

Proposed Development:
The Boweries
Barnham Road
Eastergate
West Sussex

Flood Risk Assessment and Drainage Strategy

Prepared by:

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Prepared for:

Domusea Developments Limited

Ref: ES1814/FRA

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Proposed Development The Boweries, Eastergate
Flood Risk Assessment

Prepared by

Kazys Narbutas

Signed



BSc (Hons) CEng

MICE MCIHT aAPS

Date: 28th May 2018

Reviewed by

Kevin Mitchell

Signed



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Date: 28th May 2018

Revision	Description	Date	Initials
O	Initial issue	May 2018	KN

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Appendix B	Southern Water Sewer Records and Indicative Drainage Plan
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1.0 INTRODUCTION

1.1 Appointment

- 1.1.1 Escher Silverman was commissioned by Domusea Developments Limited to produce an initial flood risk and drainage assessment in support of the outline planning application for the proposed development of 28 residential dwellings at The Boweries, Barnham Road, Eastergate, West Sussex to be submitted to Arun District Council.

1.2 Objective of Assessment

- 1.2.1 The assessment is focused on the flood risk associated with the site and the potential constraints to any proposed redevelopment.
- 1.2.2 The assessment consists of a desk study, data research and a walk over survey of the site.
- 1.2.3 The assessment considers all potential sources of flooding, including fluvial, pluvial, tidal, surface water runoff, overland flows, groundwater, sewers and artificial ponds and reservoirs.
- 1.2.4 The assessment will also establish what the most appropriate surface water drainage techniques are to ensure the development complies with the requirements of the '*National Planning Policy Framework*' guidance and associated Technical Guidance.

- 1.2.5 The NPPF guidance and Technical Guidance are published by the Department for Communities and Local Government sets out the Government's planning policies for England and how these are to be applied for meeting the challenge of climate change, flooding and coastal change.

1.3 Limitations

- 1.3.1 This assessment is reliant upon information from Southern Water and Arun District Council Strategic Flood Risk Assessment (SFRA). Escher Silverman is not liable for any errors resulting from third party information.

2.0 EXISTING SITE

2.1 Site Location

- 2.1.1 The site, known as *The Boweries*, is situated south of the B2233 in Eastergate, West Sussex. It is currently occupied by a single residential dwelling and several out buildings. The grid reference is 495041,105122. The site location can be seen on Figure 1 below and on the location plan found in **Appendix A**.

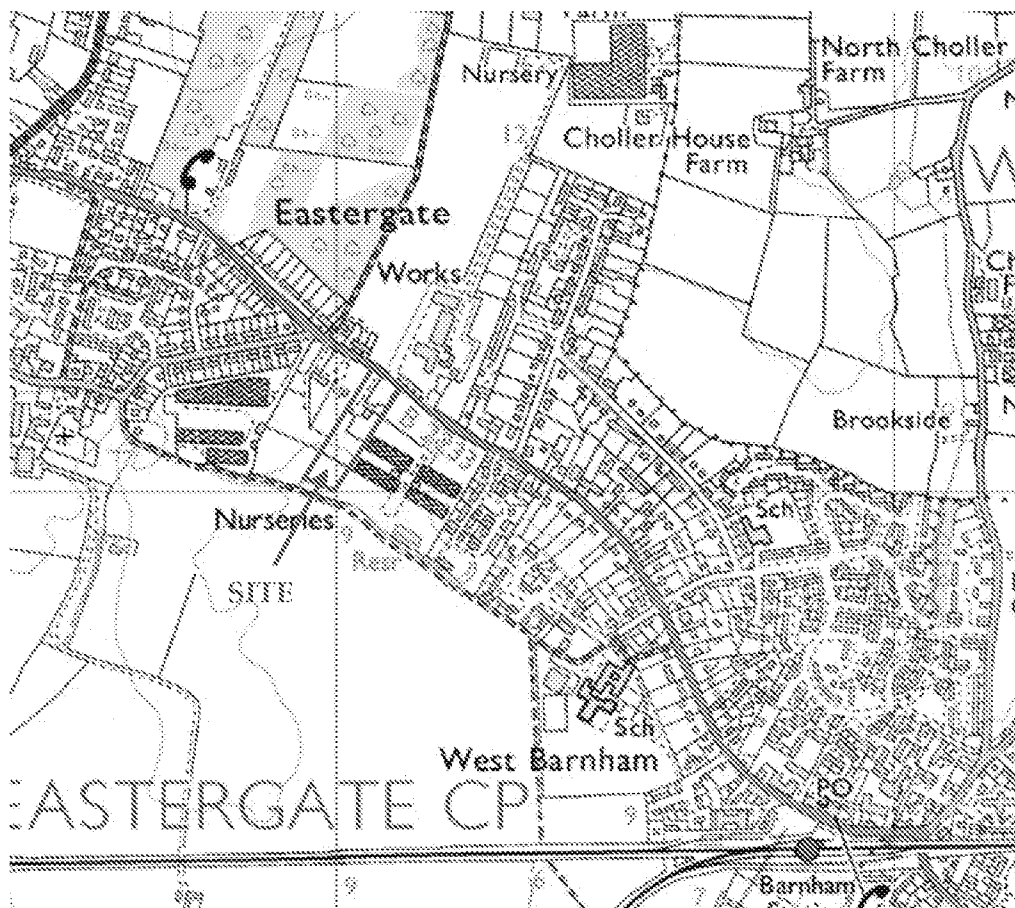


Figure 1. Site Location

2.2 Site Description

- 2.2.1 The site covers an area of approximately 1.4 Hectares and will be accessed from the B2233, Barnham Road.

2.3 Existing and Proposed Drainage

- 2.3.1 The local sewerage undertaker is Southern Water and records indicate that there is a public foul sewer running along Barnham Road. It is unlikely that a gravity connection can be made to the sewer for the whole development. It is anticipated that the southern area of the site will connect to a pumping station which will discharge into the gravity system serving the northern area. An indicative foul drainage layout can be seen on drawing ES1814-602-01 in **Appendix B**, together with a copy of the Southern Water sewer records. Connection to the public sewer will be to a new manhole constructed on the sewer and will be subject to a Section 106 Agreement with Southern Water. Current legislation gives the right for connection to the public sewer subject to the payment of the appropriate infrastructure charges.
- 2.3.2 There are no public surface water sewers or watercourses in the vicinity of the site.
- 2.3.3 Existing buildings on the site utilise soakaways as the means of surface water disposal. Utilising this information it is proposed to employ infiltration techniques as the means of surface water drainage for the new development site, using a combination of soakaways and permeable paving. This proposal will embrace the preferred option for surface water drainage from a new development as defined by the Environment Agency in their Sustainable Urban Drainage System (SUDS) hierarchy of sustainability.

2.4 Site Topography

- 2.4.1 The OS mapping for the area indicates that the site is predominantly flat with a slight slope from south to north. This has been confirmed by a site walkover.

3.0 SEQUENTIAL TEST

3.1 As set out in the NPPF, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. For these purposes:

- ‘areas at risk of flooding’ means land within Flood Zones 2 and 3; or land within flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency;
- ‘flood risk’ means risk from all sources of flooding – including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

3.2 As set out in the NPPF, the aim of the Sequential Test is to steer development to areas with the lowest probability of flooding. Flood Zones are the starting point for the Sequential Test. Flood maps can be accessed via the Environment Agency (EA) website which indicates Flood Zones 2 and 3 with Flood Zone 1 being all the land falling outside Zones 2 and 3.

3.3 The Flood Zones refer to the probability of sea and river flooding, ignoring the presence of existing defences and are defined as follows;

- Flood Zone 1 Low Probability

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding.

- Flood Zone 2 Medium Probability

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between 1 in 200 and 1 in 1000 annual probability of sea flooding.

- Flood Zone 3 High Probability

This zone comprises land assessed as having a 1 in 100 or greater probability of river flooding or 1 in 200 or greater probability of flooding from the sea.

3.4 In November 2016 Arun District Council issued their final Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA), produced on their behalf by JBA Consulting. This has been prepared to provide readily and easily accessible information for applicants preparing a site specific FRA.

3.5 The SFRA can be accessed via the Arun District Council website and contains mapping indicating the information required to complete the site specific FRA.

3.6 The relevant SFRA maps covering Eastergate are contained in the appendices of the Arun District Council SFRA. These maps identify the proposed development site as being situated in Flood Zone 1, having the lowest probability of flooding, and show that the site is outside any future climate change flood zones. Copies of the relevant flood maps are contained in **Appendix C** of this report.

3.6 From the information contained in the SFRA and detailed above, the development site satisfies the requirements of the Sequential Test.

3.7 The proposed development site is in excess of 1 hectare and therefore a FRA is required.

3.8 The FRA should consider;

- The disposal of surface water run-off generated by the proposed development following the SUDS train utilising infiltration drainage as the primary means of surface water disposal.
- The surface water run-off generated for the 1 in 100 year event with an allowance for 40% climate change should be considered, as required by NPPF guidance in the surface water drainage design;
- The effect of flooding from the development due to exceedence events and/or local drainage network failures.
- The effect of flooding from other sources on the development and suitable 'flood flow routes' should be identified across the development that will not have a detrimental effect on the development.

4.0 FLOOD RISK ASSESSMENT

4.1 Flood Risk Methodology

4.1.1 This FRA has been prepared in accordance with NPPF Technical Guidance *Technical Guidance to National Planning Policy Framework* and demonstrates.

- whether the proposed development is likely to be affected by current or future flooding from any source;
- to the LPA (Local Planning Authority) that the development is safe and, where possible, reduces flood risk overall;

4.2 Assessment of Flooding to Development

4.2.1 The Sequential Test carried out in Section 3.0 of this report identified the development site as being situated in Flood Zone 1 having the lowest probability of flooding from river or sea sources and is also not currently at direct risk of flooding.

4.2.2 The SFRA mapping attached in **Appendix C** indicates that the site is not affected by any sources of flooding or future flooding from climate change.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 Based on the current information the following can be concluded;

- The site is situated in Flood Zone 1 and is suitable for all building type uses;
- Given the anticipated geology of the site infiltration drainage should be appropriate as the means of surface water disposal.

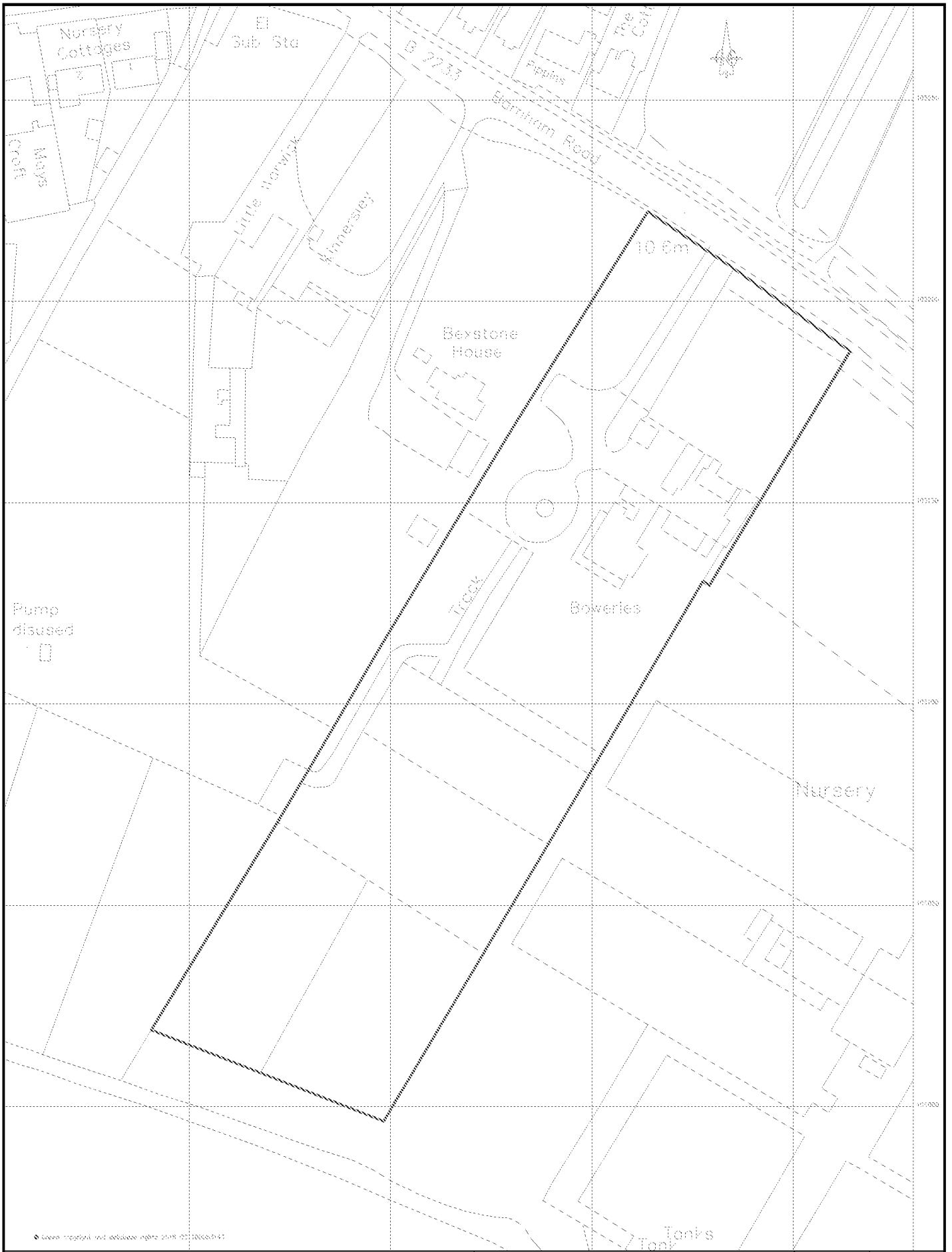
5.2 Recommendations

5.2.1 It is recommended that the following be undertaken;

- Carry out percolation tests in accordance with BRE365 to determine the infiltration rate of the sub soils which can be used in the detailed design of a surface water drainage system;
- The drainage for the development should be designed for the 1 in 100 year event with an allowance of 40% for climate change in accordance with Environment Agency guidance;
- Liaise with the Environment Agency at an early stage to ensure the most appropriate infiltration drainage is utilised.
- Undertake a topographical survey of the site to ensure levels can be set to ensure flood flow routes through the site should an exceedance event occur.

Appendix A

Site Location Plan



 ESCHER · SILVERMAN <i>Civil & Structural Consulting Engineers</i> Roughton, A2 Omega Park, Electron Way, Chandlers Ford, Hampshire SO53 4SE Tel: 023 8027 8659 Email: reception@eschers.co.uk www.eschersilverman.com	Project		Scales	Paper Size
	BOWERIES, EASTERGATE		1:1250	A4
	Drawing Title		Drawing No.	
	Site Location Plan		ES1814-500-00	
	Sheet	Rev		
	1 of 1	A		

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Appendix B

Southern Water Sewer Records and Indicative Drainage Layout



Type 2 Foul Water Pumping Station: Inlet IL - 4.90 - CL - 6.10
8 No 4 Bedroom Units
Storage requirement for 48 person population with 0.8 reduction factor in accordance with British Water 'Flow & Loads' - 38.5 x 150 = 5775 litres (5.8cum)

Connection to existing public foul sewer, subject to S106 Agreement with Southern Water

Key

Existing foul water sewer

New foul water gravity sewer

New foul water rising main

New foul water manhole

Type 2 foul drainage pumping station

A	27.0518	Initial issue	KN
Rev.	Date	Details	Initials

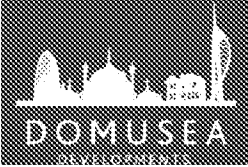
Drawing Status

PRELIMINARY FOR PLANNING

Project

**BOWERIES
BARNHAM , ROAD, EASTERGATE**

Client



 **ESCHER SILVERMAN**
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Roughdon, A2 Omega Park, Electron Way, Chaudlers Ford, Hampshire SO53 4SE
Tel: 023 8027 8659 Email: reception@eschersilverman.com

Drawing Title

**Engineering Details
Indicative Drainage Layout**

Drawn	Checked	Scales	Paper Size	Date
KN		1:250 @ A2	A2	05.18
Job No.	Drawing No.	Revision		
ES1814	602-01	A		



105002

O.S. REF.

SU9505SW

Title: 281961__Boweries, Barnham Road,

Drawn by: yadavs

Scale: 1:1250

Date: 27/02/2018

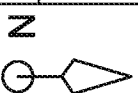
The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

The actual positions should be determined on site.

WARNING: SAC pipes are constructed of Bonded Asbestos Cement.

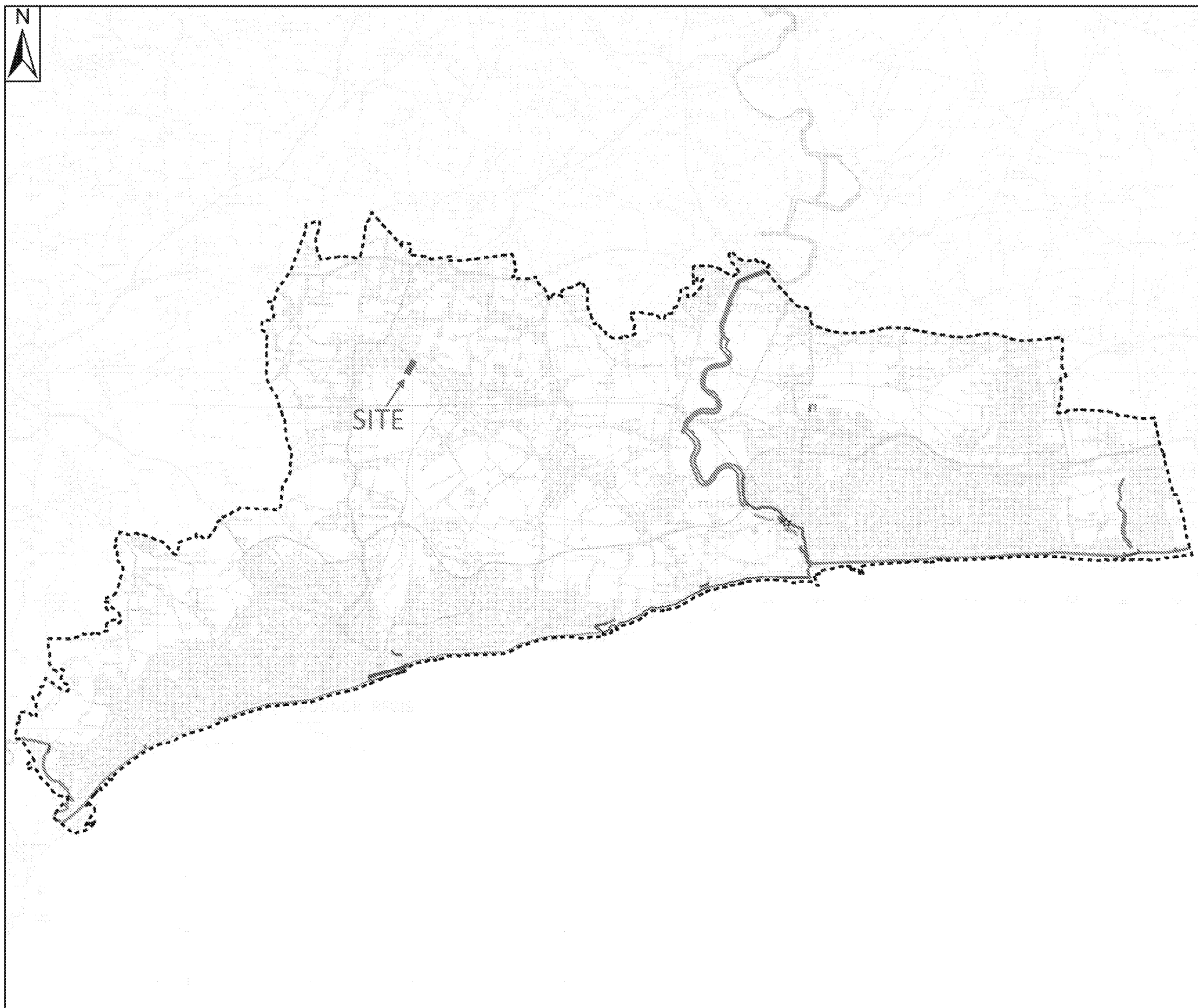
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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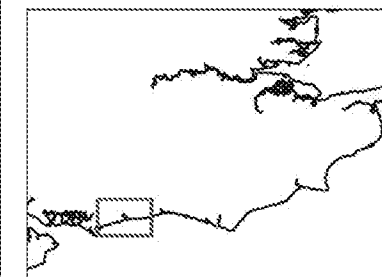


Appendix C

Arun District Council '*Strategic Flood Risk Assessment*' Maps.



Key Plan



Legend

- Arun District SFRA boundary
- Gap in Littlehampton defence
- Defence type and maintainer**
- Embankment, Environment Agency
- Embankment, Private
- Embankment, Unknown
- Wall, Environment Agency
- Wall, Local Authority
- Wall, Private
- Shingle Beach, Environment Agency
- Shingle Beach, Local Authority
- Shingle Beach, Littlehampton Harbour
- Shingle Beach, Private
- Shingle Beach, Worthing Borough
- Unknown

REV	Date	Comments
A	June 2018	-



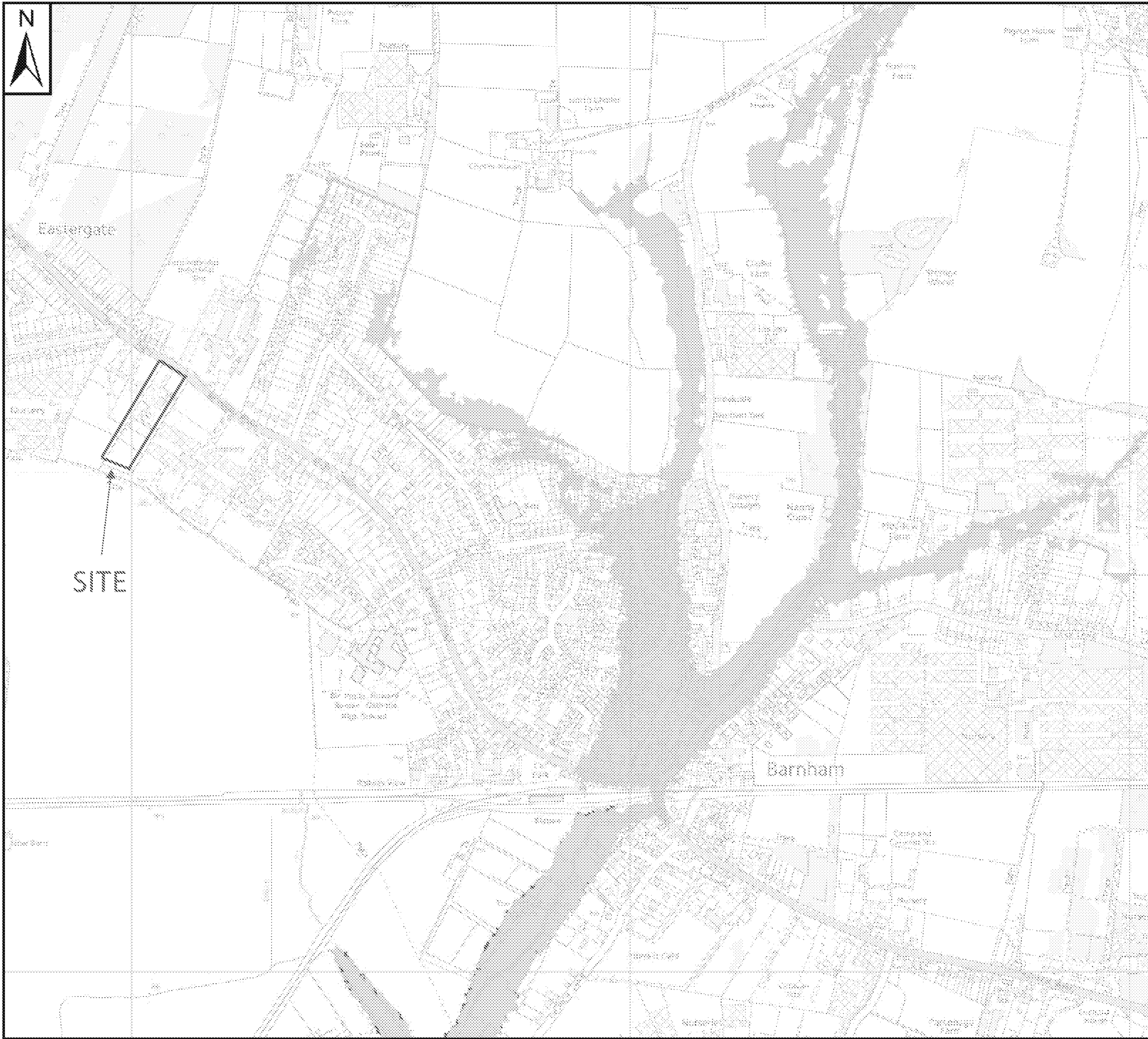
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SFRA: APPENDIX I
DEFENCES

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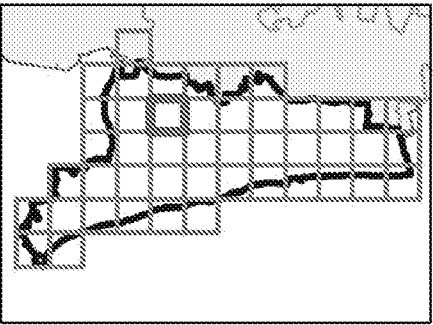
Notes

Hydraulic modelling has been undertaken as part of this SFRA to provide updated climate change flood mapping in the Arun District for Flood Zone 3a. This modelling followed the latest guidance for climate change in FRAs/SFRAs released by the Environment Agency in February 2015 (and updated in April 2018). Climate change for fluvial events has been based on the Higher Central estimates for the years 2031, 2061 and 2111. Present day flood risk information is available for comparison. Arun District is within the South East River Basin District and therefore allowance are:

- 2031 = +15% flows
- 2061 = +30% flows
- 2111 = +40% flows

For defenceless models, undefended case still water level and defended case still water level with wave overtopping simulations have been completed to inform future flood risk within the Arun District. Again, climate change allowance predictions are for the years 2031, 2061 and 2111, with present day outputs for comparison.

Key Plan



Legend

- Arun District SFRA boundary
- Present Flood Zone 3a
- Future Flood Zone 3a (2061)
- Future Flood Zone 3a (2111)



REF	Date	Comments
A	August 2016	
B		
C		

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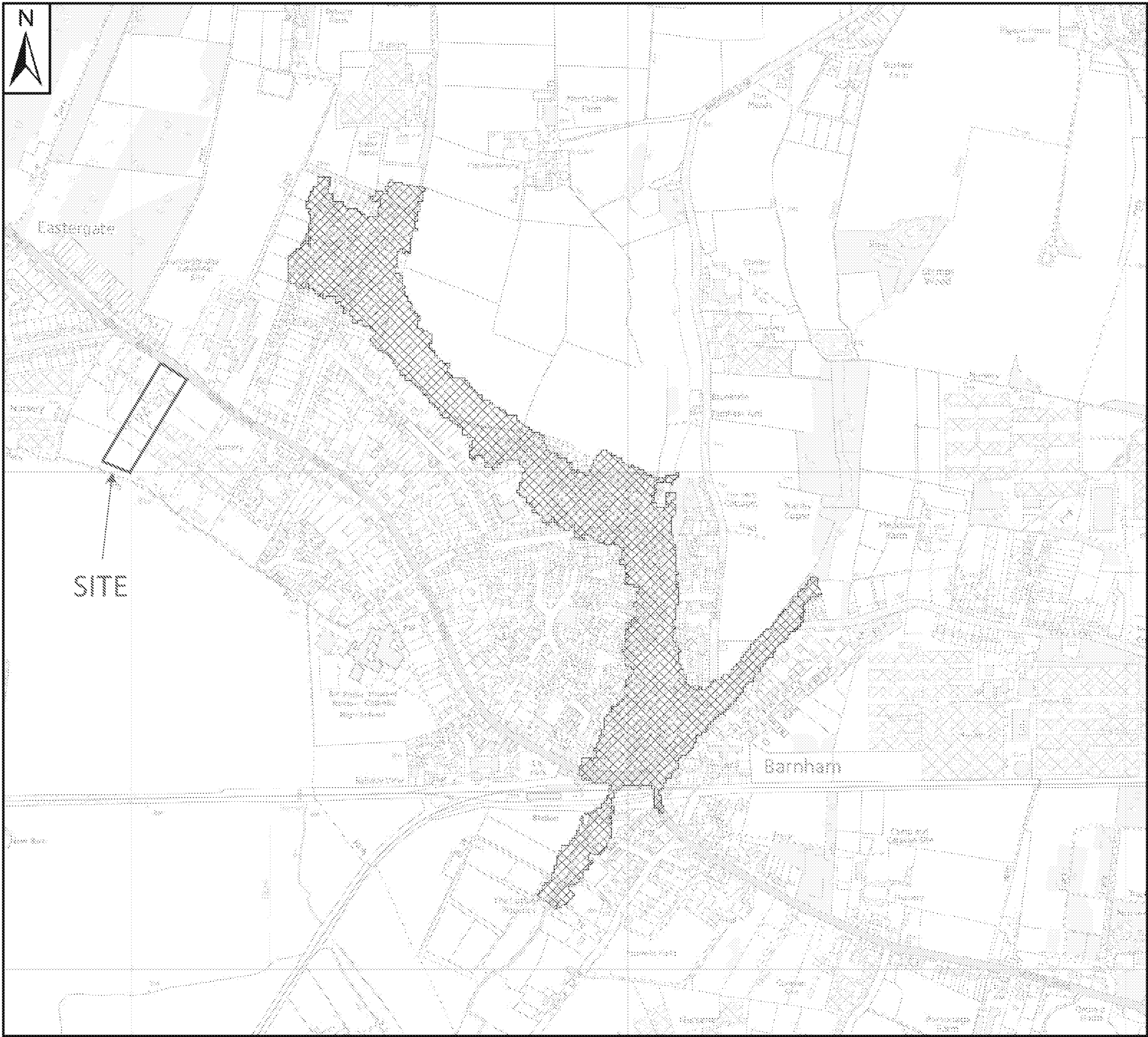
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**LEVEL 1 SFRA: APPENDIX D
CLIMATE CHANGE MAPPING**

Sheet No: 12 of 45 Index Number: ADC_12

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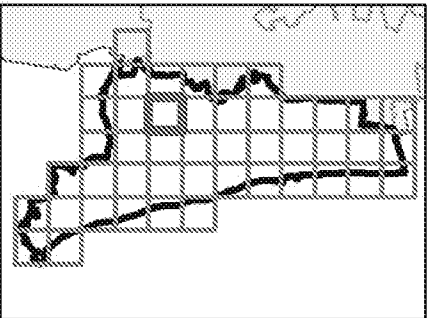
Notes

Flood Alerts are used to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and make early preparations. It is issued earlier than a flood warning, to give customers advance notice of the possibility of flooding, but before we 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.

Some areas may be covered by more than one flood warning area as they may be at risk of flooding from more than one

Key Plan



Legend

	Arun District SFRA boundary		08SF WF 0605
	08SF WF 0601		08SF WF 2801
	08SF WF 4803		08SF WF 2802
	08SF WF 4904		08SF WF 2801
	08SF WF 5301		08SF WF 0608
	08SF WF 0302		08SF WF 4901
	08SF WF 5607		08SF WF 2401
	08SF WF 0608		08SF WF 2402



REF	Date	Comments
A	June 2018	-
B		
C		

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**LEVEL 1 SFRA: APPENDIX G
FLOOD WARNING AREAS**

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