< Back

Learn more about this area's flood risk

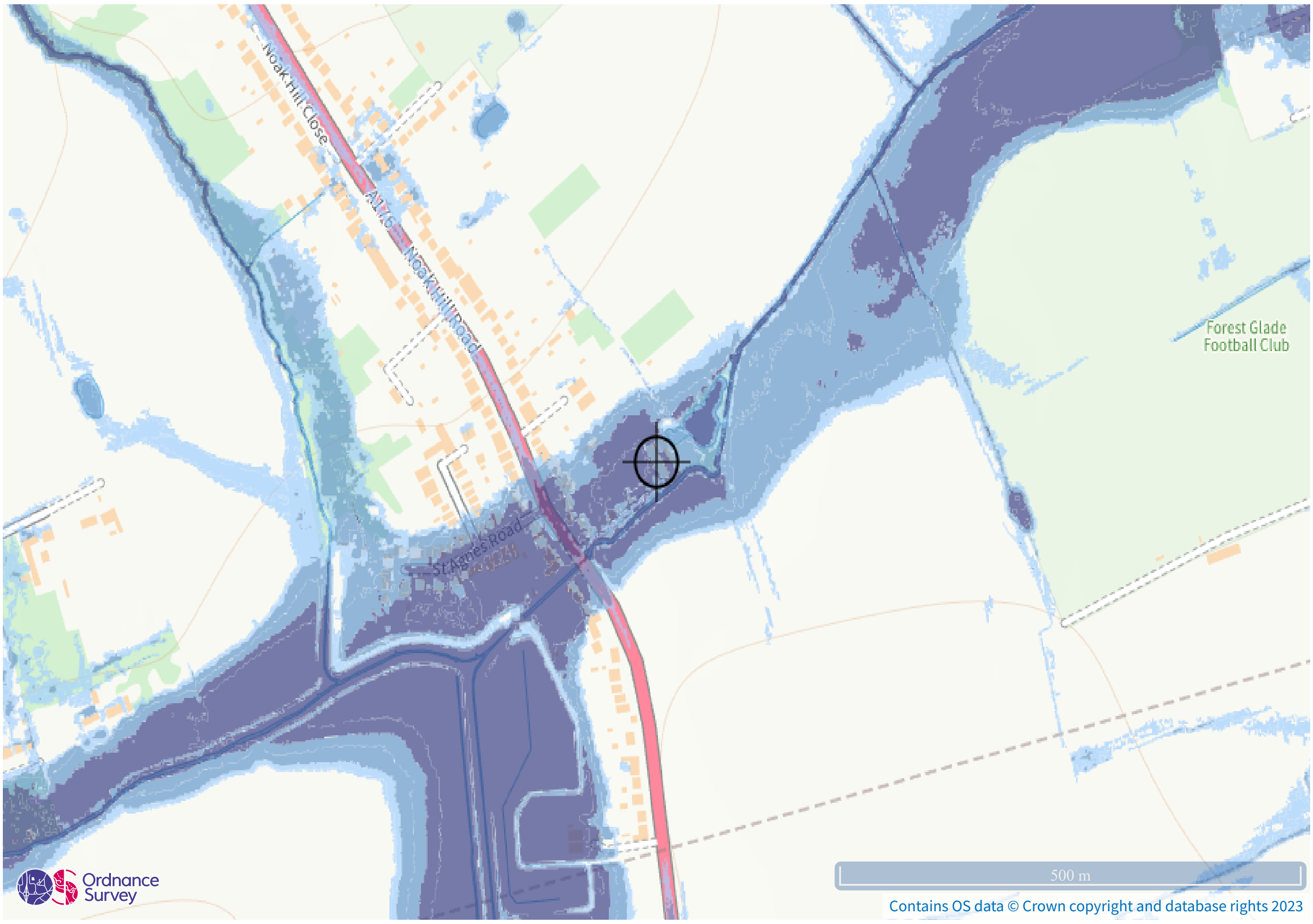
Select the type of flood risk information you're interested in. The map will then update.

Flood risk

Low risk: depth

Location

Enter a place or postcode



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

- Over 900mm
- 300 to 900mm
- Below 300mm

Location you selected

View the flood risk information for the location you originally searched for (/risk)

RichardJackson Engineering Consultants

Appendix F4

Environment Agency Product 4 Flood Data

Environment Agency

Product 4: Supporting Documentation

GUIDANCE INCLUDED:

1. PRODUCT 4 FACT SHEET.
2. FLOOD ZONE 3 FACTSHEET - EAST ANGLIA (EAST)
3. FLOOD RISK ASSESSMENT (FRA) CHECKLIST
4. NEW TIDAL CLIMATE CHANGE ALLOWANCES FOR ESSEX, NORFOLK AND SUFFOLK
5. UPDATED FLUVIAL CLIMATE CHANGE ALLOWANCES FOR ESSEX, NORFOLK AND SUFFOLK

PARTNERSHIP AND STRATEGIC OVERVIEW TEAM – EAST ANGLIA (EAST) Version 6 Updated May 2023

creating a better place

Product 4 Fact Sheet

Thank you for your enquiry.

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

Please refer to the Open Government Licence available here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ which explains the permitted use of this information.

You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

Please be aware that flooding can come from different sources. Examples of these are:
- from rivers or the sea
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system)
- overflowing or backing up of sewer or drainage systems which have been overwhelmed
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea.

Areas Benefiting from Flood Defences

Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year or flooding from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

Flood Risk Assessment Checklist

If you are planning on using this data within a Flood Risk Assessment, we recommend that you take the time to fill in the attached FRA checklist, and to read the attachments which contain information relevant to the area that interests you.

We would like to stress the importance of filling in the Flood Risk Assessment check list and providing up-to-date and correct data. The data will be checked against our records when we review the Flood Risk Assessment in our role as statutory consultee.

It is important that you provide a map in section 2 of the FRA checklist (See Appendix A), including the highest and most representative flood levels for your site. We recommend using a number of nodes that provide a fair representation of the modelled data across your site. For example, if it is a small extension (< 250 square metres) then approximately 5-10 nodes would be sufficient. For larger sites, approximately 10 to 20 nodes would be appropriate.

If you have a new enquiry or would like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months by email at Enquiries_EastAnglia@environment-agency.gov.uk

East Anglia Area
Ipswich Office, Iceni House, Cobham Road, Ipswich, Suffolk, IP3 9JD
General Enquiries: 03708 506506
Email: enquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Flood Zone 3 Factsheet

East Anglia (East)

Oct 2017 - v.7

This factsheet provides information to assist with the preparation of a Flood Risk Assessment (FRA) in support of development proposals reviewed by the East Anglia teams, based at Ipswich. It should be read alongside the Environment Agency's general FRA advice (FRA Guidance note 3). For information relating to proposals managed by East Anglia teams please contact: planning.eastanglia@environment-agency.gov.uk.

This factsheet covers issues relating to FRAs only and does not address other matters we may take into account when considering development proposals (e.g. proximity to a watercourse, contaminated land, Water Framework Directive and biodiversity requirements). For further information on those issues, please contact: planning.eastanglia@environment-agency.gov.uk

Sequential Test and Exception Test

The Local Planning Authority (LPA) will need to be satisfied that the proposed development passes the flood risk Sequential Test, and if applicable, the first part of the Exception Test, in line with requirements of the National Planning Policy Framework (NPPF). We therefore strongly suggest you speak to them prior to commencing work on an FRA. Information regarding the aim of the Sequential Test, applying the Sequential Test and the Exception Test can all be found in the Practice Guide supporting the NPPF.

Inappropriate development

Table 2 of the Practice Guide categorizes developments according to their vulnerability and table 3 sets out which vulnerabilities are inappropriate in Flood Zone 3. You should be aware that we are likely to object in principle where it is indicated that a development is not compatible in Flood Zone 3. Please note that Flood Zone 3b is defined by the Local Planning Authority's Strategic Flood Risk Assessment, or by the 5% (1 in 20 year) modelled flood outlines and levels held by the Environment Agency.

More detail on what should be in the FRA (additional to that highlighted in Guidance Note 3):

The FRA should assess all sources of flooding and provide sufficient information on the characteristics of flooding at the site, such as frequency, depth, velocity, speed of onset, and duration. As a minimum the FRA needs to assess the flood risk on site by comparing our modelled flood levels with a GPS verified topographical survey of the site to determine the anticipated flood depths during the 5% (1 in 20), 1% / 0.5% (1 in 100 / 200) (design) and 0.1% (1 in 1000) (extreme) events including allowances for climate change. Climate change allowances can be found on our website. If the area is protected by defences then the FRA should consider both the actual flood risk to the site through overtopping of the defences, and the residual risk posed by the defences being breached.

- **Sequential approach on site**

If the site contains a range of Flood Zones, the sequential approach should be applied within the site to direct development to the areas of lowest flood risk. If it isn't possible to locate all development in Flood Zone 1, then the most vulnerable elements should be located in the lowest risk parts of the site.

- **Finished Floor Levels**

Proposals for 'more vulnerable' development should include floor levels set no lower than 300 mm above the level of any flooding that would occur if defences were overtopped in a 1% / 0.5% flood event (including allowances for climate change). Safe refuge should also be provided above the 0.1% undefended/breach flood level (including allowances for climate change). We are likely to raise an objection where these requirements are not achieved.
We recommend 'less vulnerable' development also meets this requirement to minimize disruption and costs in a flood event. If this is not achievable then it is recommended that a place of refuge is provided above the 0.1% flood level (including allowances for climate change). Where safety is reliant on refuge it is important that the building is structurally resilient to withstand the pressures and forces (hydrostatic & hydrodynamic) associated with flood water. The LPA may need to receive supporting information and calculations to provide certainty that the buildings will be constructed to withstand these water pressures.

- **Safe Access**

During a flood, the journey to safe, dry areas completely outside the extent of a 1% / 0.5% flood event (including allowances for climate change), should not involve crossing areas of potentially fast flowing water. Those venturing out on foot in areas where flooding exceeds 100 millimetres or so would be at risk from a wide range of hazards, including, for example unmarked drops, or access chambers where the cover has been swept away. Safe access and egress routes should be assessed in accordance with the guidance document 'FD2320 (Flood Risk Assessment Guidance for New Developments)'.

- **Emergency Flood Plan**

Where safe access cannot be achieved, or if the development would be at actual flood risk or residual risk of flooding in a breach, an emergency flood plan must be provided. The plan should deal with matters of evacuation and refuge, and should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the Local Planning Authority.

- **Flood Resilience / Resistance Measures**

To minimize the disruption and cost implications of a flood event we encourage development to incorporate flood resilience/resistance measures up to the extreme 0.1% climate change flood level.
Information on preparing property for flooding can be found in the documents 'Improving the Flood performance of new buildings' and 'Prepare your property for flooding'.

- **Betterment**

Every effort should be made by the applicant to improve the flood risk to the local area, especially if there are known flooding issues. Opportunities should also be taken to provide environmental enhancements as part of the design, for example naturalizing any rivers on the site with a buffer zone on both sides.

- **Increases in Built Footprint (excluding open coast situations)**

It will need to be shown that any increase in built footprint within the extent of a 1% flood event (including allowances for climate change), can be directly compensated for on a volume-for-volume and level-for-level basis to prevent a loss of floodplain storage. If there are no available areas for compensation above the design flood level and compensation will not be possible, then a calculation of the offsite flood risk impacts will need to be undertaken. If this shows significant offsite impacts then no increases in built footprint will be allowed. Further guidance on the provision of compensatory flood storage is provided in section A3.3.10 of the CIRIA document C624.

Flood Defence Consent

Flood Defence Consents now fall under the Environmental Permitting (England and Wales) Regulations 2010 system (EPR). You may need an environmental permit for flood risk activities if you want to do work in, under, over or within 8 metres of a fluvial river or any flood defence structure or culvert / 16m from a tidal river or any flood defence structure or culvert. New forms and further information can be found at: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits .

Local policies and recommendations

You will need to demonstrate to the Local Planning Authority that the requirements of any local flood risk planning policies have been met and the recommendations of the relevant Strategic Flood Risk Assessment, Shoreline Management Plans and Catchment Flood Management Plans have been considered.

Further Information:

If you require the flooding information we hold for this site then please email our local Customers and Engagement Team: enquiries_eastanglia@environment-agency.gov.uk. For further details on our flood map products please visit our website at: www.environment-agency.gov.uk/research/planning/93498.aspx.

Environment Agency

Flood Risk Assessment (FRA) Checklist	
This document should be attached to the front of the Flood Risk Assessment (FRA) issued to Local Planning Authorities (LPA) in support of a development proposal which may be at risk of flooding. This document is not a substitute for a FRA. Please note, under our responsibilities as a statutory consultee we will review any submitted FRA only in respect to fluvial and tidal risk. Your FRA should also consider other sources of flooding such as surface water, drainage, and ground water flooding.	
1.Development Proposal	
Site name	
National Grid Reference (NGR)	
Flood Risk Assessment	Reference/Title: Date:
Existing site use & vulnerability classification	
Proposed site use & vulnerability classification	
2. Flood Risk	
Flood Zone(s) affecting the site/property	
Sources of flooding affecting the site	
Have you considered flood storage compensation?	Yes/No **
3. Please provide a node map and accompanying table in the Flood Risk Assessment similar to the example given (see Appendix A). You should clearly demonstrate the highest and most representative flood levels for your proposed development. For example, if it is a small extension (< 250 square metres) then approximately 5-10 nodes would be sufficient. For larger sites, approximately 10 to 20 nodes would be appropriate.	
4. Mitigation	
Finished floor levels (in mAOD) for each proposed floor. Have you considered a freeboard for these Finished Floor Levels?***	
Drawing reference showing Finished Floor Levels for proposed development	
Have you considered suitable internal and external access for safe refuge above the flood level?	Yes/No
5.Proximity to the watercourse/ flood defence/ culvert	
Are the proposed developments on, over, under or within 8 metres of a fluvial main river or 16 metres of a tidal main river or flood defence?	Yes/No If yes, please provide a cross section drawing in your planning application showing the distance of the proposed development in relation to the watercourse/flood defence/culvert. If yes, this will require a Flood Risk Activity Permit.
Map 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 be aware floodplain compensation may be required for your site. Floodplain compensation is normally required when the proposed site use has an increased built footprint in relation to the existing site use and lies primarily in Flood Zone 3, which is considered the fluvial floodplain. This is normally demarked in the modelled data by the 1 in 100 + Climate Change flood return period.**

***** Please refer to the Local Authority's SFRA for further guidance on freeboard requirements for each type of development**

Environment Agency, Iceni House, Cobham Road, Ipswich, IP3 9JD
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Planning advice and guidance
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

Complete the form in the link and email back to planning.eastanglia@environment-agency.gov.uk

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.

Flood Risk Assessments guidance
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/
https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications
https://www.gov.uk/guidance/flood-risk-and-coastal-change

You should also consult the Strategic Flood Risk Assessment and flood risk local plan policies 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 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 overland runoff. You should discuss surface water management with your Lead Local Flood Authority.
3. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection due to insufficient information

Advice to Consultants
The data provided in the checklist and FRA will be checked against our records as we review the FRAs when consulted on by the Local Planning Authority in our remit as statutory consultee for flood risk from tidal and fluvial sources. We require you to get in touch with us to check for the most up to date model information and FRA checklist. Having the latest data is important as not having the data will possibly delay us in reviewing your application at planning stage.

Environment Agency, Iceni House, Cobham Road, Ipswich, IP3 9JD
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Appendix A: (This is an example only for how to do the node map and accompanying table)

1. Outline your site boundary clearly

2. Clearly mark the node points where you are extracting data from

3. Select node points that cover the site, around the site itself, and along the access route to the site to give a representative sample

	National Grid Reference		Modelled Levels
Node	**Easting**	**Northing**	**[insert return period]**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Environment Agency, Iceni House, Cobham Road, Ipswich, IP3 9JD
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Flood risk assessments: Climate change allowances

Application of the allowances and local considerations

East Anglia; Essex, Norfolk, Suffolk, Cambridgeshire and Bedfordshire

1) The climate change allowances

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in October 2021 and is available on Gov.uk. The guidance can be used for planning applications, local plans, neighbourhood plans and other projects. It provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, rather than a single national allowance. It advises on what allowances to use for assessment based on vulnerability classification, flood zone and development lifetime.

2) Assessment of climate change impacts on fluvial flooding

Where existing EA flood risk datasets and models do not provide the required climate change allowances, it is up to developers to undertake any work needed to appropriately assess the impacts of climate change on flood risk. They can do this by using the approaches in **Table A** below:

Table A below indicates the level of technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location. This should be used as **a guide only**. Ultimately, the agreed approach should be based on expert local knowledge of flood risk conditions, local sensitivities and other influences. **For these reasons, we recommend that applicants and / or their consultants should contact the Environment Agency at the pre-planning application stage to confirm the assessment approach, on a case by case basis**. The email addresses for our Sustainable Places teams at our respective offices can be found in Section 8 below.

Table A defines three possible approaches to account for flood risk impacts due to climate change, in new development proposals:

- **Basic:** Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.
- **Intermediate:** Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance being applied to the 'design flood' flow.
- **Detailed:** Perform detailed hydraulic modelling, either through re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.

Table A – Indicative guide to assessment approach

VULNERABILITY CLASSIFICATION	FLOOD ZONE	DEVELOPMENT TYPE		
		NON-MAJOR	SMALL-MAJOR	LARGE-MAJOR
ESSENTIAL INFRASTRUCTURE	Zone 2	Detailed		
	Zone 3a	Detailed		
	Zone 3b	Detailed		
HIGHLY VULNERABLE	Zone 2	Intermediate/ Basic	Intermediate/ Basic	Detailed
	Zone 3a	Not appropriate development		
	Zone 3b	Not appropriate development		
MORE VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Intermediate/ Basic	Detailed	Detailed
	Zone 3b	Not appropriate development		
LESS VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Basic	Basic	Detailed
	Zone 3b	Not appropriate development		
WATER COMPATIBLE	Zone 2	None		
	Zone 3a	Intermediate/ Basic		
	Zone 3b	Detailed		

Note: Where the table states 'not appropriate development', this is in line with national planning policy. If in exceptional circumstances such development types are proposed in these locations, we would expect a detailed modelling approach to be used.

NOTES:

- Non-Major: 1-9 dwellings/ less than 0.5 ha | Office / light industrial under 1ha | General industrial under 1 ha | Retail under 1 ha | Gypsy/traveller site between 0 and 9 pitches
- Small-Major: 10 to 30 dwellings | Office / light industrial 1ha to 5ha | General industrial 1ha to 5ha | Retail over 1ha to 5ha | Gypsy/traveller site over 10 to 30 pitches
- Large-Major: 30+ dwellings | Office / light industrial 5ha+ | General industrial 5ha+ | Retail 5ha+ | Gypsy/traveler site over 30+ pitches | any other development that creates a non-residential building or development over 1000 sq m.

The assessment approach should be agreed with the Environment Agency as part of pre-planning application discussions to avoid abortive work.

3) Specific local considerations

Where the Environment Agency and the applicant and / or their consultant has agreed that a '**basic**´ level of assessment is appropriate, the figures in Table B below can be used as a precautionary allowance for potential climate change impacts on peak 'design' (i.e. 1% annual probability) fluvial flood level rather than undertaking detailed modelling.

Table B – Local precautionary allowances for potential climate change impacts

Essex, Norfolk and Suffolk

Hydraulic Model (Watercourse)	Precautionary allowance (basic approach)
Blackwater & Brain - Blackwater between TL7520925623 and TL7820324314 Brain between TL7373323312 and TL7683821321	500mm
Other main rivers, tributaries and ordinary watercourses	For other main rivers, tributaries and ordinary watercourses that are not stated above, basic allowances have not been calculated. In this instance you can either: • If flow data is available you can request this data from us and can conduct an intermediate assessment yourself • Or alternatively, you can choose to undertake a Detailed Assessment and "perform detailed hydraulic modelling, through either re-running our hydraulic models (if available) or constructing a new model

Cambridgeshire and Bedfordshire

Watercourse / Model	Precautionary allowance (basic approach)
Alconbury Brook	600mm
River Kym	
Lower Ouse (Model Extent)	700mm
Mid Ouse (Cold Brayfield to Bromham – between SP9156852223 and TL0132950919)	700mm
Mid Ouse (East of Bedford to Roxton – between TL0791848903 and TL1618854543)	700mm
River Hiz and River Purwell	400mm
River Ivel	500mm
Pix Brook	450mm
Potton Brook	500mm
River Cam and tributaries (excluding the Cam Lodes and the Slade System)	450mm
Great Barford (ordinary watercourses)	500mm
Bromham (ordinary watercourse)	550mm

NOTES:

Urban areas excluded from the 'basic' approach: St Ives, Holywell, Godmanchester, Swavesey, Over, Bedford, Newport Pagnell, Buckingham and Leighton Buzzard. More detailed assessment of climate change allowances will need to be undertaken in these locations.

Use of these allowances will only be accepted after discussion with the Environment Agency.

4) Fluvial flood risk mitigation

For planning consultations where we are a statutory consultee and our Flood risk standing advice **does not** apply we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications. **These are a guide only**. **We strongly recommend you contact us at the pre-planning application stage to confirm this on a case by case basis.** For planning consultations where we are not a statutory consultee or our Flood risk Standing advice applies, we recommend that local planning authorities and developers use these benchmarks but we do not expect to be consulted.

- For development classed as '**essential infrastructure**' our benchmark for flood risk mitigation is for it to be designed to the '**higher central**' climate change allowance for the epoch that most closely represents the lifetime of the development, including decommissioning. Please note that nationally significant infrastructure projects (NSIPs) may also need to assess a **credible maximum climate change scenario** by applying the '**upper end**' allowance for peak river flow as a sensitivity test. This will help to determine how sensitive the development is to changes in the climate and to ensure that it can be adapted to large-scale climate change over its lifetime.

- For **highly vulnerable**, **more vulnerable, less vulnerable and water compatible** developments in flood zones 2 and 3a, the '**central**' climate change allowance is our minimum benchmark for flood risk mitigation. For large urban settlement extensions or developments that form new communities, the credible maximum climate change scenario must be assessed; in these circumstances, you should use the '**upper end'** allowance.

- For **water compatible** development in flood zone 3b, the '**central**' climate change allowance for the epoch that most closely represents the lifetime of the development is our minimum benchmark for flood risk mitigation.

For peak river flow allowances and a visual representation of the above, please see Tables 1 and 2 below.

Table 1 peak river flow allowances by Management Catchment (use 1961 to 1990 baseline)				
Management Catchment	**Allowance category**	**Total potential change anticipated for '2020s' (2015 to 39)**	**Total potential change anticipated for '2050s' (2040 to 2069)**	**Total potential change anticipated for '2080s' (2070 to 2125)**
Upper and Bedford Ouse	**Upper end**	24%	30%	58%
	Higher central	10%	11%	30%
	Central	5%	4%	19%
Cam and Ely Ouse	**Upper End**	21%	22%	45%
	Higher Central	7%	5%	19%
	Central	2%	-2%	9%
Old Bedford and Middle Level	**Upper End**	23%	22%	39%
	Higher central	9%	4%	15%
	Central	3%	-3%	6%
North West Norfolk	**Upper End**	30%	34%	57%
	Higher central	18%	18%	33%
	Central	13%	11%	23%
North Norfolk Rivers	**Upper End**	26%	27%	48%
	Higher central	13%	11%	24%
	Central	7%	4%	14%
Broadland Rivers	**Upper End**	27%	27%	44%
	Higher central	14%	10%	20%
	Central	8%	3%	11%
East Suffolk	**Upper End**	25%	29%	54%
	Higher central	13%	13%	29%
	Central	8%	7%	19%
Combined Essex	**Upper End**	27%	37%	72%
	Higher central	13%	16%	38%
	Central	7%	8%	25%

South Essex	**Upper End**	22%	27%	48%
	Higher central	11%	11%	26%
	Central	6%	5%	17%

If you are not sure which management catchment your site falls within, please use the guidance and link to the peak river flow map, which can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-river-flow-allowances

Table 2: Using peak river flow allowances for flood risk assessments

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
2	higher central[1]	central[2]	central[2]	central	central
3a	higher central[1]	**X**	central[2]	central	central
3b	higher central[1]	**X**	**X**	**X**	central

X – Development should not be permitted
If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the higher central allowance.

[1] For NSIPs, the 'upper end' allowance should be used to assess a credible maximum climate change scenario.

[2] For large urban settlement extensions or developments that form new communities, the credible maximum climate change scenario must be assessed. In these circumstances, you should use the 'upper end' allowance.

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case we may want to check this data and how you propose to use it.

Assessing off-site impacts and calculating floodplain compensation

The appropriate allowance to assess off-site impacts and calculation floodplain compensation requirements depends on the land uses in affected areas.

The '**central'** allowance should be used in most cases. However, the '**higher central'** allowance should be used when the affected area contains essential infrastructure.

5) Development in tidal flood risk areas

For flood risk assessments and strategic flood risk assessments, assess both the **higher central** and **upper end** allowances for all development vulnerability classes (see table 3 below).

For NSIPs and large urban settlement extensions or developments that form new communities, the **credible maximum climate change scenario** should be assessed (sea level rise and sensitivity test allowances for offshore wind speed and extreme wave height and storm surge uplift). To assess the flood risk from a high impact climate change scenario, you should use the H^{++} allowance of 1.9m for the total sea level rise to 2100.

Table 3: sea level allowances for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level risk for each epoch is in brackets

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Anglian	Higher central	5.8 (203)	8.7 (261)	11.6 (348)	13 (390)	1.20
Anglian	Upper end	7 (245)	11.3 (339)	15.8 (474)	18.1 (543)	1.60
South east	Higher central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.20
South east	Upper end	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.60

6) Tidal flood risk mitigation

For planning consultations where we are a statutory consultee and our flood risk standing advice does not apply, we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications. **These are a guide only. We strongly recommend you contact us at the pre-planning application stage to confirm this on a case by case basis. Please note you may be charged for this advice.** For planning consultations where we are not a statutory consultee or our flood risk standing advice applies, we recommend that local planning authorities and developers use these benchmarks but we do not expect to be consulted.

- For development classed as essential Infrastructure, highly vulnerable development and more vulnerable development, our minimum benchmark for flood risk mitigation is the **'upper end'** climate change allowance for the development lifetime (including decommissioning where relevant).

- For water compatible or less vulnerable development (e.g. commercial), our minimum benchmark for flood risk mitigation is the **'higher central'** climate change allowance for the development lifetime. In sensitive locations it may be necessary to use the **'upper end'** allowance to inform built in resilience.

If you are using our 2018 Coastal Flood Modelling Data outputs:
The **upper end** allowance become progressively higher each year than the climate change flood level outputs used in our current 2018 coastal flood model. So as an approximation we recommend that the following uplift values are added on to the on-site climate change flood levels provided in the Product 4:

- For development lifetimes extending to 2122, add 0.34m
- For development lifetimes extending to 2123, add 0.36m
- For development lifetimes extending to 2124, add 0.38m
- For development lifetimes extending to 2125, add 0.40m

If the proposed development is greater than 30 houses and the flood zone is in an open-coast location, we recommend that a more accurate impact of the increased upper end flood levels on the overtopping on-site flood levels is modelled by rerunning our coastal overtopping model with the new flood levels; you can obtain the model from us with a Product 6 and 7 request. If the site is located within a small or constrained tidal or coastal floodplain then regardless of the size of the development, you may also need to undertake remodelling of the flood levels to obtain an accurate assessment of the impacts of climate change; please contact us for advice (contact details in Section 8 below).

If you are using our Broads 2008 Flood Modelling Data outputs:
For the **upper end** allowance, please add the following uplift values onto the climate change flood levels provided in the Product 4:

- For development lifetimes extending to 2122, add 0.34m
- For development lifetimes extending to 2123, add 0.36m
- For development lifetimes extending to 2124, add 0.38m
- For development lifetimes extending to 2125, add 0.40m

If you are using our 2008 Thames Flood Modelling Data outputs:
Please add the appropriate climate change allowances for the South East River Basin District onto the present day flood levels obtained in the Product 4, starting from a base year of 2005. The allowances should be applied to the year appropriate to the respective development lifetime for residential or commercial developments.
***** note**:** We anticipate that there will be updated flood modelling outputs available for the Thames Estuary in mid-2022. Developers preparing Flood Risk Assessments for developments in this area should check for availability of new data with the East Anglia (East) PSO team (contact details in Section 8 below).*

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case, we may want to check this data and how you propose to use it.

7) Assessment of climate change impacts for Surface Water Management

Please see the latest advice on the use of Peak Rainfall Intensity climate change allowances, which can be found here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

The Environment Agency is not a statutory consultee to the land use planning system for the consideration of surface water flood risk and management. We therefore recommend that you contact the relevant Lead Local Flood Authority (contact details listed below) to discuss Flood Risk Assessment requirements to support your development’s surface water management proposals.

Cambridgeshire County Council - fr.planning@cambridgeshire.gov.uk
Central Bedfordshire Council – floodrisk@centralbedfordshire.gov.uk
Bedford Borough Council – floodrisk@bedford.gov.uk
Milton Keynes Council – llfa@milton-keynes.gov.uk
Buckinghamshire County Council - floodmanagement@buckscc.gov.uk
Herts County Council - floodandwatermanagement@hertscc.gov.uk
Northamptonshire County Council - floodandwater@northamptonshire.gov.uk
Norfolk County Council – llfa@norfolk.gov.uk
Suffolk County Council – floods@suffolk.gov.uk
Essex County Council – suds@essex.gov.uk
Thurrock Council – TransportDevelopment@thurrock.gov.uk
Southend-on-Sea Council – llfa@southend.gov.uk

8) Our Service

Non-chargeable service

We will give a free opinion on:

- What climate change allowance to apply to a particular development type
- Which technical approach is suitable in the FRA

Chargeable service:

- Review of climate change impacts using intermediate and detailed technical approaches (i.e. modelling review)
- Assessment and review of proposals for managed adaptation.

Contact Details

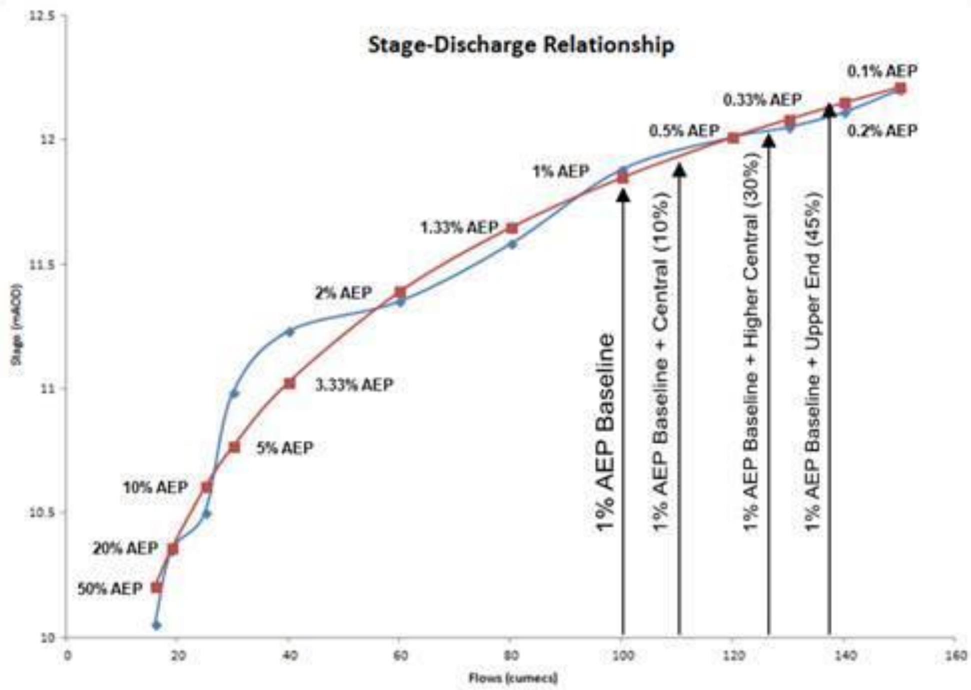
For East Anglia (Great Ouse Catchment): planning.brampton@environment-agency.gov.uk

For East Anglia (East): planning.ipswich@environment-agency.gov.uk

Appendix 1 – Further information on the Intermediate approach.

1) The methodology the chart is based on does not produce an accurate stage-discharge rating and is a simplified methodology for producing flood levels that can be applied in low risk small-scale development situations.
2) The method should not be applied where there is existing detailed modelled climate change outputs that use the new allowances. In such circumstances, the 'with climate change' modelled scenarios should be applied.

An example stage-discharge relationship is shown below.



Flood risk assessment data

Location of site: 568475 / 191199 (shown as easting and northing coordinates)
Document created on: 6 July 2023
This information was previously known as a product 4.
Customer reference number: DW3RT4VX1AE5

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 get 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
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Not included in this document

This document does not include a Flood Defence Breach Hazard Map.

If your location has a reduced flood risk from rivers and sea because of defences, you need to request a Flood Defence Breach Hazard Map and information about the level of flood protection offered at your location from the East Anglia Environment Agency team at enquiries_eastanglia@environment-agency.gov.uk. This information will only be available if modelling has been carried out for breach scenarios.

Include a site location map in your request.

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: Crouch 2016
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 1 May 2017

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 occuring 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 selected location is in flood zone 2.

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

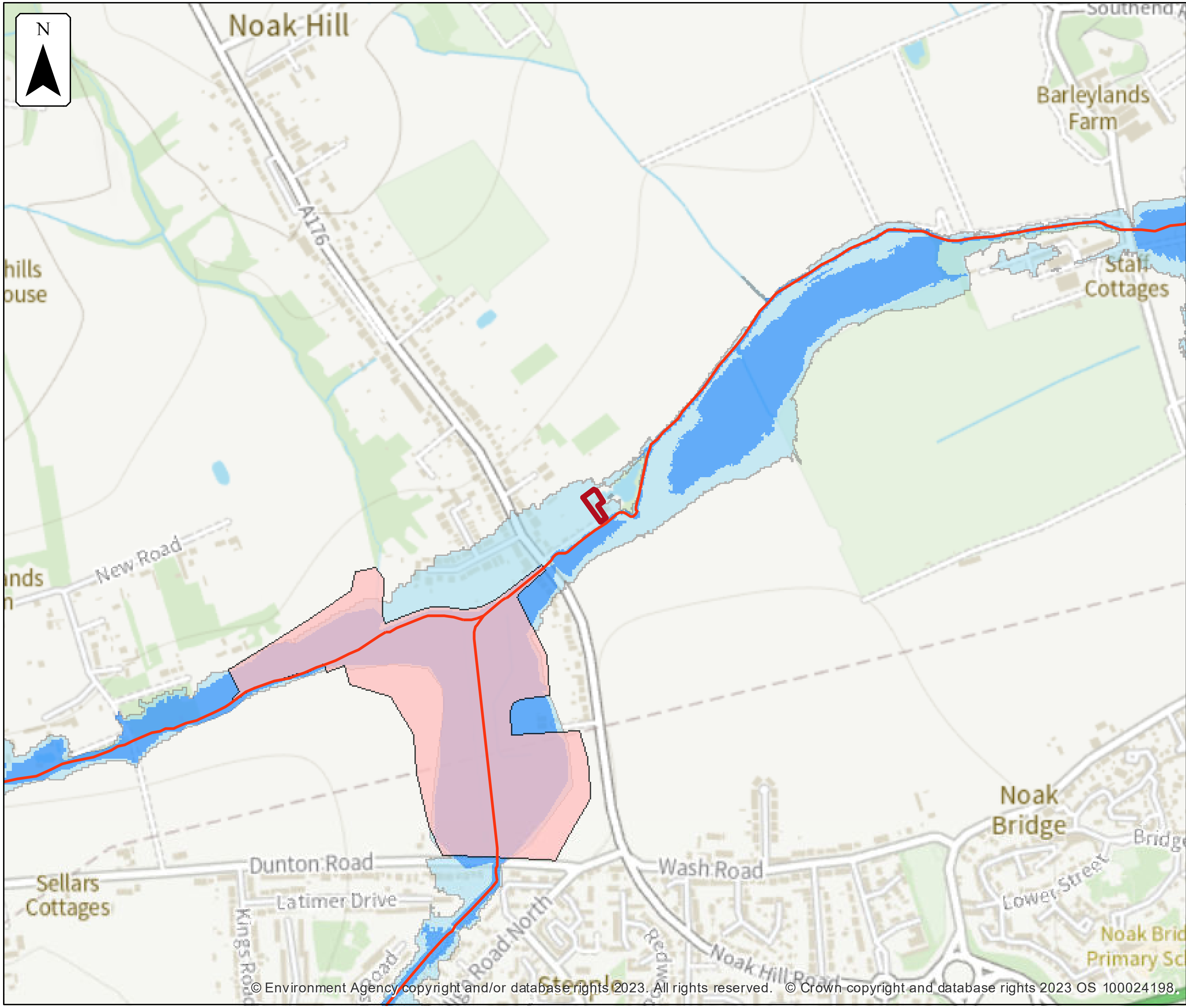
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- 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.



Environment Agency

Flood map for planning

Location (easting/northing)
568475/191199

Scale
1:10,000

Created
6 Jul 2023

- Selected area
- Main river
- Water storage area
- Flood zone 3
- Flood zone 2

0 100 200 300 400 500
metres

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 - we can only supply flood risk data relating to flooding from rivers or the sea

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

Environment Agency

Historic flood map

Location (easting/northing)
568475/191199

Scale
1:10,000

Created
6 Jul 2023

Selected area

Main river

Date of flood event

June, 1958

0 100 200 300 400 500
metres

Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
1 June 1958	30 September 1958	other	other	Yes

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, their condition and the standard of protection. 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.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk

Date: 13/07/2023
Datasheet Reference: EAN/2023/317016

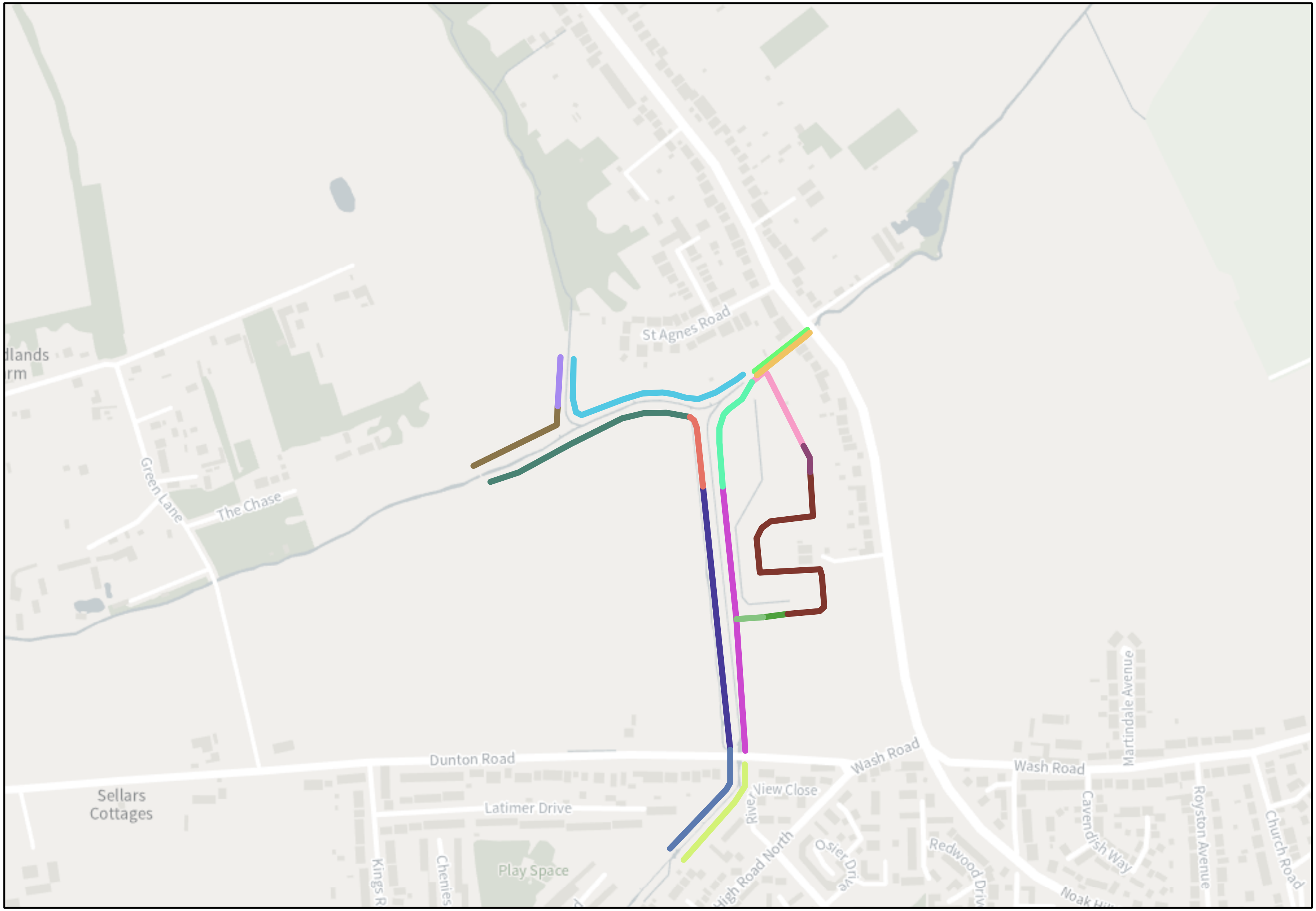
Defence Information

Asset Reference	Maintainer	Asset Type	Asset Description	Overall Condition Grade	Crest Level
10900	Environment Agency	Embankment		2 - Good	25.849
55298	Environment Agency	Embankment	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 Spillway	3 - Fair	25.531
34652	Environment Agency	Embankment	Earth Embankment Part Of Major Asset - FR/04/A003 Laindon Barnes FSA	3 - Fair	25.45
55297	Environment Agency	Embankment		3 - Fair	25.711
34654	Environment Agency	Embankment		3 - Fair	26.15
135590	Environment Agency	Embankment		3 - Fair	26.517
134498	Environment Agency	Embankment		3 - Fair	25.956
55113	Environment Agency	Embankment		3 - Fair	26.37
134499	Environment Agency	Embankment	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 Earth Embankment	3 - Fair	25.46
135592	Environment Agency	Embankment		3 - Fair	25.734
34651	Environment Agency	Embankment	Clay Embankment, Turf Revetment Laindon Barnes FSA FR/04/A003	3 - Fair	26.984
10899	Environment Agency	Embankment		4 - Poor	26.65
10901	Environment Agency	Embankment		2 - Good	25.75
34653	Environment Agency	Embankment	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 Spillway	2 - Good	25.43
55299	Environment Agency	Embankment	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 Earth Embankment, turf revetment	3 - Fair	25.531
135591	Environment Agency	Wall	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 concrete parapet wall and concrete lined channel	4 - Poor	
10898	Environment Agency	Wall	Part Of Major Asset - Laindon Barnes FSA FR/04/A003 concrete parapet wall and concrete lined channel	4 - Poor	

Report

Grade	Rating	Description
1	Very Good	Cosmetic Defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation.
5	Very Poor	Severe defects resulting in complete performance failure.

Flood Defence Location Map
Ref: EAN/2023/317016



Environment Agency

Legend

Defences

AIMSID

- 10898
- 10899
- 10900
- 10901
- 134498
- 134499
- 135590
- 135591
- 135592
- 34651
- 34652
- 34653
- 34654
- 55113
- 55297
- 55298
- 55299

Scale 1:7,500

N

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

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(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods

Climate change

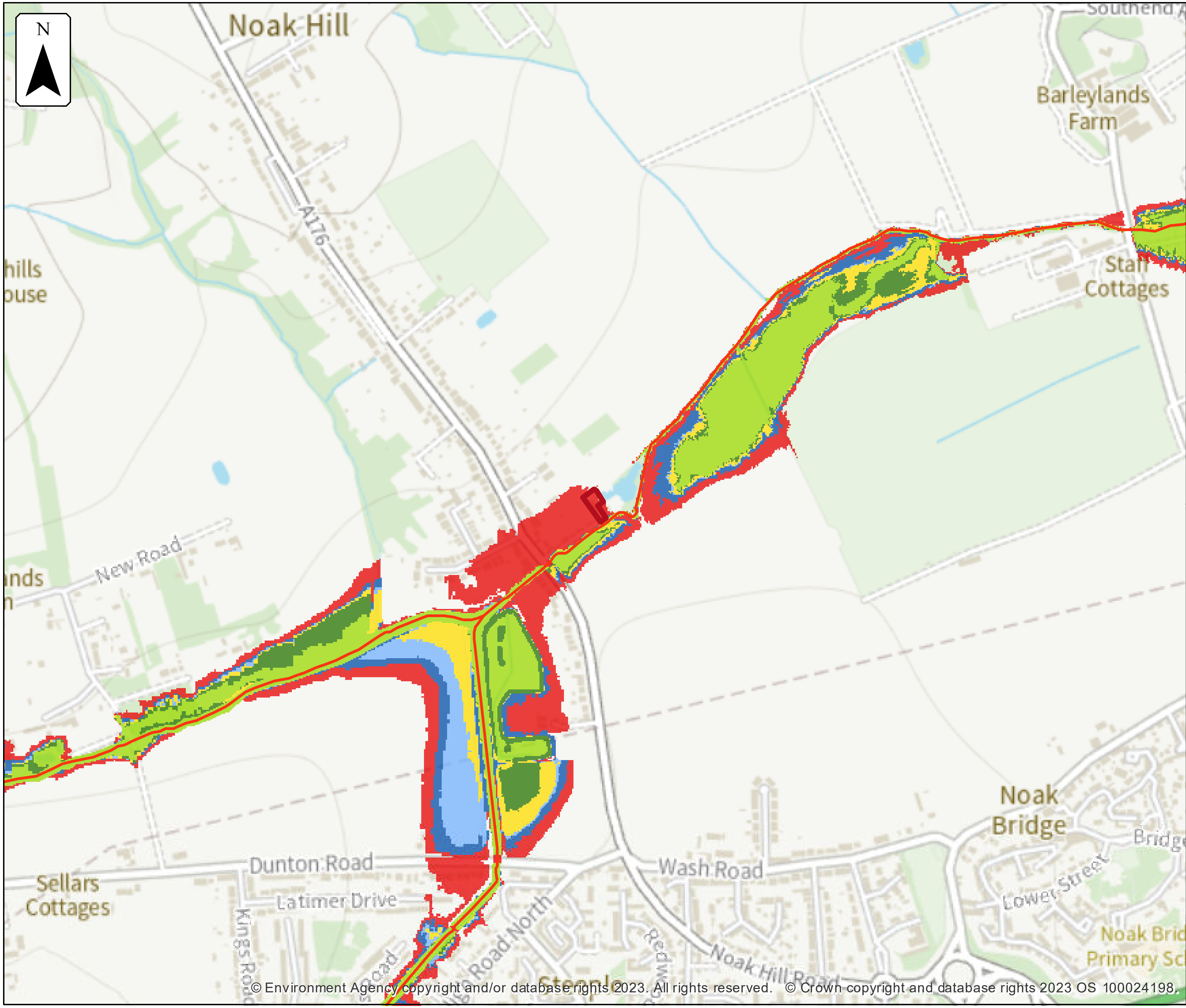
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change



Defended modelled fluvial extent

Location (easting/northing)
568475/191199

Scale **1:10,000**

Created **6 Jul 2023**

Model name
Crouch 2016

Selected area

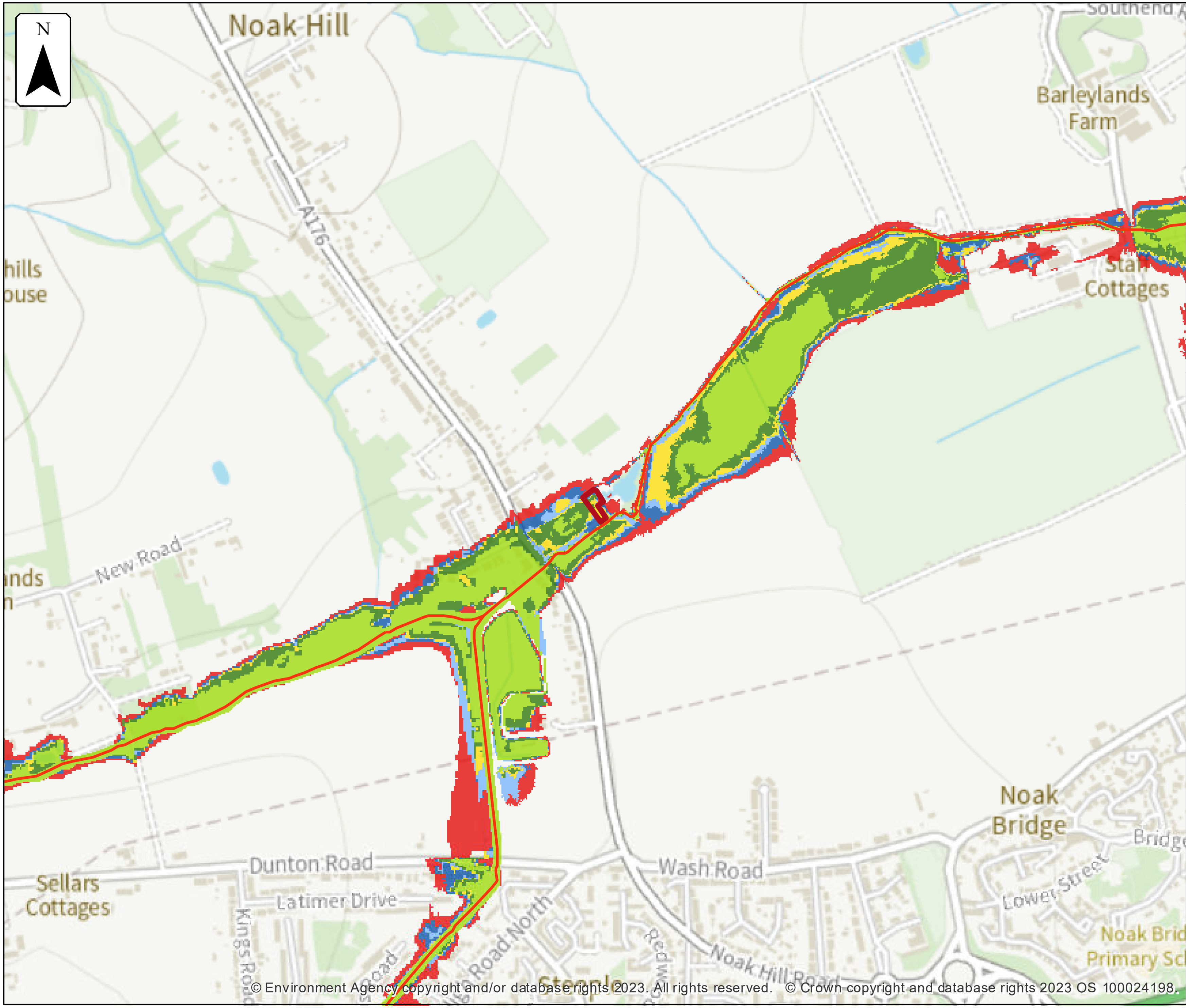
Main river

Modelled flood extent

- 5% AEP
- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
568475/191199

Scale
1:10,000

Created
6 Jul 2023

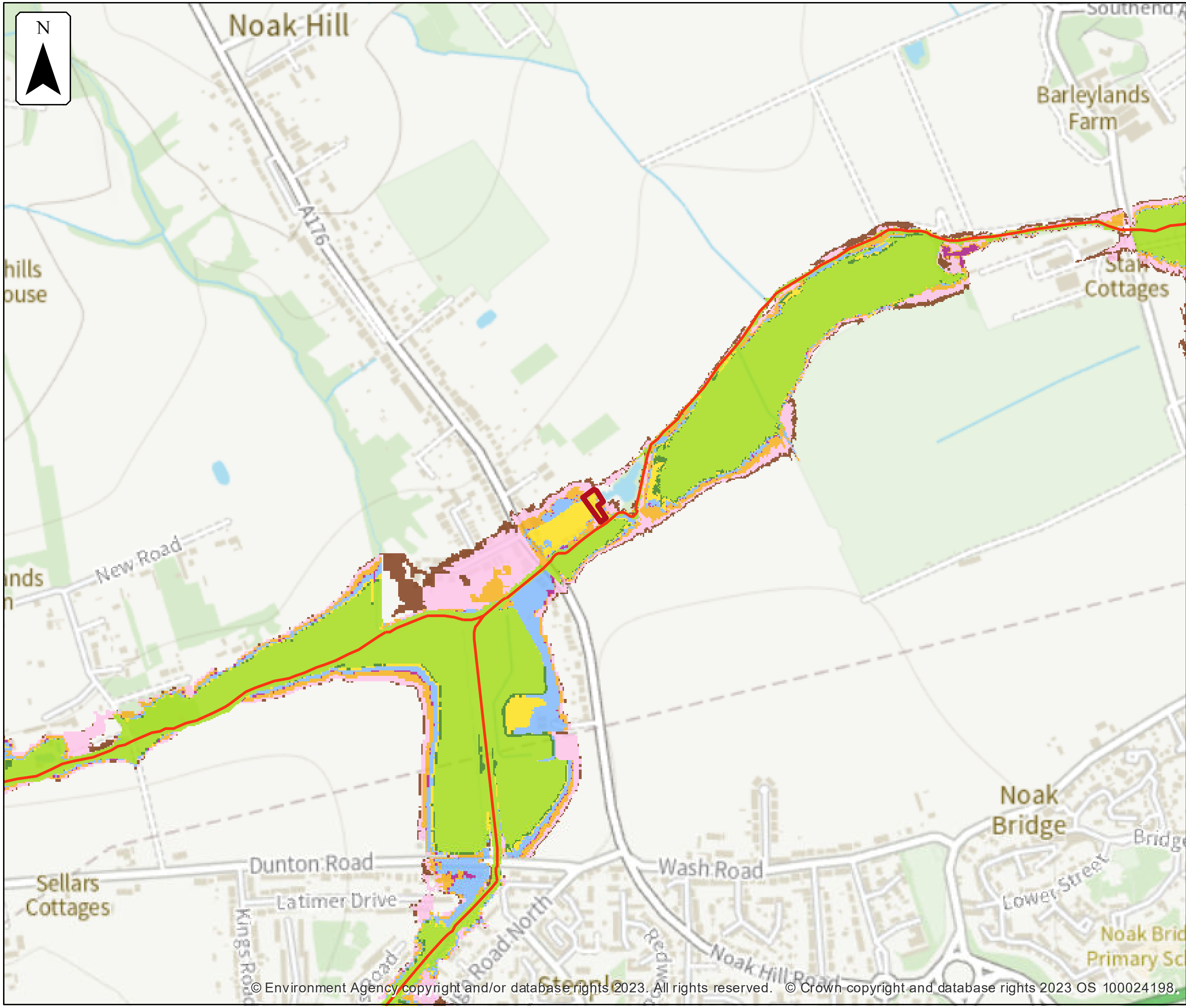
Model name
Crouch 2016

- Selected area
- Main river

Modelled flood extent
- 5% AEP
- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
568475/191199

Scale **1:10,000**

Created **6 Jul 2023**

Model name
Crouch 2016

Selected area

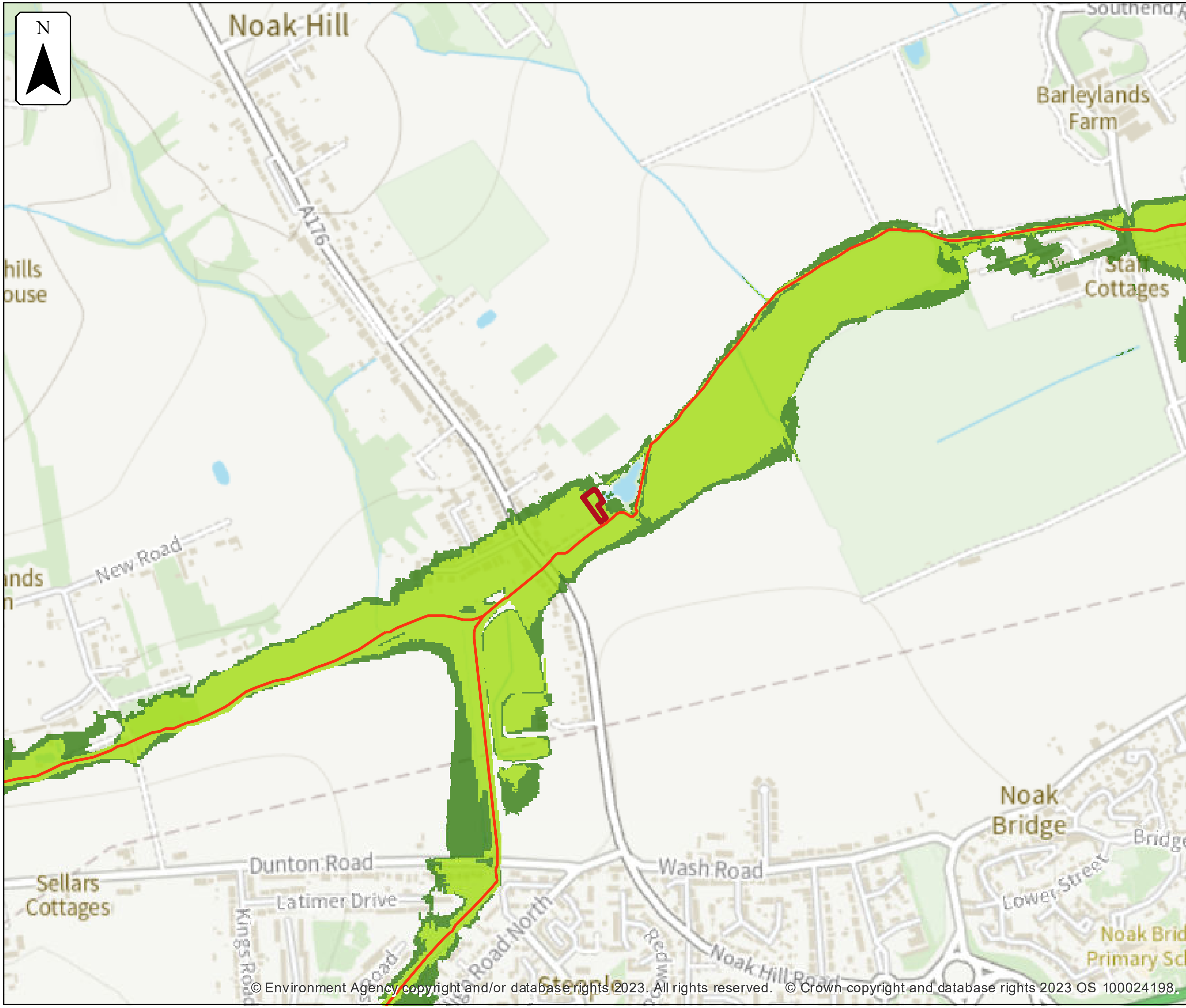
Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+25%)
- 1.0% AEP (+35%)
- 1.0% AEP (+65%)
- 0.5% AEP (+20%)
- 0.5% AEP (+25%)
- 0.5% AEP (+35%)
- 0.5% AEP (+65%)
- 0.1% AEP (+20%)
- 0.1% AEP (+25%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
568475/191199

Scale **1:10,000**

Created **6 Jul 2023**

Model name
Crouch 2016

Selected area

Main river

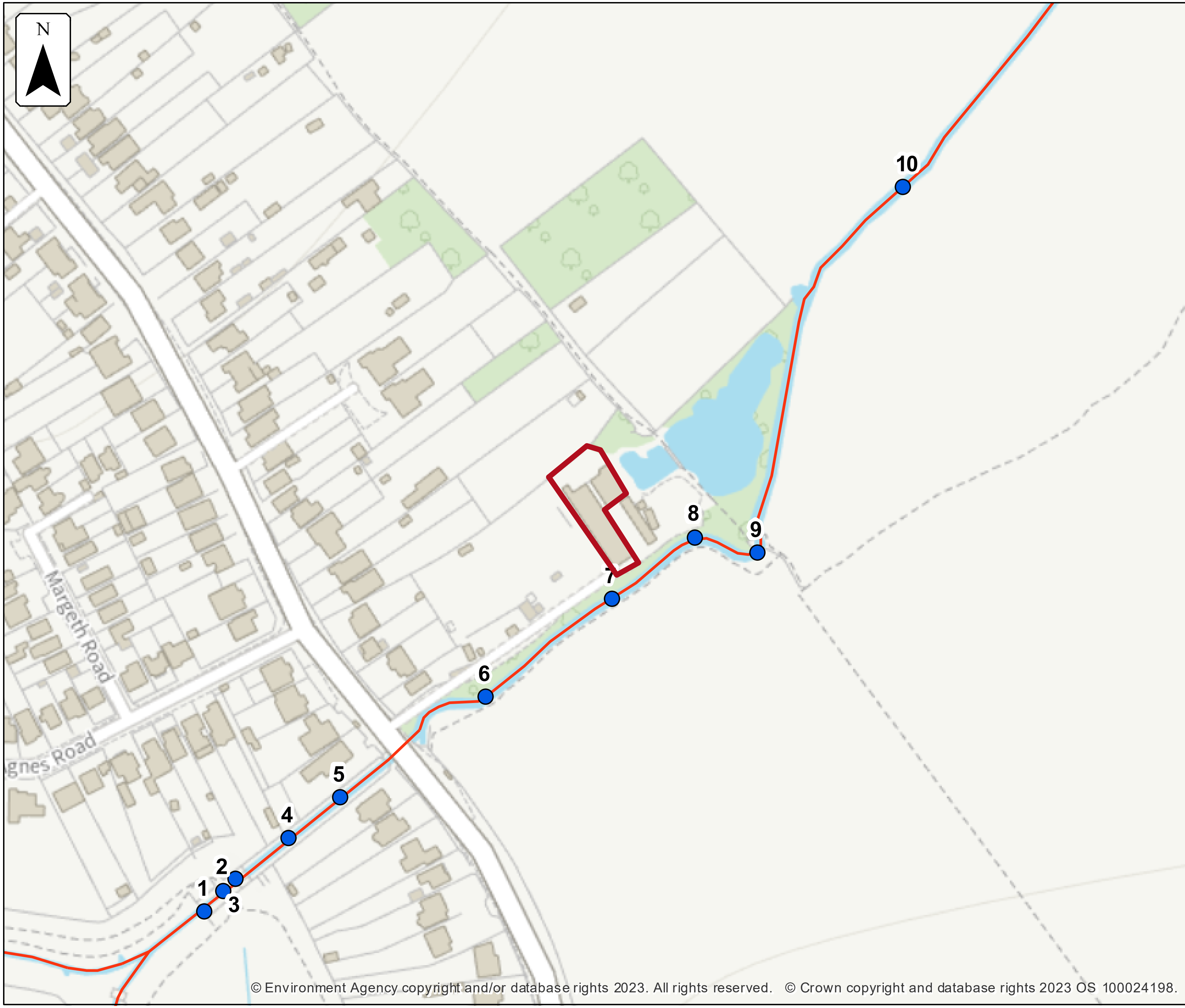
Modelled flood extent

1.0% AEP (+20%)

0.1% AEP (+20%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
568475/191199

Scale
1:2,500

Created
6 Jul 2023

Model name
Crouch 2016

Selected area
Modelled location
Main river

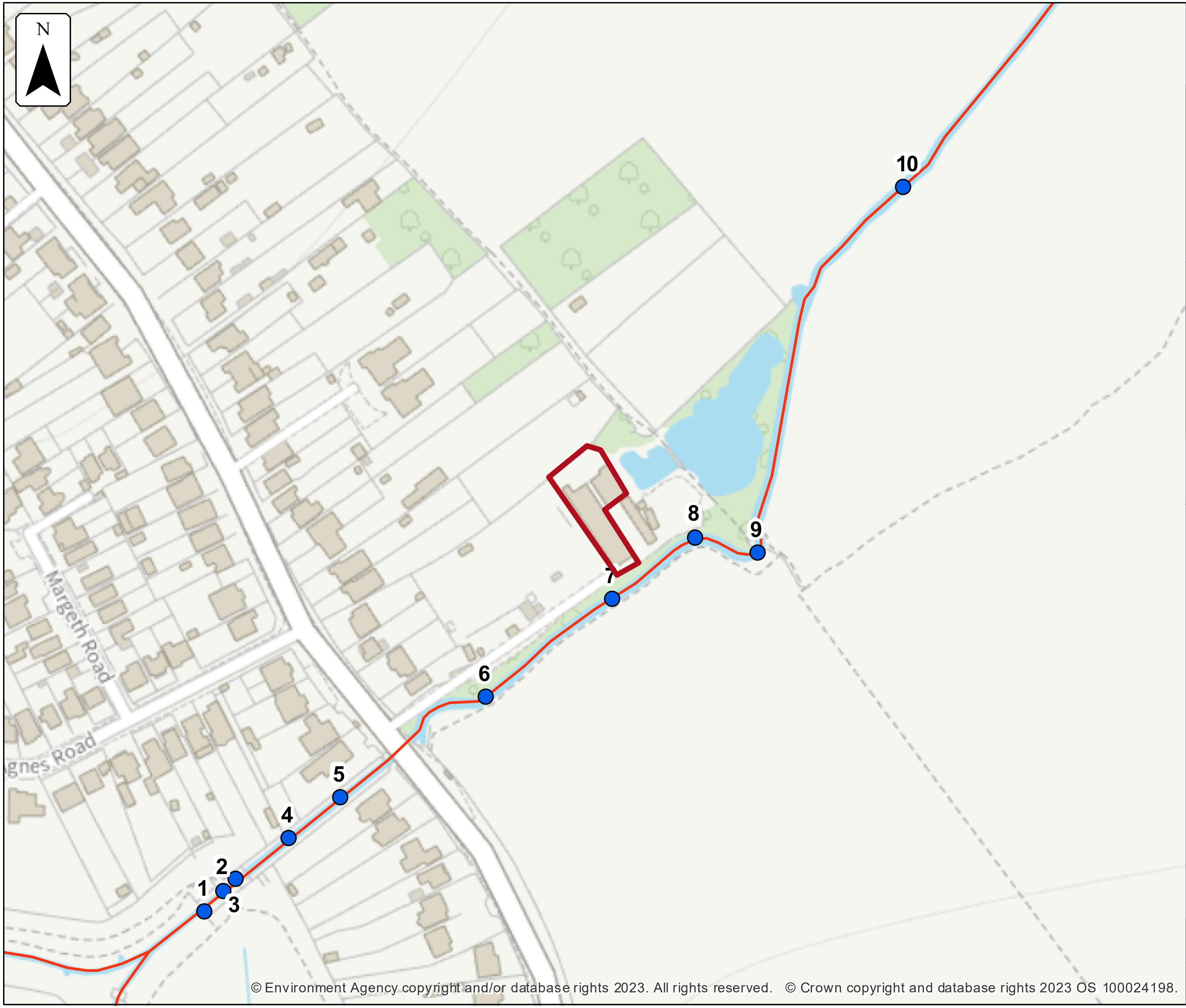
0 25 50 75 100
metres

Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1285605	568285	191001	25.48	6.12	25.60	6.44	25.81	7.39	25.85	7.60	26.12	9.07	26.59	11.93
2	1285843	568294	191011	24.92	6.12	25.06	6.65	25.22	7.59	25.25	7.80	25.42	9.26	25.82	11.71
3	1285725	568301	191016	24.91	6.12	25.05	6.65	25.20	7.59	25.23	7.80	25.40	9.26	25.80	11.71
4	1285750	568326	191036	24.84	6.12	24.98	6.65	25.13	7.59	25.16	7.80	25.32	9.26	25.68	13.92
5	1285751	568351	191056	24.76	6.12	24.90	6.65	25.06	7.59	25.08	7.80	25.24	9.26	25.56	13.92
6	1285615	568422	191105	23.96	6.12	24.02	6.65	24.12	7.59	24.15	7.80	24.26	9.26	24.57	15.70
7	1285669	568484	191153	23.74	6.12	23.79	6.65	23.88	7.59	23.90	7.80	24.01	9.26	24.29	15.66
8	1285885	568524	191183	23.54	6.12	23.57	6.65	23.64	7.59	23.66	7.80	23.77	9.26	24.04	15.82
9	1285962	568555	191175	23.37	6.12	23.39	6.65	23.44	7.59	23.45	7.80	23.54	9.26	23.78	15.68
10	1285925	568625	191353	22.86	6.12	22.89	6.65	22.95	7.59	22.96	7.79	23.07	9.27	23.29	15.59

Data in this table comes from the Crouch 2016 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
568475/191199

Scale
1:2,500

Created
6 Jul 2023

Model name
Crouch 2016

Selected area
Modelled location
Main river

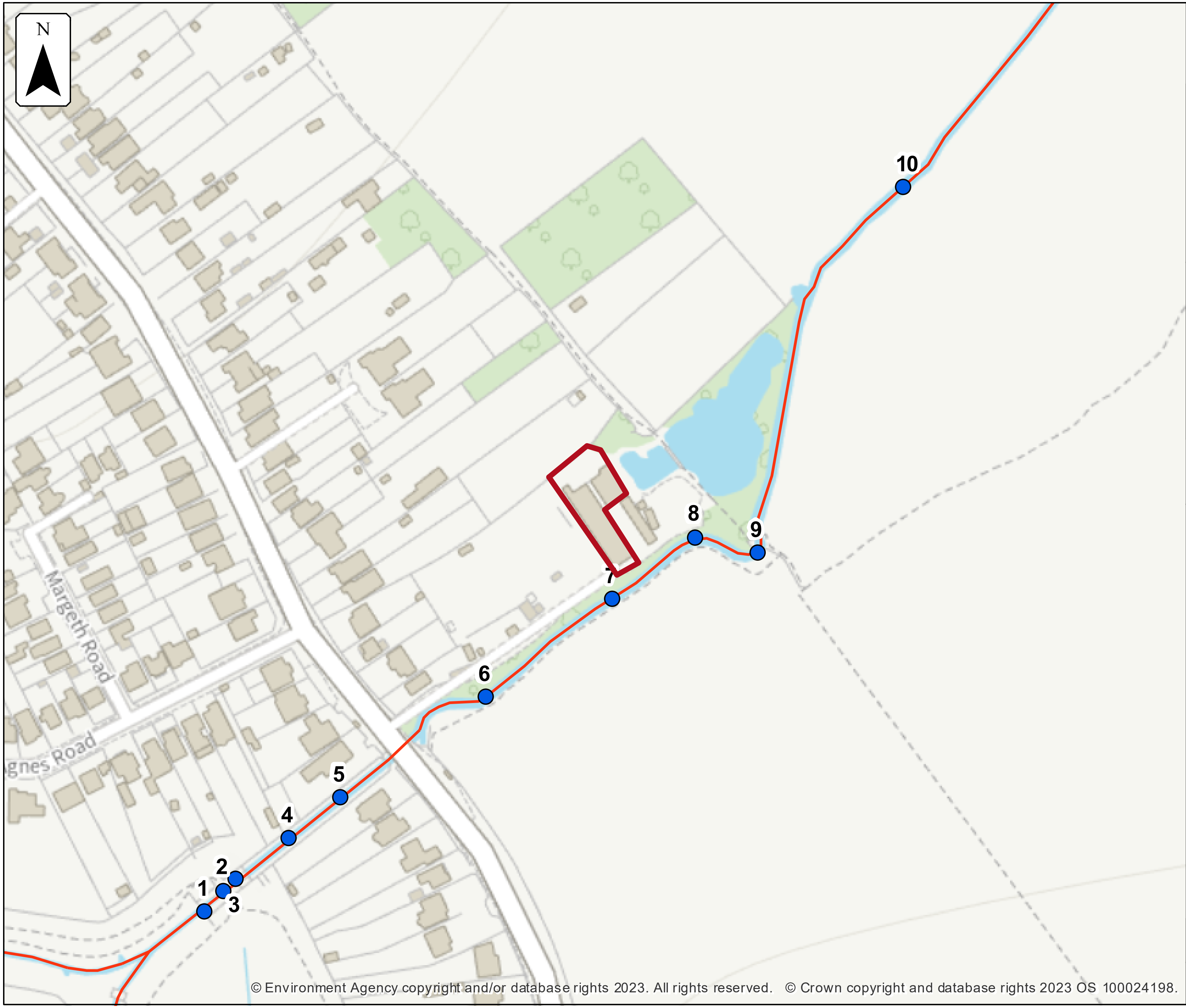
0 25 50 75 100
metres

Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1285605	568285	191001	24.78	6.39	25.04	7.34	25.09	7.76	25.11	8.15	25.18	8.40	25.41	8.77
2	1285843	568294	191011	24.71	6.39	25.01	7.34	25.06	7.76	25.09	8.13	25.16	8.39	25.40	8.75
3	1285725	568301	191016	24.69	6.39	25.01	7.34	25.06	7.76	25.09	8.13	25.16	8.39	25.39	8.75
4	1285750	568326	191036	24.68	4.70	24.99	4.88	25.04	5.27	25.07	6.01	25.15	5.86	25.39	6.25
5	1285751	568351	191056	24.65	4.68	25.0	4.71	25.05	4.71	25.08	4.68	25.15	4.66	25.39	4.69
6	1285615	568422	191105	23.91	5.68	24.18	8.14	24.29	9.66	24.35	10.71	24.51	13.88	24.88	26.54
7	1285669	568484	191153	23.69	5.68	23.93	8.14	24.04	9.66	24.09	10.71	24.24	13.88	24.56	26.54
8	1285885	568524	191183	23.51	5.68	23.69	8.14	23.81	9.66	23.86	10.71	23.99	13.88	24.28	26.53
9	1285962	568555	191175	23.35	5.68	23.47	8.14	23.57	9.66	23.62	10.71	23.73	13.88	23.98	26.54
10	1285925	568625	191353	22.83	5.68	22.98	8.11	23.09	9.59	23.17	10.63	23.27	13.87	23.41	26.54

Data in this table comes from the Crouch 2016 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



Environment Agency

Defended climate change modelled fluvial node locations

Location (easting/northing)
568475/191199

Scale
1:2,500

Created
6 Jul 2023

Model name
Crouch 2016

Selected area
Modelled location
Main river

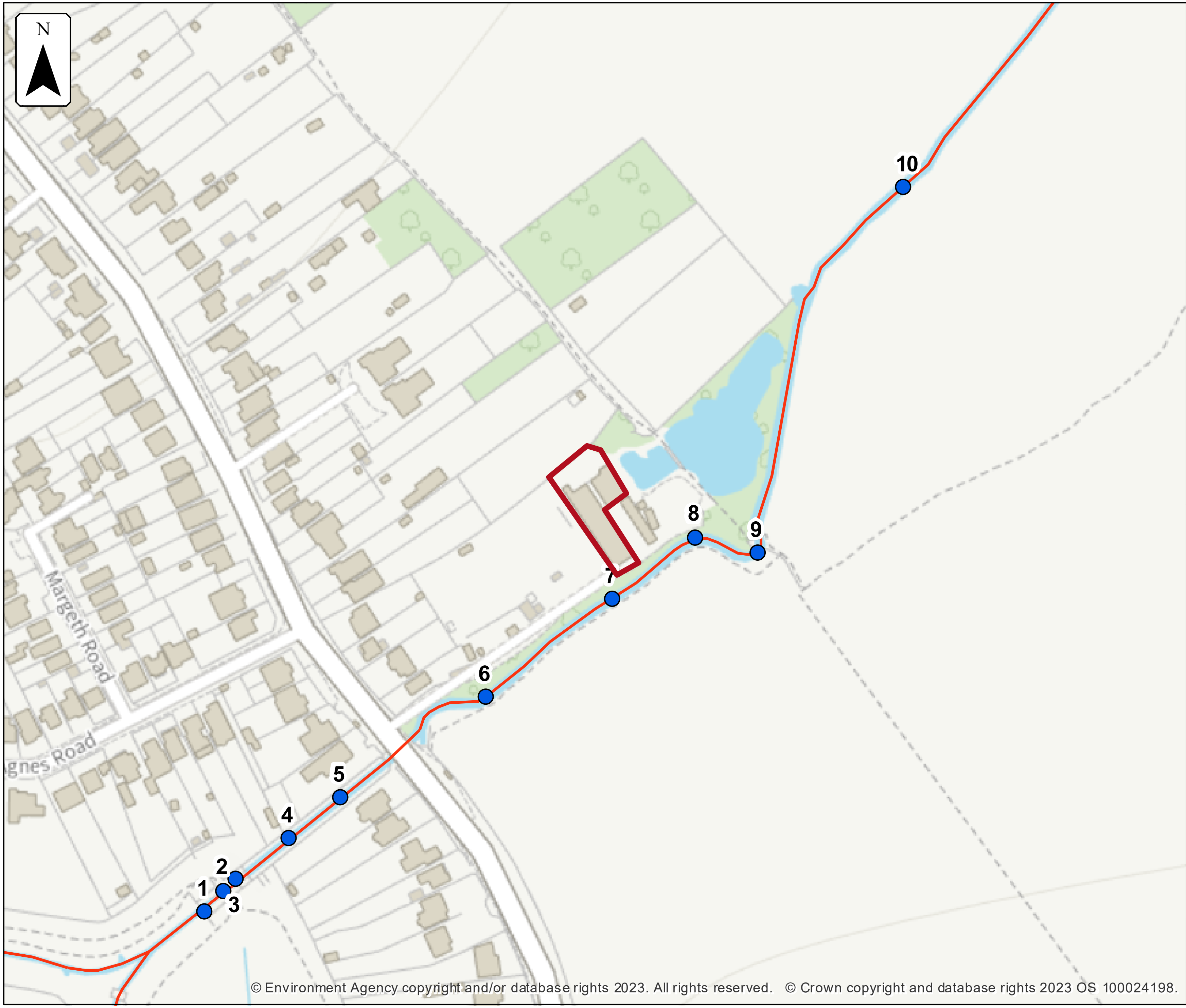
0 25 50 75 100
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+25%)		1.0% AEP (+35%)		1.0% AEP (+65%)		0.5% AEP (+20%)		0.5% AEP (+25%)		0.5% AEP (+35%)		0.5% AEP (+65%)		0.1% AEP (+20%)		0.1% AEP (+25%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1285605	568285	191001	26.07	8.77	26.11	9.05	26.18	9.39	26.35	10.30	26.28	9.93	26.32	10.14	26.37	10.44	26.55	11.36	26.66	13.29	26.67	13.89
2	1285843	568294	191011	25.38	8.96	25.42	9.22	25.45	9.58	25.54	10.44	25.51	10.10	25.52	10.29	25.55	10.56	25.65	11.53	25.87	12.11	25.88	12.18
3	1285725	568301	191016	25.36	8.97	25.40	9.24	25.44	9.58	25.52	10.44	25.49	10.10	25.51	10.29	25.53	10.56	25.63	11.54	25.86	12.11	25.87	12.18
4	1285750	568326	191036	25.29	8.94	25.32	9.23	25.36	9.58	25.44	10.44	25.41	10.10	25.42	10.29	25.45	10.56	25.54	11.55	25.72	14.90	25.73	15.06
5	1285751	568351	191056	25.20	8.92	25.23	9.23	25.26	9.57	25.34	10.44	25.31	10.10	25.33	10.29	25.35	10.56	25.44	11.55	25.60	14.90	25.60	15.06
6	1285615	568422	191105	24.24	8.90	24.26	9.23	24.28	9.58	24.34	10.44	24.32	10.10	24.33	10.29	24.34	10.56	24.47	12.88	24.76	21.16	24.80	22.76
7	1285669	568484	191153	23.99	8.90	24.01	9.23	24.03	9.58	24.08	10.44	24.06	10.10	24.07	10.29	24.08	10.56	24.20	12.88	24.44	21.16	24.48	22.75
8	1285885	568524	191183	23.75	8.89	23.77	9.22	23.80	9.58	23.85	10.44	23.83	10.10	23.84	10.29	23.85	10.56	23.96	12.98	24.17	21.16	24.21	22.75
9	1285962	568555	191175	23.51	8.89	23.53	9.22	23.57	9.58	23.61	10.44	23.60	10.10	23.60	10.29	23.62	10.56	23.72	13.05	23.89	21.16	23.93	22.75
10	1285925	568625	191353	23.04	8.86	23.06	9.22	23.09	9.57	23.15	10.43	23.12	10.09	23.14	10.28	23.16	10.55	23.27	14.49	23.35	21.12	23.38	22.72

Data in this table comes from the Crouch 2016 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



Environment Agency

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
568475/191199

Scale **1:2,500**

Created **6 Jul 2023**

Model name
Crouch 2016

Selected area

Modelled location

Main river

0 25 50 75 100
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		0.1% AEP (+20%)	
				Level	Flow	Level	Flow
1	1285605	568285	191001	25.16	8.32	25.55	8.72
2	1285843	568294	191011	25.15	8.32	25.54	8.70
3	1285725	568301	191016	25.14	8.32	25.53	8.70
4	1285750	568326	191036	25.13	5.80	25.53	6.26
5	1285751	568351	191056	25.14	4.61	25.52	4.66
6	1285615	568422	191105	24.48	13.10	24.96	32.15
7	1285669	568484	191153	24.21	13.09	24.65	32.17
8	1285885	568524	191183	23.96	13.10	24.36	32.15
9	1285962	568555	191175	23.72	13.10	24.06	32.17
10	1285925	568625	191353	23.27	13.22	23.46	32.18

Data in this table comes from the Crouch 2016 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

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 East Anglia Environment Agency team at enquiries_eastanglia@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

Flood risk assessments: Climate change allowances

Application of the allowances and local considerations

East Anglia; Essex, Norfolk, Suffolk, Cambridgeshire and Bedfordshire

1) The climate change allowances

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency guidance on considering climate change in Flood Risk Assessments (FRAs). This guidance was updated in October 2021 and is available on Gov.uk. The guidance can be used for planning applications, local plans, neighbourhood plans and other projects. It provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, rather than a single national allowance. It advises on what allowances to use for assessment based on vulnerability classification, flood zone and development lifetime.

2) Assessment of climate change impacts on fluvial flooding

Where existing EA flood risk datasets and models do not provide the required climate change allowances, it is up to developers to undertake any work needed to appropriately assess the impacts of climate change on flood risk. They can do this by using the approaches in **Table A** below:

Table A below indicates the level of technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location. This should be used as **a guide only**. Ultimately, the agreed approach should be based on expert local knowledge of flood risk conditions, local sensitivities and other influences. **For these reasons, we recommend that applicants and / or their consultants should contact the Environment Agency at the pre-planning application stage to confirm the assessment approach, on a case by case basis**. The email addresses for our Sustainable Places teams at our respective offices can be found in Section 8 below.

Table A defines three possible approaches to account for flood risk impacts due to climate change, in new development proposals:
- **Basic:** Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.
- **Intermediate:** Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance being applied to the 'design flood' flow.
- **Detailed:** Perform detailed hydraulic modelling, either through re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.

Table A – Indicative guide to assessment approach

VULNERABILITY CLASSIFICATION	FLOOD ZONE	DEVELOPMENT TYPE		
		NON-MAJOR	SMALL-MAJOR	LARGE-MAJOR
ESSENTIAL INFRASTRUCTURE	Zone 2	Detailed		
	Zone 3a	Detailed		
	Zone 3b	Detailed		
HIGHLY VULNERABLE	Zone 2	Intermediate/ Basic	Intermediate/ Basic	Detailed
	Zone 3a	Not appropriate development		
	Zone 3b	Not appropriate development		
MORE VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Intermediate/ Basic	Detailed	Detailed
	Zone 3b	Not appropriate development		
LESS VULNERABLE	Zone 2	Basic	Basic	Intermediate/ Basic
	Zone 3a	Basic	Basic	Detailed
	Zone 3b	Not appropriate development		
WATER COMPATIBLE	Zone 2	None		
	Zone 3a	Intermediate/ Basic		
	Zone 3b	Detailed		

Note: Where the table states 'not appropriate development', this is in line with national planning policy. If in exceptional circumstances such development types are proposed in these locations, we would expect a detailed modelling approach to be used.

NOTES:

- Non-Major: 1-9 dwellings/ less than 0.5 ha | Office / light industrial under 1ha | General industrial under 1 ha | Retail under 1 ha | Gypsy/traveller site between 0 and 9 pitches
- Small-Major: 10 to 30 dwellings | Office / light industrial 1ha to 5ha | General industrial 1ha to 5ha | Retail over 1ha to 5ha | Gypsy/traveller site over 10 to 30 pitches
- Large-Major: 30+ dwellings | Office / light industrial 5ha+ | General industrial 5ha+ | Retail 5ha+ | Gypsy/traveler site over 30+ pitches | any other development that creates a non-residential building or development over 1000 sq m.

The assessment approach should be agreed with the Environment Agency as part of pre-planning application discussions to avoid abortive work.

3) Specific local considerations

Where the Environment Agency and the applicant and / or their consultant has agreed that a '**basic**´ level of assessment is appropriate, the figures in Table B below can be used as a precautionary allowance for potential climate change impacts on peak 'design' (i.e. 1% annual probability) fluvial flood level rather than undertaking detailed modelling.

Table B – Local precautionary allowances for potential climate change impacts

Essex, Norfolk and Suffolk

Hydraulic Model (Watercourse)	Precautionary allowance (basic approach)
Blackwater & Brain - Blackwater between TL7520925623 and TL7820324314 Brain between TL7373323312 and TL7683821321	500mm
Other main rivers, tributaries and ordinary watercourses	For other main rivers, tributaries and ordinary watercourses that are not stated above, basic allowances have not been calculated. In this instance you can either: • If flow data is available you can request this data from us and can conduct an intermediate assessment yourself • Or alternatively, you can choose to undertake a Detailed Assessment and "perform detailed hydraulic modelling, through either re-running our hydraulic models (if available) or constructing a new model

Cambridgeshire and Bedfordshire

Watercourse / Model	Precautionary allowance (basic approach)
Alconbury Brook	600mm
River Kym	
Lower Ouse (Model Extent)	700mm
Mid Ouse (Cold Brayfield to Bromham – between SP9156852223 and TL0132950919)	700mm
Mid Ouse (East of Bedford to Roxton – between TL0791848903 and TL1618854543)	700mm
River Hiz and River Purwell	400mm
River Ivel	500mm
Pix Brook	450mm
Potton Brook	500mm
River Cam and tributaries (excluding the Cam Lodes and the Slade System)	450mm
Great Barford (ordinary watercourses)	500mm
Bromham (ordinary watercourse)	550mm

NOTES:

Urban areas excluded from the 'basic' approach: St Ives, Holywell, Godmanchester, Swavesey, Over, Bedford, Newport Pagnell, Buckingham and Leighton Buzzard. More detailed assessment of climate change allowances will need to be undertaken in these locations.

Use of these allowances will only be accepted after discussion with the Environment Agency.

4) Fluvial flood risk mitigation

For planning consultations where we are a statutory consultee and our Flood risk standing advice **does not** apply we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications. **These are a guide only**. **We strongly recommend you contact us at the pre-planning application stage to confirm this on a case by case basis.** For planning consultations where we are not a statutory consultee or our Flood risk Standing advice applies, we recommend that local planning authorities and developers use these benchmarks but we do not expect to be consulted.

- For development classed as '**essential infrastructure**' our benchmark for flood risk mitigation is for it to be designed to the '**higher central**' climate change allowance for the epoch that most closely represents the lifetime of the development, including decommissioning. Please note that nationally significant infrastructure projects (NSIPs) may also need to assess a **credible maximum climate change scenario** by applying the '**upper end**' allowance for peak river flow as a sensitivity test. This will help to determine how sensitive the development is to changes in the climate and to ensure that it can be adapted to large-scale climate change over its lifetime.

- For **highly vulnerable**, **more vulnerable, less vulnerable and water compatible** developments in flood zones 2 and 3a, the '**central**' climate change allowance is our minimum benchmark for flood risk mitigation. For large urban settlement extensions or developments that form new communities, the credible maximum climate change scenario must be assessed; in these circumstances, you should use the '**upper end'** allowance.

- For **water compatible** development in flood zone 3b, the '**central**' climate change allowance for the epoch that most closely represents the lifetime of the development is our minimum benchmark for flood risk mitigation.

For peak river flow allowances and a visual representation of the above, please see Tables 1 and 2 below.

Table 1 peak river flow allowances by Management Catchment (use 1961 to 1990 baseline)

Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015 to 39)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2125)
Upper and Bedford Ouse	Upper end	24%	30%	58%
	Higher central	10%	11%	30%
	Central	5%	4%	19%
Cam and Ely Ouse	Upper End	21%	22%	45%
	Higher Central	7%	5%	19%
	Central	2%	-2%	9%
Old Bedford and Middle Level	Upper End	23%	22%	39%
	Higher central	9%	4%	15%
	Central	3%	-3%	6%
North West Norfolk	Upper End	30%	34%	57%
	Higher central	18%	18%	33%
	Central	13%	11%	23%
North Norfolk Rivers	Upper End	26%	27%	48%
	Higher central	13%	11%	24%
	Central	7%	4%	14%
Broadland Rivers	Upper End	27%	27%	44%
	Higher central	14%	10%	20%
	Central	8%	3%	11%
East Suffolk	Upper End	25%	29%	54%
	Higher central	13%	13%	29%
	Central	8%	7%	19%
Combined Essex	Upper End	27%	37%	72%
	Higher central	13%	16%	38%
	Central	7%	8%	25%

South Essex	**Upper End**	22%	27%	48%
	Higher central	11%	11%	26%
	Central	6%	5%	17%

If you are not sure which management catchment your site falls within, please use the guidance and link to the peak river flow map, which can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-river-flow-allowances

Table 2: Using peak river flow allowances for flood risk assessments

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
2	higher central[1]	central[2]	central[2]	central	central
3a	higher central[1]	**X**	central[2]	central	central
3b	higher central[1]	**X**	**X**	**X**	central

X – Development should not be permitted
If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the higher central allowance.

[1] For NSIPs, the 'upper end' allowance should be used to assess a credible maximum climate change scenario.

[2] For large urban settlement extensions or developments that form new communities, the credible maximum climate change scenario must be assessed. In these circumstances, you should use the 'upper end' allowance.

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case we may want to check this data and how you propose to use it.

Assessing off-site impacts and calculating floodplain compensation

The appropriate allowance to assess off-site impacts and calculation floodplain compensation requirements depends on the land uses in affected areas.

The '**central'** allowance should be used in most cases. However, the '**higher central'** allowance should be used when the affected area contains essential infrastructure.

5) Development in tidal flood risk areas

For flood risk assessments and strategic flood risk assessments, assess both the **higher central** and **upper end** allowances for all development vulnerability classes (see table 3 below).

For NSIPs and large urban settlement extensions or developments that form new communities, the **credible maximum climate change scenario** should be assessed (sea level rise and sensitivity test allowances for offshore wind speed and extreme wave height and storm surge uplift). To assess the flood risk from a high impact climate change scenario, you should use the H^{++} allowance of 1.9m for the total sea level rise to 2100.

Table 3: sea level allowances for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level risk for each epoch is in brackets

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Anglian	Higher central	5.8 (203)	8.7 (261)	11.6 (348)	13 (390)	1.20
Anglian	Upper end	7 (245)	11.3 (339)	15.8 (474)	18.1 (543)	1.60
South east	Higher central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.20
South east	Upper end	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.60

6) Tidal flood risk mitigation

For planning consultations where we are a statutory consultee and our flood risk standing advice does not apply, we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications. **These are a guide only. We strongly recommend you contact us at the pre-planning application stage to confirm this on a case by case basis. Please note you may be charged for this advice.** For planning consultations where we are not a statutory consultee or our flood risk standing advice applies, we recommend that local planning authorities and developers use these benchmarks but we do not expect to be consulted.

- For development classed as essential Infrastructure, highly vulnerable development and more vulnerable development, our minimum benchmark for flood risk mitigation is the **'upper end'** climate change allowance for the development lifetime (including decommissioning where relevant).

- For water compatible or less vulnerable development (e.g. commercial), our minimum benchmark for flood risk mitigation is the **'higher central'** climate change allowance for the development lifetime. In sensitive locations it may be necessary to use the **'upper end'** allowance to inform built in resilience.

If you are using our 2018 Coastal Flood Modelling Data outputs:
The **upper end** allowance become progressively higher each year than the climate change flood level outputs used in our current 2018 coastal flood model. So as an approximation we recommend that the following uplift values are added on to the on-site climate change flood levels provided in the Product 4:

- For development lifetimes extending to 2122, add 0.34m
- For development lifetimes extending to 2123, add 0.36m
- For development lifetimes extending to 2124, add 0.38m
- For development lifetimes extending to 2125, add 0.40m

If the proposed development is greater than 30 houses and the flood zone is in an open-coast location, we recommend that a more accurate impact of the increased upper end flood levels on the overtopping on-site flood levels is modelled by rerunning our coastal overtopping model with the new flood levels; you can obtain the model from us with a Product 6 and 7 request. If the site is located within a small or constrained tidal or coastal floodplain then regardless of the size of the development, you may also need to undertake remodelling of the flood levels to obtain an accurate assessment of the impacts of climate change; please contact us for advice (contact details in Section 8 below).

If you are using our Broads 2008 Flood Modelling Data outputs:
For the **upper end** allowance, please add the following uplift values onto the climate change flood levels provided in the Product 4:

- For development lifetimes extending to 2122, add 0.34m
- For development lifetimes extending to 2123, add 0.36m
- For development lifetimes extending to 2124, add 0.38m
- For development lifetimes extending to 2125, add 0.40m

If you are using our 2008 Thames Flood Modelling Data outputs:
Please add the appropriate climate change allowances for the South East River Basin District onto the present day flood levels obtained in the Product 4, starting from a base year of 2005. The allowances should be applied to the year appropriate to the respective development lifetime for residential or commercial developments.
***** note**:*** *We anticipate that there will be updated flood modelling outputs available for the Thames Estuary in mid-2022. Developers preparing Flood Risk Assessments for developments in this area should check for availability of new data with the East Anglia (East) PSO team (contact details in Section 8 below).*

There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case, we may want to check this data and how you propose to use it.

7) Assessment of climate change impacts for Surface Water Management

Please see the latest advice on the use of Peak Rainfall Intensity climate change allowances, which can be found here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

The Environment Agency is not a statutory consultee to the land use planning system for the consideration of surface water flood risk and management. We therefore recommend that you contact the relevant Lead Local Flood Authority (contact details listed below) to discuss Flood Risk Assessment requirements to support your development's surface water management proposals.

Cambridgeshire County Council - fr.planning@cambridgeshire.gov.uk
Central Bedfordshire Council – floodrisk@centralbedfordshire.gov.uk
Bedford Borough Council – floodrisk@bedford.gov.uk
Milton Keynes Council – llfa@milton-keynes.gov.uk
Buckinghamshire County Council - floodmanagement@buckscc.gov.uk
Herts County Council - floodandwatermanagement@hertscc.gov.uk
Northamptonshire County Council - floodandwater@northamptonshire.gov.uk
Norfolk County Council – llfa@norfolk.gov.uk
Suffolk County Council – floods@suffolk.gov.uk
Essex County Council – suds@essex.gov.uk
Thurrock Council – TransportDevelopment@thurrock.gov.uk
Southend-on-Sea Council – llfa@southend.gov.uk

8) Our Service

Non-chargeable service

We will give a free opinion on:

- What climate change allowance to apply to a particular development type
- Which technical approach is suitable in the FRA

Chargeable service:

- Review of climate change impacts using intermediate and detailed technical approaches (i.e. modelling review)
- Assessment and review of proposals for managed adaptation.

Contact Details

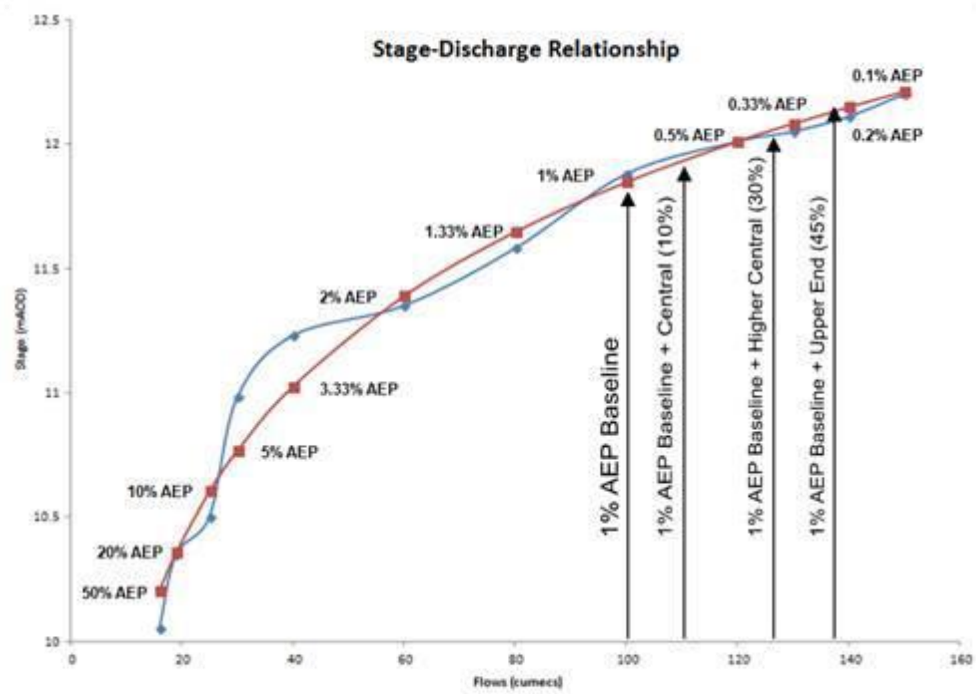
For East Anglia (Great Ouse Catchment): planning.brampton@environment-agency.gov.uk

For East Anglia (East): planning.ipswich@environment-agency.gov.uk

Appendix 1 – Further information on the Intermediate approach.

1) The methodology the chart is based on does not produce an accurate stage-discharge rating and is a simplified methodology for producing flood levels that can be applied in low risk small-scale development situations.
2) The method should not be applied where there is existing detailed modelled climate change outputs that use the new allowances. In such circumstances, the 'with climate change' modelled scenarios should be applied.

An example stage-discharge relationship is shown below.



RichardJackson
Engineering Consultants

Appendix F5

Reservoir Flood Risk

< Back

Learn more about this area's flood risk

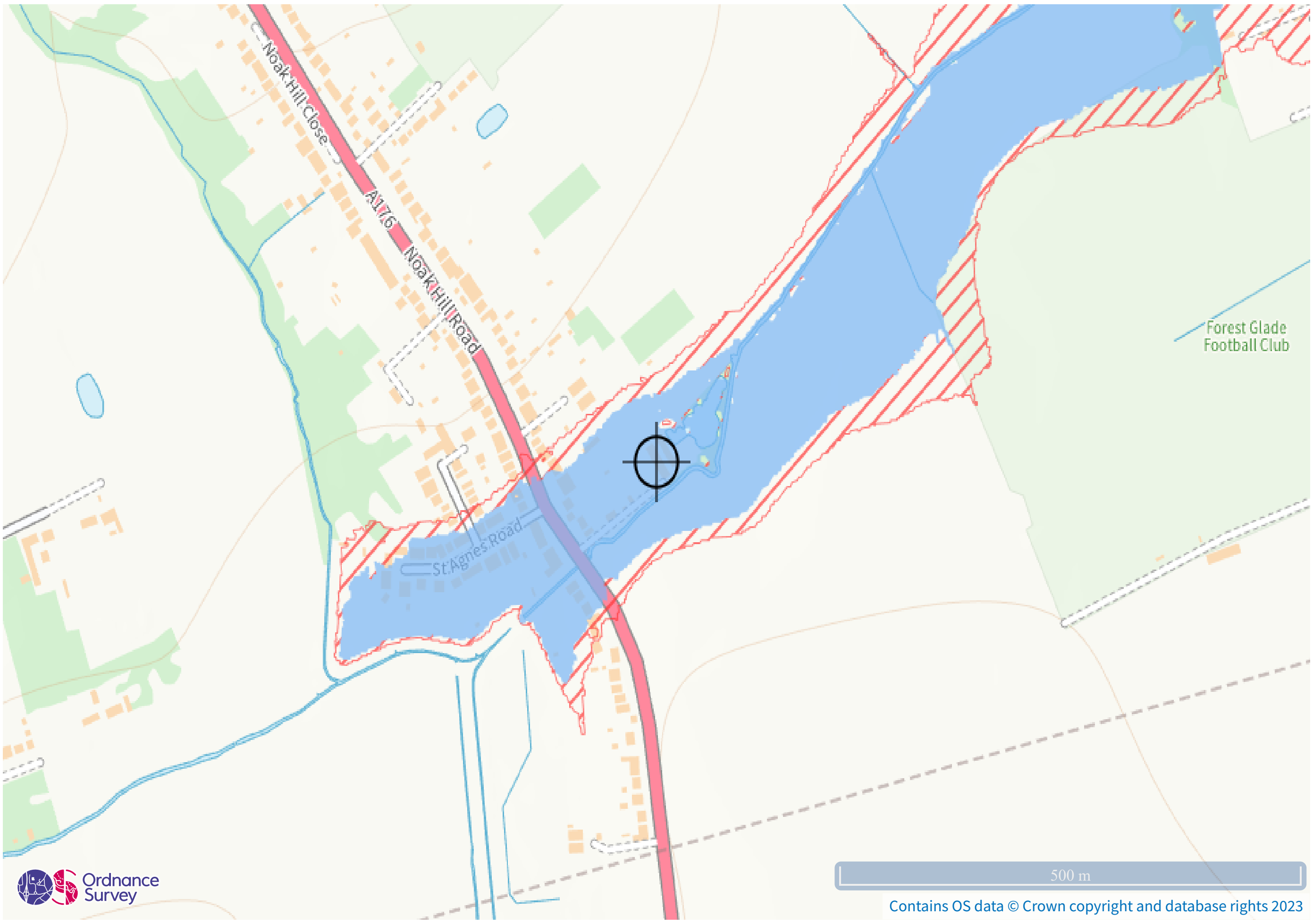
Select the type of flood risk information you're interested in. The map will then update.

Flood risk

Extent of flooding

Location

CM12 9UN



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 the location you originally searched for (/risk)](/risk)

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

Appendix G

Greenfield Runoff Rate Calculation

hr wallingford

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Stedroy Allen
Site name:	Fisheries Site
Site location:	Noak Hill

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.59429° N
Longitude:	0.43093° E
Reference:	3782793565
Date:	Mar 20 2024 16:25

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.329

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	573	573
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	1.26	1.26
1 in 1 year (l/s):	1.07	1.07
1 in 30 years (l/s):	2.89	2.89
1 in 100 year (l/s):	4.01	4.01
1 in 200 years (l/s):	4.7	4.7

Appendix H

Preliminary Surface Water Calculations and Drainage Strategy

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)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	1.000	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)	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
✓	S.01	0.062	5.00	24.250	Adoptable	1200	568450.820	191200.660	1.050
✓	S.02	0.010	5.00	24.250	Adoptable	1200	568475.390	191163.200	1.569
✓	S.03	0.005	5.00	24.200	Adoptable	1200	568476.990	191160.860	1.620
✓	S.04	0.009	5.00	23.900	Adoptable	1200	568492.010	191176.030	1.200
✓	S.05	0.005	5.00	23.900	Adoptable	1200	568492.980	191171.420	1.224
✓	S.06	0.047	5.00	24.200	Adoptable	1200	568460.450	191191.970	1.050
✓	DUMMY.01		5.00	24.500			568453.630	191198.610	1.050
✓	DUMMY.02			24.200			568458.760	191190.840	1.071
✓	DUMMY.03			24.200			568475.730	191165.160	1.377
✓	OUTFALL			23.000			568482.560	191152.700	1.200

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	S.01	S.02	44.799	0.600	23.200	22.756	0.444	100.9	150	5.75	50.0
1.001	S.02	S.03	2.835	0.600	22.681	22.655	0.026	109.0	225	5.78	50.0
1.002	S.03	OUTFALL	9.880	0.600	22.580	21.800	0.780	12.7	300	5.82	50.0
4.000	S.04	S.05	4.711	0.600	22.700	22.676	0.024	200.0	300	5.07	50.0
4.001	S.05	S.03	19.162	0.600	22.676	22.580	0.096	199.6	300	5.36	50.0
3.000	S.06	DUMMY.02	2.033	0.600	23.150	23.129	0.021	96.8	150	5.03	50.0
2.000	DUMMY.01	DUMMY.02	9.311	0.600	23.450	23.129	0.321	29.0	150	5.08	50.0
2.001	DUMMY.02	DUMMY.03	30.781	0.600	23.129	22.823	0.306	100.6	150	5.59	50.0
2.002	DUMMY.03	S.02	1.989	0.600	22.823	22.756	0.067	29.7	150	5.61	50.0

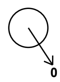
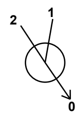
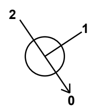
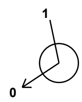
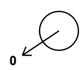
	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
✓	1.000	S.01	S.02	1.000	17.7	11.2	0.900	1.344	0.062	0.0	87	1.059
✓	1.001	S.02	S.03	1.251	49.8	21.5	1.344	1.320	0.119	0.0	103	1.207
?	1.002	S.03	OUTFALL	4.440	313.9	24.9	1.320	0.900	0.138	0.0	57	2.686
✓	4.000	S.04	S.05	1.108	78.3	1.6	0.900	0.924	0.009	0.0	30	0.446
✓	4.001	S.05	S.03	1.109	78.4	2.5	0.924	1.320	0.014	0.0	37	0.511
✓	3.000	S.06	DUMMY.02	1.021	18.0	8.5	0.900	0.921	0.047	0.0	72	1.006
✓	2.000	DUMMY.01	DUMMY.02	1.876	33.2	0.0	0.900	0.921	0.000	0.0	0	0.000
✓	2.001	DUMMY.02	DUMMY.03	1.002	17.7	8.5	0.921	1.227	0.047	0.0	73	0.990
✓	2.002	DUMMY.03	S.02	1.854	32.8	8.5	1.227	1.344	0.047	0.0	52	1.558

Pipeline Schedule

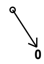
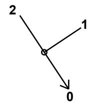
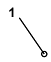
Link	Length (m)	Slope (1:X)	Dia (mm)
1.000	44.799	100.9	150
1.001	2.835	109.0	225
1.002	9.880	12.7	300
4.000	4.711	200.0	300
4.001	19.162	199.6	300
3.000	2.033	96.8	150
2.000	9.311	29.0	150
2.001	30.781	100.6	150
2.002	1.989	29.7	150

Link
1.000
1.001
1.002
4.000
4.001
3.000
2.000
2.001
2.002

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Node Type	Connections		Link	IL (m)	Dia (mm)
S.01	568450.820	191200.660	24.250	1.050	1200	Manhole		0	1.000	23.200	150
S.02	568475.390	191163.200	24.250	1.569	1200	Manhole		1	2.002	22.756	150
								2	1.000	22.756	150
								0	1.001	22.681	225
S.03	568476.990	191160.860	24.200	1.620	1200	Manhole		1	4.001	22.580	300
								2	1.001	22.655	225
								0	1.002	22.580	300
S.04	568492.010	191176.030	23.900	1.200	1200	Manhole		0	4.000	22.700	300
S.05	568492.980	191171.420	23.900	1.224	1200	Manhole		1	4.000	22.676	300
								0	4.001	22.676	300
S.06	568460.450	191191.970	24.200	1.050	1200	Manhole		0	3.000	23.150	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Node Type	Connections		Link	IL (m)	Dia (mm)
DUMMY.01	568453.630	191198.610	24.500	1.050		Junction		0	2.000	23.450	150
DUMMY.02	568458.760	191190.840	24.200	1.071		Junction		1	3.000	23.129	150
								2	2.000	23.129	150
								0	2.001	23.129	150
DUMMY.03	568475.730	191165.160	24.200	1.377		Junction		1	2.001	22.823	150
								0	2.002	22.823	150
OUTFALL	568482.560	191152.700	23.000	1.200		Junction		1	1.002	21.800	300

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	1440
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)	1.1
Summer CV	1.000	30 year (l/s)	2.5
Winter CV	1.000	100 year (l/s)	3.1
Analysis Speed	Detailed	Check Discharge Volume	✓
Skip Steady State	x	100 year 360 minute (m³)	85

Storm Durations

15	60	180	360	600	960	2880
30	120	240	480	720	1440	10080

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	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	0.329	Betterment (%)	0
SAAR (mm)	573	QBar	1.3
Soil Index	4	Q 1 year (l/s)	1.1
SPR	0.47	Q 30 year (l/s)	2.5
Region	6	Q 100 year (l/s)	3.1
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)	0.329	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.413
CWI	86.370	Runoff Volume (m³)	85

Node S.03 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	22.580	Product Number	CTL-SHE-0046-1100-1350-1100
Design Depth (m)	1.350	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.1	Min Node Diameter (mm)	1200

Node S.01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.200	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	615	Depth (m)	0.450
Safety Factor	2.0	Width (m)	7.800	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Node S.02 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	435
Side Inf Coefficient (m/hr)	0.00000	Link	1.000
Safety Factor	2.0	Surround Shape	Link Surround
Porosity	0.30	Diameter (mm)	1000
Invert Level (m)	22.756		

Node S.02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.681	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Node S.04 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.700	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	19.000		

Node S.06 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	23.150	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	705	Depth (m)	0.450
Safety Factor	2.0	Width (m)	9.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Node DUMMY.03 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	22.823	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	1605	Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	13.300		

Node DUMMY.03 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	435
Side Inf Coefficient (m/hr)	0.00000	Link	2.001
Safety Factor	2.0	Surround Shape	Link Surround
Porosity	0.30	Diameter (mm)	1000
Invert Level (m)	22.823		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991
1 year 15 minute winter	76.857	30.991
1 year 30 minute summer	71.439	20.215
1 year 30 minute winter	50.133	20.215
1 year 60 minute summer	48.435	12.800
1 year 60 minute winter	32.179	12.800
1 year 120 minute summer	30.053	7.942
1 year 120 minute winter	19.966	7.942
1 year 180 minute summer	23.233	5.979
1 year 180 minute winter	15.102	5.979
1 year 240 minute summer	18.475	4.882
1 year 240 minute winter	12.274	4.882
1 year 360 minute summer	14.169	3.646
1 year 360 minute winter	9.210	3.646
1 year 480 minute summer	11.185	2.956
1 year 480 minute winter	7.431	2.956
1 year 600 minute summer	9.182	2.511
1 year 600 minute winter	6.274	2.511
1 year 720 minute summer	8.203	2.199
1 year 720 minute winter	5.513	2.199
1 year 960 minute summer	6.768	1.782
1 year 960 minute winter	4.483	1.782
1 year 1440 minute summer	4.949	1.326
1 year 1440 minute winter	3.326	1.326
1 year 2880 minute summer	2.986	0.800
1 year 2880 minute winter	2.007	0.800
1 year 10080 minute summer	1.260	0.322
1 year 10080 minute winter	0.813	0.322
30 year 15 minute summer	268.706	76.035
30 year 15 minute winter	188.566	76.035
30 year 30 minute summer	174.929	49.499
30 year 30 minute winter	122.757	49.499
30 year 60 minute summer	116.589	30.811
30 year 60 minute winter	77.459	30.811
30 year 120 minute summer	70.438	18.615
30 year 120 minute winter	46.797	18.615
30 year 180 minute summer	53.298	13.715

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 180 minute winter	34.645	13.715
30 year 240 minute summer	41.604	10.995
30 year 240 minute winter	27.641	10.995
30 year 360 minute summer	31.221	8.034
30 year 360 minute winter	20.295	8.034
30 year 480 minute summer	24.324	6.428
30 year 480 minute winter	16.160	6.428
30 year 600 minute summer	19.756	5.404
30 year 600 minute winter	13.498	5.404
30 year 720 minute summer	17.490	4.687
30 year 720 minute winter	11.754	4.687
30 year 960 minute summer	14.215	3.743
30 year 960 minute winter	9.416	3.743
30 year 1440 minute summer	10.161	2.723
30 year 1440 minute winter	6.829	2.723
30 year 2880 minute summer	5.883	1.577
30 year 2880 minute winter	3.953	1.577
30 year 10080 minute summer	2.284	0.583
30 year 10080 minute winter	1.474	0.583
100 year +45% CC 15 minute summer	505.670	143.087
100 year +45% CC 15 minute winter	354.856	143.087
100 year +45% CC 30 minute summer	332.000	93.944
100 year +45% CC 30 minute winter	232.982	93.944
100 year +45% CC 60 minute summer	222.268	58.739
100 year +45% CC 60 minute winter	147.669	58.739
100 year +45% CC 120 minute summer	134.215	35.469
100 year +45% CC 120 minute winter	89.169	35.469
100 year +45% CC 180 minute summer	101.219	26.047
100 year +45% CC 180 minute winter	65.795	26.047
100 year +45% CC 240 minute summer	78.690	20.795
100 year +45% CC 240 minute winter	52.280	20.795
100 year +45% CC 360 minute summer	58.701	15.106
100 year +45% CC 360 minute winter	38.157	15.106
100 year +45% CC 480 minute summer	45.550	12.038
100 year +45% CC 480 minute winter	30.262	12.038
100 year +45% CC 600 minute summer	36.875	10.086
100 year +45% CC 600 minute winter	25.195	10.086
100 year +45% CC 720 minute summer	32.556	8.725
100 year +45% CC 720 minute winter	21.879	8.725
100 year +45% CC 960 minute summer	26.340	6.936
100 year +45% CC 960 minute winter	17.448	6.936
100 year +45% CC 1440 minute summer	18.700	5.012
100 year +45% CC 1440 minute winter	12.567	5.012
100 year +45% CC 2880 minute summer	10.688	2.864
100 year +45% CC 2880 minute winter	7.183	2.864
100 year +45% CC 10080 minute summer	4.037	1.030
100 year +45% CC 10080 minute winter	2.605	1.030

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S.01	12	23.273	0.073	11.1	1.6731	0.0000	OK
240 minute winter	S.02	236	22.866	0.185	5.1	5.7784	0.0000	OK
240 minute winter	S.03	236	22.866	0.285	4.7	0.3229	0.0000	OK
240 minute winter	S.04	224	22.867	0.167	2.5	8.6443	0.0000	OK
240 minute winter	S.05	224	22.866	0.190	4.6	0.2148	0.0000	OK
15 minute summer	S.06	12	23.214	0.064	8.4	1.6780	0.0000	OK
15 minute summer	DUMMY.01	1	23.450	0.000	0.0	0.0000	0.0000	OK
15 minute summer	DUMMY.02	12	23.193	0.064	5.6	0.0000	0.0000	OK
30 minute summer	DUMMY.03	24	22.862	0.039	5.7	1.3047	0.0000	OK
15 minute summer	OUTFALL	1	21.800	0.000	0.8	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 summer	S.01	1.000	S.02	8.2	0.976	0.463	0.3757	
240 minute winter	S.02	1.001	S.03	-3.8	0.448	-0.075	0.1044	
240 minute winter	S.03	Hydro-Brake®	OUTFALL	0.8				27.2
240 minute winter	S.04	4.000	S.05	4.6	0.193	0.059	0.2059	
240 minute winter	S.05	4.001	S.03	4.7	0.079	0.060	1.1103	
15 minute summer	S.06	3.000	DUMMY.02	5.6	0.782	0.311	0.0146	
15 minute summer	DUMMY.01	2.000	DUMMY.02	0.0	0.000	0.000	0.0332	
15 minute summer	DUMMY.02	2.001	DUMMY.03	5.7	1.287	0.321	0.1457	
30 minute summer	DUMMY.03	2.002	S.02	4.2	1.176	0.128	0.0077	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S.01	12	23.353	0.153	27.2	3.6352	0.0000	SURCHARGED
360 minute winter	S.02	360	23.093	0.412	12.2	14.3085	0.0000	SURCHARGED
360 minute winter	S.03	360	23.093	0.513	6.0	0.5803	0.0000	SURCHARGED
360 minute winter	S.04	360	23.093	0.393	4.2	21.7692	0.0000	SURCHARGED
360 minute winter	S.05	360	23.093	0.417	5.8	0.4717	0.0000	SURCHARGED
15 minute summer	S.06	12	23.274	0.124	20.6	3.3647	0.0000	OK
15 minute summer	DUMMY.01	1	23.450	0.000	0.0	0.0000	0.0000	OK
15 minute summer	DUMMY.02	12	23.245	0.116	15.5	0.0000	0.0000	OK
360 minute winter	DUMMY.03	360	23.093	0.270	5.3	11.5379	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	21.800	0.000	0.8	0.0000	0.0000	OK

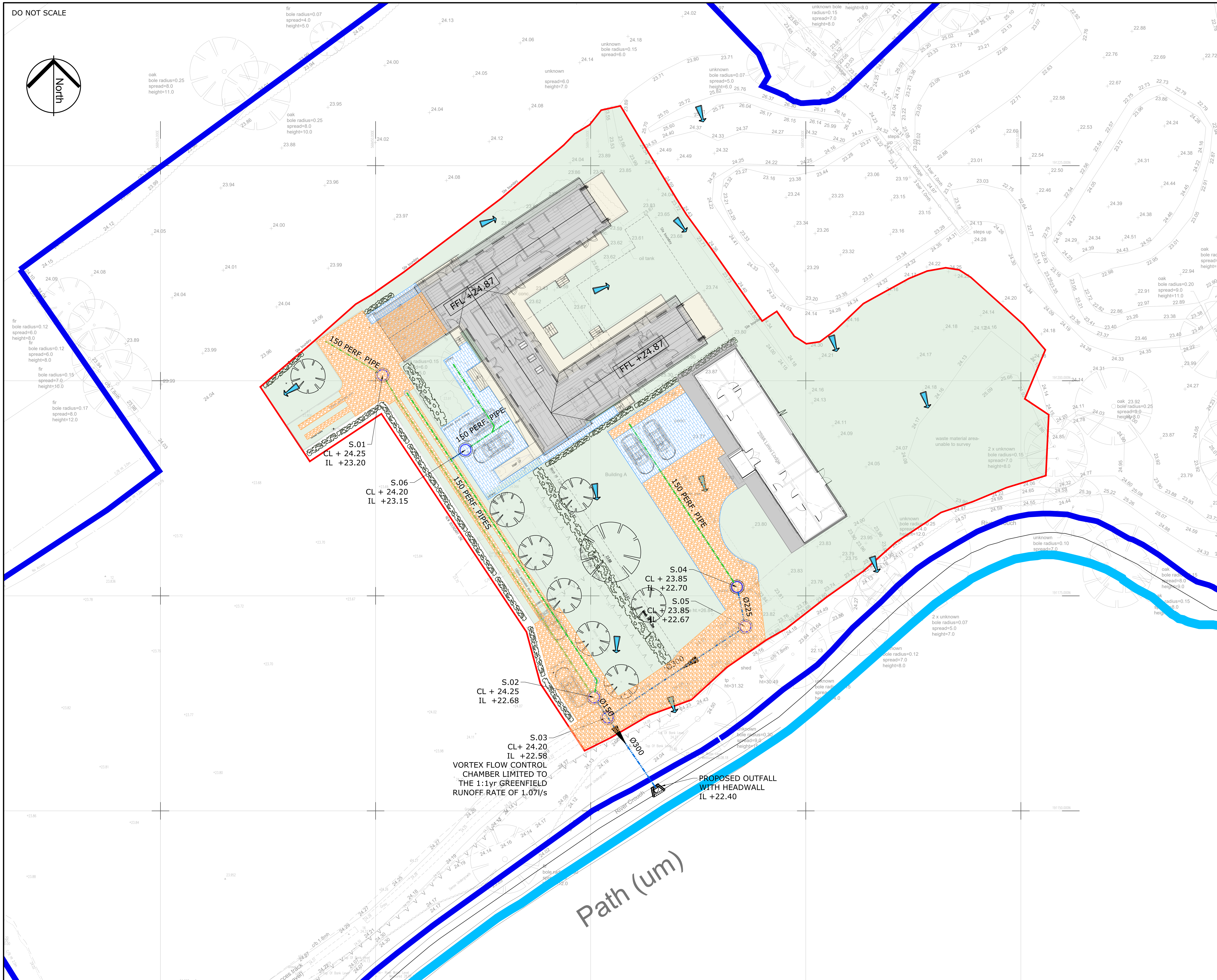
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S.01	1.000	S.02	18.4	1.126	1.039	0.7430	
360 minute winter	S.02	1.001	S.03	-5.2	0.465	-0.104	0.1128	
360 minute winter	S.03	Hydro-Brake®	OUTFALL	0.8				66.6
360 minute winter	S.04	4.000	S.05	5.8	0.192	0.074	0.3317	
360 minute winter	S.05	4.001	S.03	6.0	0.098	0.077	1.3494	
15 minute summer	S.06	3.000	DUMMY.02	15.5	1.028	0.862	0.0307	
15 minute summer	DUMMY.01	2.000	DUMMY.02	0.0	0.000	0.000	0.0680	
15 minute summer	DUMMY.02	2.001	DUMMY.03	15.5	1.561	0.874	0.3340	
360 minute winter	DUMMY.03	2.002	S.02	8.3	0.821	0.254	0.0350	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	S.01	690	23.881	0.681	3.8	11.1951	0.0000	SURCHARGED
720 minute winter	S.02	690	23.880	1.199	12.2	26.6121	0.0000	SURCHARGED
720 minute winter	S.03	690	23.880	1.300	6.8	1.4707	0.0000	SURCHARGED
720 minute winter	S.04	690	23.880	1.180	6.0	25.9324	0.0000	FLOOD RISK
720 minute winter	S.05	690	23.880	1.204	6.0	1.3621	0.0000	FLOOD RISK
720 minute winter	S.06	690	23.881	0.731	2.9	12.8553	0.0000	SURCHARGED
720 minute winter	DUMMY.01	690	23.881	0.431	0.1	0.0000	0.0000	SURCHARGED
720 minute winter	DUMMY.02	690	23.881	0.752	2.9	0.0000	0.0000	SURCHARGED
720 minute winter	DUMMY.03	690	23.880	1.057	4.1	25.8954	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	21.800	0.000	0.8	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	S.01	1.000	S.02	3.8	0.528	0.215	0.7887	
720 minute winter	S.02	1.001	S.03	6.6	0.456	0.132	0.1128	
720 minute winter	S.03	Hydro-Brake®	OUTFALL	1.1				106.8
720 minute winter	S.04	4.000	S.05	-5.6	0.192	-0.072	0.3317	
720 minute winter	S.05	4.001	S.03	-5.8	-0.085	-0.074	1.3494	
720 minute winter	S.06	3.000	DUMMY.02	2.9	0.718	0.161	0.0358	
720 minute winter	DUMMY.01	2.000	DUMMY.02	-0.1	-0.006	-0.003	0.1639	
720 minute winter	DUMMY.02	2.001	DUMMY.03	2.9	0.686	0.164	0.5419	
720 minute winter	DUMMY.03	2.002	S.02	9.4	0.701	0.287	0.0350	

DO NOT SCALE



LEGEND:

- PROPOSED PRIVATE SURFACE WATER MANHOLE
- PROPOSED PRIVATE SURFACE WATER DRAIN
- PROPOSED PERFORATED DRAIN
- OWNERSHIP BOUNDARY
- DEVELOPMENT BOUNDARY
- PROPOSED OUTFALL HEADWALL
- PROPOSED PERMEABLE PAVING
- PROPOSED GRAVEL PAVING
- FLOOD FLOW EXCEEDANCE ROUTING

REV	DATE	DESCRIPTION	DRAWN	CHKD
P2	20.04.24	ISSUED FOR PLANNING	SJA	MJG
P1	07.07.23	PRELIMINARY ISSUE	SJA	MJG

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

FISHERIES SITE
REAR OF 259 NOAK HILL ROAD
CM12 9UN

Title

PROPOSED DRAINAGE SCHEME

Client

MR R JUDD

RichardJackson
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Scale	Drawn	Date
1:200 @ A1	SJA	07/07/23
Project Manager	Checked	Approved
MJG	MJG	MJG

Status	Suitability Description	RJL Project No :
S2	FOR INFORMATION	62308

project	originator	zone	level	type	role	number	revision
62308	RJL	XX	XX	DR	S	1000	P1

A1

RichardJackson
Engineering Consultants

Appendix I

Drainage Maintenance Schedule

SUDS MAINTENANCE SCHEDULE

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	Annually or as required	Maintenance Company
Gullies	• Visual inspection	Monthly or as required	• Gully pots to be emptied	Annually or as required	Maintenance Company
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	Maintenance Company to liaise with Hydro International or others if alternative product is used to agree on maintenance for the installed component.
Permeable Paving / Gravel	• Visual Inspection	Monthly or as required	• Remove debris and sweep	Annually or as required	Maintenance Company / Landowner
Silt Trap	• Visual inspection for silt and blockages	Monthly or as required	• Remove debris and silt	Annually or as required	Maintenance company in accordance with the manufacturer's recommendations.

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