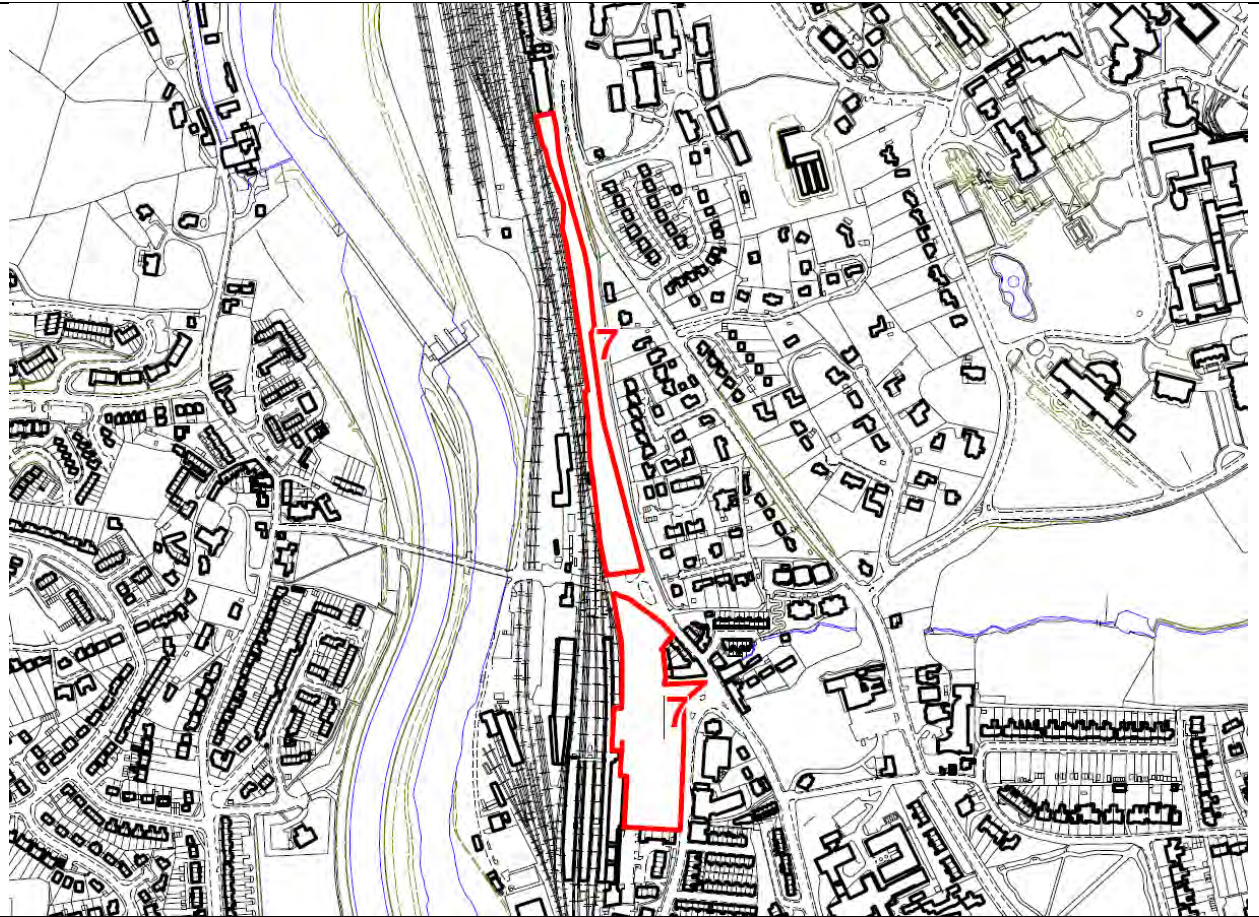
Site Area	3.58ha
Existing or Former Use (if known)	School
Proposed Use (if known)	Residential, care home, assisted living, pre-school accommodation
Flood Risk	Flood Zone 1
Planning Permission	<u>17/1640/FUL – Granted 28 June 2018</u> <i>Redevelopment of the Exeter Royal Academy for Deaf Education (eRADE) site to provide 146 new homes (C3), a care home and assisted living units (both C2), accommodation for a pre-school, access related works, provision of landscaping and open space and other associated works</i>
Comment	The site is much larger than required for the proposals and has already secured planning consent for a comprehensive residential-led development.

2. Former Exwick Middle School



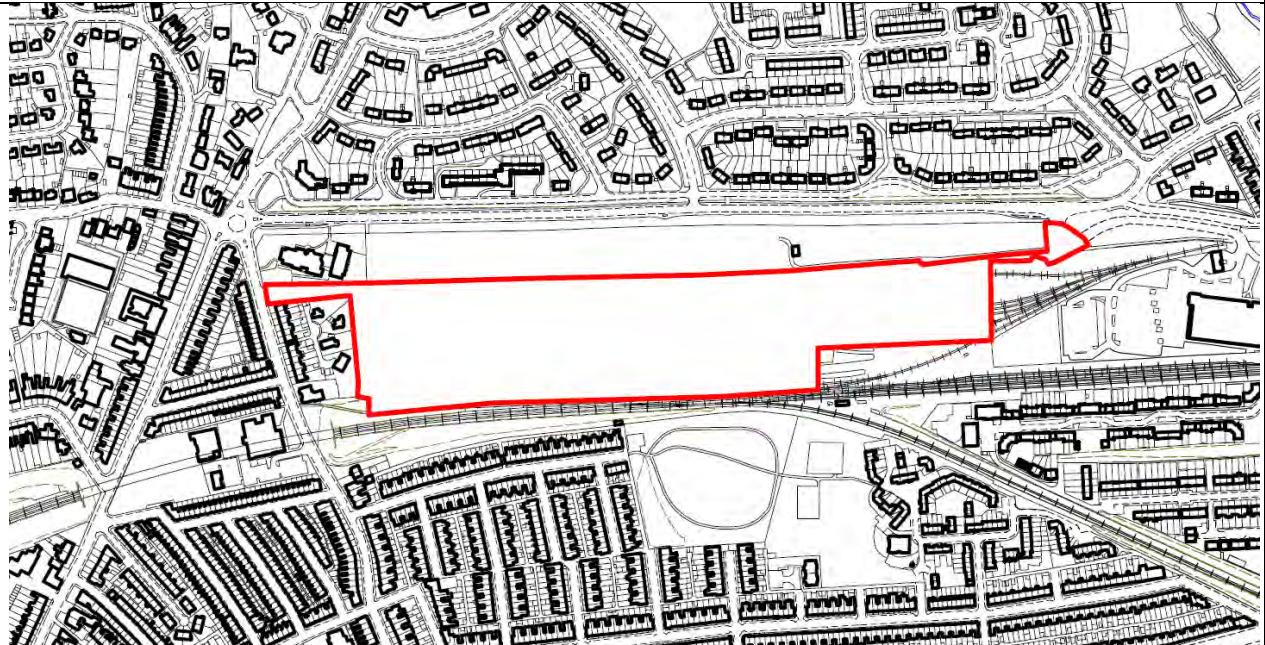
Site Area	1.25ha
Existing or Former Use (if known)	Education/Vacant
Proposed Use (if known)	Residential
Flood Risk	Flood Zone 1
Planning Permission	<p><u>17/1788/OUT – Granted 7 January 2019</u> <i>Outline application for Residential development with vehicular access from Gloucester Road via Higher Exwick Hill (All detailed matters relating to access, appearance, landscaping, layout and scale of development reserved for future consideration).</i></p> <p><u>19/1712/RES – Granted 3 June 2020</u> <i>The construction of 43 dwellings with associated gardens, parking and landscaping with vehicular access from Gloucester Road via Higher Exwick Hill. (Approval of Reserved Matters of Access, Appearance, Landscaping, Layout and Scale pursuant to planning permission reference 17/1788/OUT granted on 7th January 2019).</i></p>
Comment	The site is not a sufficient size to accommodate the proposed development and furthermore, planning permission has already been secured for residential development.

3. Land adj Exeter St Davids Station



Site Area	2.2ha
Existing or Former Use (if known)	Appears to namely comprise car parking
Proposed Use (if known)	N/A
Flood Risk	Flood Zone 3
Planning Permission	Not consented
Comment	The site lies within Flood Zone 3 and therefore has a higher risk of flooding compared to the proposal site. Whilst the site area is of a sufficient size, there are significant constraints due to the layout and orientation.

4. Exmouth Junction, Prince Charles Road



Site Area	6.7ha
Existing or Former Use (if known)	Surface storage area
Proposed Use (if known)	Residential, senior living with care units
Flood Risk	Flood Zone 2
Planning Permission	<p><u>19/0650/OUT – Granted 21 May 2021</u></p> <p>Outline application for the construction of 400 residential dwellings (Class C3), 65 senior living with care units (Class C2), new public open and green spaces, access road, refurbishment and extension of locally listed former water tower, and associated works (Landscaping reserved for future consideration).</p> <p><u>21/1495/FUL – Pending Determination</u></p> <p>Construct a part 4, part 5 storey building containing 89 residential units (Use Class C3) with associated access, parking, landscaping and infrastructure works, in Phase 3 (65 senior living with care units C2) forming part of a larger site granted Outline Planning Permission Ref: 19/0650/OUT.</p>
Comment	The site is significantly greater in size than what is required and is located further from the city centre. Furthermore, planning consent has already been secured.



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