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Structural Engineering
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**Wadars Animal Rescue
Centre
Hangleton Lane
Ferring, BN12 6PP**

**PROPOSED COMERCIAL
DEVELOPMENT**

FLOOD RISK ASSESSMENT

Issue: A
Date: 23rd April 2020
Author: M. Wojcieszak
Verified by L.G. Leslie
Job No: 9254



Registered No. 15 32604

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Executive Summary

Monson Engineering has been instructed to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed redevelopment at Hangleton Farm Livery Stables.

According to low detail, national-scale flood mapping created on behalf of the EA (Environment Agency), the development site lies within Flood Zone 1. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). However, part of the site appears to be affected by surface water flooding, a National Planning Policy Framework compliant Flood Risk Assessment is required to support the forthcoming planning application.

Under the NPPF, the proposed commercial development is considered to be 'Less Vulnerable'.

A desktop study for this Flood Risk Assessment has taken into account the review of the following documents:

- Environment Agency Flood Maps
- Arun District Council Level 1 Strategic Flood Risk Assessment (SFRA) - Final Report (v2 August 2016)
- Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) (v5 September 2016)
- Arun Strategic Surface Water Management Study (SWMS) (October 2016)

There will be no detrimental off-site impacts from this proposed development as far as flooding is concerned as surface water will be managed on site.

1.00 Introduction

- 1.01 Monson Engineering has been instructed to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for proposed redevelopment at Hangleton Farm Livery Stables.
- 1.02 The development site is situated within Flood Zone 1, but it is a receptor of the overground flows originating to the north.
- 1.03 This report will conform to the National Planning Policy Framework published in 2012, revised in 2018 and updated in June 2019; the National Planning Practice Guidance published in 2016 (updated in 2019) and the Local Planning Authority local plan policies including the Arun Stage Surface Water Management Plan.

2.00 Development Description and Location

- 2.01 Development of Animal Rescue Centre, to include new buildings for reception, training & education, cattery, kennels & associated ancillary accommodation, conversion of existing barn into staff accommodation along with driveways, car parking & landscaping. The approximate National Grid Reference of the site is TQ 08926 03671 (508926E, 103671N).
- 2.02 A topographical survey carried out by Offington Land Surveys indicates the general fall of the ground from North to South and East to West. A site location plan, topographical survey, and development proposals can be found in **Appendix A**.
- 2.02 The proposal is for the provision of somewhat commercial premisses. The flood risk vulnerability classification for this type of development is considered as "Less Vulnerable" (as defined in Table 2 of the Technical Guidance to the National Planning Policy Framework).
- 2.03 The proposed redevelopment lies within Zone 1, with only a fraction of the site boundary being affected by surface water flooding. As the renewal works lies within Zone 1, all types of developments are appropriate according to Table 3 of the Technical Guidance to the National Planning Policy Framework.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	*	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	*	*	*

Key: ✓ Development is appropriate.
 * Development should not be permitted.

2.04 **Sequential Test**

As set out in the National Planning Policy Framework, the aim of the Sequential Test is to direct development towards areas of lowest flood risk. These Flood Zones refer to the probability of river and coastal flooding, ignoring the presence of any existing flood defences. The proposed redevelopment site is situated in an area of lowest flood risk (Flood Zone 1) and is therefore deemed to satisfy the basis of the Sequential Test.

2.05 **Exception Test**

If the Sequential Test is applicable to the redevelopment, the Exception Test is not required to be implemented.

3.00 Definition of Flood Hazards

3.01 Flooding from the sea (tidal) and rivers (fluvial)

The EA Flood Map for Planning (**Appendix B**) confirms that the proposed development site lies within Flood Zone 1, low risk of flooding from a fluvial/tidal source, which has a <0.1% annual probability of flooding from either of these sources.

The closest EA main river is the Ferring Rife, which is approximately 200 m to the south and terminates at the English Channel approximately 2km away. The EA flood map shows that this watercourse flooding does not affect the site or the access. This is due to the topography of the surrounding areas.

The elevation of this site ranges from 9.0m ODN to approximately 12m ODN so is not at all affected by tidal flooding.

3.02 Flooding from Surface Water Run-Off and Overland Flow (Pluvial)

Pluvial flooding is the term used to describe flooding which occurs when intensive, often short duration, rainfall is unable to soak into the ground or to enter drainage systems, and therefore runs over the land surface causing flooding. It is most likely to occur when soils are saturated or baked hard so that they cannot infiltrate any additional water or in urban areas where buildings, tarmac and concrete prevent water from soaking into the ground.

The EA Flood Map for Surface Water shows that the proposed development is located predominantly in an area of "Very Low" risk from surface water flooding, with small areas along the site boundary and Hangleton Lane are designated as an area of "medium and high" risk. This is due to the presence of man-made structures along the boundary of the neighbouring properties, which channels the surface water runoff.

Furthermore, the EA Surface Water Flood Depth Map for the high-risk scenario shows that the proposed development would remain unaffected. There are, however, some areas on the access road to the west which will be subject to some low risk of flood from surface water.

The depth of flood for this scenario is less than 300mm and therefore, not of any significant concern in terms of flood risk.

In the course of this desktop study, no records have been found from the EA suggesting that the site has been previously affected by surface water flooding. However, that the SFRA Flooding History Records Appendix H, indicates some instances of flooding, which probably are associated with surface water drainage system being overwhelmed. However, the latter does not show the locations of these instances and quantify the flood incidents as a failure.

It has been reported to Monson that the site is a receptor of the surface water flooding, as the neighbouring properties have build structures that blocked the passage of the overground flows. Monson has quantified the flows and designed a system that will intercept those flows and safely dispose of them through the infiltration. Details of the proposed drainage system can be seen in Appendix C.

3.03 **Flooding from Groundwater**

Groundwater flooding occurs as a result of water rising from the underlying rock or from water flowing from abnormal springs. This can still occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater can still flow from areas where the ground level is high to the areas where the ground level is low. In low-lying areas, the water table is usually at shallower depths, but during very wet periods where all the additional groundwater flowing towards this area, the water table can rise to the surface causing groundwater flooding.

The SFRA Flooding History highlights zero historical incidents in Hangleton with respect to Groundwater flooding, but it defines the areas as having a 'medium risk' of surface water flooding. Extract from British Geological Survey Map can be seen in Appendix D.

3.04 **Flooding from Sewers**

Sewer flooding events are usually the results of overloaded sewers following heavy rainfall blockages caused by the misuse of the sewer system. No information has been identified to suggest that the site is susceptible to sewage surcharge flooding as there are no sewers within vicinity of the site.

If the sewers that are running underneath the Littlehampton Road blocked or surcharged, wastewater would flow down the slope predominantly along the line of the sewer so would not affect the site.

We, therefore, consider the risk of flooding from the sewerage system to the proposed development to be very low.

3.05 **Flooding from Reservoirs, Canals and other artificial sources**

Reservoirs are artificial bodies of water, where water is collected and stored behind or within a man-made structure and released under control either to reduce the flow magnitudes in downstream channels or to meet a requirement when needed for purposes such as irrigation, municipal needs or hydroelectric power (SFRA, 2017).

The Environment Agency Flood Map for reservoirs shows the risk of flooding from these sources, however, the proposed development proposals lie outside the affected area.

- 3.06 All the potential sources of flood risk to the proposed development have been considered and all have been identified as low to very low risks. A checklist has been provided below to help identify these areas which can be discussed in greater detail in this section.

Possible Source of Flooding	Applicable to this Site?
Fluvial flooding from nearby rivers or streams	☐
Coastal Flooding	☐
Surface Water Runoff from the Site, Adjacent or Nearby Land	☒
Flooding from Surface Water Sewers	☐
Flooding from Foul Water Sewers	☐
Flooding from Reservoirs	☐
Flooding from Groundwater	☒
Flooding from other Sources	☐

4.00 Probability

- 4.01 The proposed development is situated within Flood Zone 1 and a small part of the site boundary within land designated as being at risk of surface water flooding which can be confirmed in the Flood Maps in **Appendix B**.
- 4.02 The EA Flood Map for Planning has been produced in part using a relatively coarse, national scale flood modelling strategy, and in part by detailed modelling. It is important to note that only the potential floodplain is modelled; the mitigating effects of any flood defences currently in place are not considered. For reference, the definition of the NPPF flood risk zones is included below:

Very low risk means that each year this area has a chance of flooding of less than 0.1%.

5.00 Climate Change

- 5.01 The Arun SFRA has been developed taking into account the current risk of flooding from all sources, and the impact of climate change as per the Environment Agency Revised Climate Change Guidance in February 2016 has been taken into account.
- 5.02 The impacts of Climate Change in the district on groundwater flooding, surface water and sewer flooding, tidal flooding and fluvial flooding are anticipated to increase and as such, the risk from these sources should be re-assessed and appropriate measures taken in the future. How these increases will impact flood risk in Arun has been tested in hydraulic models.

6.00 Flood Risk Management Measures

- 6.01 There will be no detrimental off-site impacts as far as flooding is concerned as surface water will be managed and controlled on site and risks from other sources have been assessed to be low to very low and The site is shown to be within flood zone 1 from the maps available from the Environment Agency.
- 6.02 No flood mitigation measures are required to protect the properties but the buildings should be constructed with the finished floor levels being the standard 150mm above the ground level. This protects the properties against any possible flood water caused by localised blockages to sewers, burst water mains or overland flow.

7.00 Off-Site Impacts

- 7.01 There will be no off site impacts as the surface water drainage serving the new development will be managed in a way that will reduce the runoff from the existing situation.

8.00 Residual Risks

- 8.01 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include an intense rainfall event which the drainage system cannot cope with.
- 8.02 The SuDS system proposed for this development has been designed to cope with the 1 in 100 year critical storm event with a 40% allowance for climate change.

9.00 Conclusion

- 9.01 Monson Engineering has been instructed to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed redevelopment at Hangleton Farm Livery Stables.
- 9.02 According to low detail, national-scale flood mapping created on behalf of the EA (Environment Agency), the development site lies within Flood Zone 1. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). However, part of the site appears to be affected by surface water flooding, a National Planning Policy Framework compliant Flood Risk Assessment is required to support the forthcoming planning application.
- 9.03 Under the NPPF, the proposed commercial development is considered to be 'Less Vulnerable'.
- 9.04 A desktop study for this Flood Risk Assessment has taken into account the review of the following documents:
- Environment Agency Flood Maps
 - Arun District Council Level 1 Strategic Flood Risk Assessment (SFRA) - Final Report (v2 August 2016)

- Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) (v5 September 2016)
- Arun Strategic Surface Water Management Study (SWMS) (October 2016)

9.05 There will be no detrimental off-site impacts from this proposed development as far as flooding is concerned as surface water will be managed on site.

9.06 Based on the Information provided in the EA Flood Maps for Planning, the proposed development has very low probability of fluvial or coastal flooding. In addition, other sources of flood risk to the development have been considered from available information.

9.07 The proposed drainage system for this development will manage flood risk on site and therefore preventing any off-site flood impacts.

9.08 On the basis of the findings of this report, the proposed development is considered to be suitable on the grounds of flood risk.

Appendix A - Site Location Plan, Development Proposals and Topography



Notes:

1. This drawing to be read in conjunction with all other relevant Monson drawings and specifications, any discrepancies to be reported to Monson prior to any fabrication or work commencing on site.

2. Do not scale this drawing, use figured dimensions only

3. All dimensions in millimetres, all levels in metres.

A	DT	24/10/18	Original issue
Issue	By	Date	Amendments

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Project:

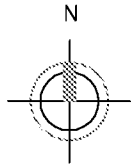
Wadars
Hangleton Lane
Ferring, West Sussex
BN12 6PP

Description:

Site Location Plan

Original Drawing:	Prepared	MW	Approved	GL
Origin:	Crowborough		Size	A1
Current Issue:	Approved	GL	Date	23/04/20
Drawing Status:	PRELIMINARY			

Scale: 1:2500	Dwg No: 9254/300	Issue: A
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JUTHERN CROSS
GRAVY STORAGE

HIGHDOWN HILL COTTAGE

CAROL ANNE HOUSE

HANGLETON LODGE

HANGLETON
FARM CAFE

WADARS

REYNARDS NURSERY



Location Plan 1:1250

Amdesign

ARCHITECTURE DESIGN DEVELOPMENT
Leeza Aldis-Hobbs ARB RIBA SPAB

Job: 07756 329400
E-mail: leeza@amdesignltd.co.uk

PROJECT
**WADARS
HANGLETON LANE
FERRING
BN12 6PP**
PROJECT STAGE
PI ANNING

DRAWING
SITE PLAN

DRAWING No
306/01

SCALE 1:1250
DATE OCT 2010

REVISION
DRAWN LA
CHECKED

LETTER	REVISION	DATE
This scheme is subject to town planning and all other necessary consents. All dimensions and levels to be checked on site. This drawing is to be read in conjunction with other relevant drawings and documents. Report all discrepancies to the Architect before work commences.		



SCALE 1:2500
0m 50m 100m 150m 200m 250m 300m



- Notes:
1. This drawing to be read in conjunction with all other relevant Monson drawings and specifications, any discrepancies to be reported to Monson prior to any fabrication or work commencing on site.
 2. Do not scale this drawing, use figured dimensions only.
 3. All dimensions in millimetres, all levels in metres.

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Project:
Wadars
Hangleton Lane
Ferring, West Sussex
BN12 6PP

Description:
Topographical Survey

Original Drawing:	Prepared	MW	Approved	GL
Origin:	Crowborough		Size	A1
Current Issue:	Approved	GL	Date	23/04/20
Drawing Status:	PRELIMINARY			

Scale: 1 : 500	Dwg No: 9254/301	Issue: A
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Appendix B - Maps Showing Flood Zones from Environment Agency

Flood map for planning

Your reference
BN12 6PP

Location (easting/northing)
508938/103710

Created
21 Apr 2020 9:26

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

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<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Flood map for planning

Your reference

BN12 6PP

Location (easting/northing)

508938/103710

Scale

1:2500

Created

21 Apr 2020 9:26

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefiting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area

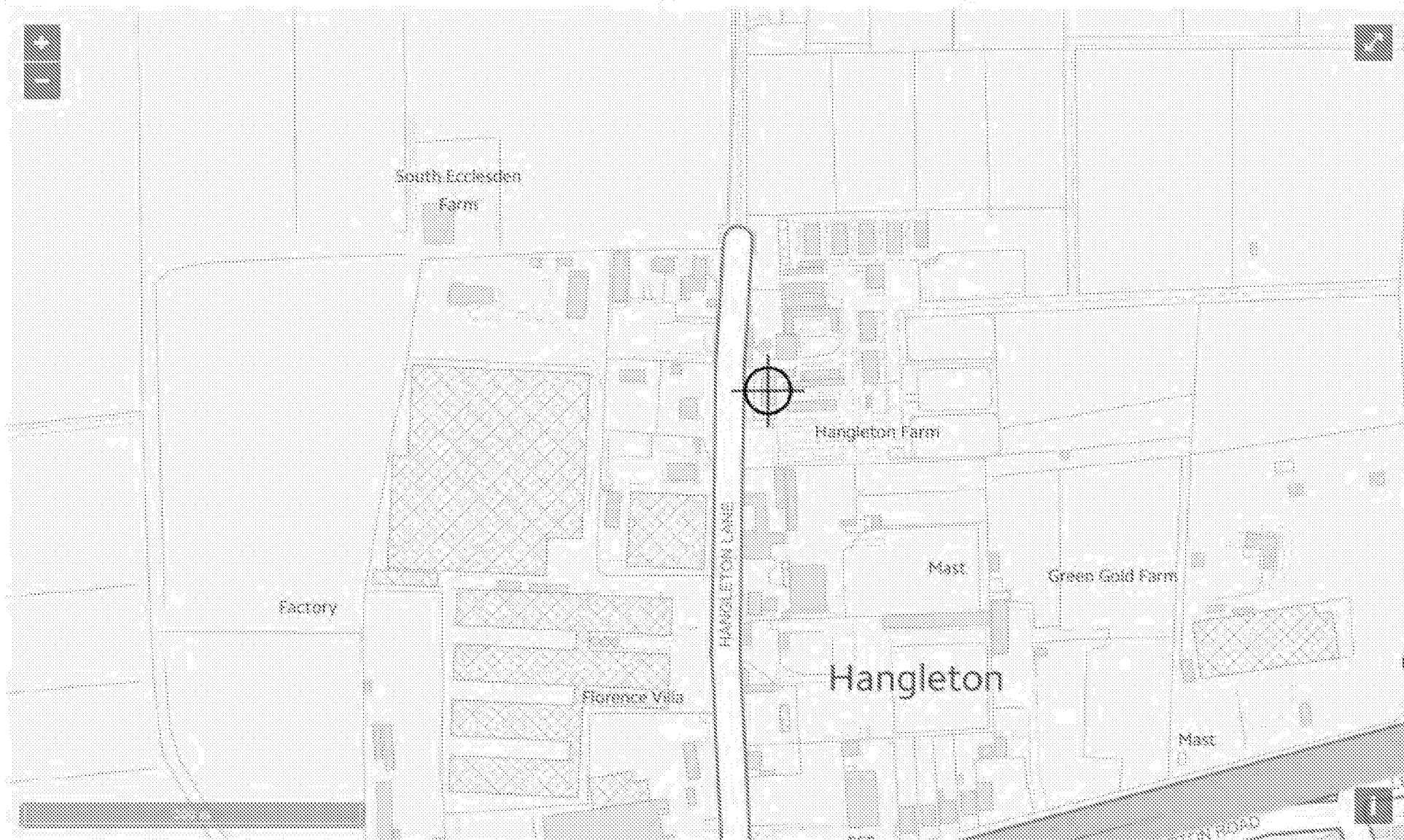
0 20 40 60m

Page 2 of 2



Extent of flooding

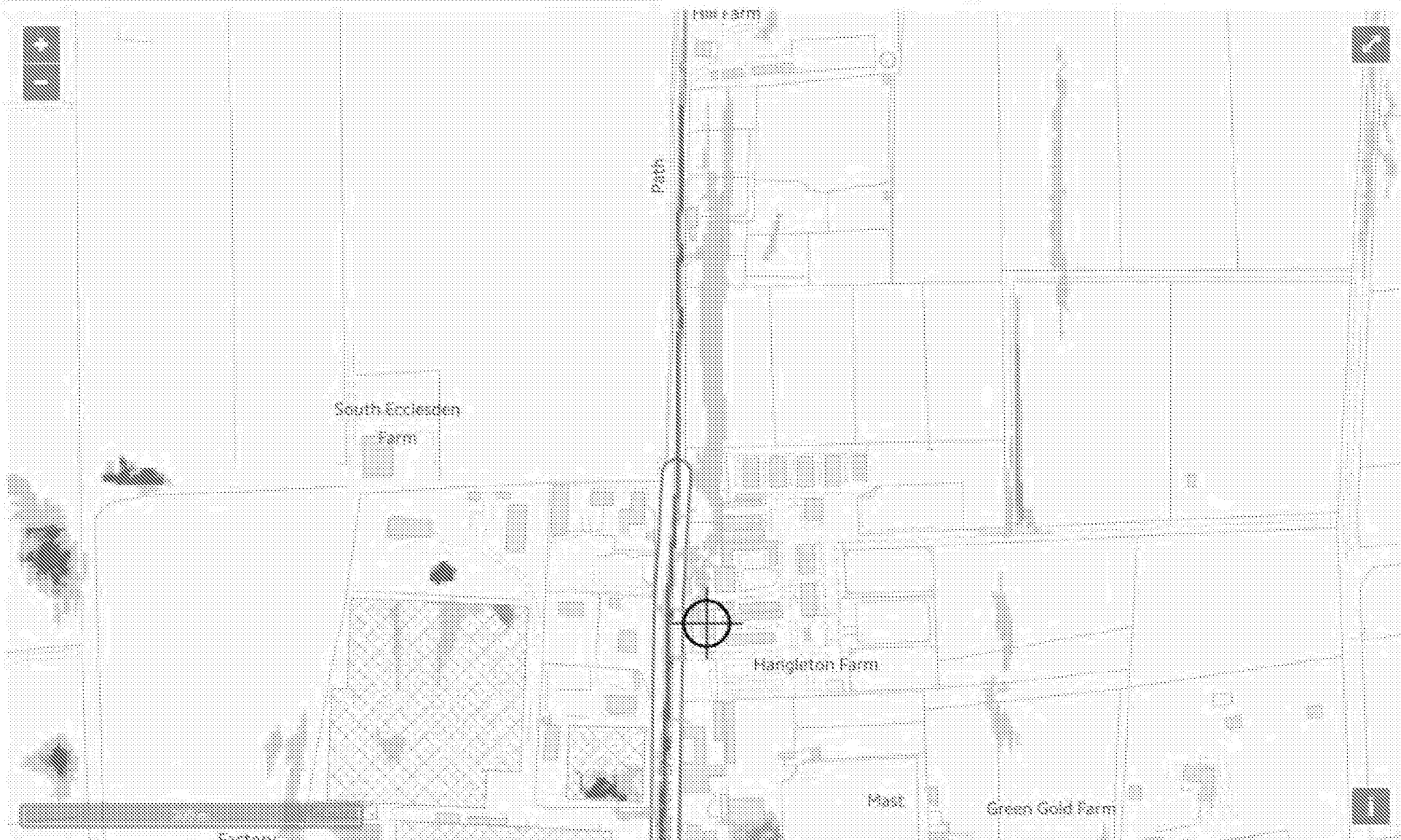
Enter a place or postcode



Extent of flooding from rivers or the sea

Extent of flooding

Enter a place or postcode



Extent of flooding from surface water

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High Medium Low Very low Location you selected

High risk: depth

Enter a place or postcode



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

Flood depth (millimetres)

Over 900mm 300 to 900mm Below 300mm Location you selected

High risk: velocity

Enter a place or postcode



Surface water flood risk: water velocity in a high risk scenario

Flood velocity (metres/second)

Medium risk: depth

Enter a place or postcode

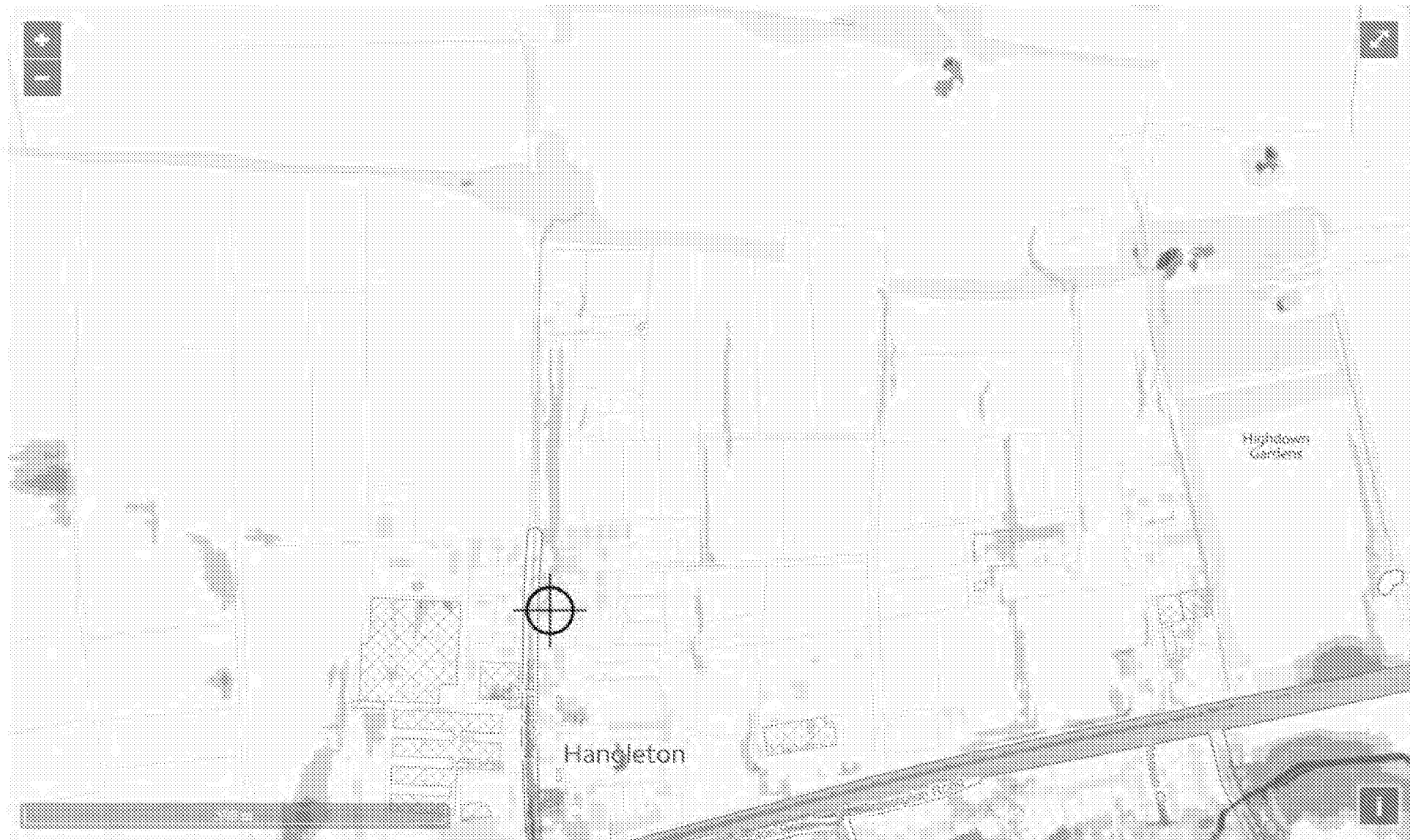


Surface water flood risk: water depth in a medium risk scenario

Flood depth (millimetres)

Low risk: depth

Enter a place or postcode



Highdown
Gardens

Handleton

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

Flood depth (millimetres)

APRIL DISTRICT COUNCIL FG/6/20/PL

- Over 900mm
- 300 to 900mm
- Below 300mm
- Location you selected

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

Low risk: velocity

Enter a place or postcode



Appendix C - Proposed Drainage System



Location Plan 1:500

LETTER	REVISION	DATE
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This scheme is subject to town planning and all other necessary consents. All dimensions and levels to be checked on site. This drawing is to be read in conjunction with other relevant drawings and documents. Report all discrepancies to the Architect before work commences.

1. This drawing to be read in conjunction with all other relevant Monson drawings and specifications, any discrepancies to be reported to Monson prior to any fabrication or work commencing on site.

3. All dimensions in millimetres, all levels in metres

3. All dimensions in millimetres, all levels in metres

A	DT	24/10/18	Original issue
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Project:
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Hangleton Lane
Ferring, West Sussex
BN12 6PP

Proposed Drainage

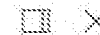
Original Drawing:	Prepared	MW	Approved	GL
Origin:	Crowborough		Size	A1
Current Issue:	Approved	GL	Date	23/04/20
Drawing Status:	PRELIMINARY			

Scale: 1 : 250	Dwg No: 9254/302	Issue: A
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Appendix D – Site Geology



Geology



Superficial deposits: Head - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period.

[More information](#)

Bedrock geology: Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk, Culver Chalk and Portsdown Chalk Formations - Chalk. Sedimentary bedrock formed between 93.9 and 72.1 million years ago during the Cretaceous period.

[More information](#)

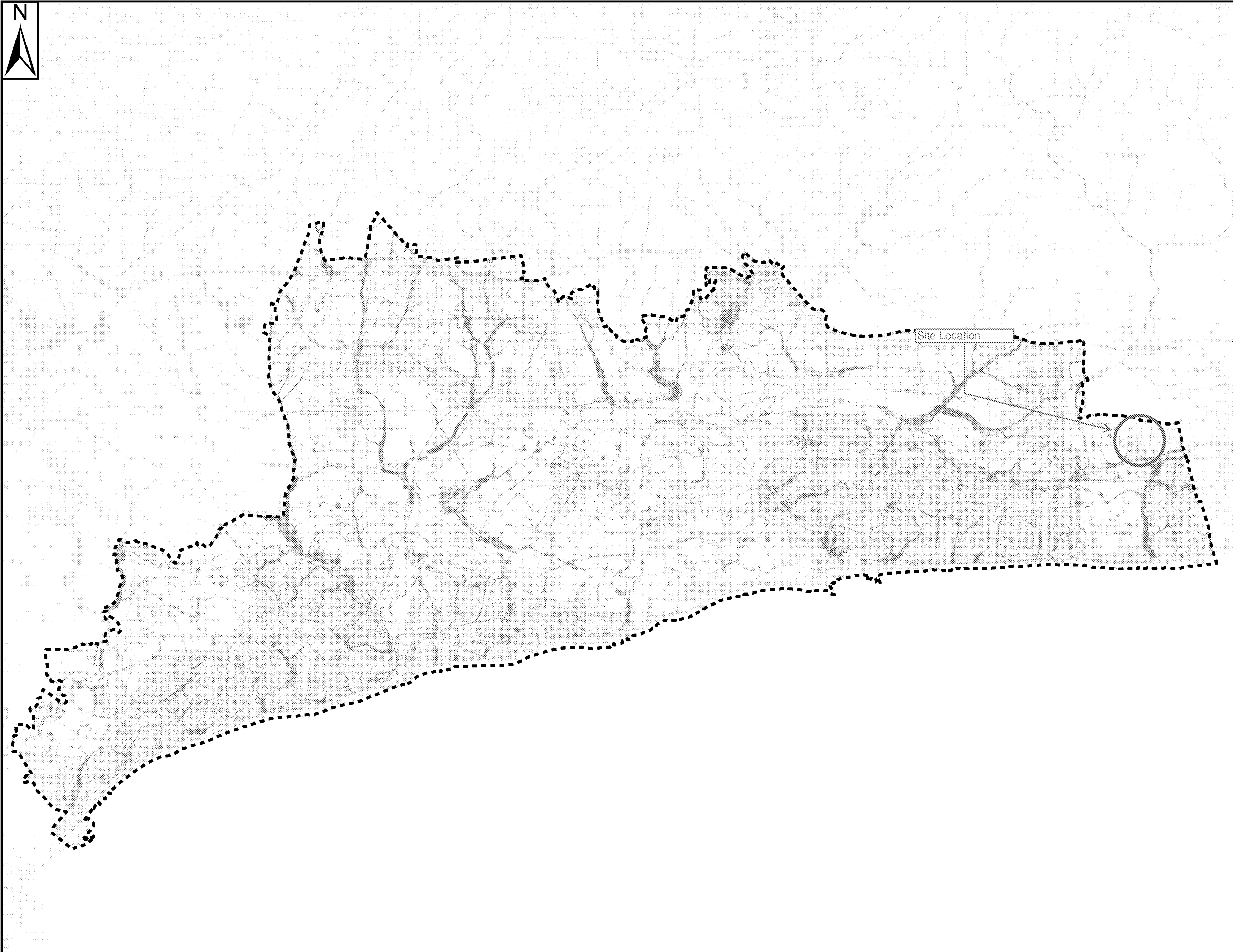


Witchampton Road

Century Avenue

Century Road

Appendix E - Extracts from Arun SFRA & SWMS



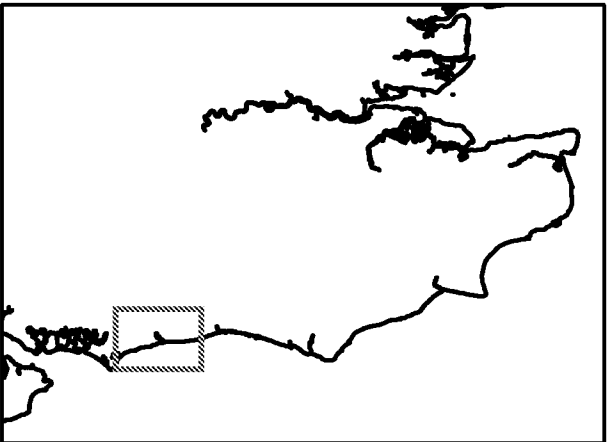
Notes

The updated Flood Map for Surface Water (uFMISW) shows the flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which:
(a) is on the surface of the ground (whether or not it is moving), and
(b) has not yet entered a watercourse, drainage system or public sewer.

The uFMISW will pick out natural drainage channels, rivers, low areas in the floodplain and flow paths between buildings but it will only indicate flooding caused by local rainfall.

Note: The uFMISW shows predictions of flooded areas but does not show whether individual properties will be affected by surface water flooding or have been affected in the past. The uFMISW should not be used to predict if individual properties will flood.

Key Plan



Legend

- Arun District SFRA boundary
- uFMISW 30-year extent
- uFMISW 100-year extent
- uFMISW 1,000-year extent

REF	Date	Comments
A	June 2016	-

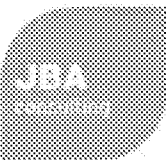


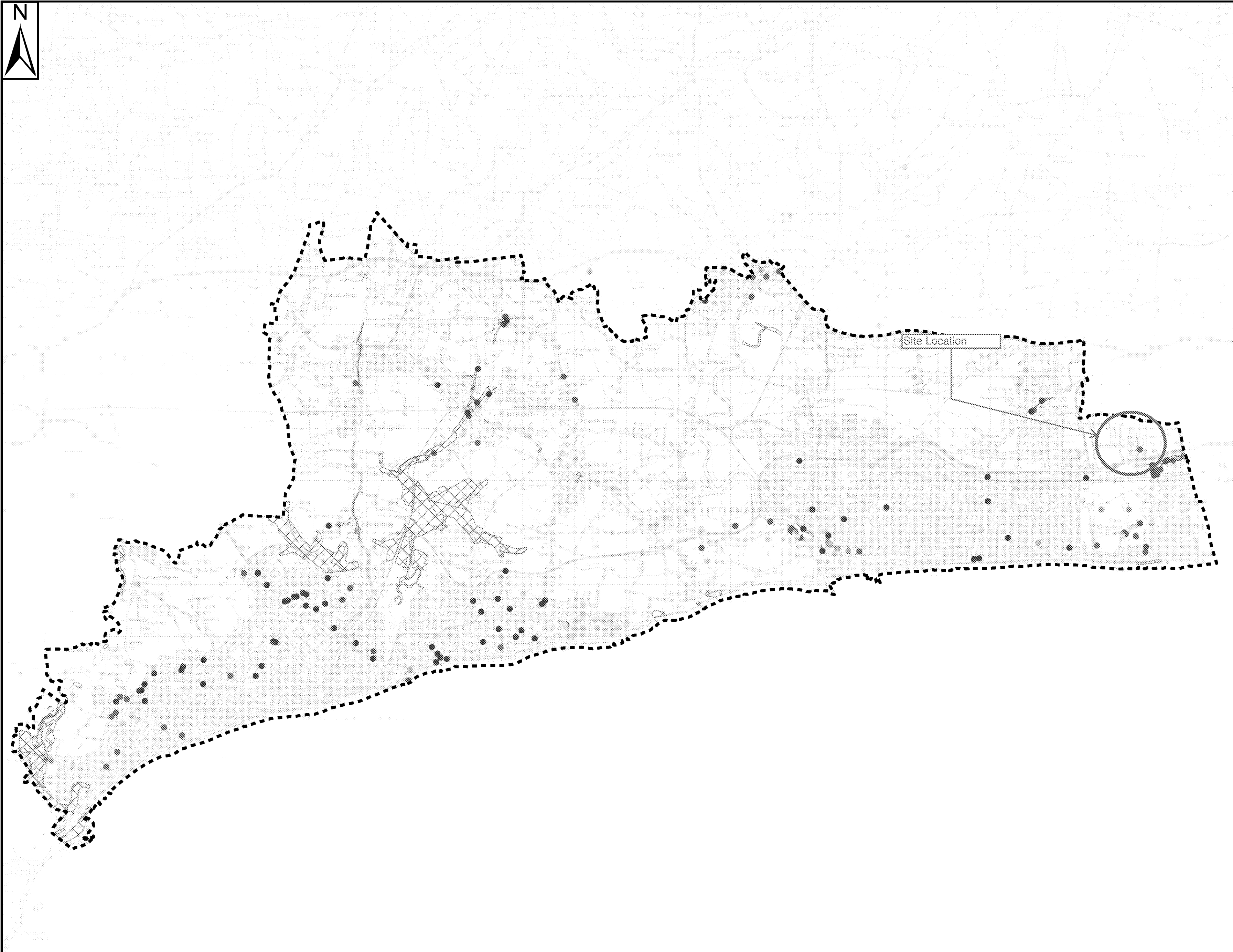
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**SFRA: APPENDIX E
SURFACE WATER FLOOD RISK**

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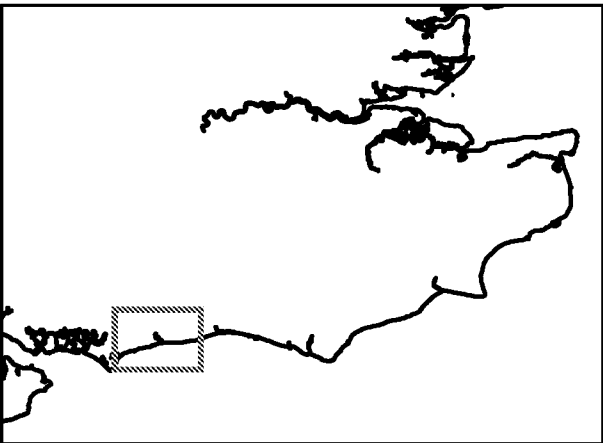
Notes

The Historic Flooding Map shows the recorded incidents and flood outlines provided by Arun District Council, West Sussex County Council, Southern Water and Environment Agency. Historical flood extent was obtained from the Environment Agency.

Flooding incidents provided have been categorised based upon the details provided in the records. Unknown flood points could not be determined from the information provided, and therefore could be from a number of sources.

Please note that not all historical records may be shown on this map, and that it is therefore advised you contact Arun District Council for updated information post 2015.

Key Plan



Legend

- Arun District SFRA boundary
- Historic flood outline

Source of flooding

- Fluvial
- Coastal
- Tidal
- Surface Water
- Failure
- Unknown

REF	Date	Comments
A	June 2016	-

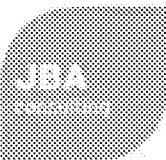


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**SFRA: APPENDIX H
HISTORIC FLOOD RECORDS**

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Notes

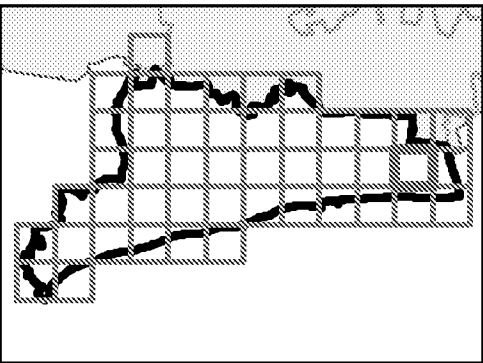
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- (b) has not yet entered a watercourse, drainage system or public sewer

The uFMISW will pick out natural drainage channels, rivers, low areas in the floodplain and flow paths between buildings but it will only indicate flooding caused by local rainfall

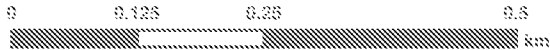
Note. The uFMISW shows predictions of flooded areas but does not show whether individual properties will be affected by surface water flooding or have been affected in the past. The uFMISW should not be used to predict if individual properties will flood.

Key Plan



Legend

- Arun District SFRA boundary
- uFMISW 30-year extent
- uFMISW 100-year extent
- uFMISW 1,000-year extent



REF	Date	Comments
A	June 2010	
B		
C		

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LEVEL 1 SFRA: APPENDIX E SURFACE WATER FLOOD RISK

Sheet No: 28 of 48 Index Number: AGC_26

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