



**BRIGHT PLAN CIVILS**

**SALTHAM BARNS, RUNCTON**

**PROPOSED MINOR DEVELOPMENT**

Flood Risk Assessment & Drainage Strategy

Prepared on Behalf of  
Saward Properties Limited

D2110/FRA1.1

September 2022

## DOCUMENT CONTROL

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- Appendix A** Architectural Development Proposals
- Appendix B** Topographic Survey
- Appendix C** BGS Borehole Records
- Appendix D** Southern Water Public Sewer Records
- Appendix E** Environment Agency Product 4 Flood Data
- Appendix F** Chichester District Council Strategic Flood Risk Assessment
- Appendix G** Wallingford Greenfield Calculations
- Appendix H** Causeway Flow Hydraulic Calculations

## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 Bright Plan Civils is instructed by Saward Properties Limited to prepare a flood risk assessment and drainage strategy to accompany a planning application for minor development at Saltham Barns, Runcton.
- 1.1.2 This report has been undertaken in accordance with National Planning Policy Framework (NPPF) and The Planning Practice Guidance on Flood Risk and Coastal Change in addition to the use of SuDS for achieving sustainable development.
- 1.1.3 The proposed minor development will involve the extension of an existing barn as demonstrated by the development proposals contained within **Appendix A**. The proposed extension will provide an additional internal floor area to the order of 85m<sup>2</sup>.
- 1.1.4 In preparing this report, Bright Plan Civils has referred to the following documents and information:
- Environment Agency Flood Maps for Planning
  - Long Term Flood Risk Information; Flood Risk Maps
  - Southern Water public sewer records
  - Chichester District Council's Strategic Flood Risk Assessment
  - Chichester District Council drainage records
  - West Sussex County Council's Strategic Flood Risk Assessment
  - West Sussex County Council drainage records
  - British Geological Survey information and records
- 1.1.5 This report has been prepared to assess flood risk at the site, and to advise of any mitigation which may be required in order to ensure that the proposed development remains safe for its design life in accordance with current design standards.
- 1.1.6 This report has been prepared for the benefit of the named client only.

## 2 SITE LOCATION AND DESCRIPTION

- 2.1.1 A site location plan has been prepared (**PL100**) and is included within this report.
- 2.1.2 The site measures c. 2,652m<sup>2</sup> (0.27Ha) and is located on Saltham Lane, Runcton.
- 2.1.3 The site is currently occupied by 5 No. existing barns, which are utilised as small business units.
- 2.1.4 The site is bound to the north by an existing residential property, whilst commercial/industrial premises are located beyond the eastern boundary. Large undeveloped agricultural land is situated to the south of the site and to the west, beyond Saltham Lane, is further undeveloped land.
- 2.1.5 Site levels have been obtained by Medlam Surveys, dated June 2022. The survey is contained within **Appendix B**.
- 2.1.6 The levels obtained for the area of proposed development lie within the range of 4.841m AOD to 4.336m AOD, falling from east to west. Levels along the existing access within the immediate vicinity of the proposed development lie between 4.667m AOD and 3.125m AOD, again falling from east to west. At the point of access, Saltham Lane is indicated as being at a level of 2.971m AOD.

## 2.2 Ground Conditions

- 2.2.1 Intrusive site investigation has not been undertaken, therefore it is not possible to confirm exact ground conditions at the site.
- 2.2.2 In the absence of intrusive site investigation results, reference has been made to the British Geological Survey (BGS) website.
- 2.2.3 The BGS Geology of Britain Viewer identifies a bedrock geology consisting of 'Lambeth Group – Clay, silt and sand.'

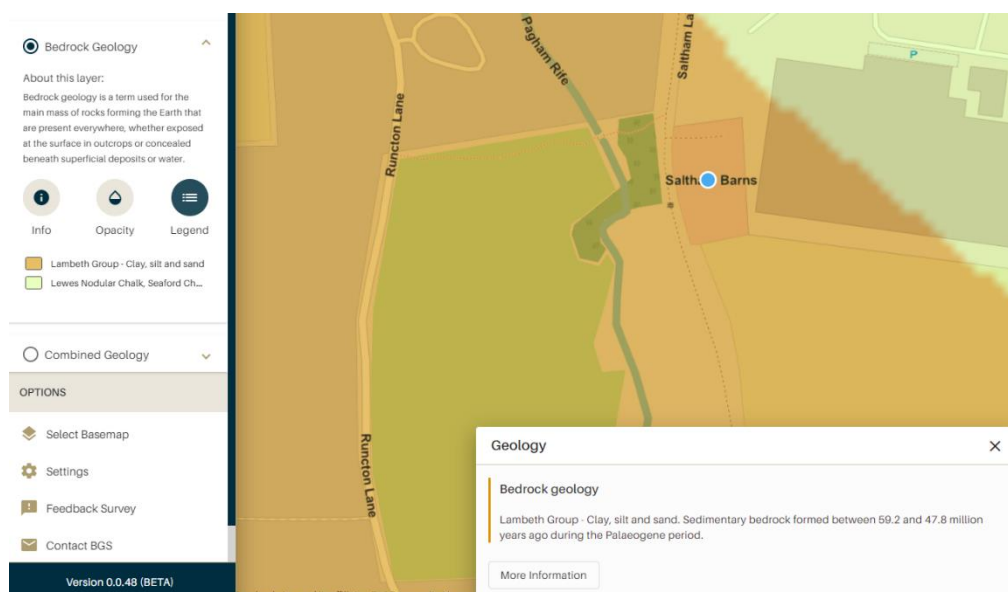


Figure 1. BGS Geology of Britain Viewer - Bedrock Geology

- 2.2.4 Superficial Deposits are identified as being variable – predominantly 'Alluvial Fan Deposits – Gravel, sand, silt and clay', with 'Raised Marine Deposits – Clay, silt, sand and gravel' to the south-west of the site.

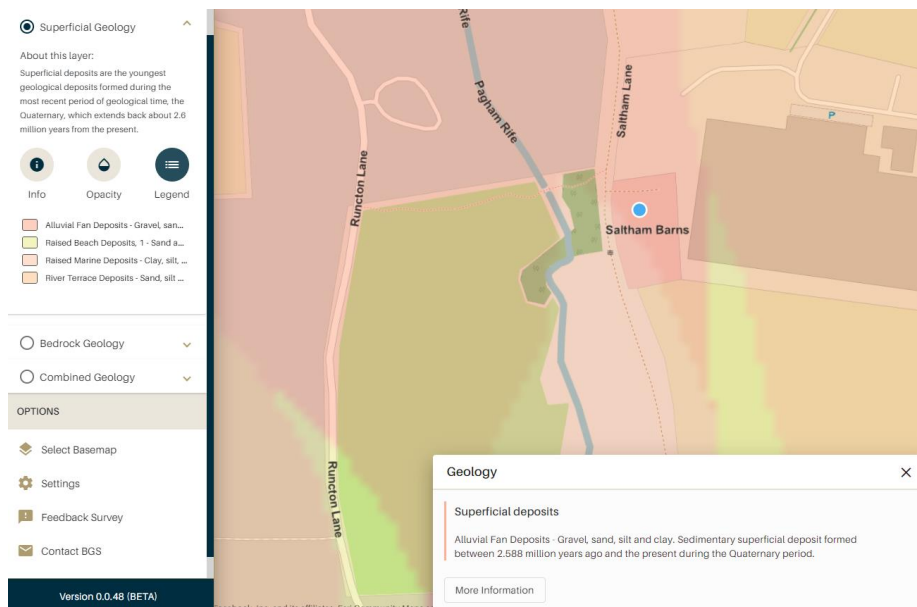


Figure 2. BGS Geology of Britain Viewer - Superficial Deposits

2.2.5 The BGS provide public records of boreholes via the GeolIndex Onshore mapping tool. Reference has been made to this tool in order to review boreholes records within the vicinity of the site in order to gain a better understanding of the anticipated or expected geology at the site.

2.2.6 The nearest borehole in relation to the site is located to the north-west, at Runcton Manor (SU80SE180 – Easting: 488400, Northing: 102100). In view of the mapping reviewed in 2.2.3 and 2.2.4, this borehole is located within an area of the same geological classifications.

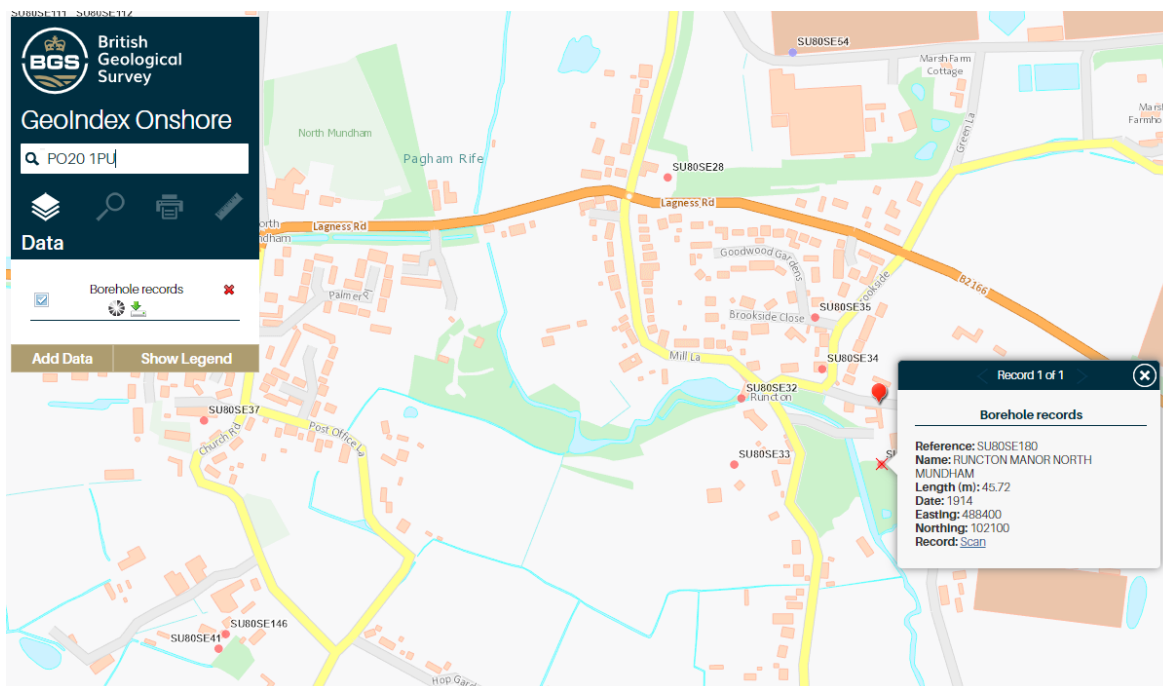


Figure 3. BGS GeolIndex Onshore Borehole Records

2.2.7 The borehole records reviewed confirm the presence of drift deposits consisting of 'Yellow marl and flint', approximately 8.22m thick, underlain by 'Upper Chalk' consisting of 'Chalk and flints'.

2.2.8 The BGS records reviewed are contained within **Appendix C**.

## 2.3 Groundwater

2.3.1 Groundwater investigation and/or monitoring has not been undertaken at the site.

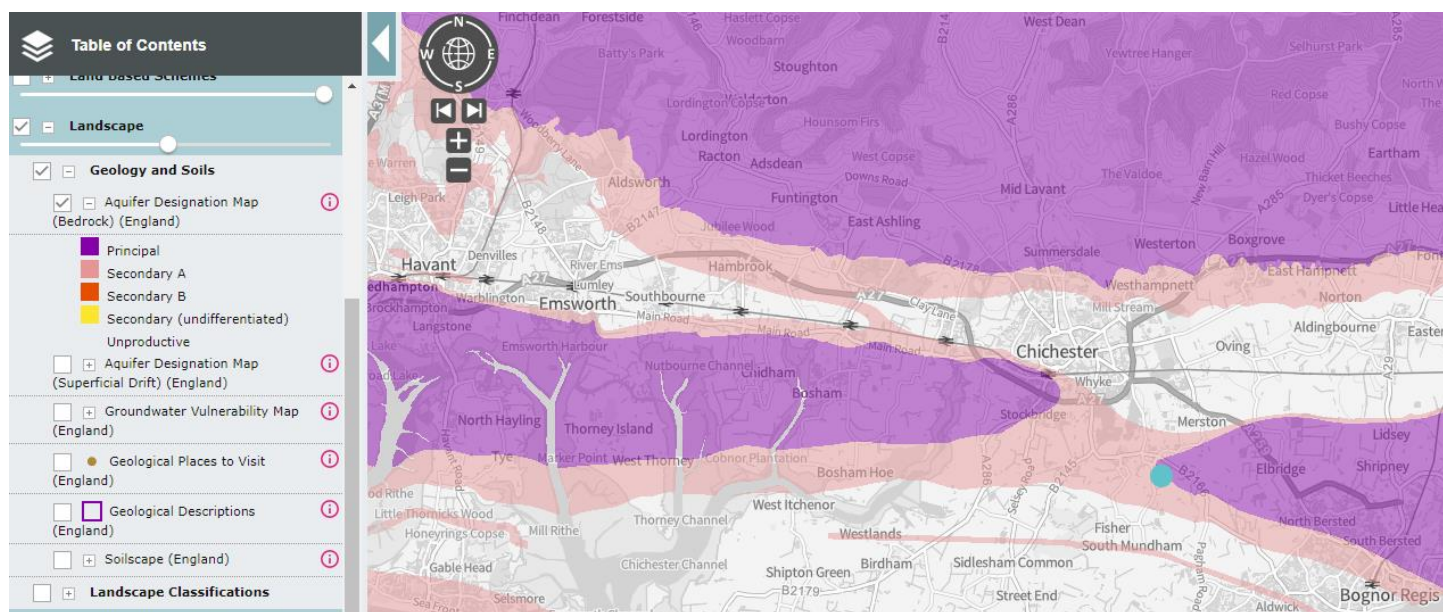
2.3.2 The BGS borehole records reviewed, as referred to in 2.2.6 and 2.2.7, confirm a rest water level of c. 6.00m below ground level. The records confirm a ground level of c. 4.50m AOD.

2.3.3 In consultation, West Sussex County Council (as Lead Local Flood Authority) has stated that Saltham Barns are within an area at 'high' risk of ground water flooding, and that during high ground water events ground water could be at or very near (within 0.025m) of ground surface.

2.3.4 Mapping managed by MAGIC ([magic.defra.gov.uk](http://magic.defra.gov.uk)) provides geographic information concerning the natural environment from across government. This mapping tool has been referred to in order to confirm whether the site is located within either any groundwater source protection zones or groundwater vulnerability zones.

2.3.5 The site is situated within a 'Secondary A' bedrock aquifer, bordering a 'Principal' bedrock aquifer (to the north-east/east), as shown in **Figure 4**. The site is also situated within a 'Secondary A' superficial drift aquifer (**Figure 5**).

2.3.6 'Secondary A' aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.





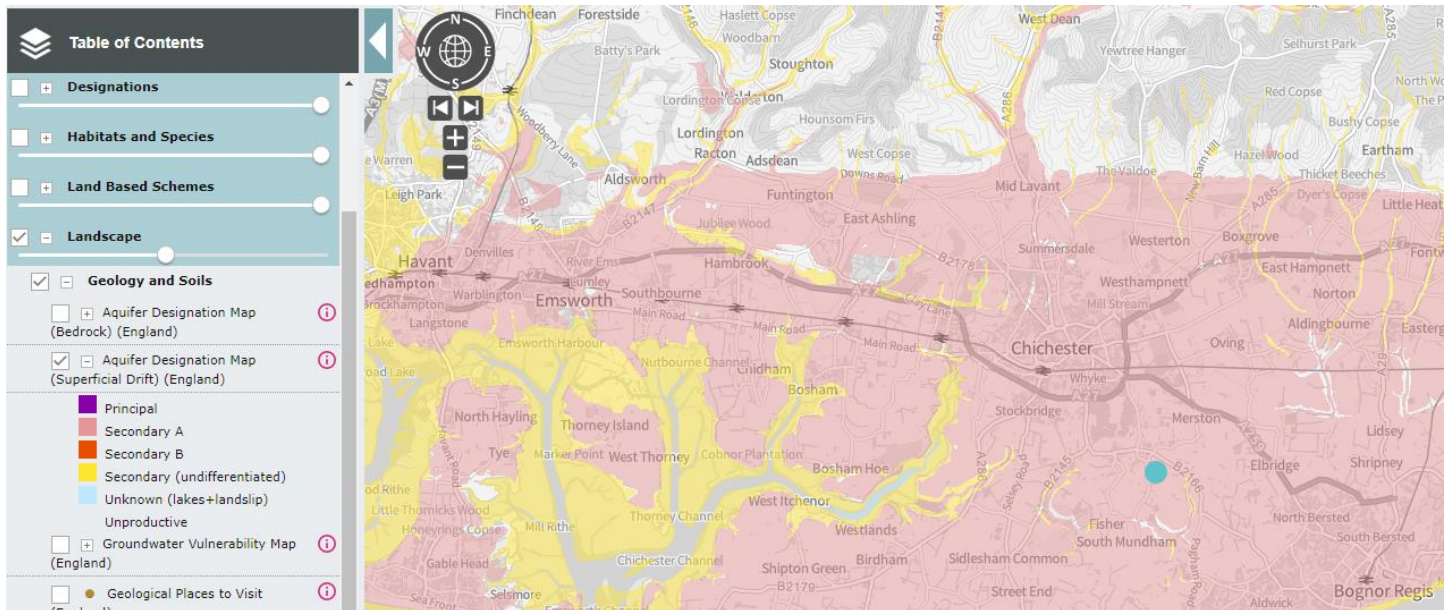


Figure 5. DEFRA Superficial Drift Aquifer Designation Map

2.3.7 The Groundwater Vulnerability confirms that the site falls within a 'Medium-High' groundwater vulnerability zone, with a 'Soluble Rock Risk'.

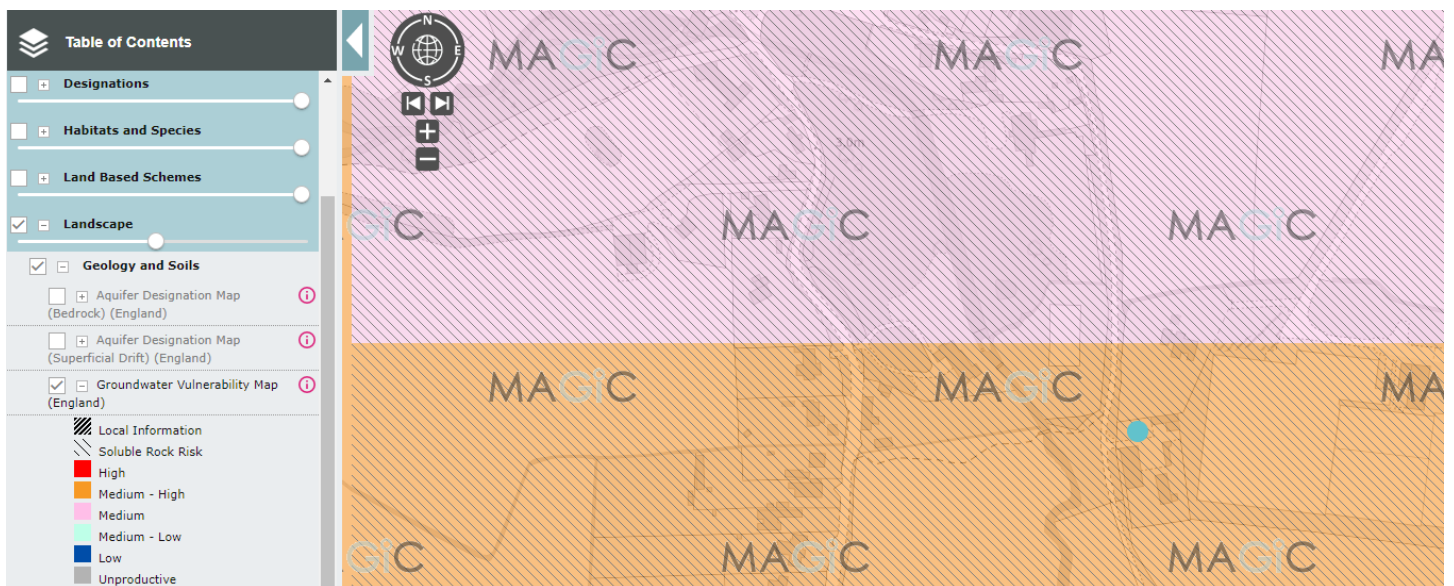


Figure 6. DEFRA Groundwater Vulnerability Map

2.3.8 'High' risk areas are those that can easily transmit pollution to groundwater, characterised by high-leaching soils and the absence of low-permeability superficial deposits. 'Medium' areas are those that offer some groundwater protection. A 'Soluble Rock Risk' is defined as areas where solution features that enable rapid movement of a pollutant may be present.

2.3.9 The site is not identified as falling within any Drinking Water Protected Areas (Surface Water), Drinking Water Safeguard Zones (Surface Water), Drinking Water Safeguard Zones (Groundwater) or Source Protection Zones.

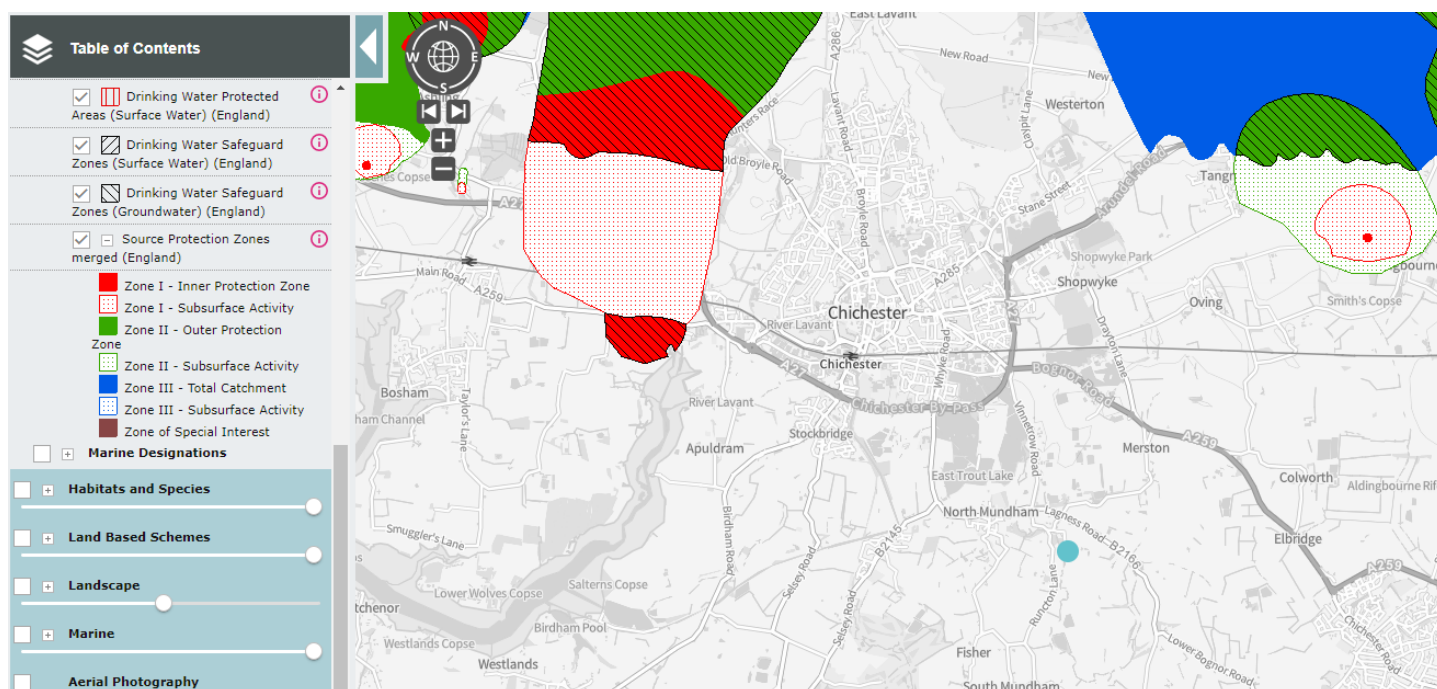


Figure 7. Drinking Water Protected Areas, Drinking Water Safeguard Zones and Source Protection Zones Map

## 2.4 Existing Drainage

2.4.1 The local sewerage authority is Southern Water. Public sewer records have been obtained from Southern Water, as contained within this report in **Appendix D**.

2.4.2 Surface Water:

- Southern Water's public sewer records indicate that there are no public surface water sewers within the vicinity of the site.
- A ditch is located along the western boundary of the site, south of the existing access, which receives existing flows from the site.
- Pagham Rife (Main River) is located approximately 40m west of the site, which flows in a southerly direction.
- The client has confirmed that the existing Unit A drains to the ditch located to the south-western corner of the site via a piped arrangement.
- 'Unit B' drains to an existing cesspool located to the immediate west of Unit C1.
- Unit C1 and Unit C2 both drain, via open-ended rainwater pipes to the ground.
- Unit D drain to the ditch located to the south-western corner of the site, utilising a connection to the piped arrangement which serves Unit A.

- Greenfield runoff rate (Qbar) has been calculated to be 0.78l/s, based on the site area of 2,652m<sup>2</sup> (0.27Ha), utilising IH124 methodology.

	<b>Greenfield Run-off Rate</b>
<b>QBAR (l/s)</b>	0.78l/s
<b>1 in 1 Year (l/s)</b>	0.66l/s
<b>1 in 30 Year (l/s)</b>	1.79l/s
<b>1 in 100 Year (l/s)</b>	2.48l/s
<b>1 in 200 Year (l/s)</b>	2.91l/s

- The run-off generated by the existing impermeable area at the site (1,122m<sup>2</sup>), will exceed that of the greenfield run-off rate.
- An existing brownfield rate of run-off has been determined using a 'flat rainfall rate' methodology. With a rainfall intensity of 50mm an hour, the existing run-off from the site in its current use is 15.58l/s (based on an area of 1,122m<sup>2</sup>).

#### 2.4.3 Foul Water:

- Southern Water's public sewer records indicate that there are no public foul water sewers within the vicinity of the site.
- The client has confirmed that the existing barns drain to 2 No. cesspits located on site.
- 1 No. cesspit is located the the west of Unit C1, and serves Units A, B, C1 and C2.
- The additional cesspit is located to the south of Unit A and the south-west of Unit D, and solely serves Unit D.
- The capacity of the 2 No. existing cesspits has not been confirmed/is unknown.

#### 2.4.4 Highway Drainage:

- Saltham Lane is a private road which is not served by a positive drainage system
- Saltham Lane drains 'over the edge' to the adjacent verge and ditch

### 3 PROBABILITY

#### 3.1 Sources of Information

3.1.1 The NPPF requires that all sources of flooding are considered being fluvial, groundwater, man-made reservoirs/canals, pluvial, sewers and tidal.

3.1.2 The likelihood of the site flooding has been established by reviewing the following information:

- Environment Agency Flood Maps for Planning
- Long Term Flood Risk Assessment; Surface Water Flood Risk Maps
- Long Term Flood Risk Assessment; Reservoir Flood Risk Maps
- Chichester District Council Strategic Flood Risk Assessment
- West Sussex County Council Strategic Flood Risk Assessment
- Consultation with Chichester District Council and West Sussex County Council

#### 3.2 Flood Maps and Modelling

3.2.1 The Environment Agency has provided Product 4 flood data in relation to the site, as contained within **Appendix E**.

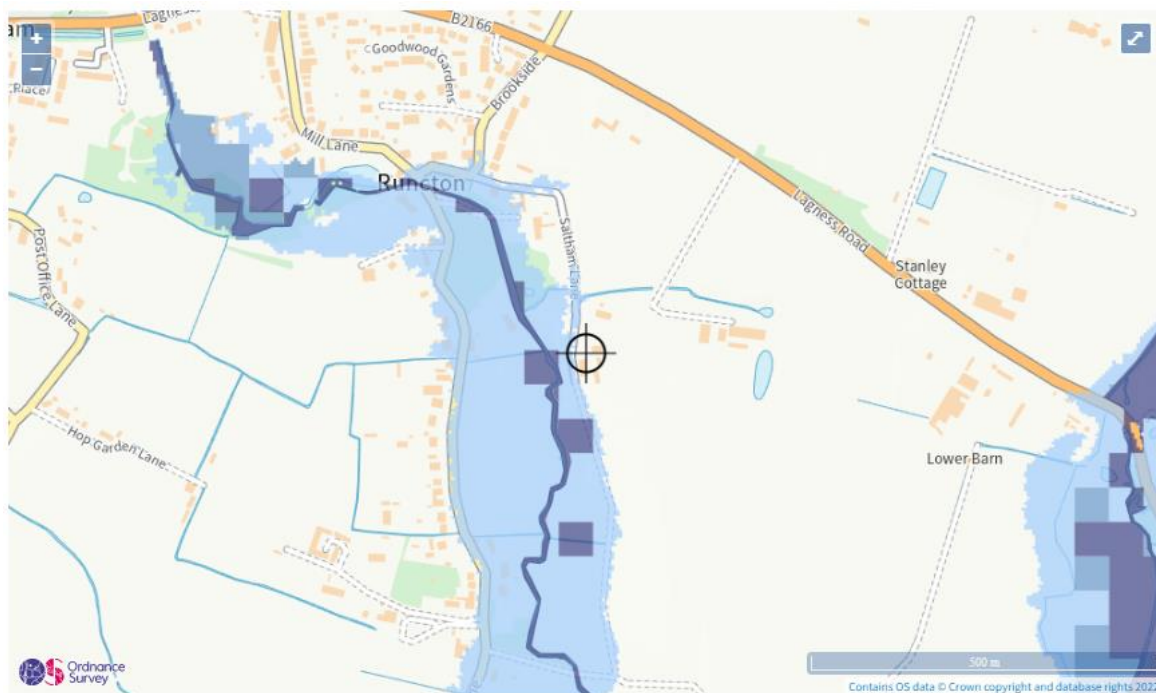
3.2.2 The Environment Agency has confirmed that the site is located in Flood Zone 1.

Flood Zone	Definition
<b>Zone 1 Low Probability</b>	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
<b>Zone 2 Medium Probability</b>	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
<b>Zone 3a High Probability</b>	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
<b>Zone 3b The Functional Floodplain</b>	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

- 3.2.3 The Flood Map for Planning (Rivers and Sea) provided as part of the Environment Agency's Product 4 response confirms that Saltham Lane is located in Flood Zone 2 and 3.
- 3.2.4 The Modelled Flood Outlines (Defended Tidal) plan provided by the Environment Agency indicates that the site is not identified at risk of flooding in the 0.5% AEP (2070 and/or 2115) or 0.1% AEP events. Saltham Lane is identified as at risk in a 0.5% AEP (2115) event.
- 3.2.5 The Modelled Flood Outlines (Undefended Tidal) plan provided by the Environment Agency indicates the proposed extension falls within an area identified as at risk of flooding in view of the 0.5% AEP (2115) event.
- 3.2.6 The Environment Agency has confirmed that there are no formal raised flood defences in the vicinity of the site.
- 3.2.7 Modelled flood levels have been provided by the Environment Agency, taken from the River Arun to East Head Coastal Modelling which was completed by JBA Consulting in 2016.
- 3.2.8 The modelled flood levels are replicated in the table, below.

Node Ref	Eastings		Northings		Modelled Flood Levels (m AOD)					
					Undefended Annual Exceedance Probability			Defended Annual Exceedance Probability		
					0.5%	0.5% (2070)	0.5% (2115)	0.1%	0.5%	0.5% (2070)
1	488483	101946	-	-	4.54	-	-	-	-	-
2	488510	101947	-	-	-	-	-	-	-	-
3	488490	101911	-	-	4.54	-	-	-	-	-
4	488489	101889	-	3.76	4.54	-	-	-	3.56	-
5	488516	101904	-	-	-	-	-	-	-	-

- 3.2.9 The FRA Site Boundary & Node Points drawing provided by the Environment Agency confirms that Node 1 corresponds with the location of the proposed barn extension. A critical flood level of 4.54m AOD has been confirmed, for the 0.5% (2115) AEP event.
- 3.2.10 Levels covering the area where the proposed barn extension is to be located fall within the range of 4.841m AOD to 4.336m AOD, falling from east to west.
- 3.2.11 In view of 3.2.10, in the worst case scenario, it is indicated that potential flood depths would be up to 204mm at the north-western boundary, in respect of the existing ground level (4.336m AOD) and the modelled flood level (4.54m AOD).
- 3.2.12 In addition to the information provided by the Environment Agency as part of the Product 4 data received, reference has also been made to Flood Maps for Planning and the Long-Term Flood Risk Maps available on Gov.uk.
- 3.2.13 The Long-Term Flood Risk Map for Rivers or the Sea does not identify the site as being at risk of flooding from such sources. Saltham Lane is identified as being at 'Low' risk of flooding from such sources, defined as an annual chance of flooding in the range of 0.1% and 1%.

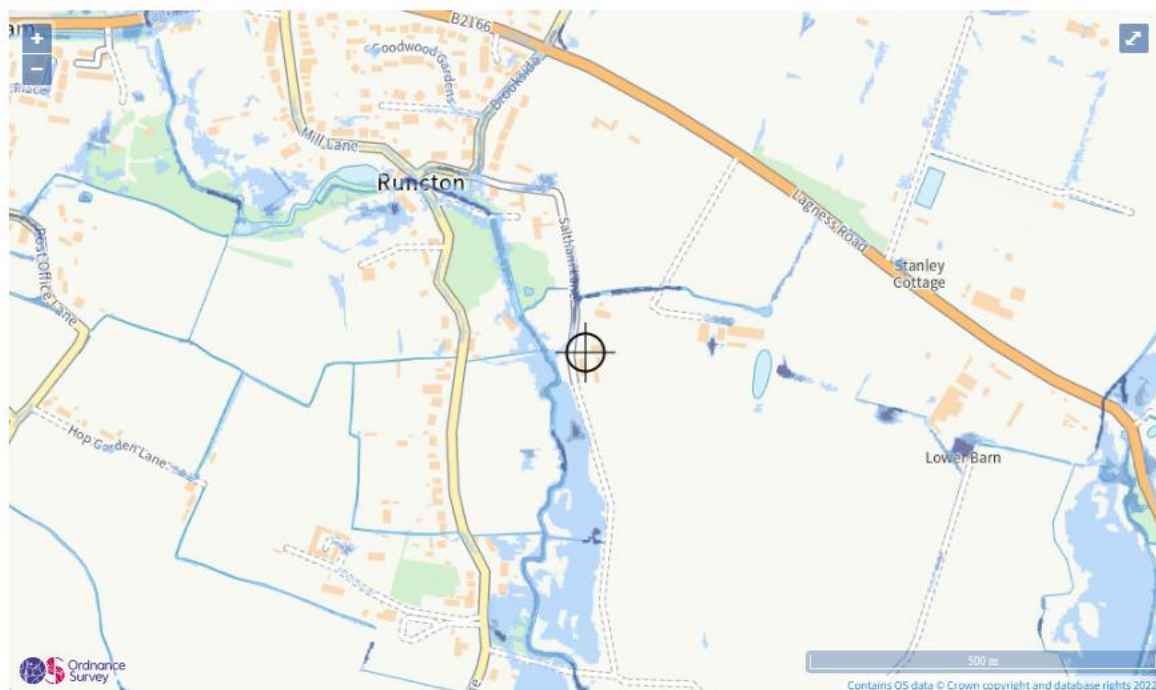


Extent of flooding from rivers or the sea

● High 
 ● Medium 
 ● Low 
 ● Very low 
 + Location you selected

**Figure 8. Long-Term Flood Risk Map; Rivers or the Sea**

3.2.14 The Long-Term Flood Risk Map for Surface Water identifies the site as being at 'Very Low' risk of flooding, defined as an area with an annual chance of flooding of less than 0.1%.

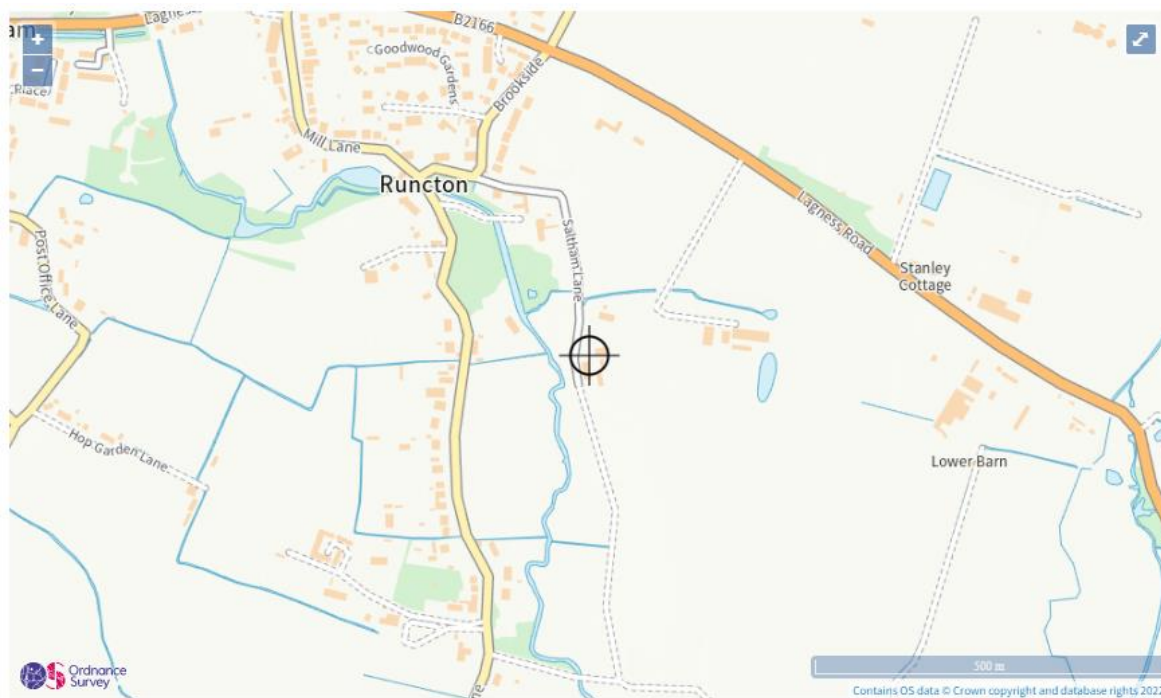


Extent of flooding from surface water

● High 
 ● Medium 
 ● Low 
 ○ Very low 
 + Location you selected

**Figure 9. Long-Term Flood Risk Map; Surface Water**

3.2.15 The Long-Term Flood Risk Map for Reservoirs does not identify the site as being at risk of flooding from such sources.



Maximum extent of flooding from reservoirs:

- when river levels are normal
- / when there is also flooding from rivers
- ⊕ Location you selected

**Figure 10. Long-Term Flood Risk Map; Reservoirs**

### 3.3 Strategic Flood Risk Assessment

- 3.3.1 Chichester District Council has a published Strategic Flood Risk Assessment, dated 2018. A revision note in conjunction with the 2018 Strategic Flood Risk Assessment has been published, dated April 2021.
- 3.3.2 The 2018 Strategic Flood Risk Assessment confirms that Saltham Lane is at risk of flooding, which is consistent with the mapping reviewed on Gov.uk as well as information and mapping provided by the Environment Agency as part of the Product 4 flood data.
- 3.3.3 Mapping from the Chichester District Council Strategic Flood Risk Assessment is contained within **Appendix F**.
- 3.3.4 The site is identified as being at risk of flooding as a result of climate change (2115 tidal event). This is consistent with the information provided by the Environment Agency.
- 3.3.5 The extents of Flood Zone 3 on Saltham Lane are confirmed as being Flood Zone 3a.
- 3.3.6 The site is not located within any Environment Agency Flood Alert or Flood Warning Areas.

### 3.4 Historic Flooding

- 3.4.1 Both the Environment Agency and West Sussex County Council have stated that neither hold any records of historic flooding at the site.
- 3.4.2 It should be noted that this does not mean that flooding has not occurred, only that it may not have been reported.



### 3.5 Summary of Flood Risk

3.5.1 The potential sources of flooding are:

Source of Flooding	Level of Risk
<p><b>Rivers and Coastal</b></p>	<p><b>Low</b></p> <p>The site is located within Flood Zone 1, albeit within the immediate vicinity of Flood Zones 2 and 3.</p> <p>The Long-Term Flood Risk Map for Rivers or the Sea does not identify the site as being susceptible to flooding from such sources.</p> <p>Information and mapping provided by the Environment Agency in response to a Product 4 request indicates that the site may be susceptible to flooding in view of climate change. The Environment Agency has confirmed a modelled flood level of 4.54m AOD for the 0.5% 2115 AEP scenario. Should such a flood event occur to this level, maximum flood depths at the area of proposed development would be up to 204mm.</p>
<p><b>Surface Water</b></p>	<p><b>Very Low</b></p> <p>The site has been assessed as being at 'Very Low' risk of surface water flooding. The area of proposed development falls from east to west with c. 500mm of fall, whilst the site is elevated above Saltham Lane by c. 1.50m.</p>

<p><b>Groundwater</b></p>	<p><b>TBC</b></p> <p>Groundwater investigation and monitoring has not been undertaken at the site.</p> <p>West Sussex County Council has stated that they understand the site to be within an area at 'High' risk of ground water flooding, and that during high groundwater events, groundwater could be at or very near (within 0.025m) of ground surface.</p> <p>The BGS borehole records reviewed as per Section 2.2 and 2.3 of this report, a rest groundwater level was stated to be c. 6.00m below a ground level of c. 4.50m AOD.</p> <p>The only way to accurately confirm the risk of flooding in relation to groundwater at the site is to undertake groundwater investigation and/or monitoring.</p> <p>In the absence of such information, the risk of groundwater flooding cannot be confirmed.</p>
<p><b>Sewers</b></p>	<p><b>Very Low</b></p> <p>Southern Water's public sewer records indicate no public foul or surface water sewers within the vicinity of the site. The nearest mapped public sewer is a public foul water sewer located c. 160m west of the site, adjacent to Runcton Lane.</p>
<p><b>Artificial Sources</b></p>	<p><b>None</b></p> <p>The site is not shown to be at risk of flooding due to artificial sources.</p>

- 3.5.2 The site is largely considered to be at 'Very Low' to 'Low' risk of flooding. The site is indicated as being at risk of flooding in the 0.5% AEP (2115) AEP event, as confirmed by the Environment Agency. The modelled flood level provided is 4.54m AOD, which would result in potential flood depths of up to 204mm within the area of the site where the proposed extension is to be located. Of the information currently available, it has not been possible to fully qualify the risk of groundwater flooding.
- 3.5.3 The proposed drainage system for the proposed development should be designed in order to provide capacity up to the design event and provide consideration of potential exceedance routes, so as to not increase the risk of surface water flooding on or off the site.

## 4 PROPOSED DEVELOPMENT

### 4.1 Description of Development

- 4.1.1 The proposed development will involve the construction of an extension to an existing barn at Saltham Barns, as demonstrated by the architectural development proposals contained within **Appendix A**.
- 4.1.2 The type of development proposed falls within the "Less Vulnerable" flood risk vulnerability classification (Annex 3: Flood risk vulnerability classification, NPPF) and is appropriate in Flood Zone 1, 2 and 3a (Flood Risk and Coastal Change Table 2).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	Exception Test Required	✓	✓	✓
Flood Zone 3a†	Exception Test Required †	✗	Exception Test Required	✓	✓
Flood Zone 3b*	Exceptions Test Required *	✗	✗	✗	✓*

✓ = Development is appropriate  
✗ = Development should not be permitted

- 4.1.3 The proposed extension will result in an increase in impermeable area to the order of c. 103m<sup>2</sup> (0.01Ha), inclusive of the proposed extension and associated bin and cycle storage.
- 4.1.4 The specific Surface Water and Foul Water drainage proposals are detailed in **Section 4** of this report.

## 5 SEQUENTIAL AND EXCEPTION TESTS

### 5.1 Sequential Test

- 5.1.1 The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account.
- 5.1.2 Seeking to steer new development to areas with the lowest risk of flooding, development within Flood Zone 1 should be prioritised.
- 5.1.3 The site is located fully within Flood Zone 1, therefore the Sequential Test is 'passed'.

### 5.2 Exception Test

- 5.2.1 Annex 3: Flood risk vulnerability classification of NPPF provides information on flood risk vulnerability for different types of development.
- 5.2.2 Commercial development, as is proposed at the site, is classified at "Less Vulnerable".
- 5.2.3 Table 2 within Paragraph 079 of Flood Risk and Coastal Change confirms that developments classified as "Less Vulnerable" are compatible with Flood Zone 1, 2 and 3a.
- 5.2.4 As the site is located fully within Flood Zone 1, and the Sequential Test is 'passed', application of the Exception Test is not required.

## 6 PROPOSED DRAINAGE STRATEGY

### 6.1 Surface Water

6.1.1 The SUDS Manual (CIRIA C753) and Building Regulations (Document H) set out a hierarchy of drainage methods to ensure that developments maximise the use of sustainable drainage techniques. The hierarchy favours infiltration methods of disposal over other methods such as watercourse and sewers, as detailed below;

- i. Utilise infiltration techniques
- ii. Attenuate rainwater in ponds or open water features for gradual release
- iii. Attenuate rainwater by storing in tanks or sealed water features for gradual release
- iv. Discharge rainwater direct to a watercourse
- v. Discharge rainwater to a surface water sewer/drain
- vi. Discharge rainwater to a combined sewer

SUDS Technique	Suitable	Comments
Living Roof	Yes	No initial constraints.
Basins and Ponds (such as Wetlands, Balancing Ponds, Detention Basins, Retention Ponds)	No	Limited land available to accommodate in view of proposed extension.
Filter strips and swales	No	Limited land available to accommodate in view of proposed extension.
Infiltration Devices - Soakaways - Infiltration trenches and basins	No	Spatial constraints on site, specifically where the proposed extension is concerned, restrict the use of features such as soakaways.
Permeable surfaces and filter drains (such as gravelled areas and porous block paving)	No	The proposed development involves the extension of an existing barn. The existing carpark finish will be retained.
Tanked systems (such as oversized pipes or cellular tanks)	Yes	No initial constraints.

6.1.2 It is proposed that the minor development in the form of the proposed extension will be served by its own dedicated surface water drainage system, which will discharge to the ditch to the south-west of the site. This will consist of a simple piped system.

- 6.1.3 Given the negligible catchment associated with the proposed development (103m<sup>2</sup>), it is possible to provide storage within the proposed piped system, inclusive of the volume of storage to be provided within manholes, to accommodate a 1 in 100-year storm event, inclusive of an allowance of 45% for climate change.
- 6.1.4 Flows to the ditch will be restricted to a rate of 2.00l/s.
- 6.1.5 Discharge to the ditch, and the associated works, will be subject to consent from Chichester District Council further to an Ordinary Watercourse Consent application.
- 6.1.6 Drawing **PL300 'Conceptual Drainage Strategy'** has been prepared to demonstrate the proposed arrangement.

## **6.2 Foul Water Drainage**

- 6.2.1 In view of an increased level of occupancy at the site, an additional volume of storage whereby the existing cesspools are concerned will be required.
- 6.2.2 Based on an increase in population of the site of up to 6 No. persons, an additional volume of storage totalling 45.20m<sup>3</sup> will be required in order to support the development, in accordance with Building Regulations, Document H2, Clause 1.6.1
- 6.2.3 The capacity/size of the existing cesspools has not been confirmed by the client. The client will be responsible for ensuring that sufficient storage is provided in view of the total population at the site, inclusive of the proposed increase in population.

## **6.3 Climate Change**

- 6.3.1 Gov.uk provides guidance for local planning authorities preparing strategic flood risk assessments and developers and their agents preparing flood risk assessments for planning applications, and development consent orders for nationally significant infrastructure projects.
- 6.3.2 Climate change allowances are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height.
- 6.3.3 Allowance for climate change shall be provided in the undertaking of site-specific flood risk assessments where new development is proposed to minimise vulnerability and provide resilience to flooding and coastal change.
- 6.3.4 The 'Peak Rainfall Allowances Map' shows anticipated changes in peak rainfall intensity.
- 6.3.5 Based on the latest allowances, for the 3.3% annual exceedance rainfall event, an increase of 40% should be applied to peak rainfall in relation to the proposed development.

6.3.6 For the 1% annual exceedance rainfall event, an increase of 45% should be applied to peak rainfall in relation to the proposed development.

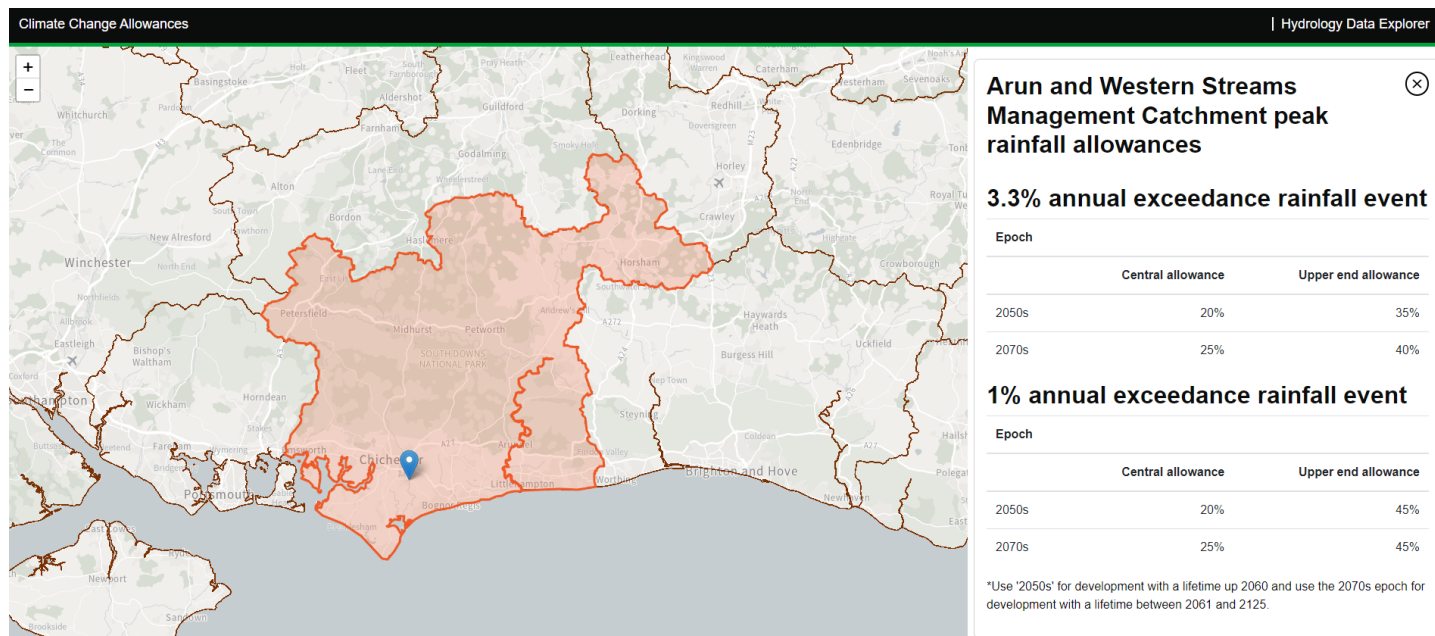


Figure 11. Climate Change Allowances – Peak Rainfall Allowances (Gov.uk)

6.3.7 In view of the Product 4 flood data provided by the Environment Agency, the site is indicated as being at risk of flooding as a result of climate change, in respect of the 0.5% (2115) AEP tidal flood event, with a modelled flood level of 4.54m AOD confirmed.

## 6.4 Urban Creep

6.4.1 No allowance has been made for urban creep given that the proposed development concerns the extension of an existing barn which is used for business/commercial purposes. West Sussex County Council's Policy for the Management of Surface Water confirms that allowances for urban creep are only required in relation to residential development.

## 7 RESIDUAL RISK AND MITIGATION

### 7.1 Residual Risk

7.1.1 The following residual risks have been identified in relation to the proposed development:

- i. Flooding at the site owing to increased flow through Pagham Rife as a result of climate change
- ii. Flooding at the site as a result of blockage to Pagham Rife
- iii. Flooding as a result of extreme rainfall events that exceed the design criteria leading to surface water flooding
- iv. Flooding as a result of blockage or failure of the on-site drainage system
- v. Flooding as a result of groundwater levels exceeding ground level

### 7.2 Mitigation

7.2.1 Consideration has been taken to the residual risks stated in Section 6.1, and the following mitigation measures are proposed:

- i. The Environment Agency Product 4 flood data indicates a maximum flood depth of 204mm in relation to the 0.5% (2115) AEP event, in view of the modelled flood level (4.54m AOD) and the lowest site level (4.336m AOD) where the proposed extension will be located. It is recognised that the Environment Agency has stated that the modelled flood level data provided does not include the latest allowance where climate change is concerned. Given the size and scale of the proposed development – a single extension of an existing barn used for business/commercial purposes, a conservative allowance in terms of freeboard in relation to the modelled flood level of 4.54m AOD is proposed. The existing barn has a surveyed threshold level of 5.090m AOD. The finished floor level of the proposed extension should be set at a minimum of 4.84m AOD – 300mm above the modelled flood level provided by the Environment Agency. Any advance on the level of 4.84m AOD is seen as further betterment and mitigation in view of the risk of flooding. This will ensure that the proposed extension is elevated above the modelled flood level, with additional freeboard.

Despite the freeboard proposed in relation to the finished floor level where the modelled flood level is concerned, additional mitigation can be afforded in the form of flood resilient and/or resistant construction methods. This may include;

- o Flood doors and/or flood barriers (where flood doors cannot be installed)
- o Anti-flood air bricks
- o Non-return valves on foul and surface water connection points
- o Raised appliances electrics
- o Tiled or 'hard' floors where possible



- ii. The area of proposed development sits at a level in the range of 4.841m AOD to 4.336m AOD, falling from east to west. Levels along the existing access lie within the range of 4.667m AOD and 3.125m AOD, whilst Saltham Lane is indicated as being at a level of 2.971m AOD. Paghams Rife is located approximately 40m west of the site. Should blockage occur in relation to Paghams Rife, flows exceeding the channel would follow the natural topography, and look to follow a path along the line of lowest level. In view of the risk of flooding as a result of climate change, it is proposed that the extension will have a finished floor level in excess of 4.84m AOD – at least 300mm above the Environment Agency's modelled flood level of 4.54m AOD for the 0.5% (2115) AEP event.
- iii. In exceedance events, flows will follow the topography of the site, as well as the wider natural topography towards lower lying land. Given the falls evident on site, run-off would follow the existing access, falling from east to west, towards Saltham Lane, as is currently the case. This would result in run-off being directed away from the proposed extension, which will be elevated as a result of a raised floor level of at least 4.84m AOD.
- iv. Should the on-site drainage system become blocked or fail, the result would be the same as in exceedance events, as outlined above. Run-off would follow the existing access, falling from east to west, towards Saltham Lane, as is currently the case. This would result in run-off being directed away from the proposed extension, which will be elevated as a result of a raised floor level of at least 4.84m AOD.
- v. Peak groundwater levels have not been established in relation to the site. Regardless, the finished floor level of the proposed extension will be elevated to a level of at least 4.84m AOD, providing freeboard in relation to existing ground levels.

## 8 FLOOD RISK MANAGEMENT

### 8.1 Safe Access and Egress

- 8.1.1 The proposed extension will be accessible via the existing access off of Saltham Lane. No change is proposed to the site's existing access arrangement or the existing general site arrangement.
- 8.1.2 Saltham Lane is identified as falling within Flood Zone 2 and 3, although the site is located in Flood Zone 1.
- 8.1.3 The risk of flooding relates to Pagham Rife; a tidal main river located c. 40m west of the site.
- 8.1.4 Given the tidal nature of Pagham Rife, and the residual risk of flooding associated with this, extreme flood events will typically be predictable and prior planning can take place to make appropriate arrangements should it be deemed necessary.
- 8.1.5 The existing barns are used as business premises, classed as "Less Vulnerable", which is also the intended use of the proposed extension. As such, occupants will not be residing at the premises.
- 8.1.6 Should flooding occur which impinges safe access and/or egress to the site, the finished floor level is to be set above the 0.5% (2115) AEP modelled flood level of 4.54m AOD. Given the freeboard proposed in relation to this (minimum 300mm) it would be possible to seek refuge within the barn extension.
- 8.1.7 Should a more extreme flood event occur, where it is not possible to remain on site, a safe route of escape through the neighbouring nursery site, to the east, can be provided. As such, a 'dry' route of escape can be achieved in the event of flooding.
- 8.1.8 It is recommended that a Flood Evacuation Plan is prepared to detail the steps which should be taken in the event of flood which might affect the site.

## 9 OFFSITE IMPACTS

- 9.1.1 The proposed development will result in a negligible increase in run-off from the site, and will therefore not cause an increase in flood risk off-site. The works associated with the proposed extension totals an area of 103m<sup>2</sup> and is therefore classed as 'Minor Development'.
- 9.1.2 Flood Risk and Coastal Change, Paragraph 051 states that 'Minor developments are unlikely to raise significant flood risk issues unless they would have an adverse effect on a watercourse, floodplain or its flood defences; they would impede access to flood defences and management facilities; or where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows'. It is considered that none of these factors are applicable.
- 9.1.3 Regardless of the above, it is proposed that flows to the receiving ditch will be restricted to a rate of 2.00l/s from the proposed on-site surface water drainage system which is to serve the proposed development (extension).

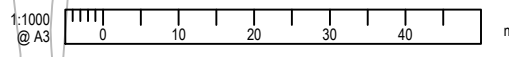
## 10 SUMMARY

- 10.1.1 This site-specific drainage strategy report is based on Environment Agency Flood Maps for Planning, Long Term Flood Risk Assessment; Surface Water Flood Risk Maps, Long Term Flood Risk Assessment; Reservoir Flood Risk Maps, Chichester District Council Strategic Flood Risk Assessment, West Sussex County Council Strategic Flood Risk Assessment and Consultation with Chichester District Council and West Sussex County Council.
- 10.1.2 The proposed development will involve the extension of an existing barn as demonstrated by the development proposals contained within **Appendix A**.
- 10.1.3 Site levels have been obtained by Medlam Surveys, dated June 2022. The survey is contained within **Appendix B**.
- 10.1.4 The levels obtained for the area of proposed development lie within the range of 4.841m AOD to 4.336m AOD, falling from east to west. Levels along the existing access within the immediate vicinity of the proposed development lie between 4.667m AOD and 3.125m AOD, again falling from east to west. At the point of access, Saltham Lane is indicated as being at a level of 2.971m AOD.
- 10.1.5 Southern Water's public sewer records indicate that there are no public surface water sewers within the vicinity of the site.
- 10.1.6 A ditch is located along the western boundary of the site, south of the existing access, which receives existing flows from the site.
- 10.1.7 Pagham Rife (Main River) is located approximately 40m west of the site, which flows in a southerly direction.
- 10.1.8 The client has confirmed that the existing Unit A drains to the ditch located to the south-western corner of the site via a piped arrangement.
- 10.1.9 'Unit B' drains to an existing cesspool located to the immediate west of Unit C1.
- 10.1.10 Unit C1 and Unit C2 both drain, via open-ended rainwater pipes to the ground.
- 10.1.11 Unit D drain to the ditch located to the south-western corner of the site, utilising a connection to the piped arrangement which serves Unit A.
- 10.1.12 The site is located in Flood Zone 1, although Saltham Lane is located in Flood Zone 2 and 3(a).
- 10.1.13 The site is identified as being at risk as a result of climate change; The Environment Agency has confirmed a modelled flood level of 4.54m AOD in relation to the 0.5% (2115) AEP flood event.
- 10.1.14 The site is identified as being at 'Very Low' risk of surface water flooding.
- 10.1.15 The finished floor level should be set at a level of at least 4.84m AOD – 300mm above the modelled flood level of 4.54m AOD (0.5%, 2115 AEP).
- 10.1.16 Based on an increase in population of the site of up to 6 No. persons, an additional volume of storage totalling 45.20m<sup>3</sup> will be required in order to support the development, in accordance with Building Regulations, Document H2, Clause 1.6.1
- 10.1.17 The completion of the development will not increase flood risk on or off the site.

10.1.18 In conclusion, this development is suitable with regards to flood risk and surface water drainage.

## DRAWINGS

- PL100** Site Location Plan
- PL101** Surface Water Flood Map
- PL102** Flood Zone Plan
- PL200** Impermeable Areas
- PL300** Conceptual Drainage Strategy



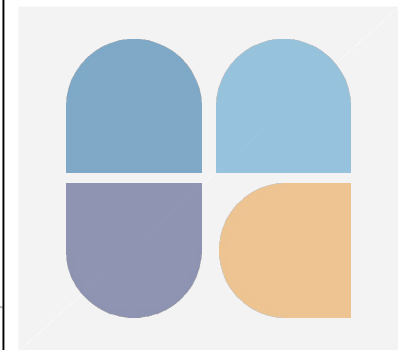
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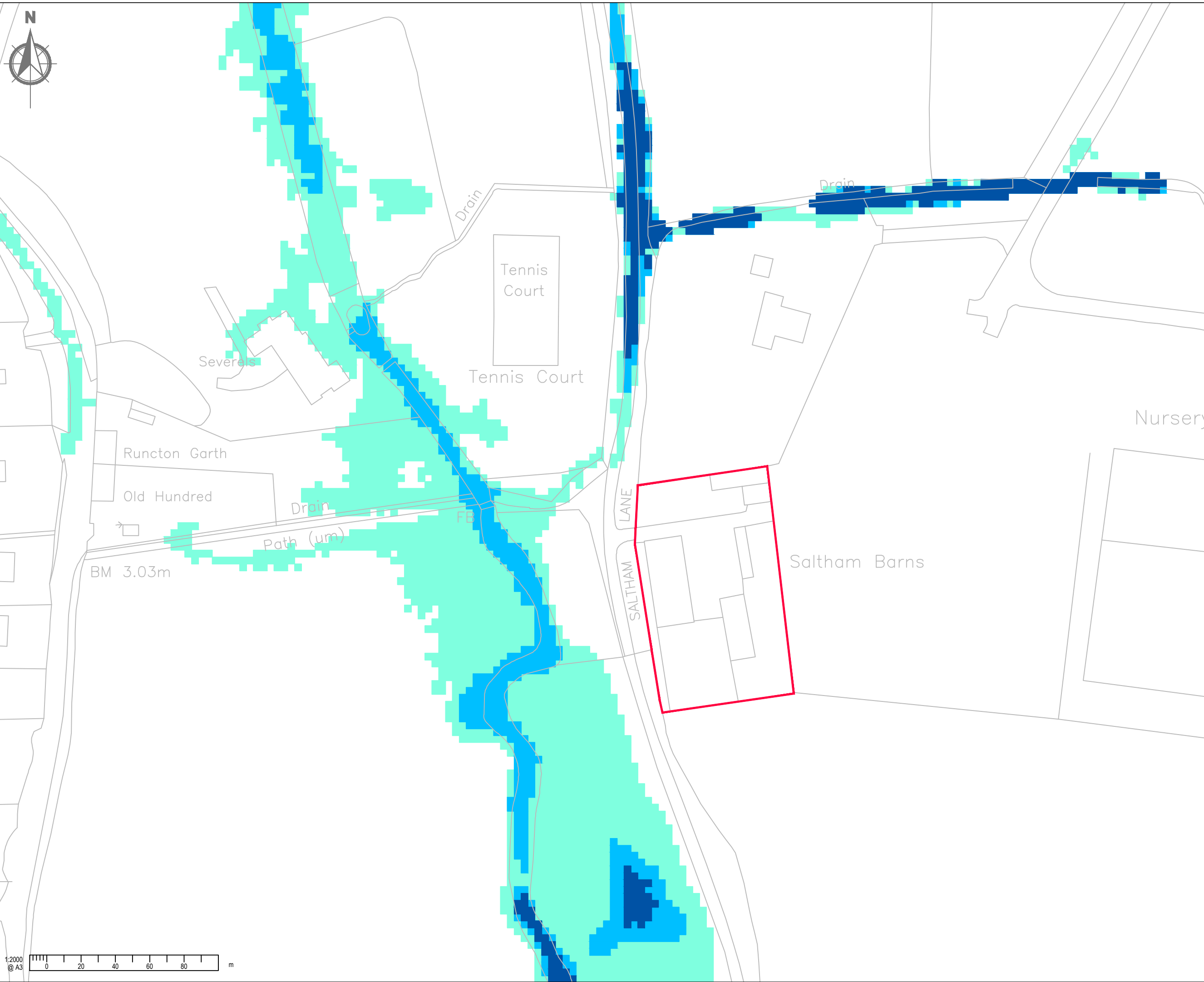
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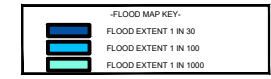


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Drawing Status <b>PLANNING</b>			
Client <b>Saward Properties Ltd</b>			
Project <b>Saltham Barns Extension Saltham Lane, Runcton, PO20 1PU</b>			
Drawing Title <b>Site Location Plan</b>			
Scale <b>1:1000</b>	Date <b>Oct. '22</b>	Drawn By <b>SPB</b>	Checked By <b>MJA</b>
Drawing No. <b>D2110-PL100</b>			Rev. <b>-</b>



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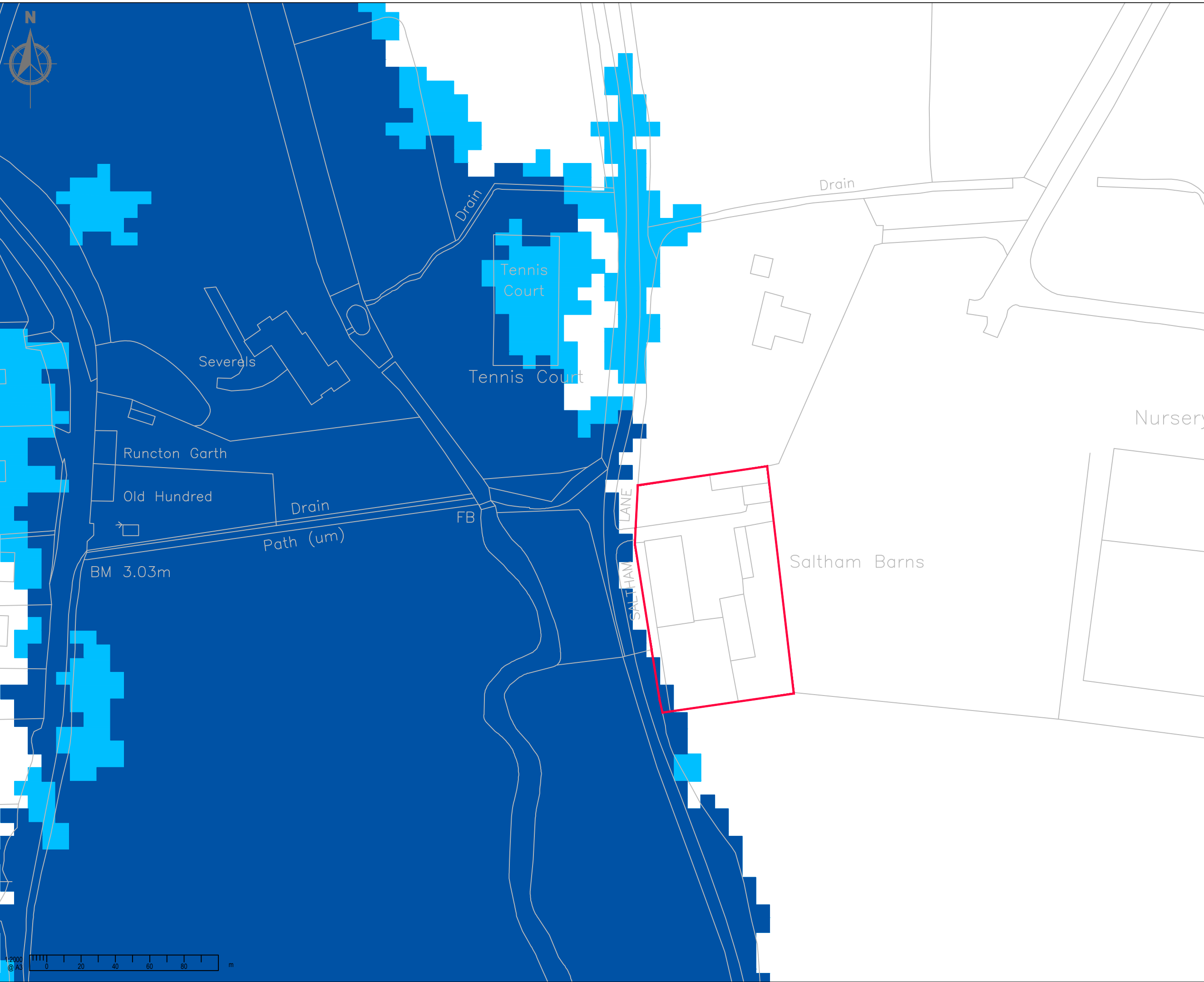
	Original issue	08/09/22
Rev.	Amendments	Date



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Drawing Status	PLANNING		
Client	Saward Properties Ltd		
Project	Saltham Barns Extension Saltham Lane, Runcton, PO20 1PU		
Drawing Title	Surface Water Flood Map		
Scale	Date	Drawn By	Checked By
1:2000	Sep 22'	MJA	MJA
Drawing No.	D2110-PL101		Rev.
			-





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-FLOOD MAP KEY-

	FLOOD ZONE 2
	FLOOD ZONE 3

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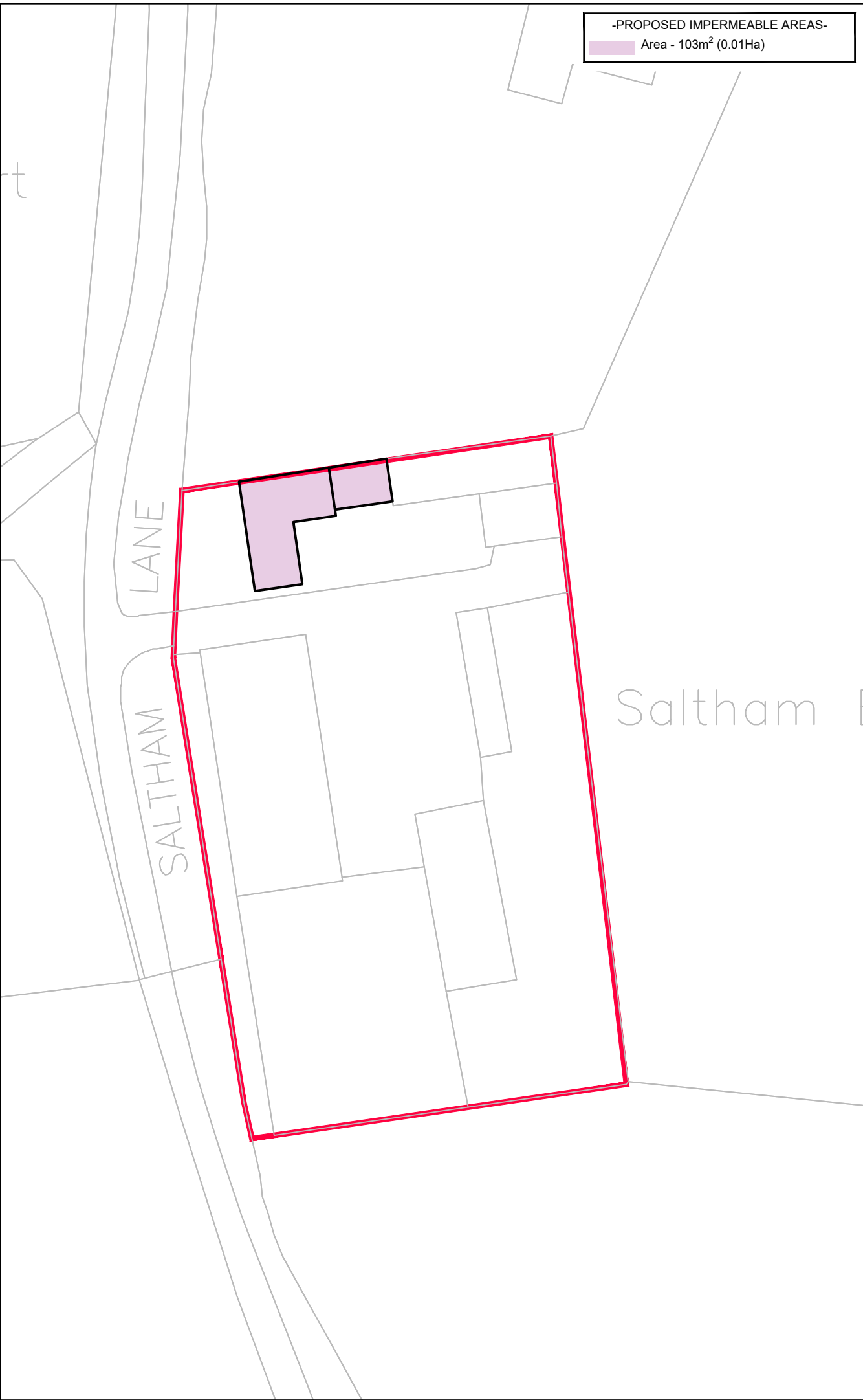
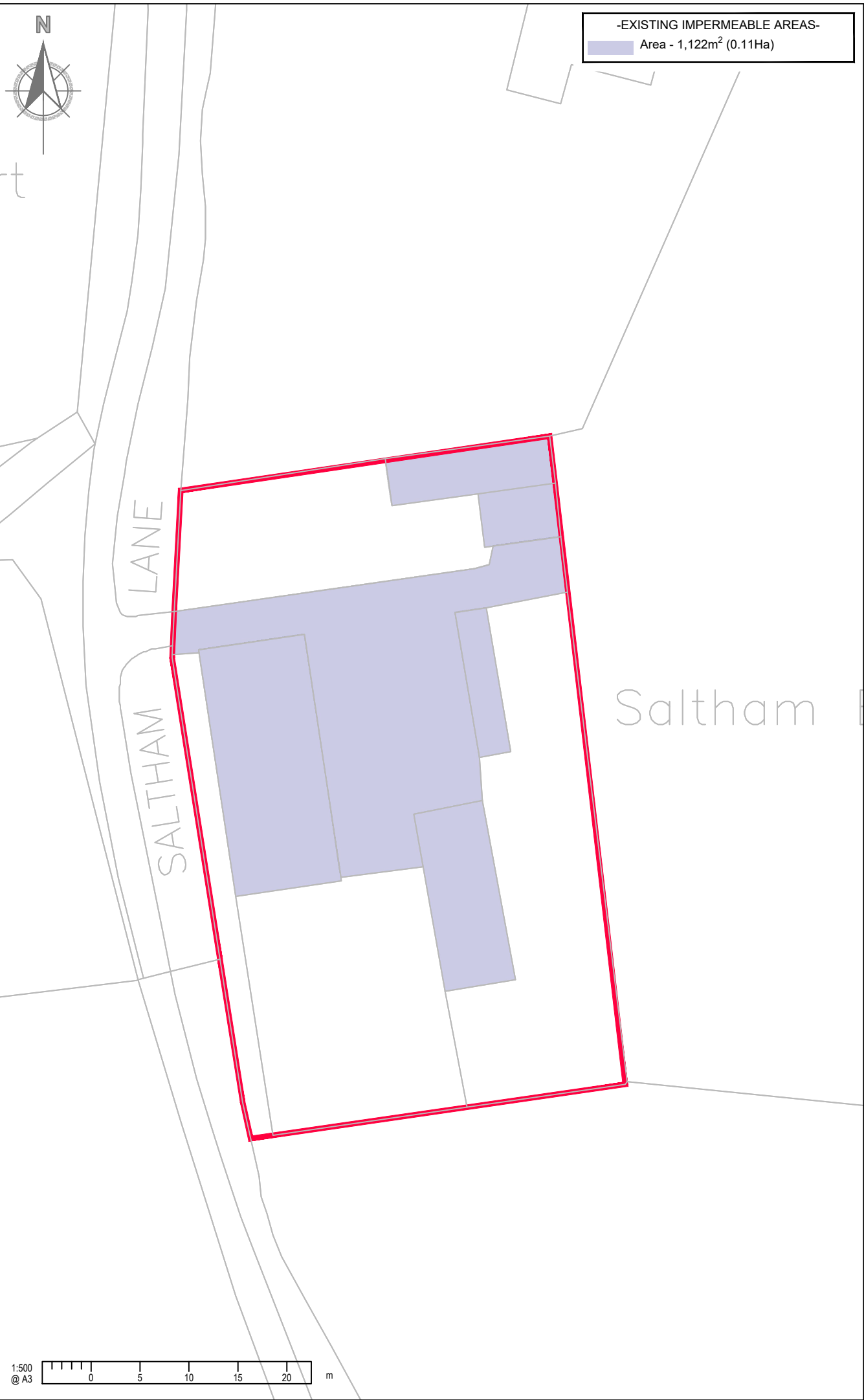
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Drawing Status <b>PLANNING</b>			
Client <b>Saward Properties Ltd</b>			
Project <b>Saltham Barns Extension Saltham Lane, Runcton, PO20 1PU</b>			
Drawing Title <b>Flood Zone Plan</b>			
Scale <b>1:2000</b>	Date <b>Sep 22'</b>	Drawn By <b>MJA</b>	Checked By <b>MJA</b>
Drawing No. <b>D2110-PL102</b>			Rev. <b>-</b>



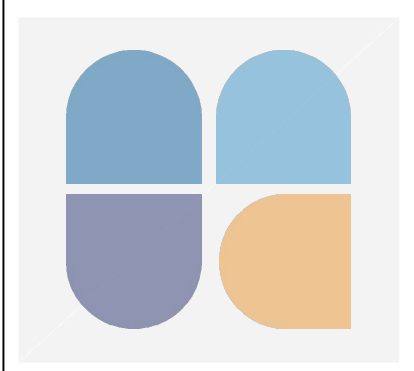
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Drawing Status	PLANNING		
Client	Saward Properties Ltd		
Project	Saltham Barns Extension Saltham Lane, Runcton, PO20 1PU		
Drawing Title	Impermeable Areas		
Scale	1:500	Date	Oct. '22
Drawn By	SPB	Checked By	MJA
Drawing No.	D2110-PL200		Rev.
			-

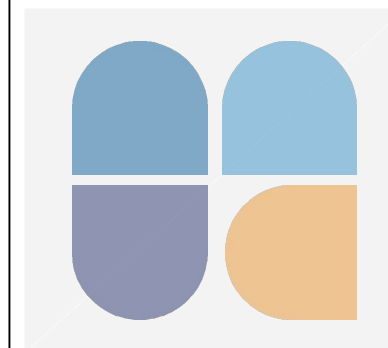
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Drawing Status: **PLANNING**

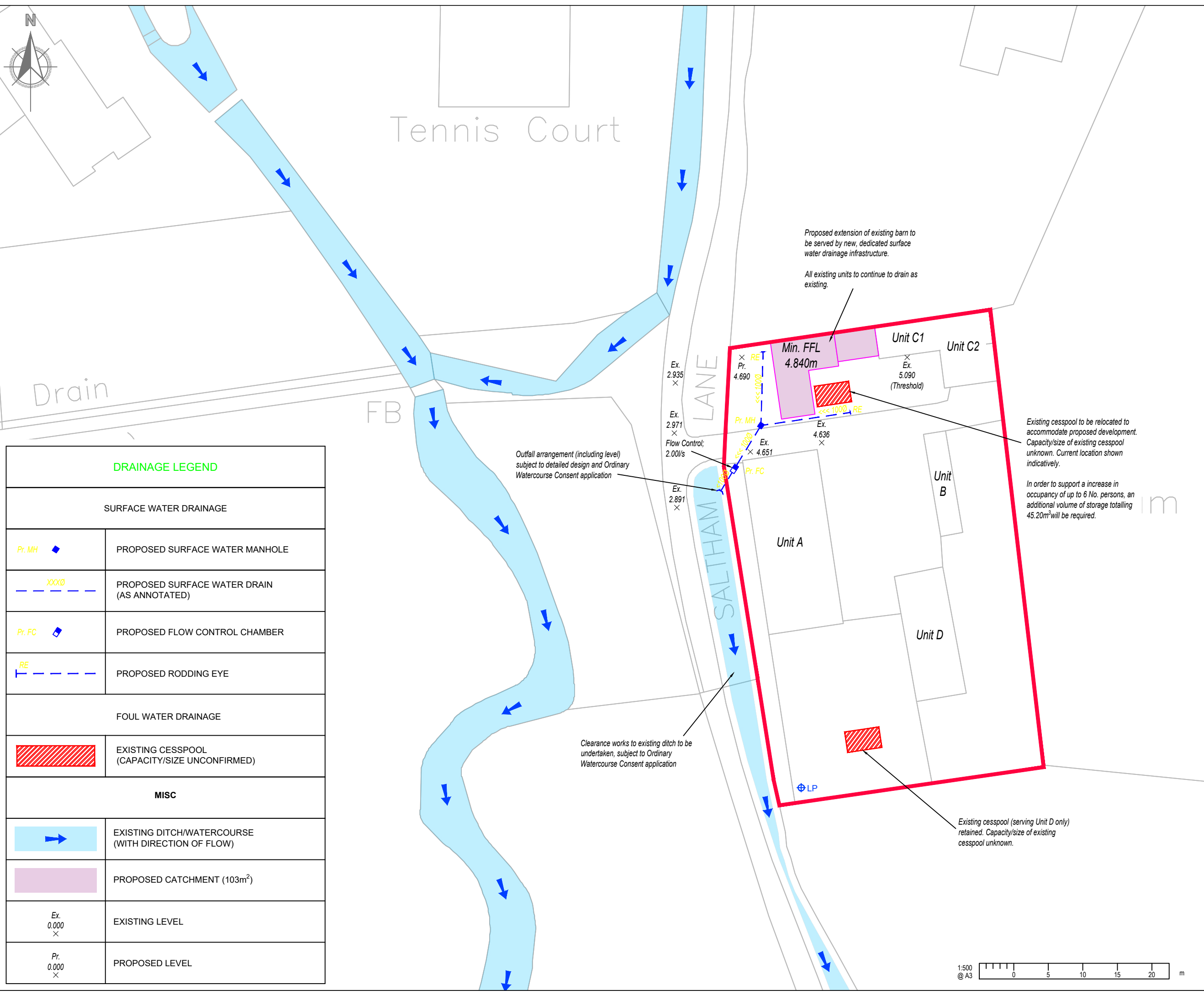
Client: **Saward Properties Ltd**

Project: **Saltham Barns Extension  
 Saltham Lane, Runcton, PO20 1PU**

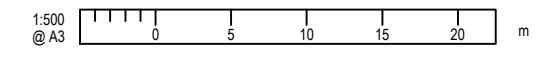
Drawing Title: **Conceptual Drainage Strategy**

Scale <b>1:500</b>	Date <b>Oct. '22</b>	Drawn By <b>SPB</b>	Checked By <b>MJA</b>
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Drawing No. <b>D2110-PL300</b>	Rev. <b>-</b>
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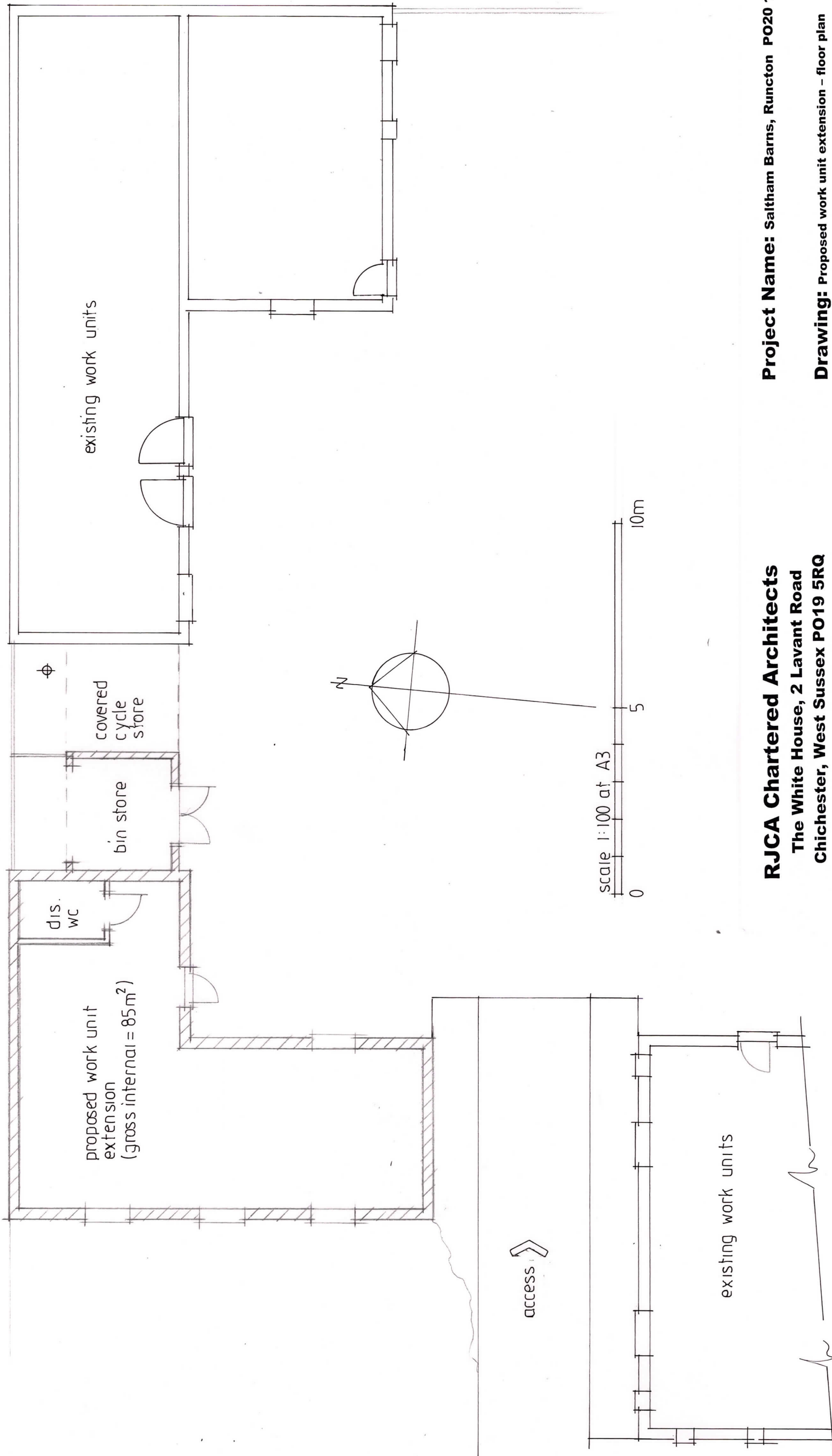


DRAINAGE LEGEND	
SURFACE WATER DRAINAGE	
Pr. MH <span style="color: blue;">◆</span>	PROPOSED SURFACE WATER MANHOLE
--- XXXØ ---	PROPOSED SURFACE WATER DRAIN (AS ANNOTATED)
Pr. FC <span style="color: blue;">◆</span>	PROPOSED FLOW CONTROL CHAMBER
RE	PROPOSED RODDING EYE
FOUL WATER DRAINAGE	
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MISC	
<span style="background-color: lightblue; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	EXISTING DITCH/WATERCOURSE (WITH DIRECTION OF FLOW)
<span style="background-color: pink; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	PROPOSED CATCHMENT (103m²)
Ex. 0.000 ×	EXISTING LEVEL
Pr. 0.000 ×	PROPOSED LEVEL



## APPENDICES

## Appendix A Architectural Development Proposals



**Project Name:** Saltham Barns, Runcton PO20 1PU  
**Drawing:** Proposed work unit extension – floor plan  
**Drawing Number:** 2021/30/04      **Rev.**

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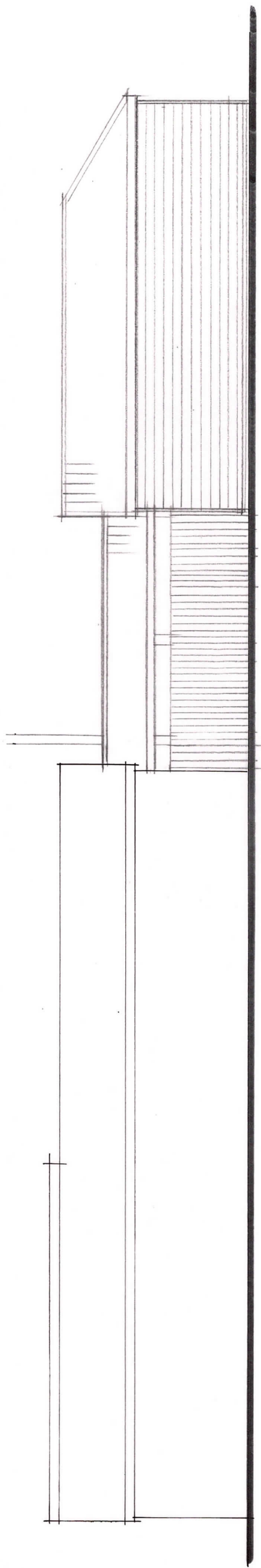
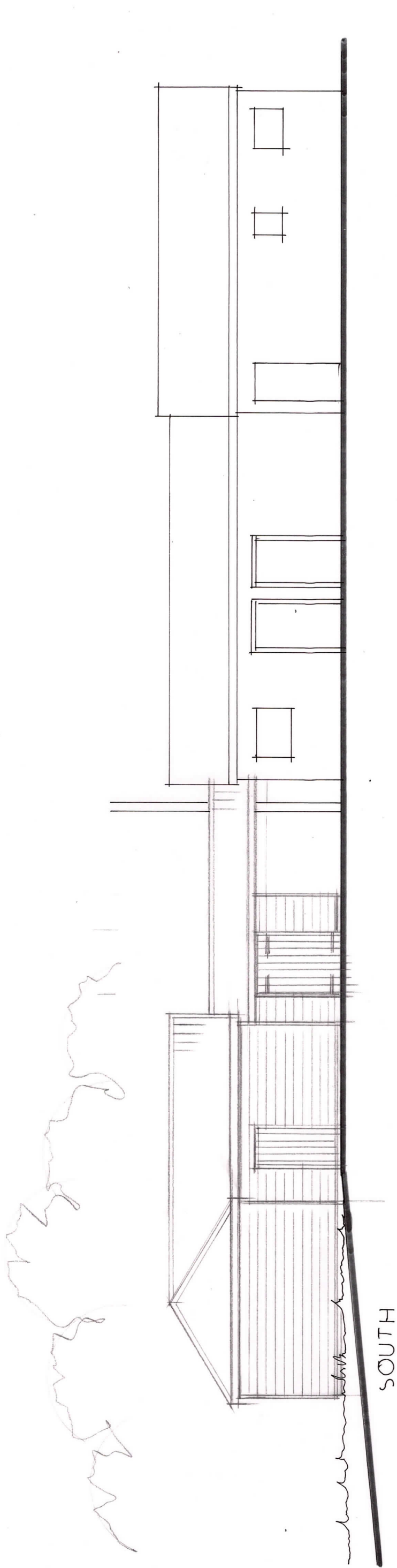
Email: [rjcatkinson@btinternet.com](mailto:rjcatkinson@btinternet.com)

**Project Name:** Saltham Barns, Runcton PO20 1PU

**Drawing:** Proposed work unit extension - East & West elevations

**Drawing Number:** 2021/30/05

Rev.



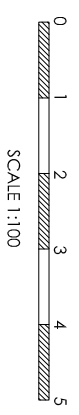
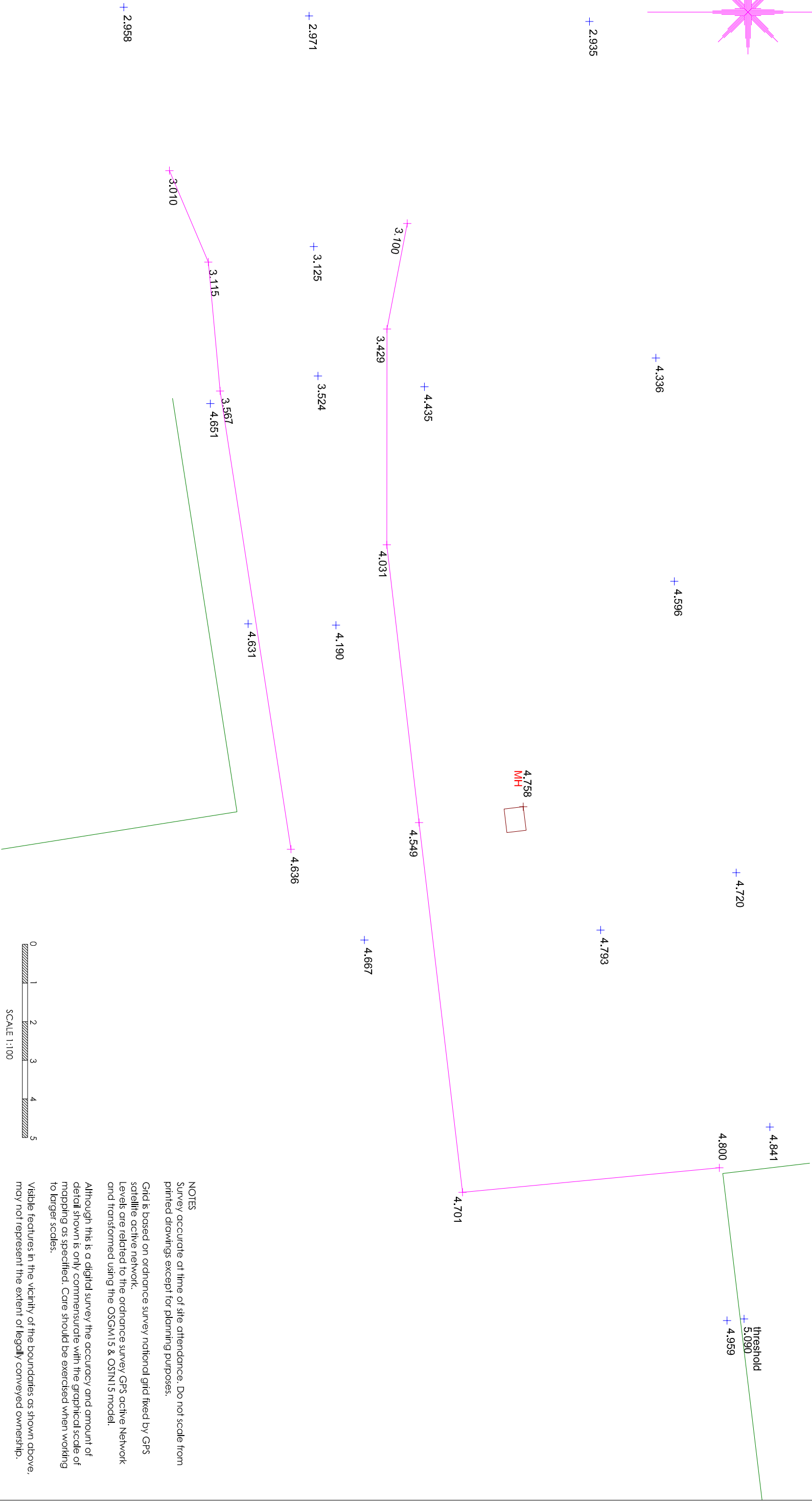
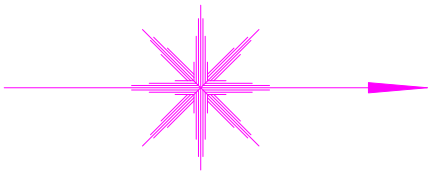
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**Project Name:** Saltham Barns, Runcton PO20 1PU  
**Drawing:** Proposed work unit extension - North & South elevations  
**Drawing Number:** 2021/30/06  
Rev.



## Appendix B Topographic Survey



**NOTES**  
 Survey accurate at time of site attendance. Do not scale from printed drawings except for planning purposes.  
 Grid is based on ordnance survey national grid fixed by GPS satellite active network.  
 Levels are related to the ordnance survey GPS active Network and transformed using the OSGM15 & OSTN15 model.  
 Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.  
 Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.

<b>medlams</b> surveys limited		<b>project: SALTHAM BARNS, RUNCTON</b>	
www.medlams-surveys.co.uk	becky@medlams-surveys.co.uk	client: A. ASWARD	job ref: S1689
07717 205 388		title: LEVELS SURVEY	scale 1:100@A3
		date JUNE 2022	dwg no: EX01 rev: -

## Appendix C BGS Borehole Records

RING at North Mundham  
Runton Manor, Chichester

County Sussex

map 1 in. map New Series

6 in. map

made by Duke & Ockenden

Date

1944  
332

SUS8047B

Communicated by Duke & Ockenden

Bored

feet.

Height above Ordnance Datum

Rest level of water

Yield tested at 420 galls. per hour.

Quality (with copy of analysis on separate sheet)

SUS84 221 S. 12

47(b)

GEOLOGICAL FORMATION.	NATURE OF STRATA.	THICKNESS.		DEPTH.	
		Feet.	Inches.	Feet.	Inches.
<u>Drift.</u>	<u>Yellow Marl &amp; flint</u>	<u>24</u>	<u>-</u>	<u>24</u>	<u>-</u>
<u>Upper Chalk</u>	<u>Chalk &amp; flints</u>	<u>123</u>	<u>-</u>	<u>150</u>	<u>-</u>
<p><u>Rest level of water 20 ft. down. Yield 420 galls. per hour. tested</u></p> <p><u>Information from Messrs Duke and Ockenden Ltd</u></p> <p>Published in  <u>Wells of Sussex</u>  <u>of Sussex</u>  <u>page 162</u></p>					

North Mundham—Map N.S.G. 332.

336. RUNTON (MANOR)  $\frac{1}{2}$  mile E. of church. Ht. above O.D.  
 15 ft. Map 61 S.E.

British Geological Survey		Thickness	Depth	Geological Survey	
		Ft.	Ft.		
Drift	Yellow marl and flint	27	27		
Upper Chalk	Chalk and flints	123	150		
<p>R.L.W. 20 ft. down. Yield 720 g. p. hour, tested. Information from Messrs. Duke and Ockenden, Ltd.</p>					

*House according to 6" map*

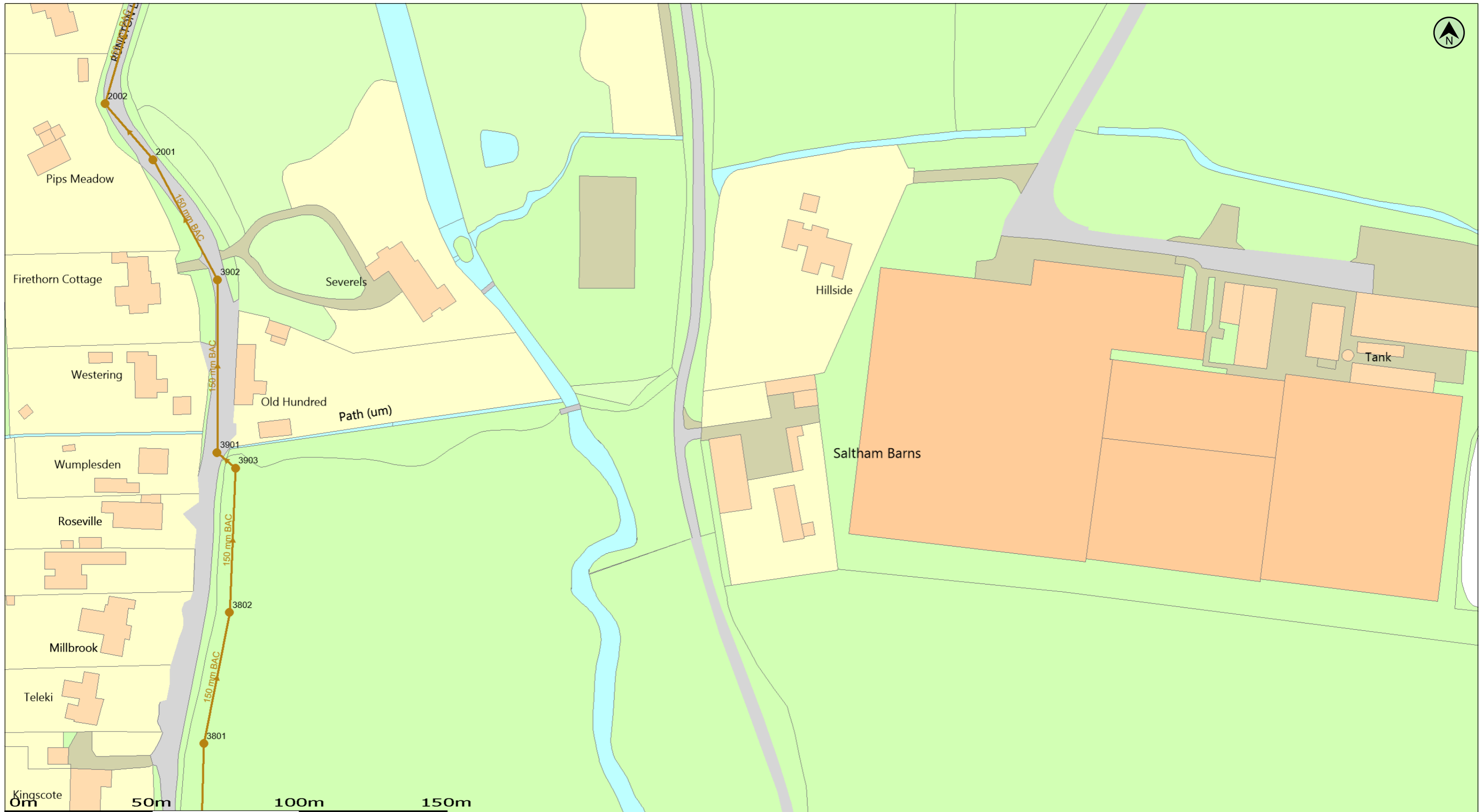
Runton House is now known as Runton Manor (Miss Lloyd - occupier). Present occupier has no knowledge of the existence of more than one well on the estate. (Information from Mr. F.O. Barlow, Newlandrange, Merston. 12/5/41) *CR*

Card in the Index at Messrs D.O.S. Office Littlehampton gives Runton Manor, Chichester bore for Mr. Soper. Lining tiles: 20" x 3" from 70 to 80 lining tiles. Alter details as above.

*J.H.L.*  
 25.10.41

DATA Bank

## Appendix D Southern Water Public Sewer Records



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Date: 29/09/22

Scale: 1:1250

Map Centre: 488489,101945

Data updated: 16/08/22

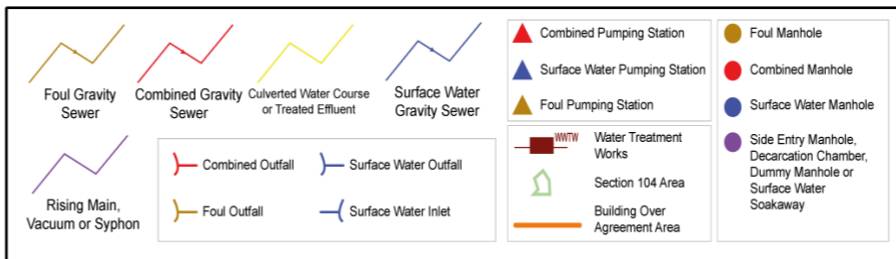
Our Ref: 963957 - 1

Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2022 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



searches@bpcivils.co.uk

D2110 Saltham Barns





## Appendix E Environment Agency Product 4 Flood Data



Dan Lytton  
Bright Plan Civils  
2 West Barn,  
Norton Lane,  
Chichester,  
PO20 3AF

**Our ref:** SSD269405  
**Date:** 25/08/2022

Dear Dan Lytton,

**Enquiry Regarding Product 4 for Flood Risk Assessment for Saltham Barns, Saltham Lane, Runcton, PO20 1PU.**

Thank you for your enquiry which was received on 20 June 2022.

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

The information on Flood Zones in the area relating to this address is as follows:

**The site is in an area located within Flood Zone 1 as shown on our Flood Map for Planning (Rivers and Sea).**

*Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.*

Flood Zone definitions can be found at [www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones](http://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones)

**Flood Defences**

There are no formal raised flood defences in the vicinity of the site.

**Model Information**

The model used was the River Arun to East Head Coastal Modelling which was completed by JBA Consulting in 2016.

**Flood History**

We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Chichester District Council** for a more comprehensive flood history check.

[FRA advisory text](#)

Name	Product 4
Description	Detailed Flood Risk Assessment Map for <b>Saltham Barns, Saltham Lane, Runcton, PO20 1PU.</b>
Licence	<a href="#">Open Government Licence</a>
Information Warnings	<p>The flood risk data provided is based on existing EA hydraulic models with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 27 July 2021.</p> <p>You should refer to '<a href="#">Flood risk assessments: climate change allowances</a>' for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.</p>
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	<p>Contains Environment Agency information © Environment Agency and/or database rights.</p> <p>Contains Ordnance Survey data © Crown copyright 2022 Ordnance Survey 100024198.</p>

## Data Available Online

Many of our flood datasets are available online:

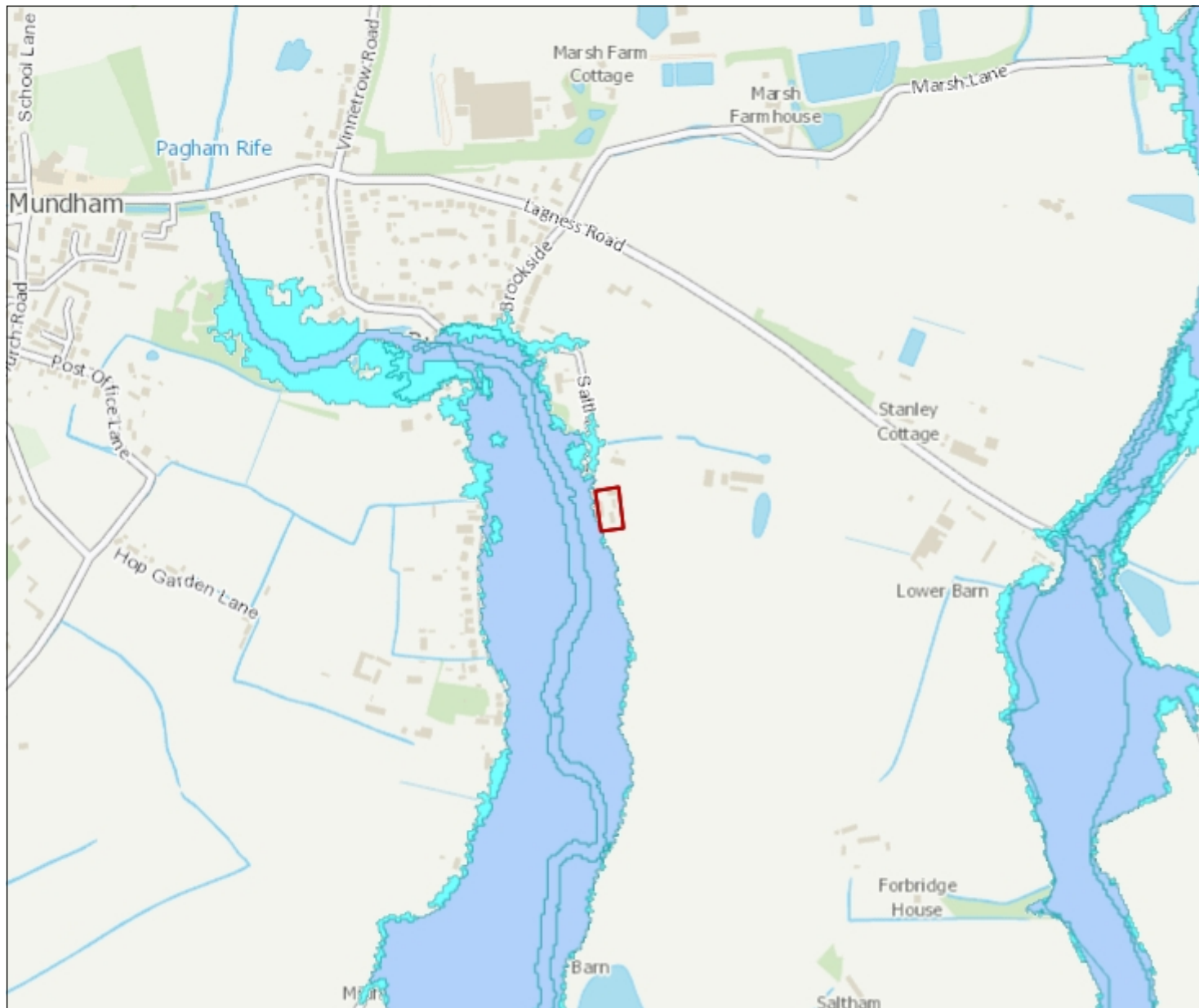
- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

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

Yours sincerely,

**Edward Conway**  
**Environment Agency, Guildbourne House, Chatsworth Road, Worthing, BN11 1LD**

# Flood Map for Planning (Rivers and Sea). Centred PO20 1PU. Created 25/08/2022.



1: 10,000

0 Metres 250



## Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

### Flood Map Areas (assuming no defences)

**Flood Zone 3** shows the area that could be affected by flooding:

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

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

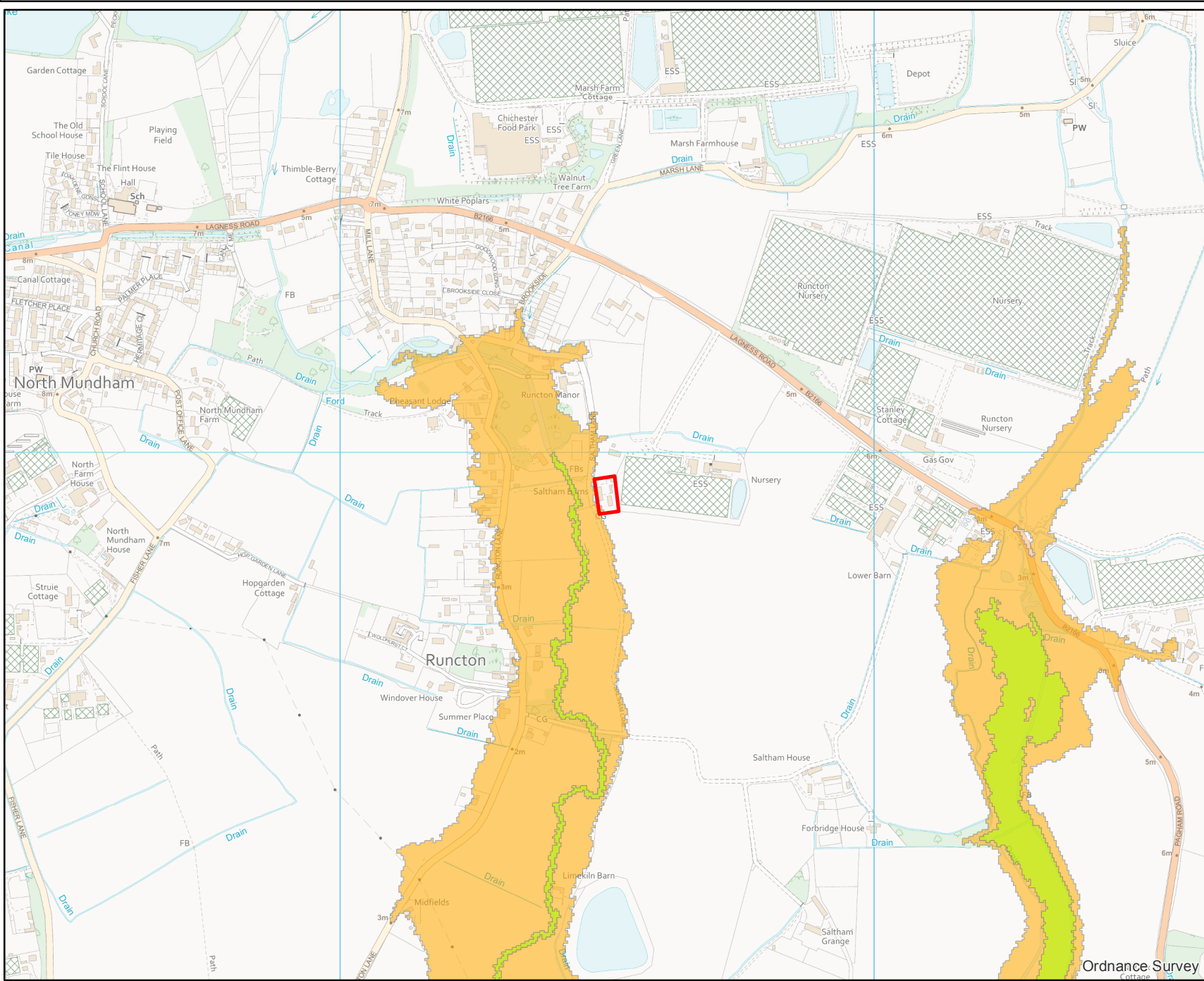
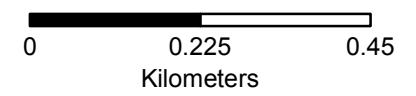


**Legend**

- Site Boundary
- 0.5% AEP (Defended Tidal)
- 0.5% AEP (2070) NPPF (Defended Tidal)
- 0.5% AEP (2115) NPPF (Defended Tidal)
- 0.1% AEP (Defended Tidal)

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

**Scale: 1:10,000**



# Modelled Flood Outlines (Undefended Tidal). Centred PO20 1PU. Created 25/08/2022.

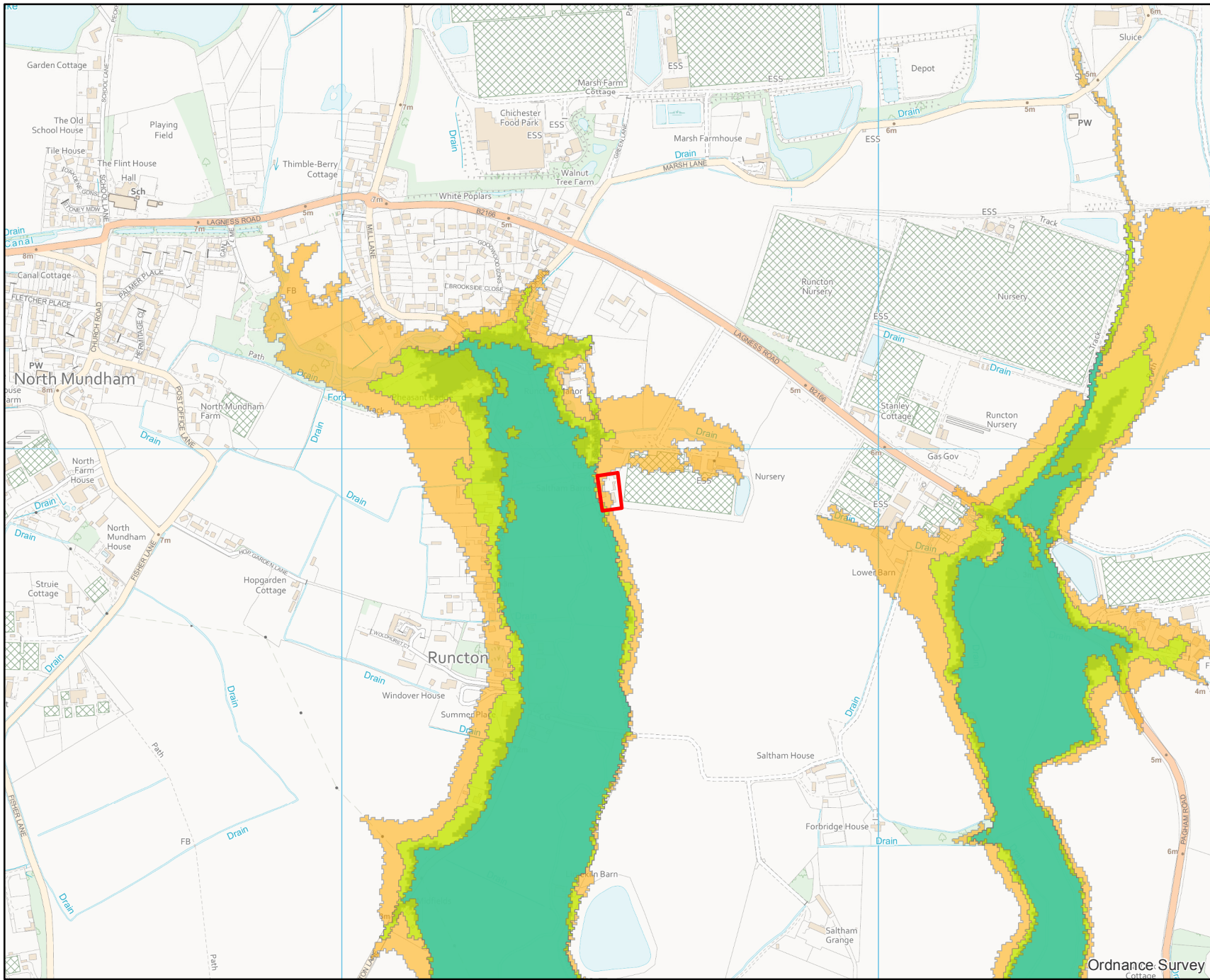
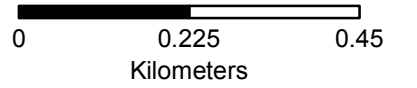


## Legend

- Site Boundary
- 0.5% AEP (Undefended Tidal)
- 0.5% AEP (2070) NPPF (Undefended Tidal)
- 0.5% AEP (2115) NPPF (Undefended Tidal)
- 0.1% AEP (Undefended Tidal)



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

Scale: 1:10,000



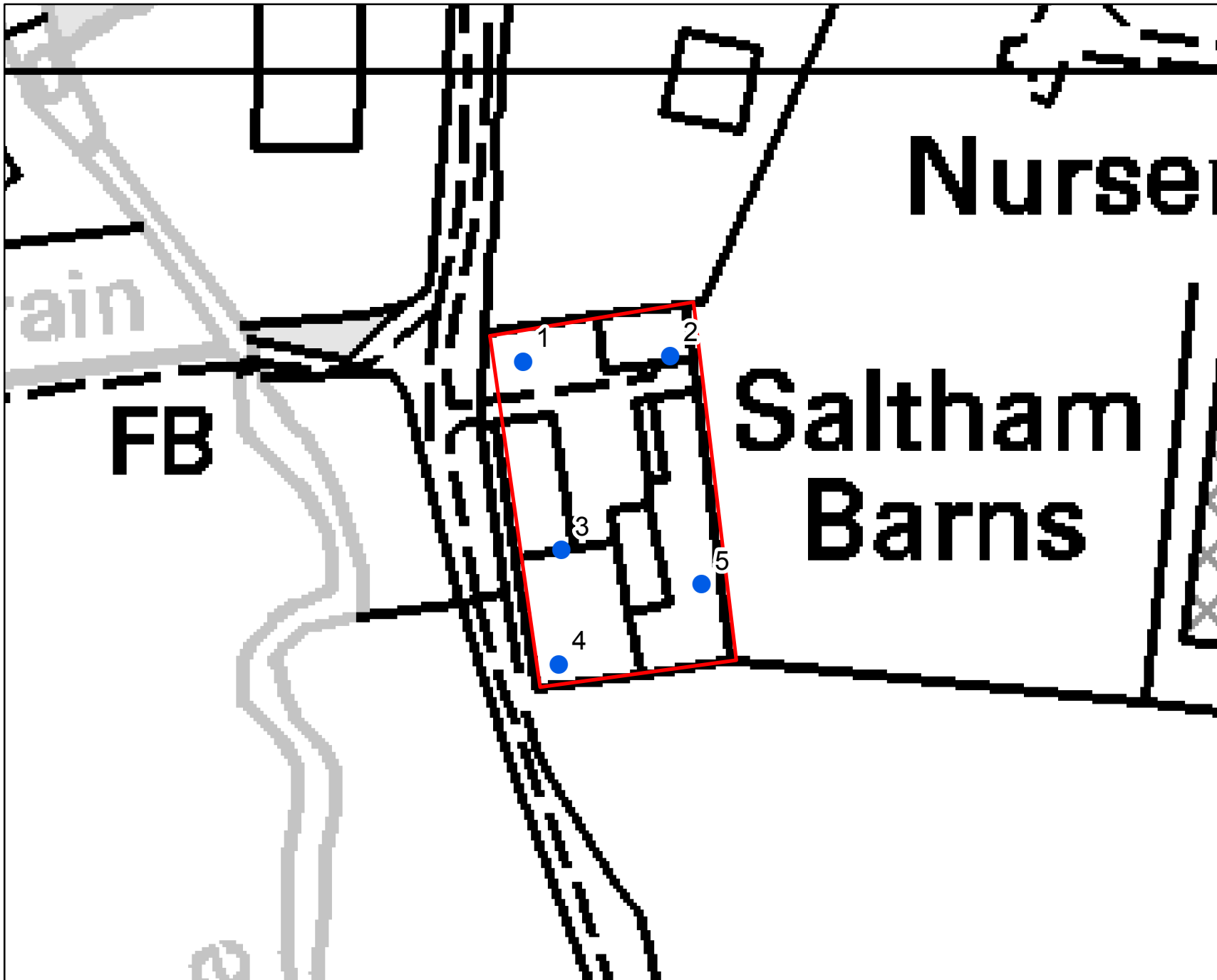
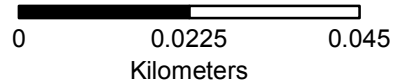


### Legend

-  Site Nodes
-  Site Boundary

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

Scale: 1:1,000



**Product 4 Flood Risk Data Requested by:** Bright Plan Civils

**Site:** Saltham Barns, Saltham Lane, Runcton, PO20 1PU

**Table 1:** Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
			Undefended Annual Exceedance Probability			
	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	488483	101946	-	-	4.54	-
2	488510	101947	-	-	-	-
3	488490	101911	-	-	4.54	-
4	488489	101889	-	3.76	4.54	-
5	488516	101904	-	-	-	-

**Table 2:** Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
			Defended Annual Exceedance Probability			
	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	488483	101946	-	-	-	-
2	488510	101947	-	-	-	-
3	488490	101911	-	-	-	-
4	488489	101889	-	-	3.56	-
5	488516	101904	-	-	-	-

**Table 3:** Water Depths: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres			
			Undefended Annual Exceedance Probability			
	Eastings	Northings	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	488483	101946	-	-	0.09	-
2	488510	101947	-	-	-	-
3	488490	101911	-	-	0.17	-
4	488489	101889	-	0.39	1.17	-
5	488516	101904	-	-	-	-



**Table 4:** Water Depths: Tidal Defended

Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Defended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	488483	101946	-	-	-	-
2	488510	101947	-	-	-	-
3	488490	101911	-	-	-	-
4	488489	101889	-	-	0.23	-
5	488516	101904	-	-	-	-

All levels taken from: River Arun to East Head Coastal Modelling (2D) (2016)


Produced on: 25/08/2022

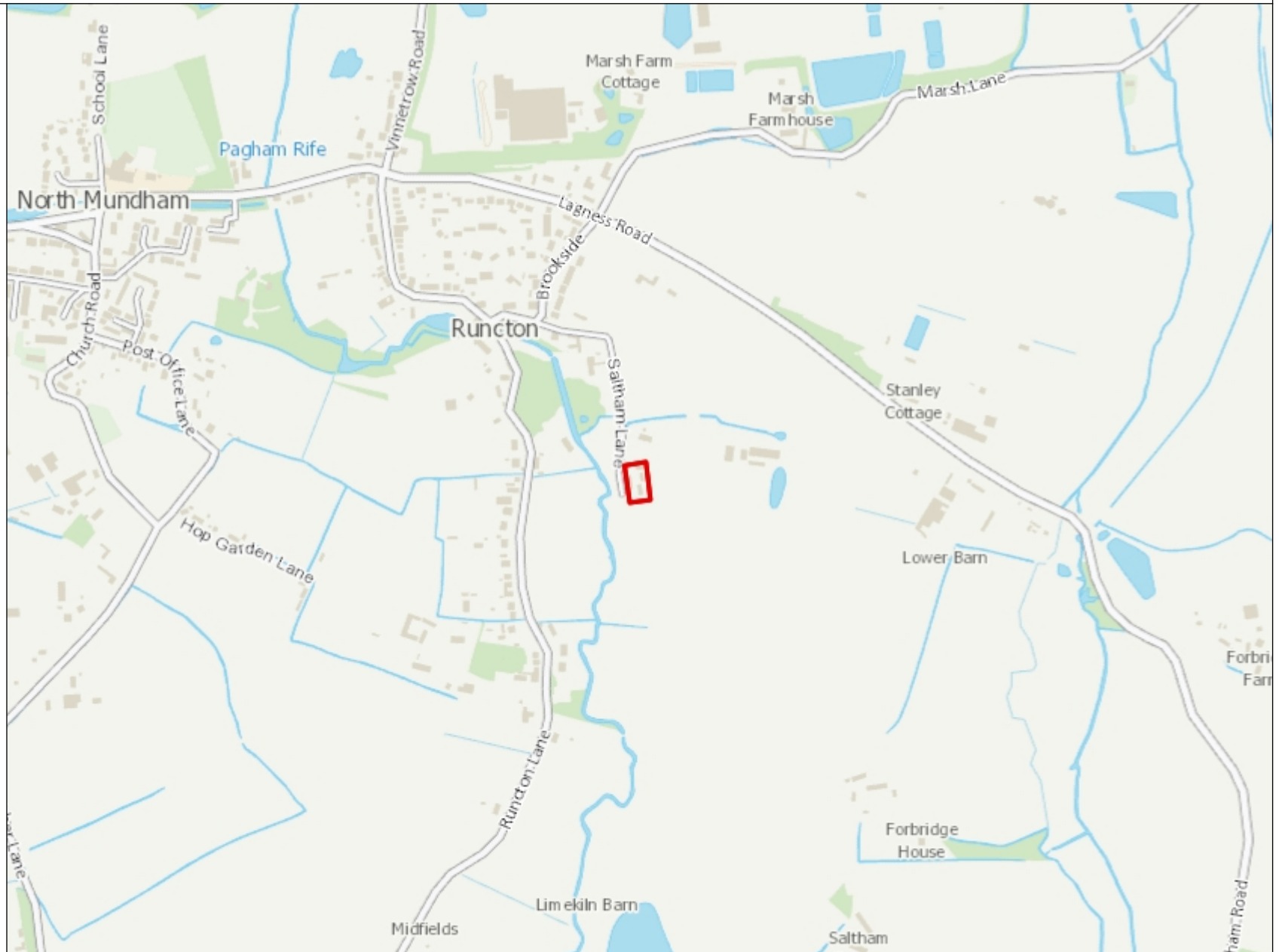
**There is no additional information or health warnings for these levels/depths or the model from which they have been produced.**

# Recorded Flood Outlines. Centred PO20 1PU. Created 25/08/2022.

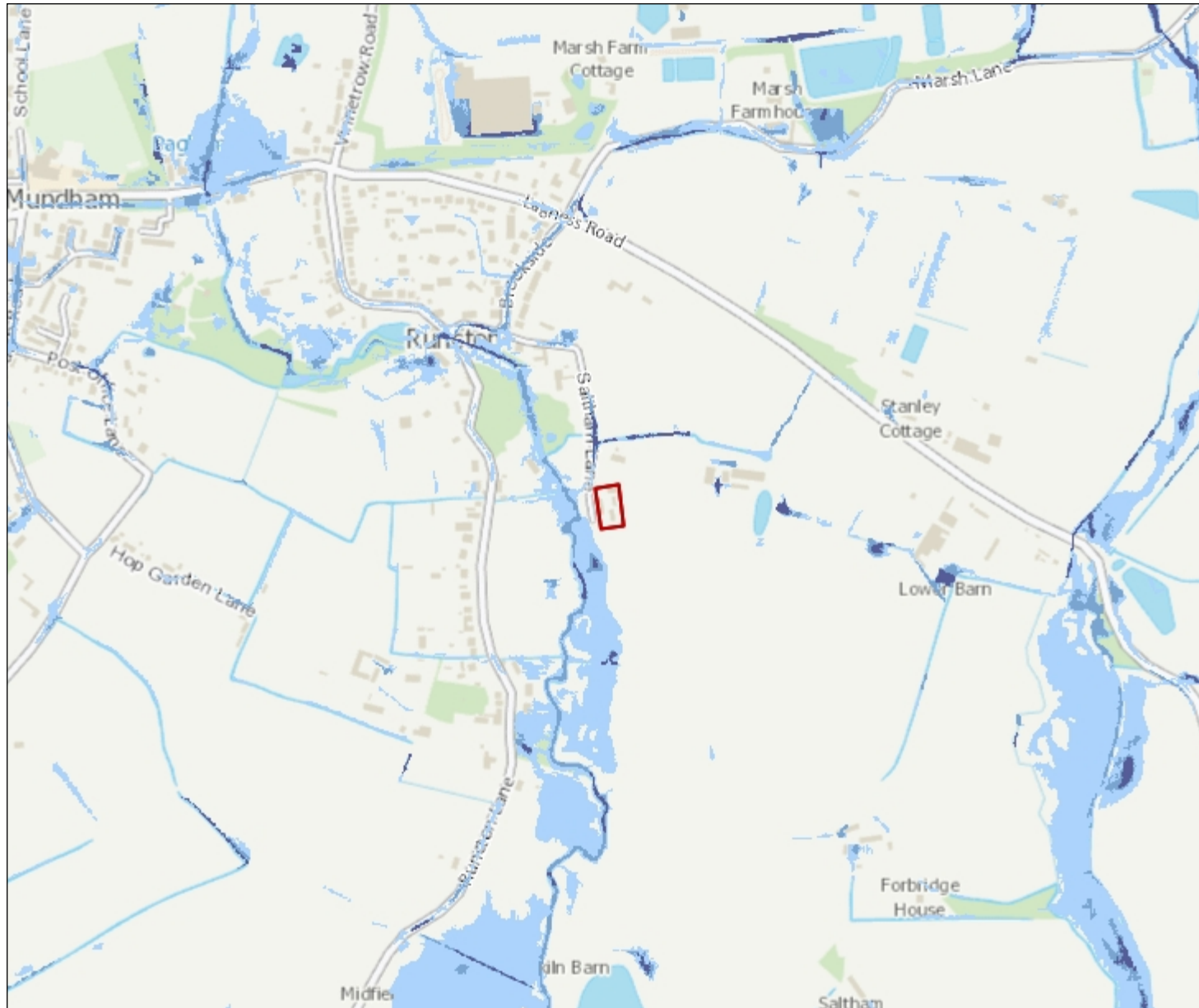


## Legend

 All recorded flood outlines



# Risk of flooding from Surface Water. Centred PO20 1PU. Created 25/08/2022.



1: 10,000

0 Metres 250



### Likelihood of flooding from Surface Water

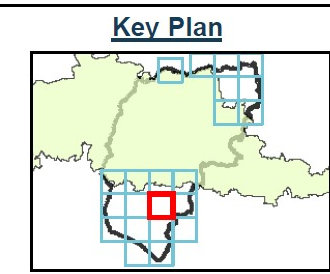
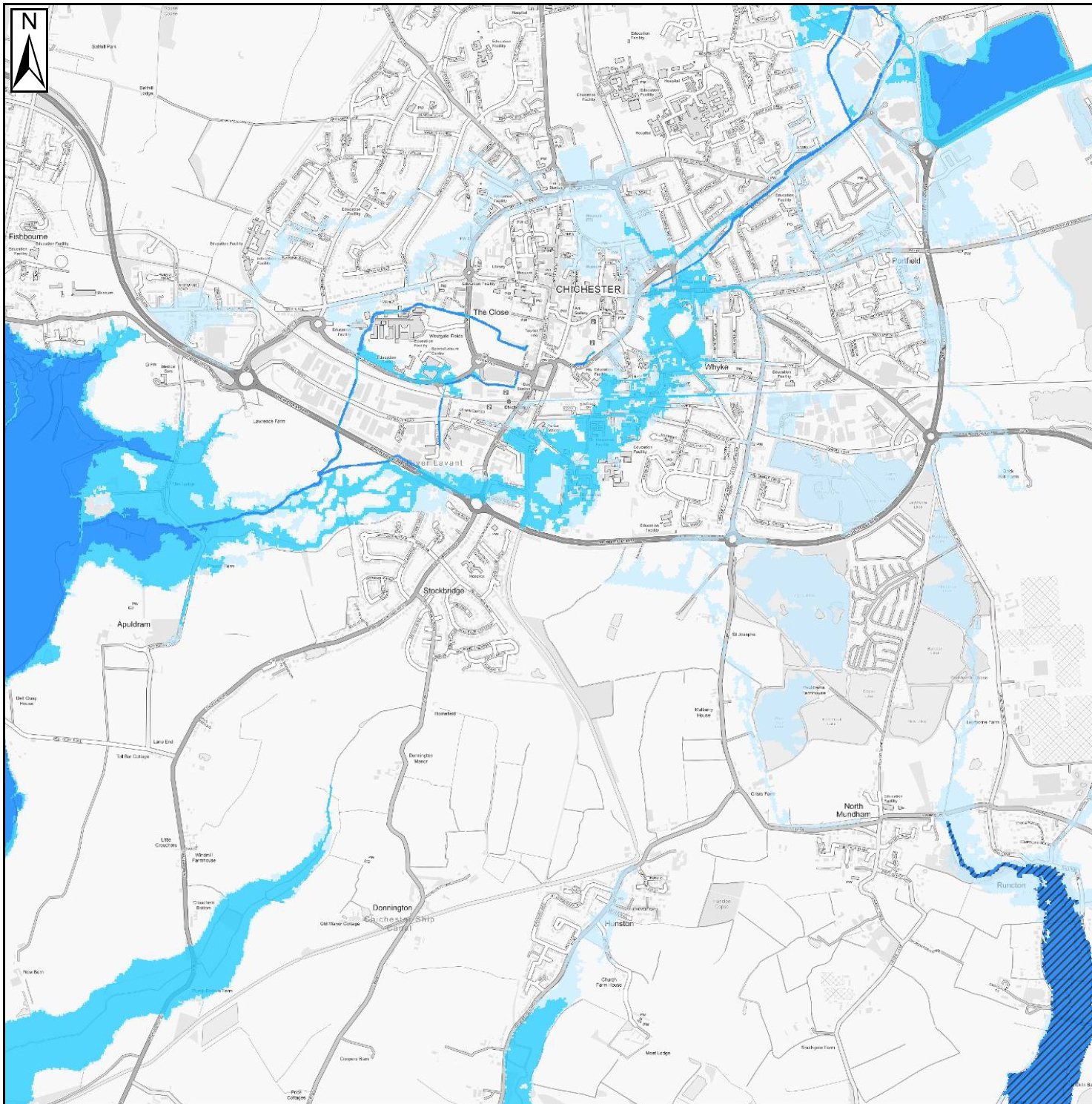
- High ( $\geq 3.3\%$ )
- Medium (3.3% - 1%)
- Low (1% - 0.1%)
- Very Low

### Likelihood of flooding from Surface Water

- High:** Greater than or equal to 3.3% (1 in 30) chance in any given year
- Medium:** Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low:** Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low:** Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on GOV.UK.

## Appendix F Chichester District Council Strategic Flood Risk Assessment



**Key Plan**

**Legend**

- Chichester District
- South Downs National Park
- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b
- 1 in 25-year event used to define Flood Zone 3b
- Flood Zone 3a used to define Flood Zone 3b

**Notes**

**Flood Zone 1:** Comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1% AEP).

**Flood Zone 2:** This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (0.1% - 1% AEP) or between 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.1% - 0.5% AEP) in any year.

**Flood Zone 3a:** This zone comprises land assessed as having a greater than 1 in 100 annual probability of river flooding (>1.0% AEP) or a greater than 1 in 200 annual probability of flooding from the sea (>0.5% AEP) in any year.

**Flood Zone 3b:** This zone comprises land where water has to flow or be stored in times of flood (the functional floodplain). The SFRA identified this Flood Zone as land which would flood with an annual probability of 1 in 20 years, where detailed modelling exists. Where the 1 in 20-year outputs are not available, the precautionary approach has been taken, surrogate return periods have been used (e.g. 1 in 25-year (4% AEP), if available). Where this was not available, then Flood Zone 3a has been used. If a proposed development is shown to be in Flood Zone 3, further investigation should be undertaken as part of a detailed site-specific FRA to define and confirm the extent of Flood Zone 3b.

The Environment Agency regularly reviews its hydrology, hydraulic modelling and flood risk mapping, and it is important that they are approached to determine whether updated (more accurate) information is available prior to commencing a site-specific FRA.



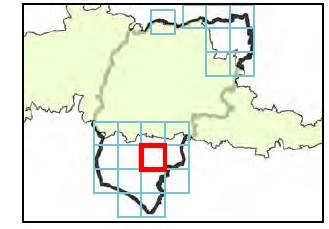
**CHICHESTER DISTRICT COUNCIL**  
SFRA: APPENDIX D - FLOOD ZONES

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### Key Plan



### Legend

- Chichester District
- South Downs National Park
- Flood Zone 3a
- Fluvial return periods
  - 1 in 100-year plus 35% CC
  - 1 in 100 year plus 45% CC
  - 1 in 100 year plus 105% CC
- Flood Zone 2 - proxy for climate change
- Tidal Epoch
  - 2070 tidal event
  - 2115 tidal event

### Notes

Climate change for fluvial events for the Central, Higher Central and Upper End estimates for the 2080s epoch (2070-2115) are shown.

The East Head to Littlehampton flood risk coastal modelling study (2016) has been used to understand the tidal and coastal flood risk along the Local Plan area for the years 2070 and 2115.

Where there is no fluvial model available, Flood Zone 2 has been used to provide indicative information on climate change. Detailed hydraulic modelling using topographic survey would be required at a site-specific level to confirm the flood risk to these sites.

Only the 1% AEP plus 35% and 45% events are available for the River Ems. If any sites are considered in this area, then further detailed assessment /modelling should be undertaken.

The Environment Agency climate change allowances may update in the future. Please refer to the latest climate change allowances provide by the Environment Agency.

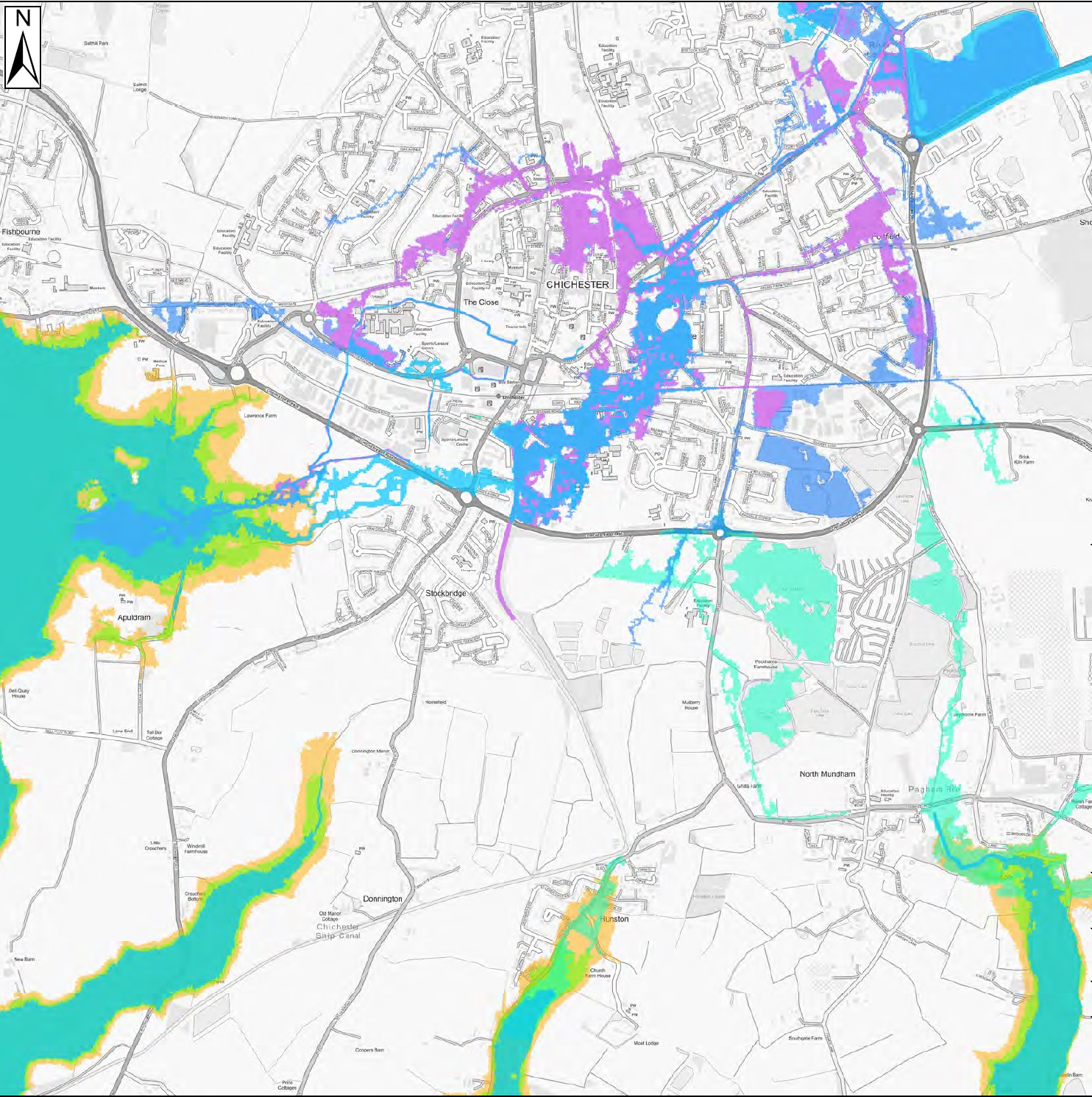


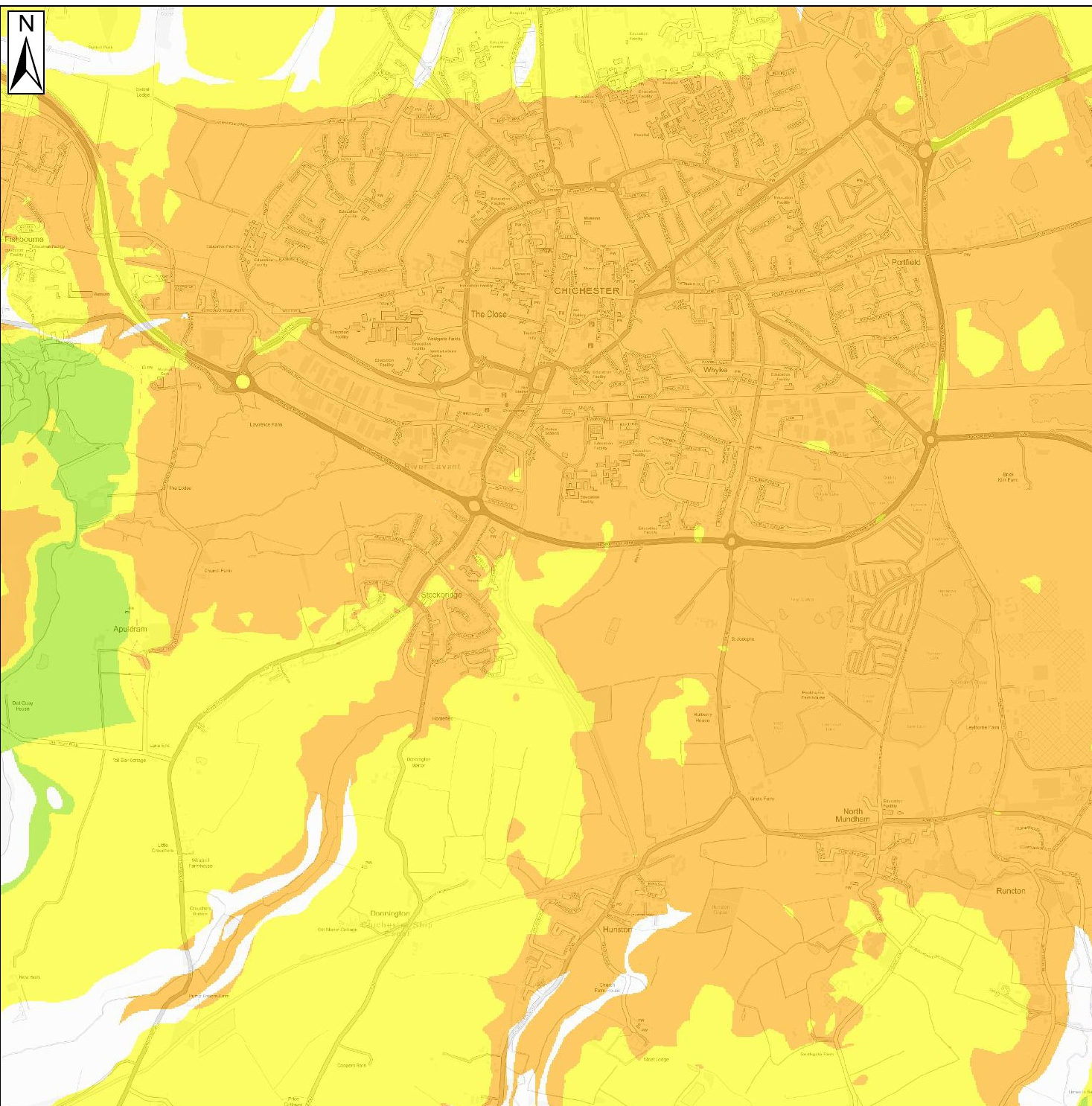
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## CHICHESTER DISTRICT COUNCIL

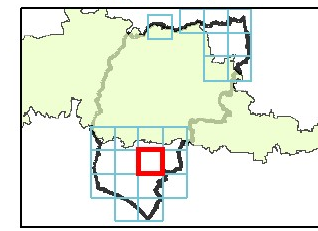
### SFRA: APPENDIX E - CLIMATE CHANGE

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**Key Plan**



**Legend**

- Chichester District
- South Downs National Park

**JBA Groundwater Map**

**Depth**

- No risk
- Groundwater levels are at least 5m below the ground surface
- Groundwater levels are between 0.5m and 5m below the ground surface
- Groundwater levels are between 0.025m and 0.5m below the ground surface
- Groundwater levels are either at or very near (within 0.025m of) the ground surface

**Notes**

JBA has developed a range of Groundwater Flood Map products at national scale. It should be noted that the JBA Groundwater Flood Map is suitable for general broad-scale assessment of the groundwater flood hazard in an area, but is not explicitly designed for the assessment of flood hazard at the scale of a single property. In high risk areas a site-specific risk assessment for groundwater flooding is recommended to fully inform on the likelihood of flooding.

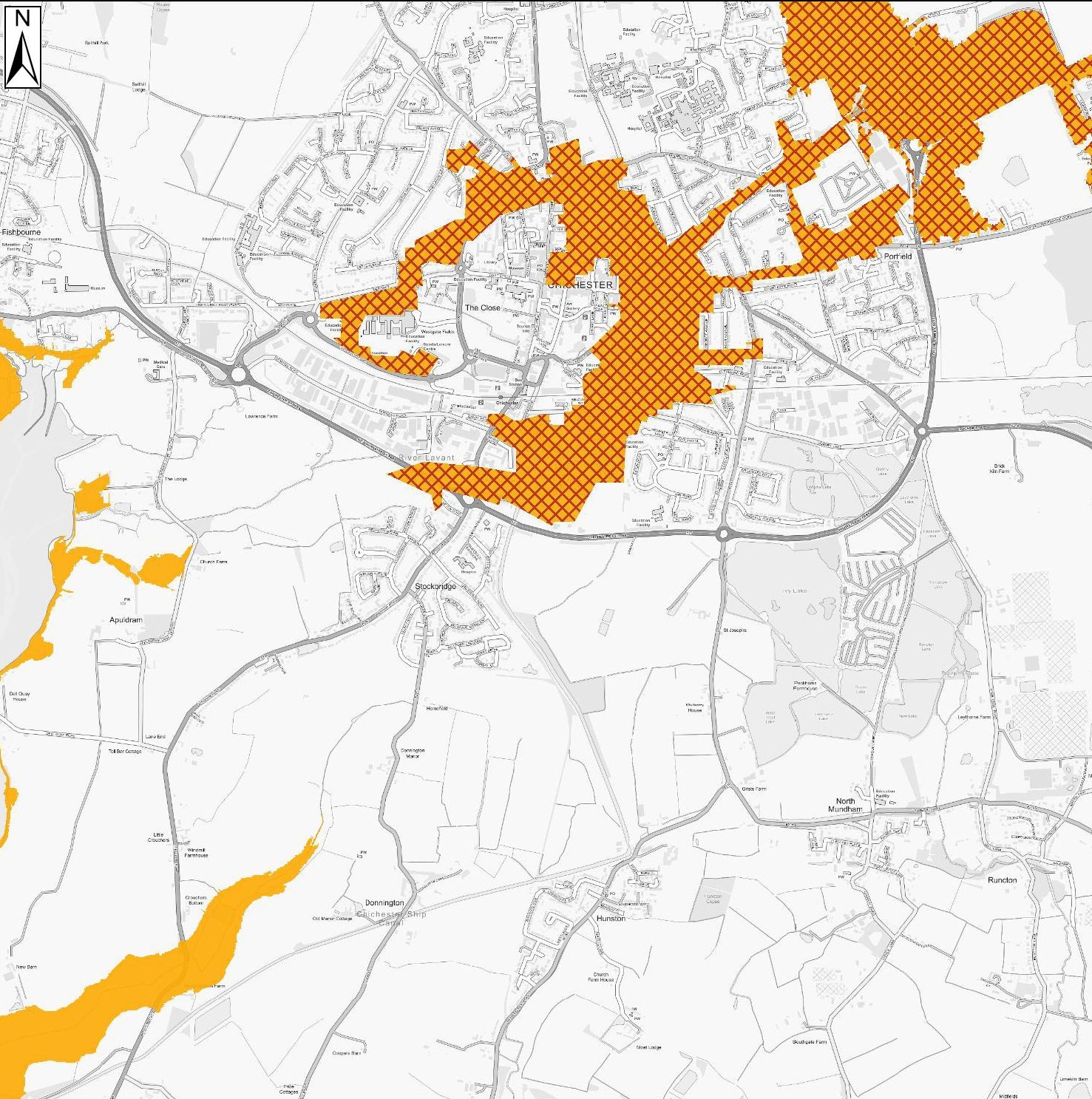


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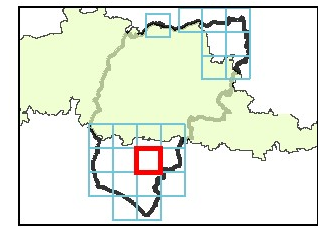
**CHICHESTER DISTRICT COUNCIL**  
SFRA: APPENDIX G - GROUNDWATER

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**Key Plan**



**Legend**

-  Chichester District
-  South Downs National Park
-  Flood Warning
-  Flood Alert

**Notes**

Flood Alerts are used by the Environment Agency to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and make early preparations. Flood Alerts are issued earlier than a flood warning to give notice of the possibility of flooding but before the Environment Agency are fully confident that flooding in Flood Warning Areas is expected.

Flood Warnings warn people of expected flooding and encourage them to take action to protect themselves and their property.



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**CHICHESTER DISTRICT COUNCIL  
SFRA: APPENDIX J - FLOOD WARNINGS AND  
ALERTS**

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## Appendix G Wallingford Greenfield Calculations

Print

Close Report



# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

**Site Details**

Latitude:

Longitude:

Reference:

Date:

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.

Runoff estimation approach

### Site characteristics

Total site area (ha):

### Methodology

Q<sub>BAR</sub> estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	<input type="text" value="3"/>	<input type="text" value="3"/>
HOST class:	<input type="text" value="N/A"/>	<input type="text" value="N/A"/>
SPR/SPRHOST:	<input type="text" value="0.37"/>	<input type="text" value="0.37"/>

### Hydrological characteristics

	Default	Edited
SAAR (mm):	<input type="text" value="712"/>	<input type="text" value="712"/>
Hydrological region:	<input type="text" value="7"/>	<input type="text" value="7"/>
Growth curve factor 1 year:	<input type="text" value="0.85"/>	<input type="text" value="0.85"/>
Growth curve factor 30 years:	<input type="text" value="2.3"/>	<input type="text" value="2.3"/>
Growth curve factor 100 years:	<input type="text" value="3.19"/>	<input type="text" value="3.19"/>
Growth curve factor 200 years:	<input type="text" value="3.74"/>	<input type="text" value="3.74"/>

### Notes

#### (1) Is Q<sub>BAR</sub> < 2.0 l/s/ha?

When Q<sub>BAR</sub> 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 <sub>BAR</sub> (l/s):	<input type="text" value="0.78"/>	<input type="text" value="0.78"/>
1 in 1 year (l/s):	<input type="text" value="0.66"/>	<input type="text" value="0.66"/>
1 in 30 years (l/s):	<input type="text" value="1.79"/>	<input type="text" value="1.79"/>
1 in 100 year (l/s):	<input type="text" value="2.48"/>	<input type="text" value="2.48"/>
1 in 200 years (l/s):	<input type="text" value="2.91"/>	<input type="text" value="2.91"/>

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at [www.uksuds.com](http://www.uksuds.com). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at [www.uksuds.com/terms-and-conditions.htm](http://www.uksuds.com/terms-and-conditions.htm). The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

## Appendix H Causeway Flow Hydraulic Calculations

### Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	1.500
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
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)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
5		5.00	4.700			488493.449	101941.593	1.300
4		5.00	4.700			488480.823	101950.383	0.700
3	0.010	5.00	4.100	675	750	488480.506	101939.706	0.831
2			4.500	1200	675	488476.535	101933.235	1.307
1			3.500			488474.699	101930.240	0.350

### 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	5	3	13.080	0.600	3.400	3.269	0.131	100.0	100	5.28	50.0
2.000	4	3	10.682	0.600	4.000	3.269	0.731	14.6	100	5.09	50.0
1.001	3	2	7.592	0.600	3.269	3.193	0.076	100.0	100	5.45	50.0
1.002	2	1	3.513	0.600	3.193	3.150	0.043	81.7	100	5.52	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	0.0	1.200	0.731	0.000	0.0	0	0.000
2.000	2.031	16.0	0.0	0.600	0.731	0.000	0.0	0	0.000
1.001	0.769	6.0	1.8	0.731	1.207	0.010	0.0	38	0.675
1.002	0.852	6.7	1.8	1.207	0.250	0.010	0.0	36	0.723

### Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	13.080	100.0	100	Circular	4.700	3.400	1.200	4.100	3.269	0.731
2.000	10.682	14.6	100	Circular	4.700	4.000	0.600	4.100	3.269	0.731
1.001	7.592	100.0	100	Circular	4.100	3.269	0.731	4.500	3.193	1.207
1.002	3.513	81.7	100	Circular	4.500	3.193	1.207	3.500	3.150	0.250

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
1.000	5			Junction		3	675	750	Manhole	Adoptable
2.000	4			Junction		3	675	750	Manhole	Adoptable
1.001	3	675	750	Manhole	Adoptable	2	1200	675	Manhole	Adoptable
1.002	2	1200	675	Manhole	Adoptable	1			Junction	

**Manhole Schedule**

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
5	488493.449	101941.593	4.700	1.300				0	1.000	3.400	100
4	488480.823	101950.383	4.700	0.700				0	2.000	4.000	100
3	488480.506	101939.706	4.100	0.831	675	750		1 2 0	2.000 3.269 1.000	3.269 3.269	100 100
2	488476.535	101933.235	4.500	1.307	1200	675		1 0	1.001 1.001	3.269 3.193	100 100
1	488474.699	101930.240	3.500	0.350				1	1.002	3.150	100

**Simulation Settings**

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m <sup>3</sup> /ha)	20.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

**Storm Durations**

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

<b>Return Period (years)</b>	<b>Climate Change (CC %)</b>	<b>Additional Area (A %)</b>	<b>Additional Flow (Q %)</b>
100	45	0	0

**Node 2 Online Hydro-Brake® Control**

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	3.193	Product Number	CTL-SHE-0069-2000-0907-2000
Design Depth (m)	0.907	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute summer	5	24	3.929	0.529	2.2	0.0000	0.0000	SURCHARGED
15 minute summer	4	1	4.000	0.000	0.0	0.0000	0.0000	OK
30 minute summer	3	24	3.928	0.659	7.4	0.4926	0.0000	FLOOD RISK
30 minute summer	2	24	3.920	0.727	3.6	0.5891	0.0000	SURCHARGED
15 minute summer	1	1	3.150	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	5	1.000	3	-2.2	-0.321	-0.358	0.1023	
15 minute summer	4	2.000	3	0.0	0.000	0.000	0.0418	
30 minute summer	3	1.001	2	3.6	0.510	0.602	0.0594	
30 minute summer	2	Hydro-Brake®	1	2.0				4.7