

# Flood Risk Assessment

Land North of Upper Bognor Road

Project number: B0603052

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# 1. Introduction

## 1.1 Background

- 1.1.1 AECOM Limited ("AECOM") has been commissioned by the University of Chichester (UoC) to undertake a Flood Risk Assessment (FRA) in support of "Land north of Upper Bognor Road at the University of Chichester, Bognor Regis Campus", hereafter referred to as 'The Site'.
- 1.1.2 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF)<sup>1</sup> and the accompanying Planning Practice Guidance (PPG): Flood Risk and Coastal Change<sup>2</sup>; and in accordance with local legislative and planning policy guidance in the Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA)<sup>3</sup>.

## 1.2 Aims and Objectives

- 1.2.1 The aim of this report is to provide a site-specific FRA to support a planning application. The FRA should assess the flood risk to and from the Site in accordance with the requirements of the NPPF<sup>1</sup> and suggest measures to avoid and / or reduce the risk. The following objectives have been achieved to fulfil this aim:
- Gather desktop information relating to geology, topography and local water features that may influence the risk of flooding to the Site;
  - Obtain flood modelling outputs from the Environment Agency associated with local watercourses to quantify the risk of tidal and fluvial flooding to the Site over its lifetime, allowing for the effects of climate change;
  - Assess the risk of flooding from all remaining sources (surface water, groundwater, sewers and ordinary watercourses) to and from the Site allowing the effects of climate change over the lifetime of development;
  - Identify the potential impacts of the Site development on the surface water flood risk to itself and surrounding area, including alterations to permeable surfacing and surface water flow paths;
  - Identify and quantify the vulnerability of the Site to flooding from all sources and where, appropriate, identify potential flood risk reduction measures, including arrangements for safe access; and,
  - Where appropriate, assess the remaining 'residual risk' after risk reduction measures have been taken into account and demonstrate that this is acceptable for the Site.

## 1.3 Source-Pathway-Receptor Model

- 1.3.1 AECOM's approach to a FRA is based on the Source-Pathway-Receptor model. The Source-Pathway-Receptor model firstly identifies the causes or 'sources' of flooding to and from a development. The identification is based on a review of available information such as mapping, local conditions and consideration of the effects of climate change. The nature and likely extent of flooding arising from any one source is considered, e.g. whether such flooding is likely to be localised or widespread.
- 1.3.2 The presence of a flood source does not always imply a risk. For example, the presence of a sewer does not necessarily increase the risk of flooding unless the sewer is local to the site and ground levels encourage surcharged water to accumulate. The exposure pathway or 'flooding mechanism' determines whether there is a risk of exposure to a flood source.

<sup>1</sup> Ministry of Housing, Communities and Local Government, (February 2019); National Planning Policy Framework. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/393122/nppf-2019.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/393122/nppf-2019.pdf). Accessed: December 2019.

<sup>2</sup> Ministry of Housing, Communities and Local Government, (March 2014); Planning Practice Guidance: Flood risk and coastal change. Available at: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>. Accessed: December 2019.

<sup>3</sup> Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment, Version 5, September 2016. Available at: <https://www.arun.gov.uk/downloads.cfm?id=2000&file=20009774.pdf&size=9670>. Accessed: December 2019.

- 1.3.3 The identification of flooding pathways is typically undertaken by considering the local and site topography, the proximity of the flood source to the receptor and the potential flood conveyance routes local to the site. For more detailed assessments hydrological or hydraulic modelling may be required to quantify the flood risk and identify specific pathways for a particular flood source.
- 1.3.4 If a flooding mechanism is considered not to be present, then the risk from the flood source is considered to be negligible.

### Assessment of flood risk to receptors

- 1.3.5 If a flood source and flooding pathway are identified, the assessment of the flood risk to the receptor is determined by combining the probability of the flood event occurring with the severity of impact (or consequences) if the flood event were to occur. Receptors include any people or buildings within the range of the flood source, and which are connected to the source by a pathway.
- 1.3.6 The probability of a flood event occurring is usually determined from historical records of events, available modelling information and the design standard and condition of any infrastructure associated with the flood source. For more detailed assessments, hydrological or hydraulic modelling may be used to determine the frequency of flood events occurring for a particular flood source.
- 1.3.7 The potential severity of the impact is determined by considering a combination of the type of flood source, the flood mechanisms identified, the layout and design of the proposed receptor and the vulnerability of the receptor.
- 1.3.8 The AECOM FRA approach involves a desk-based review of available information to establish
- Likely flooding sources;
  - Potential flooding pathways (mechanisms of flooding);
  - Probability of a flood event occurring; and
  - Severity of impact of a flood event for the site.
- 1.3.9 In summary, for there to be a risk of flooding, all the elements of the Source-Pathway-Receptor model must be present. Furthermore, effective mitigation can be provided to reduce the magnitude of flood risk by removing one element of the model. For example, by removing the pathway, defending against the flood source, incorporating flood management or flood resilience measures into building design, or providing safe access and egress and flood evacuation plans for future residents and users of the development.

## 2. Site Description

### 2.1 Site Location

- 2.1.1 The Site is located at National Grid Reference SZ 94355 99521 in the University of Chichester (Bognor Campus), Bognor Regis, West Sussex, PO21 1HP. The Site is approximately 0.3 hectares (ha) and can be accessed from the B2259 Upper Bognor Road, which borders the Site to the south. To the north and west of the Site are buildings associated with the University of Chichester campus and halls of residence. A Site Location Plan is shown in Figure 2-1.
- 2.1.2 The Site is a combination of greenfield and brownfield land. Appendix A Figure A1 shows the existing buildings on the Site; the central part of the Site is currently being used as residential cottages (No. 67 and No. 69), and buildings No. 71 and No. 71A are currently used as offices. The remainder of the existing land is Greenfield.
- 2.1.3 Aldingbourne Rife is a Main River and flows south, approximately 180m to the east of the site. An Ordinary Watercourse flows east approximately 70m to the north of the Site, and discharges to the Aldingbourne Rife. The Site is located approximately 500m north of the English Channel.

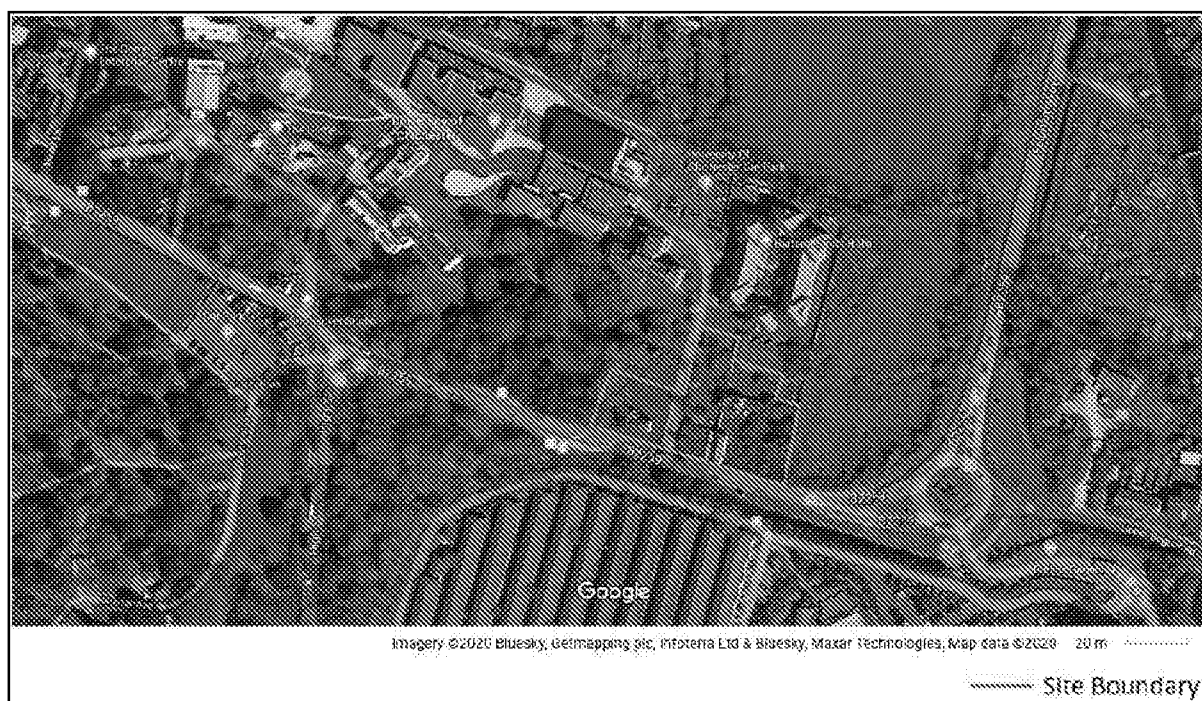


Figure 2-1 Site Location Plan

### 2.2 Topography

- 2.2.1 Appendix A Figure A1 includes topographic survey levels across the Site and indicates a slight fall across the Site from north-west to south-east from approximately 4.3m Above Ordnance Datum (AOD), to approximately 3.1m AOD.

### 2.3 Geology and Hydrogeology

- 2.3.1 The British Geological Survey (BGS)<sup>4</sup> website identifies that the Site is situated on a combination of superficial deposits including Raised Marine Deposits consisting of clay, silt, sand and gravel; and River Terrace Deposits also consisting of clay, silt, sand and gravel.
- 2.3.2 The BGS website identifies the bedrock beneath the Site as Lambeth Group - clay, silt and sand.

<sup>4</sup> British Geological Survey: Geology of Britain. Available at: <https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>. Accessed: December 2019

- 2.3.3 A 1969 BGS borehole record<sup>5</sup> (BGS ID SZ99NW41 'Bognor Regis Main Drainage 1') located approximately 115m northeast of the Site indicates that clay was encountered up to 6.7m below ground level. The record indicates the ground level to be at 3.5m AOD. The borehole record indicated that groundwater was encountered at 3.0m below ground level.

## 2.4 Flood Zone

- 2.4.1 The Environment Agency Flood Map for Planning<sup>6</sup> identifies the Site as being in Flood Zone 3 and therefore to have a high probability of flooding associated with rivers and / or the sea in the present day scenario. The Flood Map for Planning can be viewed in Figure B2, Appendix B.
- 2.4.2 However, a Product 4 data request was received from the Environment Agency in December 2019 which identifies that the Site does benefit from protection due to tidal flood defences along the coast. Figures B7 and B8 in Appendix B indicate that the Site is not at risk of tidal flooding when the tidal flood defences are in place. The risk to the Site from tidal flooding is therefore a residual risk, in the event of a breach or failure of the tidal flood defences.
- 2.4.3 Communications with the Environment Agency have confirmed that information provided in the Product 4 data request should be used to inform this FRA. This communication can be viewed in Figure B13, Appendix B.
- 2.4.4 Further assessment of the risk of flooding to the Site is presented in Section 5.

## 2.5 Flooding History

- 2.5.1 The Environment Agency Historic Flood Map<sup>7</sup> indicates no historic records of flooding exist for the Site. This is also confirmed in correspondence with the Environment Agency which can be viewed in Figure B1, Appendix B.
- 2.5.2 The Arun District Council, Level 1 SFRA<sup>3</sup> documented historic flooding which has occurred throughout the wider district. The SFRA<sup>3</sup> indicates the main sources of historic flooding in the district are surface water and groundwater. The SFRA<sup>3</sup> also outlines that fluvial and tidal flood events have caused flooding along the coastal frontage. The SFRA<sup>3</sup> also underlined that fluvial (and / or tidal) and surface water interaction has prevented the free discharge of surface water from sewer system.
- 2.5.3 The SFRA<sup>3</sup> reports *the "the most significant flood events reported to have affected the district occurred in 1968, 1974, 1980/81, 2010, 2012"*. However, the type(s) of flooding and where it occurred in the District is not discussed in detail.

<sup>5</sup> British Geological Society Geoindex Onshore Viewer Borehole viewer. Available at:

<http://mapapps2.bgs.ac.uk/geoindex/online.html?submit=Open+the+selected+Geoindex>. Accessed: January 2020.

<sup>6</sup> Environment Agency: Flood Map for Planning. Available at: <https://flood-map-for-planning.service.gov.uk/>. Accessed: December 2019.

<sup>7</sup> Environment Agency: Historic Flood Map. Available at: <https://data.gov.uk/dataset/762522ee-7d8b-43e8-bc9b-027341d68c61/a-historic-flood-map>. Accessed: December 2019. *Please note the information on this website is periodically updated.*

### 3. Development Proposals

- 3.1.1 The University of Chichester is seeking to redevelop the Site. A plan showing the proposed development can be viewed in Figure A1, Appendix A. The proposals include the construction of two new residential cottages, conversion of two existing buildings to residential use as well as provision of associated car parking and landscaping. More detail is provided below:
- Two new properties are proposed to the east of existing properties 67 and 69 Upper Bognor Road. Each of the properties will comprise a workshop at ground level with a stairwell leading to two first floor flats; a two-bedroom flat and a one-bedroom flat. It is proposed that the properties will be built in a style in-keeping with the existing buildings. The development proposals for the proposed properties can be viewed in Figures A2 – A4, Appendix A.
  - The development proposals include plans for a change of use of the existing two storey offices at 71 and 71A Upper Bognor Road from commercial back to residential. A shared 'courtyard' area will form the entrance to the new properties and to existing properties 67, 69, 71 and 71A Upper Bognor Road.
  - Additional parking spaces will be provided; 4 No. spaces to the north east of Charlotte House; and 13 No. spaces to the north west of 71/71A Upper Bognor Road. All parking areas are to be constructed of a permeable paving plastic mesh with SUDS compliant granular fill.
  - Figure A1, Appendix A 'Site Plan Proposed' - also provides details related to the provision of green spaces (gardens), bin and cycle stores, hedges, fences and new trees. The figure also identifies that ground levels at the west of the Site, adjacent to Charlotte House, are approximately 4.3m AOD and the ground levels at east of the site, adjacent to the new properties, are approximately 3.1m AOD.
- 3.1.2 The proposed development has also been captured in a Design and Access Statement<sup>8</sup>, which was prepared by Saunders Architects in December 2019.
- 3.1.3 A drainage strategy has not yet been prepared for the proposed development. A drainage strategy will be required to comply with the drainage hierarchy guidance provided in the NPPF<sup>1</sup>, and local legislative policies. Refer to Section 6.4 for further information.

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<sup>8</sup> Design and Access Statement, University of Chichester, Upper Bognor Road Residential Redevelopment, December 2019, Saunders Architects.

## 4. Planning Policy

### 4.1 National Planning Policy Framework

- 4.1.1 The NPPF<sup>1</sup> and the associated PPG<sup>2</sup> detail current policy in respect to flood risk in England. Paragraphs 148 to 169 of the NPPF are related to *meeting the challenge of climate change, flooding and coastal change*. The policy aims to avoid inappropriate development in areas of flood risk by directing development areas away from areas at highest risk. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- 4.1.2 This section sets out the key requirements for the Site.

#### Site-specific Flood Risk Assessment

- 4.1.3 Paragraph 164 (footnote 50) of the NPPF<sup>1</sup> states that “a *site-specific flood risk assessment is required for all development in Flood Zone 2 and 3*”. The Site is shown to be located within Flood Zone 3 on the Environment Agency Flood Map for Planning<sup>6</sup>. This report therefore fulfils the requirements of the NPPF<sup>1</sup>.

#### Vulnerability classification

- 4.1.4 The NPPF<sup>1</sup> considers the vulnerability of different types of development to flooding. The vulnerability classifications are detailed in Table 2 of the PPG<sup>2</sup>.
- 4.1.5 Table 2 of the PPG states that “*Buildings used for dwelling houses and student halls*” are classified as ‘More Vulnerable’. The proposals for the two new cottages are therefore considered to fall within the vulnerability classification of ‘More Vulnerable’.
- 4.1.6 The ‘change of use’ for the existing Offices at 71 and 71A Upper Bognor Road back to residential use also falls within the classification of ‘More Vulnerable’.

#### Sequential Test

- 4.1.7 The Sequential Test is a decision-making tool, designed to steer new development to areas with the lowest probability of flooding. Before development within an area at risk of flooding can be permitted, the Sequential Test needs to be applied and passed, to confirm that there are no alternative reasonably available sites at lower risk of flooding that would be preferable for the proposed development.
- 4.1.8 The development proposals include two new properties which requires the application of the Sequential Test. Appendix C provides details of the Sequential Test for this part of the development.
- 4.1.9 The Environment Agency guidance ‘*Flood risk assessment: the sequential test for applicants*’ states that development involving a ‘change of use’ does not require the application of the Sequential Test. Therefore, the proposals for the change of use for the existing offices at 71 and 71A Upper Bognor Road do not require the application of the Sequential Test.
- 4.1.10 The application of the Sequential Test indicates that, of the compared sites, the Site is most suitable for the Proposed development and therefore the test is considered to be “passed”.

#### Exception Test

- 4.1.11 As set out in paragraph 160 of the NPPF<sup>1</sup>, if, following completion of a Sequential Test, it has been demonstrated that it is not possible to use an alternative site, an Exception Test must be undertaken. For the exception test to be passed it should be demonstrated that:

*‘(a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*

*(b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.'*

- 4.1.12 The Exception Test is considered to be "passed" for the proposed development of two new properties and further details are provided in Appendix C.

## Assessing the impact of climate change

- 4.1.13 In accordance with the PPG<sup>2</sup>, it is recommended that the potential effects of climate change should be considered realistically for the lifetime of a development and that "...*developers, the local planning authority and Environment Agency should discuss and agree what allowances are acceptable*".
- 4.1.14 In February 2016, the Environment Agency updated its guidance on the climate change allowances to be applied within FRAs<sup>9</sup>. Table 1 of the guidance sets out the peak river flow allowances for each river basin district. In the South East, allowances of 35% (central), 45% (higher central) and 105% (upper end) should be considered to understand the potential range of impacts of climate change on peak river flows.

## 4.2 Local Planning Policy

### Arun District Council

- 4.2.1 The planning application for the development proposals will be made to Arun District Council as the Local Planning Authority (LPA). Policy *W DM3* of the Arun District Council, Adopted Local Plan<sup>10</sup> sets out guidance for the implementation of Sustainable Drainage Systems (SuDS) to reduce the flood risk to the surrounding environment and enhance the quality of the habitat for wildlife.
- 4.2.2 Policy *W DM3* states that '*Proposals for both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design. These features include: Green roofs; Permeable driveways and parking; Soakaways Water harvesting; and storage features including water butts*'.

### West Sussex County Council

- 4.2.3 West Sussex County Council undertakes the role as Lead Local Flood Authority (LLFA) for the District and is responsible for managing local flood risk under the Flood Risk Regulations (2009). The LLFA provides guidance on SuDS design and adoption and links to the national standards on their website<sup>11</sup>. Section 2 of the SFRA<sup>3</sup> summarises the Local Planning Policies relevant to the District, including the West Sussex Preliminary Flood Risk Assessment (2011) which reports on significant past and future flooding from all sources, except Main Rivers which are the responsibility of the Environment Agency.
- 4.2.4 The West Sussex Local Flood Risk Management Strategy (2013) is also summarised in Section 2 of the SFRA<sup>3</sup> and sets measures to manage local flood risk from surface water, groundwater and Ordinary Watercourses.

<sup>9</sup> Flood risk assessments: climate change allowances, Environment Agency. *Updated December 2019*. Available at <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>. Accessed: January 2020.

<sup>10</sup> Adoption Arun Local Plan 2011 – 2031, July 2018. Arun District Council. Available at: <https://www.arun.gov.uk/adopted-local-plan/>. Accessed: January 2020.

<sup>11</sup> Sustainable drainage systems. West Sussex County Council. Available at: <https://www.westsussex.gov.uk/fire-emergency-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/sustainable-drainage-systems/>. Accessed: January 2020.

## 5. Flood Risk to the Development

### 5.1 Overview

- 5.1.1 This section of the FRA assesses the flood risk posed to the Site from rivers and the sea; surface water runoff; groundwater; sewers and drainage systems; and from reservoirs, canals and other artificial sources. Following the assessment of each source in turn, it identifies where further mitigation measures are needed.

### 5.2 Tidal flooding

- 5.2.1 Tidal sources of flooding include seas and estuaries. Flooding from these sources can occur through overtopping of defences, breaching of defences and wave action. The Site is located approximately 500m north of the Bognor Regis coast. The coastal defences (Appendix B Figure B12) are predominantly shingle ridges with some sections also having additional protection from wave return walls, wide promenades, and rear splash walls.
- 5.2.2 Product 4 data provided by the Environment Agency in December 2019 presents the modelled flood outlines and flood levels relating to tidal flooding. Two scenarios are presented; the defended scenario with the flood defences in place, and the undefended scenario, assuming flood defences are not in place. A range of events have been modelled: the 0.5% AEP event across three different time horizons (present day, 2070 and 2115) and the 0.1% AEP event.
- 5.2.3 Resulting water levels on the Site have been identified, at the points shown in Figure 5-1.

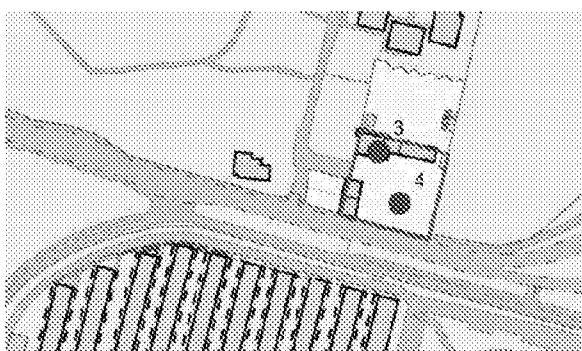


Figure 5-1 Node Reference (Appendix B3)

#### Defended scenario

- 5.2.4 Table 5-1 and Appendix B Figure B7 show that when the defences are in place, the Site is not at risk of tidal flooding. The risk of tidal flooding under normal conditions is therefore **low**.

Table 5-1 Modelled Defended Tidal Water Levels on the Site (Appendix B3 and B4)

Node Ref	Easting	Northing	Flood Levels (mAOD)			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
3	494349	99542	0	0	0	0
4	494358	99522	0	0	0	0

#### Undefended scenario

- 5.2.5 Table 5-2 and Appendix B Figure B8 show that the Site is shown to be at risk of flooding during the undefended scenario. The ground levels across the Site vary between 3.2 – 3.8m AOD, and therefore during the 0.5% AEP event for the year 2115, water depths could be greater than 1m across the Site during this undefended scenario.



Table 5-2 Modelled Undefended Tidal Water Levels on the Site (Appendix B3 and B4)

Node Ref	Easting	Northing	Flood Levels (mAGD)			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
3	494349	99542	3.59	3.94	4.47	3.70
4	494358	99522	3.60	3.98	4.53	3.73

- 5.2.6 The Site is therefore at **residual** risk of tidal flooding, in the unlikely event the coastal defences were not in place. Measures to mitigate the residual risk of flooding are included in Section 7.

### Breach modelling

- 5.2.7 As part of the SFRA<sup>3</sup> for Arun District Council, breach modelling of the coastal defences was undertaken at six strategic locations, as listed in Table 5-3. The East Head to Littlehampton West tidal/coastal flood risk model was used to simulate the breaches for the defended 0.5% AEP scenario.

Breach number	Location	Defence type
1	West bank of the River Arun east of Rope Walk road (1)	Flood wall
2	West bank of the River Arun east of Rope Walk road (2)	Embankment
3	East bank of the River Arun circa 150m downstream of the A258	Flood wall
4	East bank of the River Arun at Pier Road/Clifton Road intersection	Flood wall
5	East of Elmer	Embankment
6	Immediately south of Felpham pumping station	Embankment

Table 5-3 Breach scenario locations extracted from Table 12-3 of the Arun DC SFRA<sup>3</sup>

- 5.2.8 The breach modelling outputs have been provided as part of the Environment Agency Product 8 data request and a hazard map is included in Appendix B Figure B13 for Breach 6, occurring immediately south of Feltham pumping station, where the Aldingbourne Rife discharges into the sea. A flood extent map of the breach modelling at Felpham pumping station can be viewed on page 96 of the SFRA<sup>3</sup>.

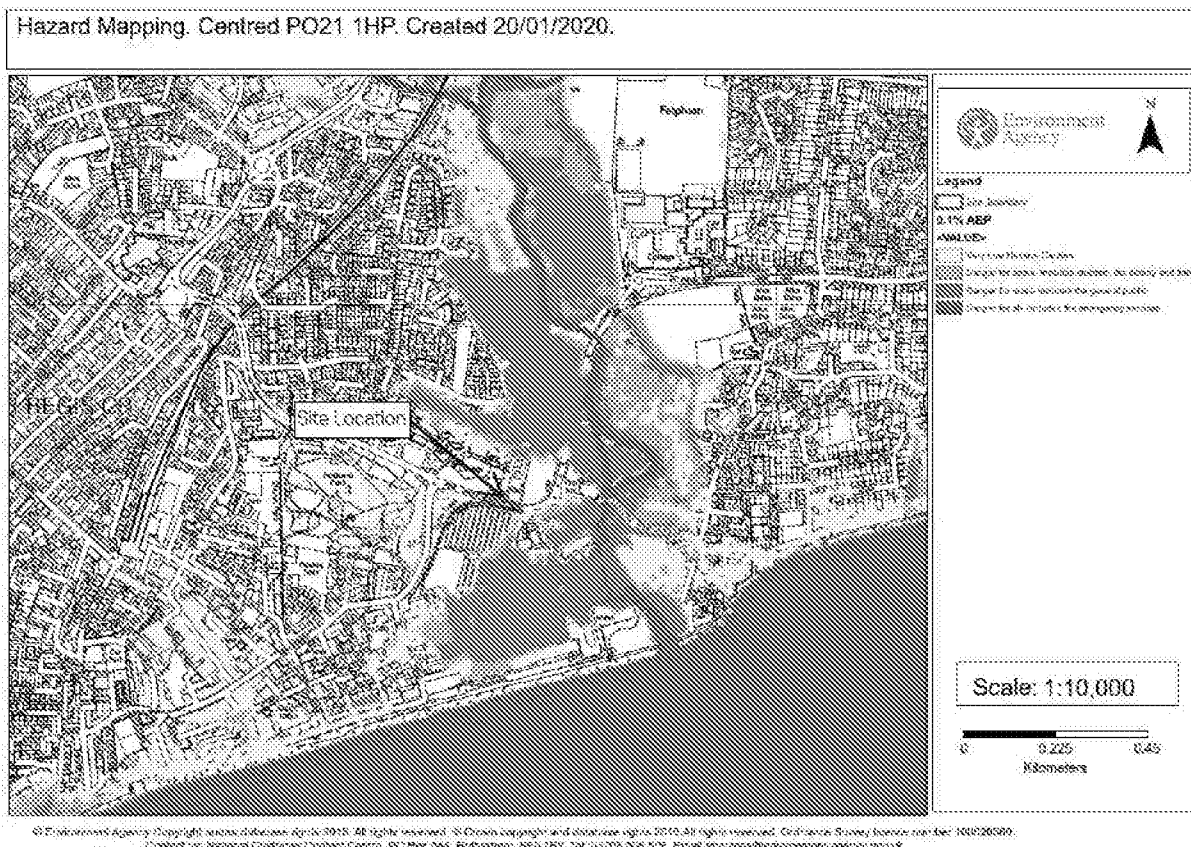


Figure 5-2 Flood Hazard, Breach Location 6 'Immediately South of Felpham Pumping Station'

- 5.2.9 Appendix B Figure B12 is reproduced in Figure 5-2. This mapping indicates that the Site would not be inundated with flood water should a breach or failure of the flood defences occur at the south of the Felpham pumping station. As this is the only modelled breach location in the vicinity of the Site, it is not possible to determine the likelihood of the Site becoming inundated if the defences were to breach in a different location.
- 5.2.10 Measures to mitigate the residual risk of flooding are included in Section 7.

## 5.3 Fluvial flooding

- 5.3.1 Fluvial flooding occurs when water comes out of channel and inundates the surrounding floodplain. This may be complicated by the influence of bridges, embankments and other features that artificially raise water levels. In some cases, fluvial flooding arises from the overtopping or breach of flood defences, the blockages of culverts or flood channels.
- 5.3.2 The Aldingbourne Rife is a Main River that flows south, approximately 180m to the east of the site. An ordinary watercourse flows east approximately 70m to the north. The ordinary watercourse discharges to the Aldingbourne Rife. Under normal conditions flow from the Aldingbourne Rife is conveyed under the sea wall via two gravity outfall structures which have tidal flaps. When tidal conditions and river flows dictate, flow is pumped over the sea wall by Felpham pumping station to discharge into a stilling bay on the upper foreshore.
- 5.3.3 The Product 4 information included in Figure B12, Appendix B, shows the extent and type of flood defences in the area. It identifies high ground along the majority of the Aldingbourne Rife. To the east of the watercourse on the Upper Bognor Road, Figure B12 shows the presence of an embankment.
- 5.3.4 The information in the SFRA supports this. Section 6.3.2 of the SFRA<sup>3</sup> states that no formal defences exists along the Aldingbourne Rife. However, the SFRA indicates the presence of a raised embankment "*adjacent to Upper Bognor Road ... which extends across the Aldingbourne Rife. The maintenance of this embankment is unknown along with the standard of protection and condition grading*".

- 5.3.5 Outputs from the modelling of the Aldingbourne Rife supplied by the Environment Agency are included in Appendix B Figures B5 and B6 for the defended and undefended modelled scenarios respectively. The defended scenario takes into account the presence of the Felpham pumping station. The figures show that the Site is not at risk of fluvial flooding during either defended or undefended scenario, for any of the modelled AEP events (5%, 1%, 0.1% AEP).
- 5.3.6 The Site is therefore considered to be at **low risk** of fluvial flooding.

## 5.4 Surface water flooding

- 5.4.1 Surface water flooding results from rainfall that fails to infiltrate the surface and travels over the ground surface. This is exacerbated by low permeability urban development or low permeability soils and geology (such as clayey soils). Developments located on or adjacent to sites with steep slopes are often at greater risk.
- 5.4.2 The Risk of Flooding from Surface Water (RoFSW) mapping (Figure B11, Appendix B) indicates the Site to be at very low risk of surface water flooding. This indicates for any given year there is predicted to be between a less than 0.1% AEP chance of flooding from surface water at the Site.
- 5.4.3 The Site is therefore considered to have a **very low risk** of flooding from surface water.

## 5.5 Groundwater flooding

- 5.5.1 Groundwater flooding usually occurs in low lying areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Low lying areas may be more susceptible to groundwater flooding because the water table is usually at a much shallower depth and groundwater paths tend to travel from high to low ground.
- 5.5.2 Figure 5-3 of the Level 1 SFRA<sup>3</sup> identifies the bedrock of Bognor Regis to be a Principal Aquifer. This figure is replicated in Figure 5-3 of this report. A Principal Aquifer is defined as layers of rock associated with high permeability bedrock and has the potential to retain high level of water storage. The presence of high groundwater levels could result in the emergence of groundwater flooding after prolonged periods of rainfall as the aquifer recharges or stores water. A BGS borehole record<sup>5</sup> from 1969 indicates that ground water was identified at approximately 3.0m below ground level.

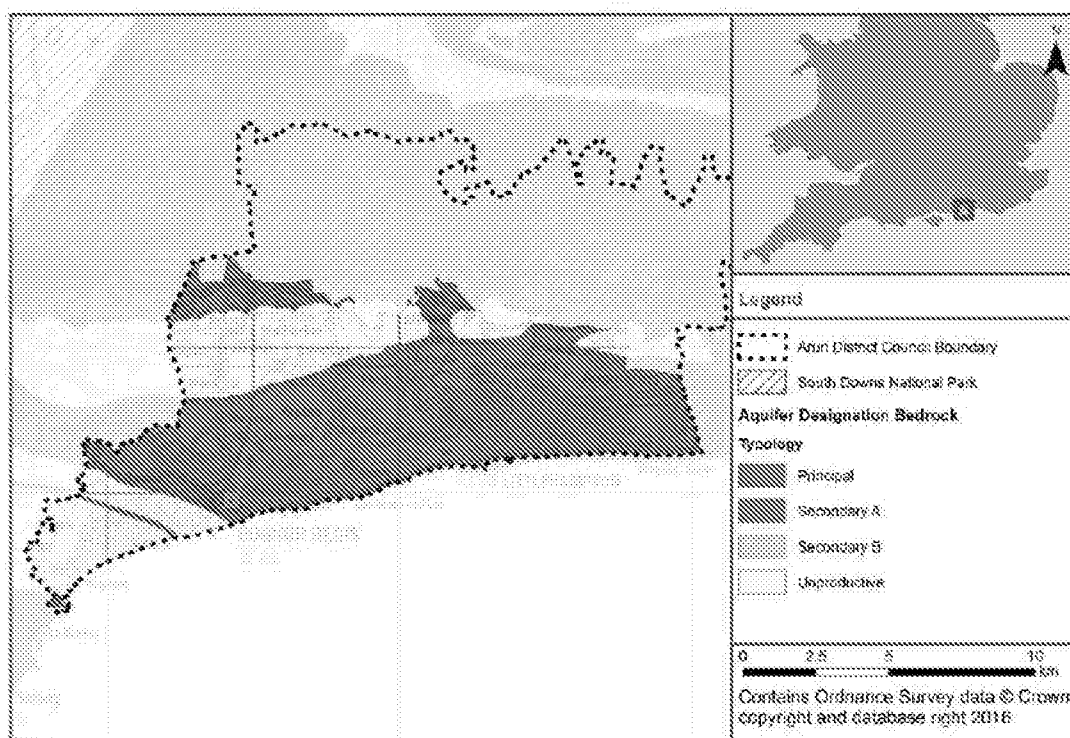


Figure 5-3: Aquifer designation bedrock in the Arun District, extracted from the Level 1 SFRA<sup>3</sup>

- 5.5.3 Figure 5-3 illustrates that the majority of the district is located on a Principal Aquifer.
- 5.5.4 As identified in Section 2.3 of this report, the Site is situated on a combination of superficial deposits including Raised Marine Deposits consisting of clay, silt, sand and gravel; and River Terrace Deposits also consisting of clay, silt, sand and gravel. The permeability of these deposits will determine the risk of groundwater rising to the surface from the Principal Aquifer.
- 5.5.5 The Areas Susceptible to Groundwater Flooding (AS<sub>t</sub>GW<sub>F</sub>) mapping in the SFRA<sup>3</sup>, (Appendix F Sheet 6 of 46) shows that the site is located within a 1 km square of which 50%-75% is susceptible to groundwater emergence.
- 5.5.6 The local area is therefore considered to have a **medium risk** of flooding from groundwater prior to further investigation. The presence of groundwater and the resulting risk of groundwater flooding to the Site should be monitored during construction of the proposed development.

## 5.6 Sewer flooding

- 5.6.1 Sewer flooding occurs when the sewer capacity becomes exceeded or where a blockage occurs causing the sewer to surcharge and flood. The SFRA<sup>3</sup> contains an extract of Southern Water DG5 Flood Register for Arun District. The DG5 Flood Register contains records of historical sewer flooding for 5-digit postcode areas. The Site is located in the PO22 8 postcode region. Table 5-2 in the SFRA<sup>3</sup> indicates 12 incidents of sewer flooding were recorded in the PO22 8 area up to 25<sup>th</sup> February 2016 (i.e. the date the DG5 was issued).
- 5.6.2 The DG5 Flood Register does not detail if the sewer flooding records covers the public foul sewer, the combined sewer, the surface water sewer or all of the aforementioned. Southern Water asset information in Appendix D indicates foul sewers, combined sewers and surface water sewers exist within the PO22 8 postcode.
- 5.6.3 A review of the local sewer asset information identifies that foul manhole local to the site are at a lower level than the proposed development and therefore if the foul network was to surcharge, effluent will not flow towards the site.

- 5.6.4 The absence of sewer flooding records for the Site suggests that this type of flooding is not a significant risk in this area. Flood risk to the proposed development from sewer flooding is therefore considered to be **low**.

## 5.7 Artificial Sources

- 5.7.1 Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs. The Environment Agency Long Term Flood Risk Information map<sup>12</sup> indicates the area is not at risk of flooding from Artificial sources.
- 5.7.2 The Site is therefore considered to have a **low risk** of flooding from artificial sources.

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<sup>12</sup> Environment Agency's Long Term Flood Risk Information map. Available at: <https://flood-warnings-information.service.gov.uk/long-term-flood-risk/map>. Accessed January 2020.

## 5.8 Summary of Flood Risk to the Development

- 5.8.1 This section of the FRA assesses the flood risk to the Site in accordance with the requirements of the NPPF<sup>1</sup>. Table 5-4 summarises flood risk to the development and where further mitigation is recommended.

Table 5-4 Summary of Flood Risk to the Development

Flood Mechanism	Source	Flood risk to the Site	Mitigation Required?
Tidal	Sea	Low (residual risk)	Yes. Refer to Section 7.
Fluvial	The Aldingbourne Rife / Ordinary Watercourse	Low	No
Surface water	Rainwater and runoff from the surrounding hardstanding areas	Very Low	No
Groundwater	Rising groundwater in the underlying Principal Aquifer	Medium risk to local area. Further investigation required during construction on Site.	Yes. Refer to Section 7.
Sewer	Surround public / private sewer systems	Low	No
Artificial Sources	None	Low	No

## 6. Flood Risk from the Development

### 6.1 Overview

- 6.1.1 This section of the FRA summarises the risk of flooding as a result of the Proposed Development to the surrounding area in accordance with the requirements of the NPPF<sup>1</sup>. This section identifies where further mitigation is required.

### 6.2 Tidal flooding

- 6.2.1 A new development may increase tidal flooding to surrounding areas by reducing the volume of storage within the floodplain and / or altering flood flow routes. Breach modelling undertaken at a strategic location close to the Site does not show the site to become inundated. However, should the Site become inundated with tidal flood waters due to a breach at a different location, the development may cause temporary displacement of flood waters elsewhere while waters fill the ground floor of the building (which has been designed as a workshop suitable for flooding). These effects are likely to be highly localised and temporary in nature and not likely to increase flood risk elsewhere.
- 6.2.2 The risk of the proposed development causing increased tidal flooding to the surrounding area is therefore considered to be **very low**.

### 6.3 Fluvial flooding

- 6.3.1 New development within the floodplain has the potential to result in loss of floodplain storage or an obstruction to a fluvial flood flow pathway which can lead to an increase in flood risk both onsite and elsewhere.
- 6.3.2 The Site is not at risk of fluvial flooding and therefore will not cause a displacement of fluvial flood water or cause an increase in flood risk elsewhere. The risk from the development on fluvial flood risk is **negligible**.

### 6.4 Surface water flooding

- 6.4.1 The risk of surface water flooding can be altered by new development disrupting existing flow paths and increasing impermeable areas. Where increased runoff due to new development is not mitigated, the volume and rate of surface water running off a site to the surrounding areas and drainage systems can be increased, potentially causing an increasing flood risk to surrounding areas.
- 6.4.2 The proposals for the Site will alter the areas of permeable and impermeable surfacing. For example, new buildings are being proposed on existing greenfield land, thereby potentially increasing the generation of surface water runoff; and areas of existing hard standing once occupied by the outbuildings to 71 Upper Bognor Road would be removed and replaced with areas of soft landscaping, thereby reducing the volume and rates of surface water runoff. Appendix A Figure A1 shows the proposals with the Site to use permeable surfaces for car parking areas.
- 6.4.3 Appropriate surface water drainage is required for the Site to ensure that surface water runoff to surrounding areas is not increased. The drainage arrangements will comply with the drainage hierarchy guidance provided in the NPPF<sup>1</sup>, and local legislative policies.
- 6.4.4 The Design and Access Statement<sup>8</sup> for the Site states that:
- “Ground investigations would be required to determine a suitable SUDS scheme to deal with the surface water drainage associated with the new building and the areas of hard landscaping. The latter have been kept to an absolute minimum to provide access.*
- It is suggested that any ground investigations should be the responsibility of the developer and so should the Council be minded to approve this application the details of the drainage design could be a condition to development”.*
- 6.4.5 The risk of the proposed development causing increased surface water flooding to the surrounding area is considered Low, given the scale of development and the local topography. The risk of the

proposed development leading to increased surface water flooding to the Site itself, prior to mitigation (through the implementation of an appropriate Drainage Strategy), is considered **medium**.

## 6.5 Groundwater Flooding

- 6.5.1 New developments that penetrate the groundwater table have the potential to displace groundwater and increase groundwater flood risk to the surrounding areas
- 6.5.2 There are no significant underground structures being proposed as part of the development and therefore the risk of the proposed development causing increased groundwater flooding to the surrounding area is considered to be **low**.

## 6.6 Sewer Flooding

- 6.6.1 Without appropriate mitigation measures, new development can cause an increased risk of sewer flooding elsewhere
- 6.6.2 The proposed changes to the listed buildings have been designed to work with the existing foul drainage. There are no changes to the listed buildings that will affect the surface water drainage.
- 6.6.3 The new building would need to be connected into the existing foul drainage network on the site which would need extending locally.
- 6.6.4 At the time of writing, a Drainage Strategy for the proposed development is not available. The risk from the development is therefore **unknown**.

## 6.7 Artificial Sources

- 6.7.1 There are no artificial sources located near to the Site. Therefore, the risk of the proposed development causing an increased risk of flooding due to artificial sources elsewhere is **negligible**.

## 6.8 Summary of Flood Risk from the Development

- 6.8.1 This section of the FRA assesses the flood risk from the Development in accordance with the requirements of the NPPF<sup>1</sup>. Table 6-1 summarises flood risk from the Project and where further mitigation is recommended.

Table 6-1 Summary of Flood Risk from the Development

Flood Mechanism	Source	Flood risk as a result of the proposed development	Mitigation Required?
Tidal	The sea	Very low	No
Fluvial	The Aldingbourne Rife / Ordinary Watercourse	Negligible	No
Surface water	Rainwater and runoff from the surrounding hardstanding areas	To surrounding area – Low. To site itself – Medium.	Yes. Refer to Section 7.
Groundwater	Rising groundwater in the underlying Principal Aquifer	Low	No
Sewer	Surround public / private sewer systems	Unknown	Yes. Refer to Section 7.
Artificial	None	Negligible	No



## 7. Mitigation Measures

### 7.1 Overview

- 7.1.1 This FRA has identified that there is a risk of flooding to and/or from the Site from tidal flooding, surface water and groundwater, and further mitigation measures are recommended.

### 7.2 Residual tidal flood risk

- 7.2.1 There is a residual tidal flood risk to the Site. Should the existing flood defences along the coast fail or be breached during extreme tidal conditions, the Site could become inundated with flood water. The following mitigation measures are recommended.

#### **Flood Resilient Design**

- 7.2.2 The two new proposed properties have been designed to be 'flood resilient' and comprise workshops on the ground floor.
- 7.2.3 The conversion of the existing properties (71 and 71A Upper Bognor Road) from commercial to residential should also consider adopting a 'flood resilient' approach, for example raising electrical sockets.

#### **Access / Egress Route**

- 7.2.4 The Site is on the edge of the maximum flood extent, and an appropriate egress route away from the Site is west along the Upper Bognor Road.

#### **Place of Safe Refuge**

- 7.2.5 Each building included in the proposed development should include a designated place of 'safe refuge' above the modelled tidal flood level. This will enable occupants of the developments to remain safe in the event that they aren't able to evacuate the building prior to floodwater reaching the Site. The place of safe refuge should be an appropriate place for occupants to remain for the duration of the flood event.
- 7.2.6 A review of the flood levels in Table 5-2 shows that the maximum flood level for the Site is the 0.5% AEP flood level for the year 2115 during the tidal undefended model scenario, which is 4.53m AOD.
- 7.2.7 It is recommended that a place of safe refuge is provided 300mm above this level. Based on a review of ground levels, the first-floor flats above the workshops are a suitable place of safe refuge.

#### **Flood Warning**

- 7.2.8 Residents of the proposed development should sign up to the Environment Agency Flood Warning Service to receive alerts.

#### **Flood Emergency Plan**

- 7.2.9 A Flood Emergency Plan should be prepared by the developer (and will be required under the forthcoming Chichester Local Plan Policy 42) that achieves the following objectives:
- Identification of extent of flooding in a 0.5% annual probability including the effects of climate change event (Appendix B Figure B8);
  - Anticipated/possible number, and vulnerability classification of residents/users (e.g. children, disabled, aged, etc.);
  - Plan of dry access routes, if they exist, or safest routes if dry routes don't exist;
  - Details of areas of safe refuge;
  - Details of Environment Agency Flood Warning Area and/or proposed Warning Evacuation Procedure before the flood; and,

- Safe Haven Procedure for full duration of flood, plus Emergency Evacuation Procedure in case of sudden illness or exceedance flood.

## 7.3 Surface water

7.3.1 In order to adequately manage the surface water on the Site an outline Drainage Strategy complying with the guidance provided in the NPPF<sup>1</sup> and local legislative policies is required.

7.3.2 It is noted within Design and Access Statement<sup>8</sup> for the Site that:

*“Ground investigations would be required to determine a suitable SUDS scheme to deal with the surface water drainage associated with the new building and the areas of hard landscaping. The latter have been kept to an absolute minimum to provide access. It should also be noted that areas of existing hard standing once occupied by outbuildings to 71 Upper Bognor Road would be removed in these proposals and replaced with areas of soft landscaping so mitigating the impact of the redevelopment on the surface water drainage system.*

*It is suggested that any ground investigations should be the responsibility of the developer and so should the Council be minded to approve this application the details of the drainage design could be a condition to development”.*

## 7.4 Sewer

7.4.1 To further mitigate the risk of sewer flooding from the Site, the following is recommended:

- **Maintenance Plan** – frequent maintenance of the existing private drainage network for the Site should be undertaken to reduce the flood risk from the drainage assets.
- If the existing private drainage arrangement for the buildings at 71 and 71A is to be retained, a maintenance plan with details of the maintenance regime should be undertaken indicating how the flood risk to and from the Site will be reduced.
- For all new private drainage arrangements and changes to existing private drainage, a maintenance plan is required to demonstrate how the flood risk to and from the Site will be kept to minimum.

## 7.5 Groundwater

7.5.1 To assess the risk of groundwater flooding to and from the proposed development it is recommended that investigations are undertaken to determine ground conditions and the level of groundwater below the ground surface. It is recommended that investigations are undertaken during winter when groundwater levels are at their highest.

## 8. Summary and Conclusions

- 8.1.1 The aim of this FRA is to assess the flood risk to and from the Site in accordance with the requirements of the NPPF<sup>1</sup> and suggest measures to avoid and/ or reduce the risk of flooding. A summary of the main outcomes of the FRA are outlined below.

### 8.2 Planning Policy

- 8.2.1 The Site is currently both brownfield and greenfield land. The proposed development includes the construction of two 'live/work' properties comprised of ground floor workshops and first floor residential accommodation. Existing buildings on the Site are also to be converted from commercial use to residential use. Hence, the proposed development is considered to be "More Vulnerable".
- 8.2.2 A Sequential Test and an Exception Test have been undertaken for the construction of the two new properties. The full assessments can be viewed in Appendix C.
- 8.2.3 The Sequential Test concluded that of the eight sites assessed, the Site is most suitable for the proposed development as it has less risk of flooding than two of the compared sites, and a similar risk of flooding to the other sites. The proposed development has been designed to be flood resilient and all residential accommodation is located on the first floor.
- 8.2.4 The Exception Test concluded that that Site will provide wider sustainability benefits to the area, through a sensitive and in-keeping design of the proposed development in addition to the regeneration of a brownfield site.

### 8.3 Flood Risk to the Site

- 8.3.1 The FRA has assessed that:
- The Site is at **low** risk of flooding from fluvial, surface water, sewer and artificial sources;
  - The Site benefits from tidal flood defences, however is considered to be at **residual** risk, should these defences breach or overtop, with flood depths >1m on the Site during the 0.5% AEP event for the year 2115.
  - The risk of groundwater flood to the local area is considered to be **medium** due the nature of underlying geology; ground investigations will be required during construction to determine the risk to the Site.

### 8.4 Flood Risk from the Site

- 8.4.1 The FRA has assessed that:
- The proposed development will not increase the risk of tidal, fluvial or groundwater flooding.
  - The risk of the proposed development causing increased surface water flooding to the surrounding area is considered Low, given the scale of development and the local topography. The risk of the proposed development leading to increased surface water flooding to the Site itself, prior to mitigation (through the implementation of an appropriate Drainage Strategy), is considered **medium**.

### 8.5 Mitigation Measures

- 8.5.1 The following mitigation measures have been incorporated into the development design or are recommended as part of this FRA in order for the proposed development to be safe, and not increase flood risk elsewhere:
- Flood resilient design for the new units; residential development is located at first floor level, with lower vulnerability workshop at ground level;
  - Identification of access /egress route along Upper Bognor Road;
  - Provision of place of safe refuge above the 0.5% AEP flood level for 2115 (4.53m AOD);

- Users of the Site should sign up to the Environment Agency Flood Warning Service and prepare Emergency Flood Plans;
- Development of a suitable Drainage Strategy describing how foul and surface water runoff from the Site will be managed. *(It is suggested within the Design and Access Statement<sup>8</sup> for the Site that any ground investigations should be the responsibility of the developer and so should the Council be minded to approve this application the details of the drainage design could be a condition to development).*

# Appendix A Development Proposals

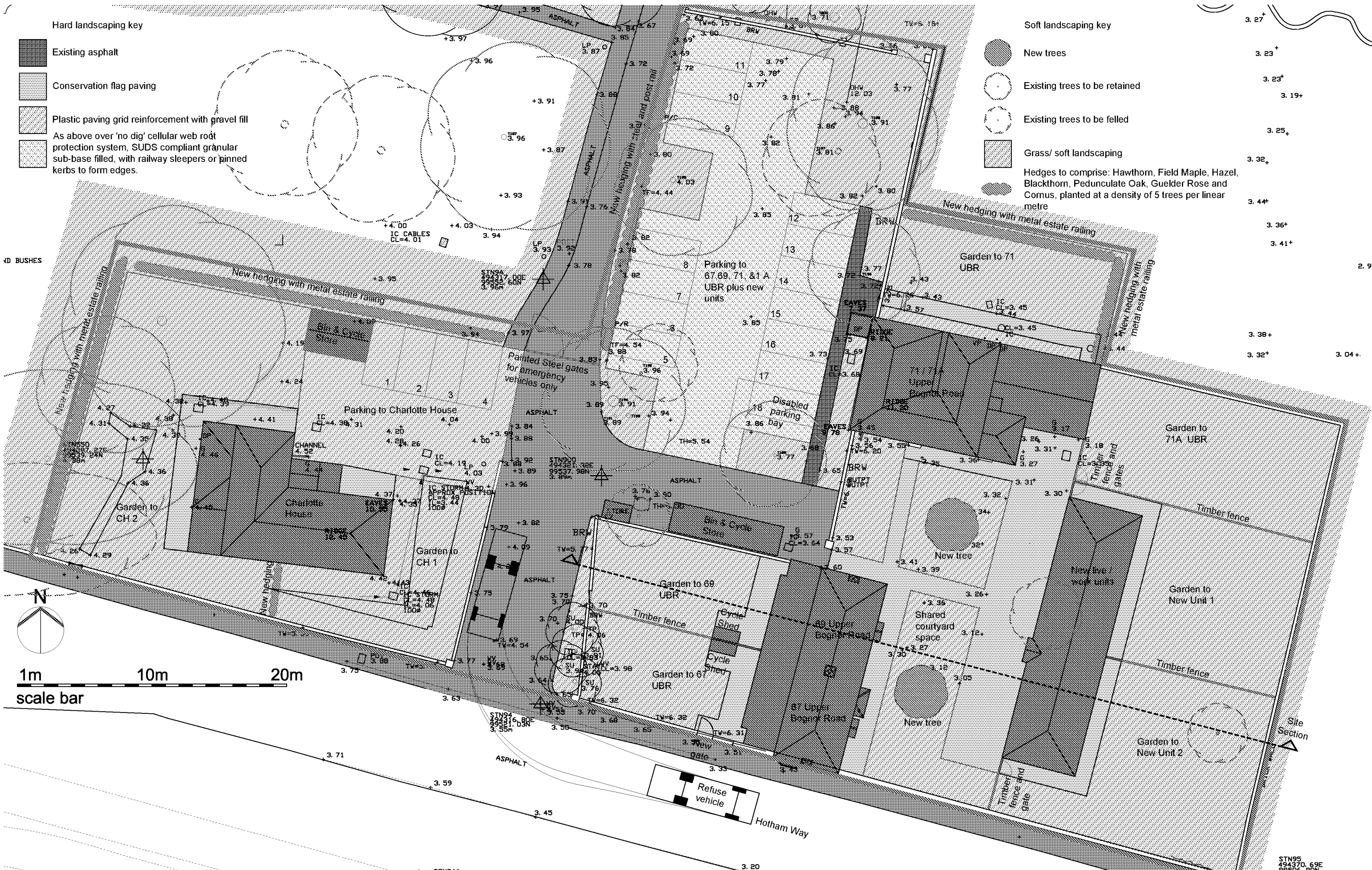
# Hard landscaping key

- Existing asphalt
- Conservation flag paving
- Plastic paving grid reinforcement with gravel fill
- As above over 'no dig' cellular web root protection system, SUDS compliant granular sub-base filled, with railway sleepers or pinned kerbs to form edges.

# Soft landscaping key

- New trees
- Existing trees to be retained
- Existing trees to be felled
- Grass/ soft landscaping
- Hedges to comprise: Hawthorn, Field Maple, Hazel, Blackthorn, Pedunculate Oak, Guelder Rose and Cornus, planted at a density of 5 trees per linear metre

10 BUSHES



D2	06-12-19	PEM PSM	Planning Issue
Rev	Date	Dr'n / Ch'd	Amendments
D=Design	T=Tender	C=Construction	SS=Superseded W=Withdrawn

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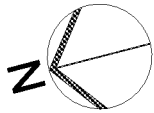
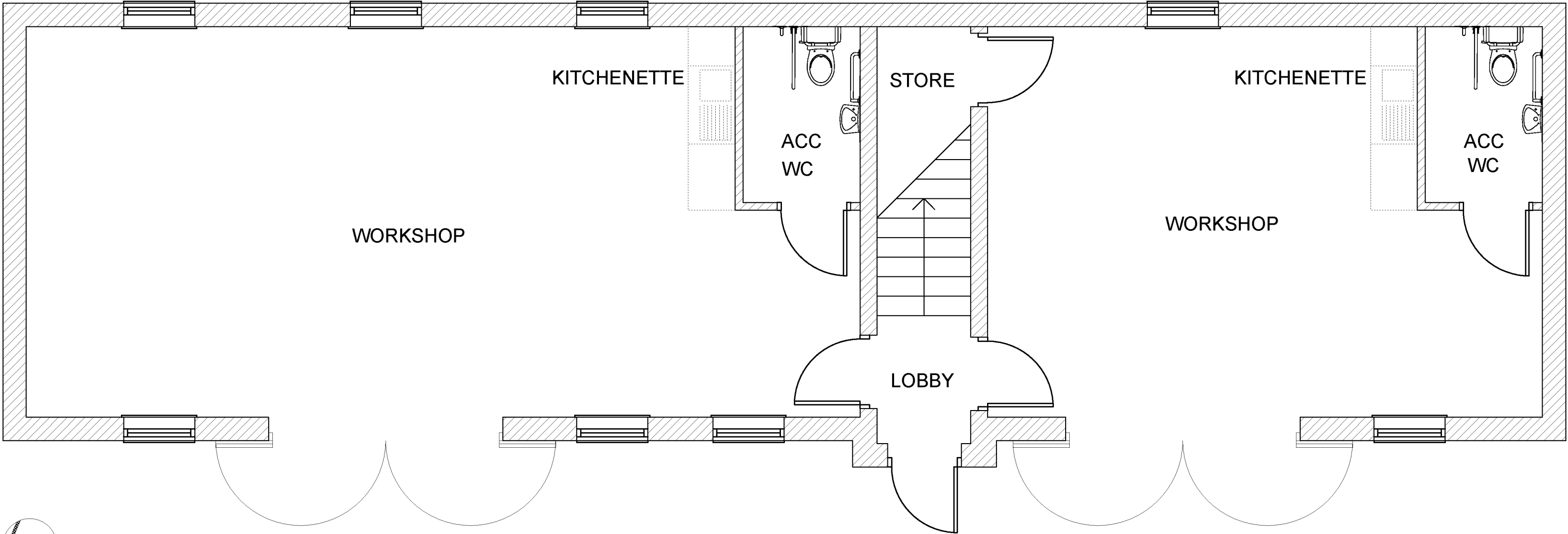
Wade Park Salisbury Road Ower Southampton SO51 6AG  
Telephone: 023 8081 1981 Facsimile: 023 8081 1959  
mail@saunders-architects.co.uk www.saunders-architects.co.uk

University of Chichester  
Upper Bognor Road Residential Redevelopment

Drawing  
Site Plan Proposed

Scale @ A3  
1:250

Drawing no.  
**5542-100-D1**



D2	05.12.19	PEM PSM	Walls hatched. North point and scale bar added.
Rev	Date	Dr'n / Ch'd	Amendments
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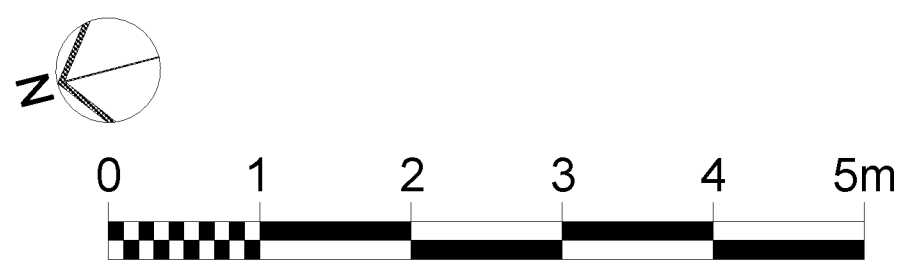
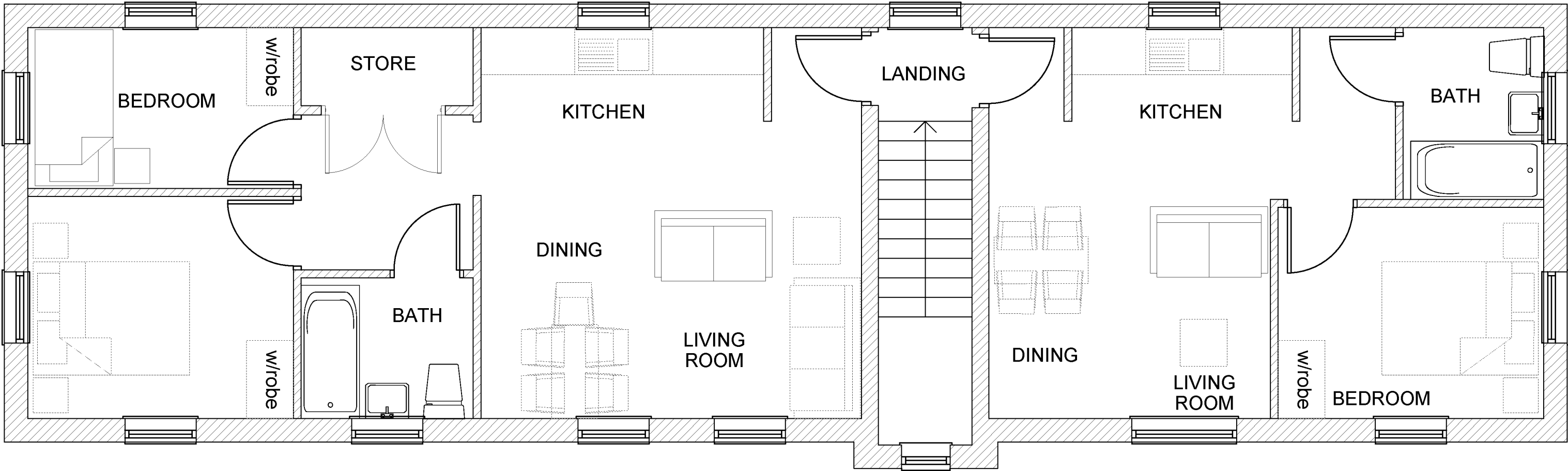
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University of Chichester  
Upper Bognor Road Residential Redevelopment

Drawing  
New Live Work Units  
Ground Floor Plan Proposed

Scale @ A3  
1:50

Drawing no.  
**5542-110-D2**



D2	05.12.19	PEM PSM	Walls hatched. North point and scale bar added.
Rev	Date	Dr'n / Ch'd	Amendments
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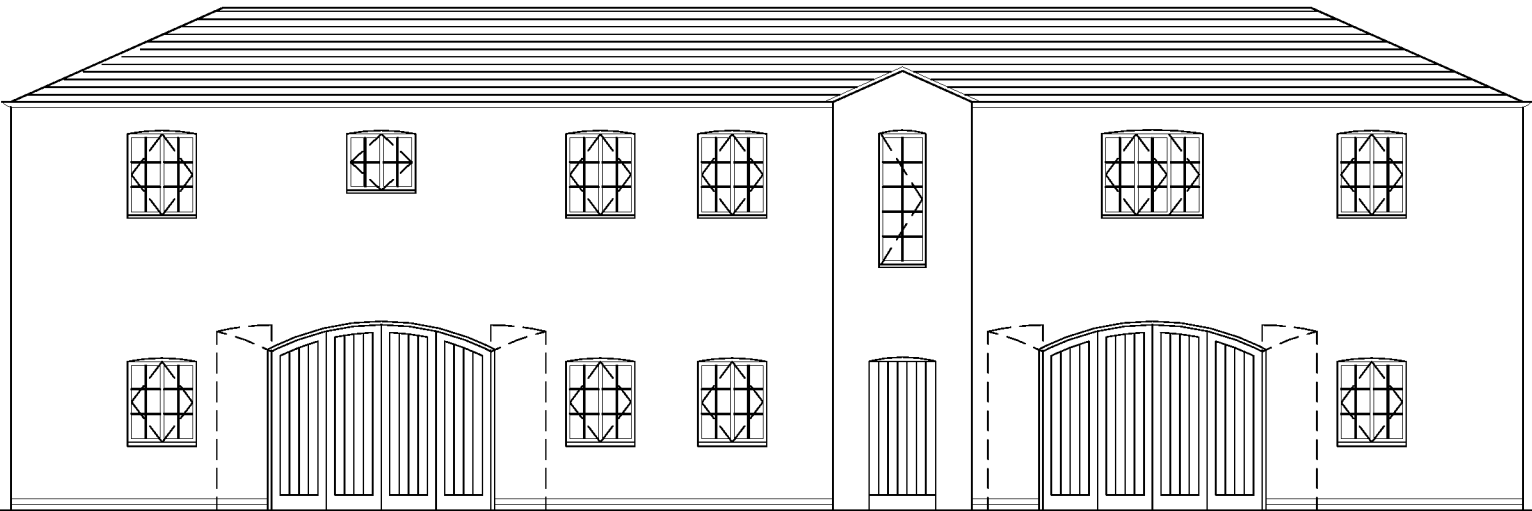
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Telephone: 023 8081 1981 Facsimile: 023 8081 1995  
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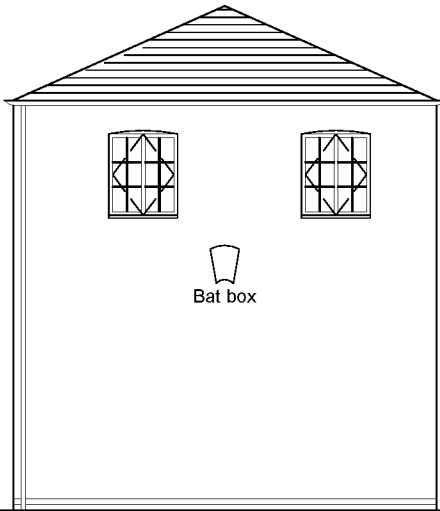
University of Chichester Upper Bognor Road Residential Redevelopment	
Drawing New Live Work Units First Floor Plan Proposed	
Scale @ A3 1:50	Drawing no. <b>5542-111-D2</b>



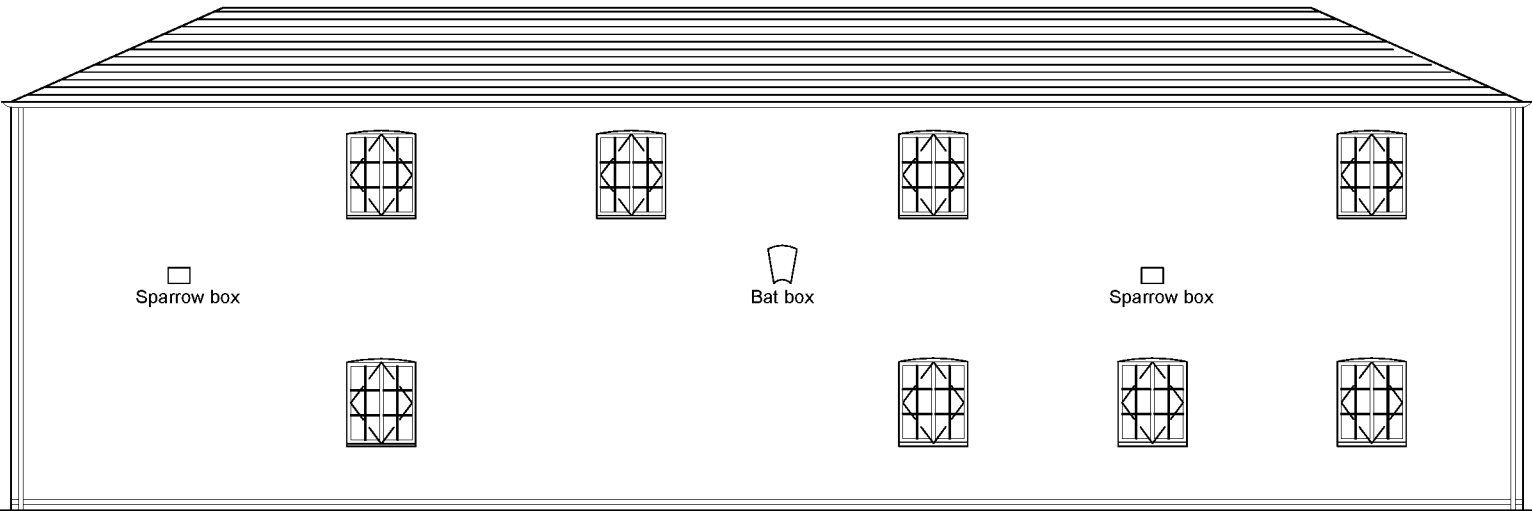
Exterior finishes:  
Painted cream stucco walls with red brick plinths.  
Timber side hung casement windows, painted white, to match style of 67 & 69 Upper Bognor Road.  
Timber doors, painted white.  
Natural slate roof.  
Black cast iron gutters and downpipes.



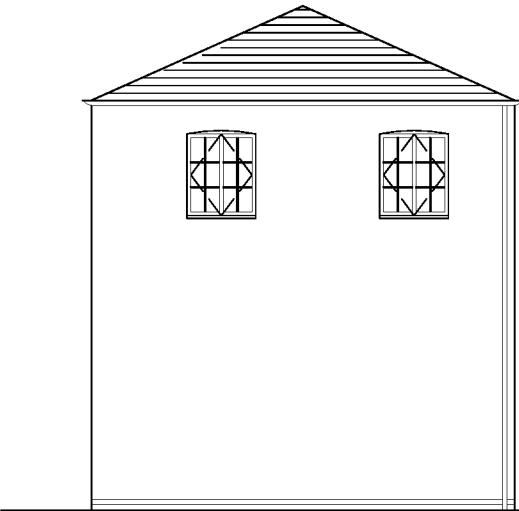
West Elevation



South Elevation



East Elevation



North Elevation

D2	06-12-19	PEM PSM	Brick plinth and rainwater pipes Sparrow and bat boxes. Materials noted. Scale bar added.
Rev	Date	Dr'n / Ch'd	Amendments
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University of Chichester  
Upper Bognor Road Residential Redevelopment

Drawing  
New Live Work Units  
ElevationsProposed

Scale @ A3  
1:100

Drawing no.  
**5542-112-D2**

## Appendix B Environment Agency Data

Martha Newman  
AECOM  
Midpoint  
Alençon Link  
Basingstoke  
Hampshire  
RG21 7PP

**Our ref:** SSD153719  
**Date:** 11/12/2019

Dear Martha Newman,

**Enquiry Regarding Product 4 for Flood Risk Assessment for University Of Chichester, Bognor Regis Campus, Upper Bognor Road, Bognor Regis, West Sussex, PO21 1HP.**

Thank you for your enquiry which was received on 03 December 2019.

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 3 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 Defences**

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

Under normal conditions flow from the Aldingbourne Rife is conveyed under the sea wall via two gravity outfall structures which have tidal flaps. When tidal conditions and river flows dictate, flow is pumped over the sea wall by Felpham pumping station to discharge into a stilling bay on the upper foreshore. The defended scenario takes into account the presence of the pumping station.

The coastal defences are predominantly shingle ridges with some sections also having additional protection from wave return walls, wide promenades, and rear splash walls.

Arun District Council are responsible for maintenance of some of the sea defences in Bognor Regis. Therefore we advise to contact them as well.

## Model Information

The models used were the Ems to Littlehampton Modelling (Arun to East Head Model) which was completed by JBA Consulting in 2016 and the Aldingbourne Flood Risk Mapping Study completed by JBA Consulting in 2015, with updated climate change mapping (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, **Arun District Council** for a more comprehensive flood history check.

### FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for <b>University Of Chichester, Bognor Regis Campus, Upper Bognor Road, Bognor Regis, West Sussex, PO21 1HP.</b>
Licence	<u>Open Government Licence</u>
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2018 Ordnance Survey 100024198.

## 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.

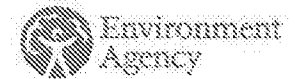
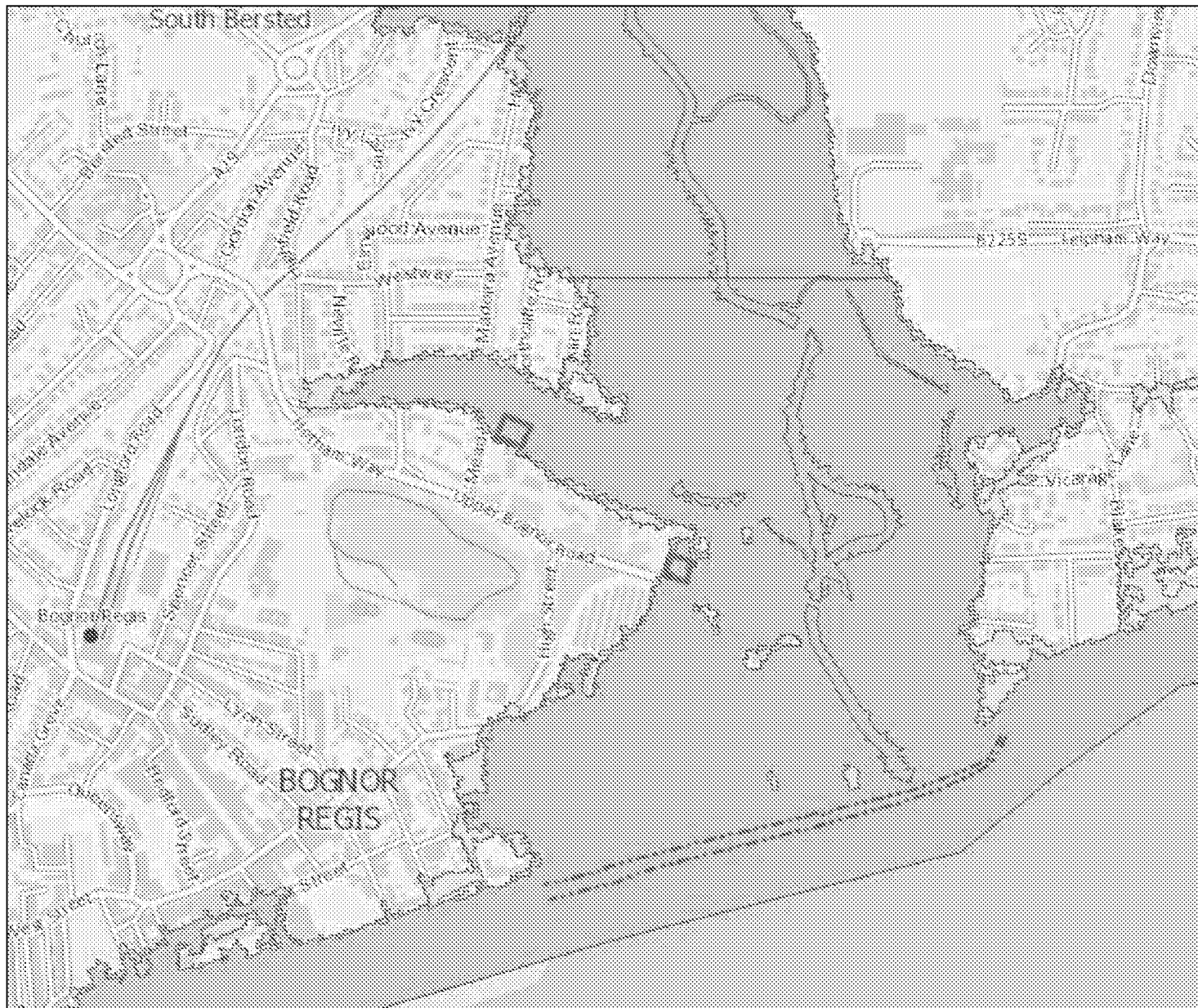
Yours sincerely,

**Tom Lamboo**

**FCRM Officer, PSO West Sussex | Solent and South Downs**

**Environment Agency | Guildbourne House, Chatsworth Road, Worthing, West  
Sussex, BN11 1LD**

# Flood Map for Planning (Rivers and Sea). Centred PO21 1HP. Created 11/12/2019.



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

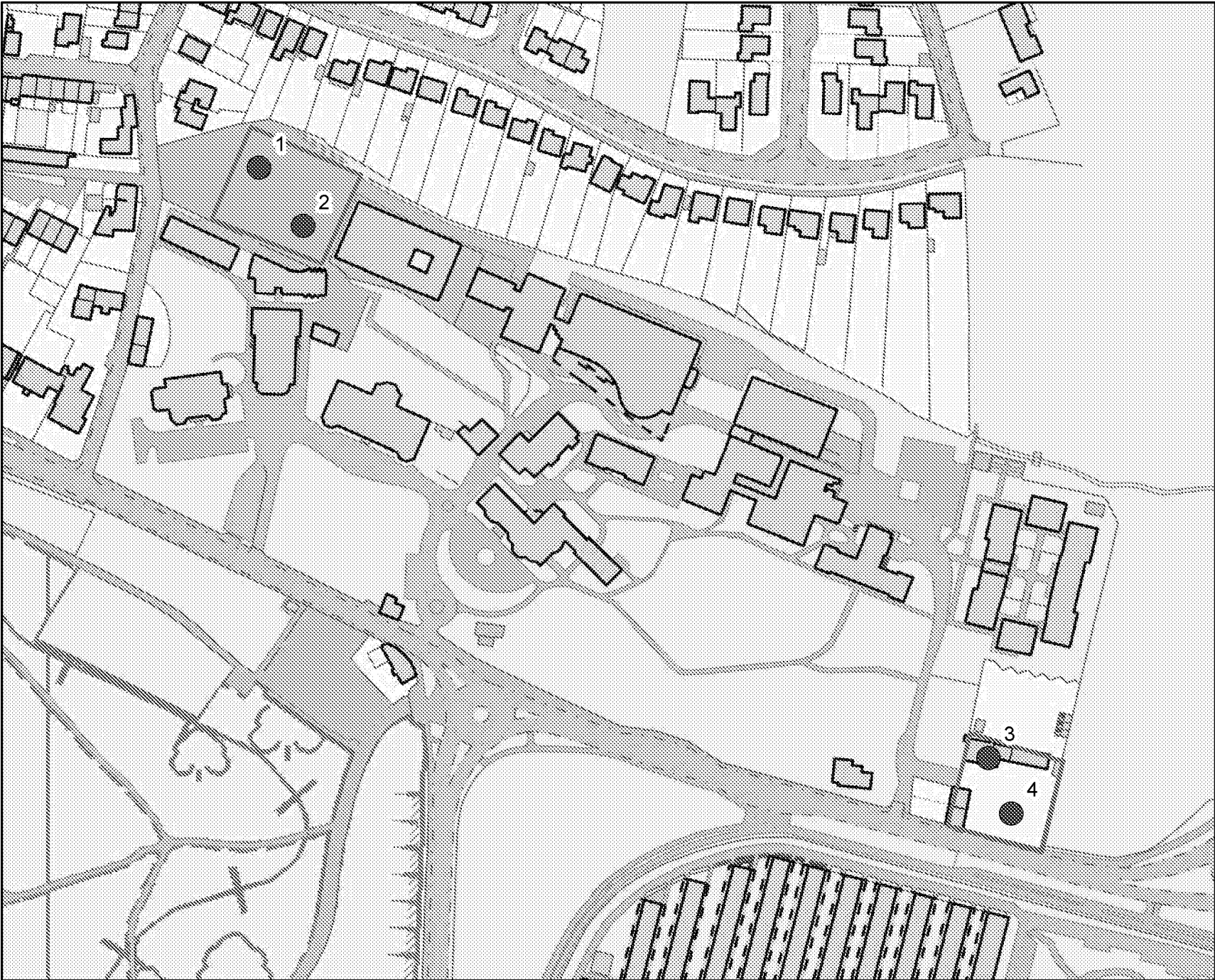
### Flood Map Areas (assuming no defences)

**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.

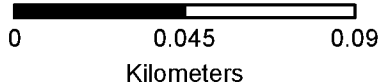
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Legend

- Site\_Nodes
- Site\_Boundary

Scale: 1:2,000



**Product 4 Flood Risk Data Requested by: AECOM**

**Site:** University Of Chichester, Bognor Regis Campus, Upper Bognor Road, Bognor Regis, West Sussex, PO21 1HP

**Table 1: Water Levels: Fluvial Undefended**

Node Ref	NGR		Modelled Flood Levels in Metres AOD					
	Eastings	Northings	Undefended Annual Exceedance Probability					
			5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494078	99762	-	-	-	-	-	-
2	494094	99740	-	-	-	-	-	-
3	494349	99542	-	-	-	-	-	-
4	494358	99522	-	-	-	-	-	-

**Table 2: Water Levels: Fluvial Defended**

Node Ref	NGR		Modelled Flood Levels in Metres AOD					
	Eastings	Northings	Defended Annual Exceedance Probability					
			5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494078	99762	-	-	-	-	-	-
2	494094	99740	-	-	-	-	-	-
3	494349	99542	-	-	-	-	-	-
4	494358	99522	-	-	-	-	-	-

**Table 3: Water Levels: Tidal Undefended**

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
	Eastings	Northings	Undefended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494078	99762	3.03	3.64	4.27	3.30
2	494094	99740	3.03	3.64	4.27	3.30
3	494349	99542	3.59	3.94	4.47	3.70
4	494358	99522	3.60	3.98	4.53	3.73



**Table 4:** 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	494078	99762	-	-	-	-
2	494094	99740	-	-	-	-
3	494349	99542	-	-	-	-
4	494358	99522	-	-	-	-

**Table 5:** Water Depths: Fluvial Undefended

Node Ref	NGR		Modelled Flood Depths in Metres					
			Undefended Annual Exceedance Probability					
	Eastings	Northings	5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494078	99762	-	-	-	-	-	-
2	494094	99740	-	-	-	-	-	-
3	494349	99542	-	-	-	-	-	-
4	494358	99522	-	-	-	-	-	-

**Table 6:** Water Depths: Fluvial Defended

Node Ref	NGR		Modelled Flood Depths in Metres					
			Defended Annual Exceedance Probability					
	Eastings	Northings	5%	1%	1% +CC (35%)	1% +CC (45%)	1% +CC (105%)	0.1%
1	494078	99762	-	-	-	-	-	-
2	494094	99740	-	-	-	-	-	-
3	494349	99542	-	-	-	-	-	-
4	494358	99522	-	-	-	-	-	-

**Table 7:** 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	494078	99762	0.62	1.22	1.85	0.88
2	494094	99740	0.41	1.01	1.64	0.67
3	494349	99542	0.26	0.62	1.15	0.38
4	494358	99522	0.31	0.69	1.24	0.44

**Table 8: Water Depths: Tidal Defended**

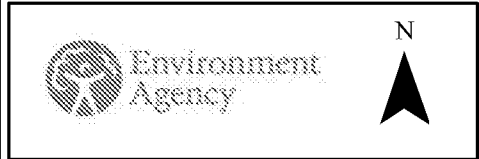
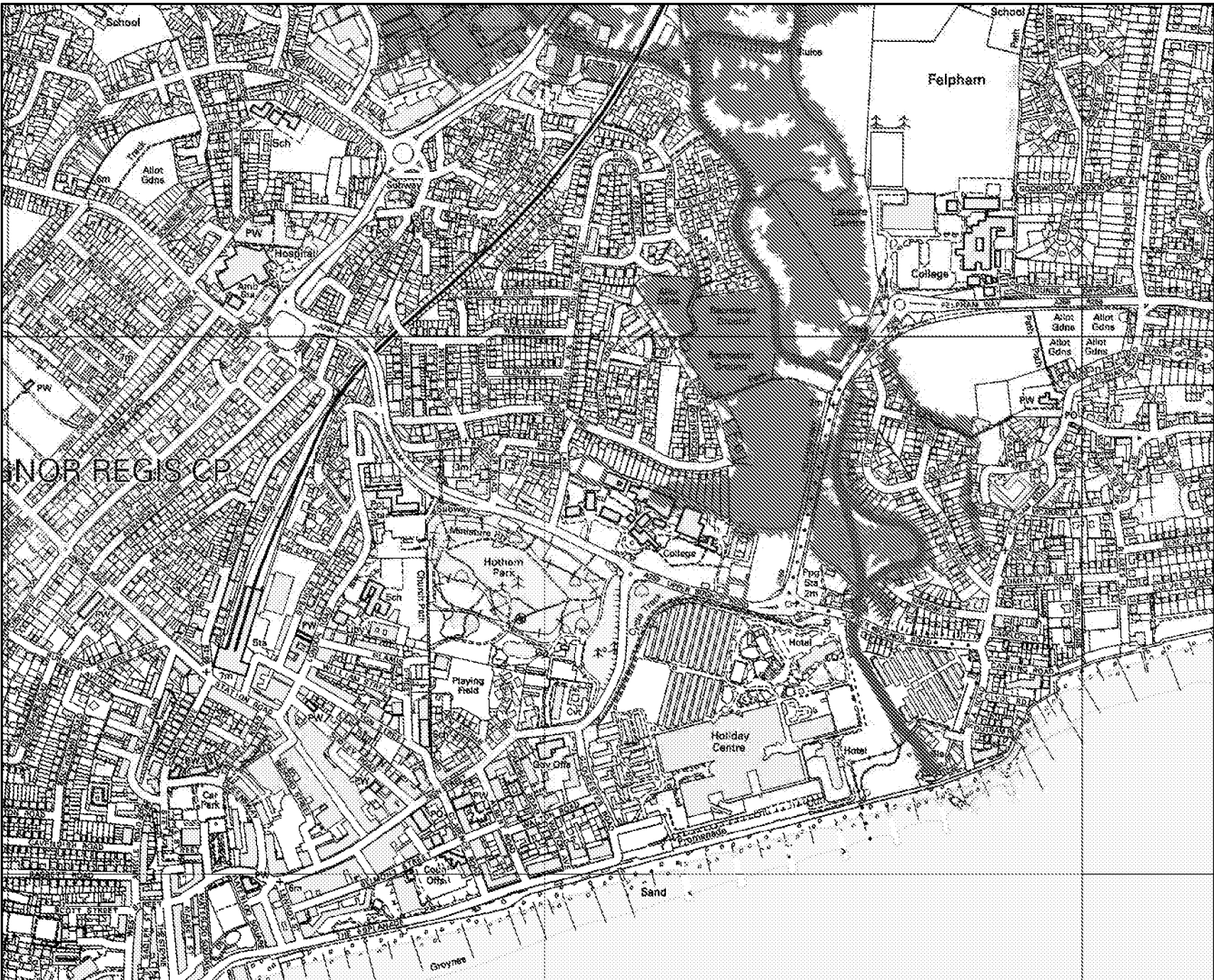
Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Defended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	494078	99762	-	-	-	-
2	494094	99740	-	-	-	-
3	494349	99542	-	-	-	-
4	494358	99522	-	-	-	-

All levels taken from:

Fluvial: Aldingbourne Flood Risk Mapping Study, completed in 2015 by JBA Consulting, plus climate change allowances (2016). Tidal: River Arun to East Head, completed in 2016 by JBA Consulting.

Produced on: 11/12/2019

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

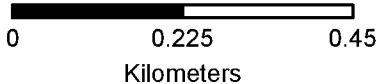


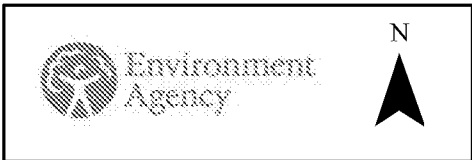
**Legend**

- Site\_Boundary
- 5% AEP (Defended Fluvial)
- 1% AEP (Defended Fluvial)
- 0.1% AEP (Defended Fluvial)

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

Scale: 1:10,000



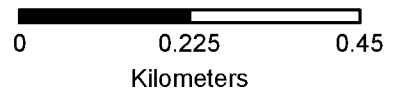


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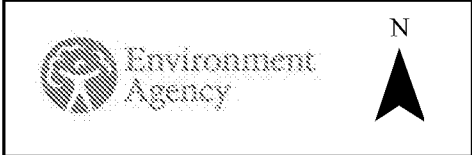
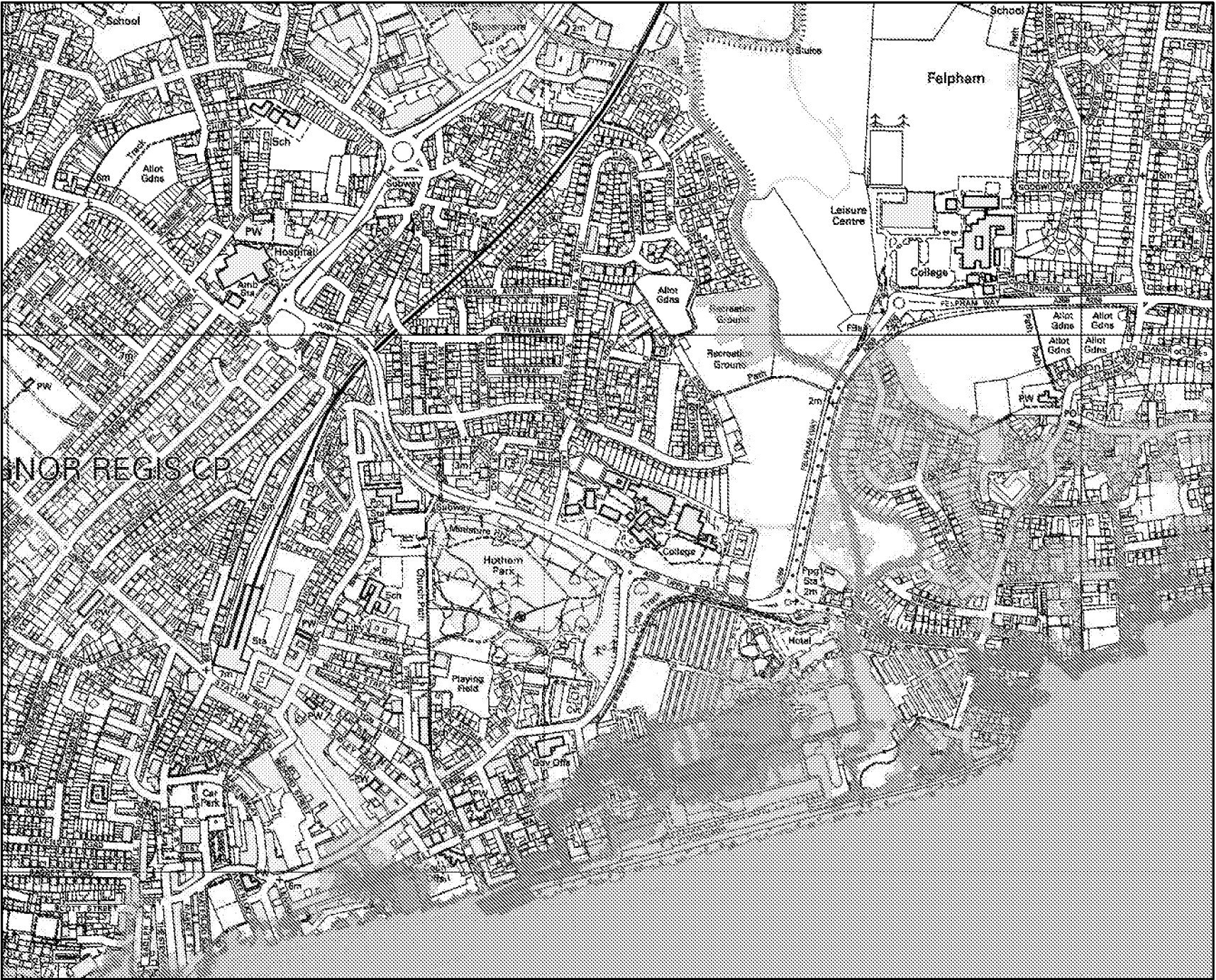
- Site\_Boundary
- 1% AEP (Undefended Fluvial)
- 0.1% AEP (Undefended Fluvial)

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

Scale: 1:10,000





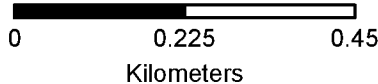


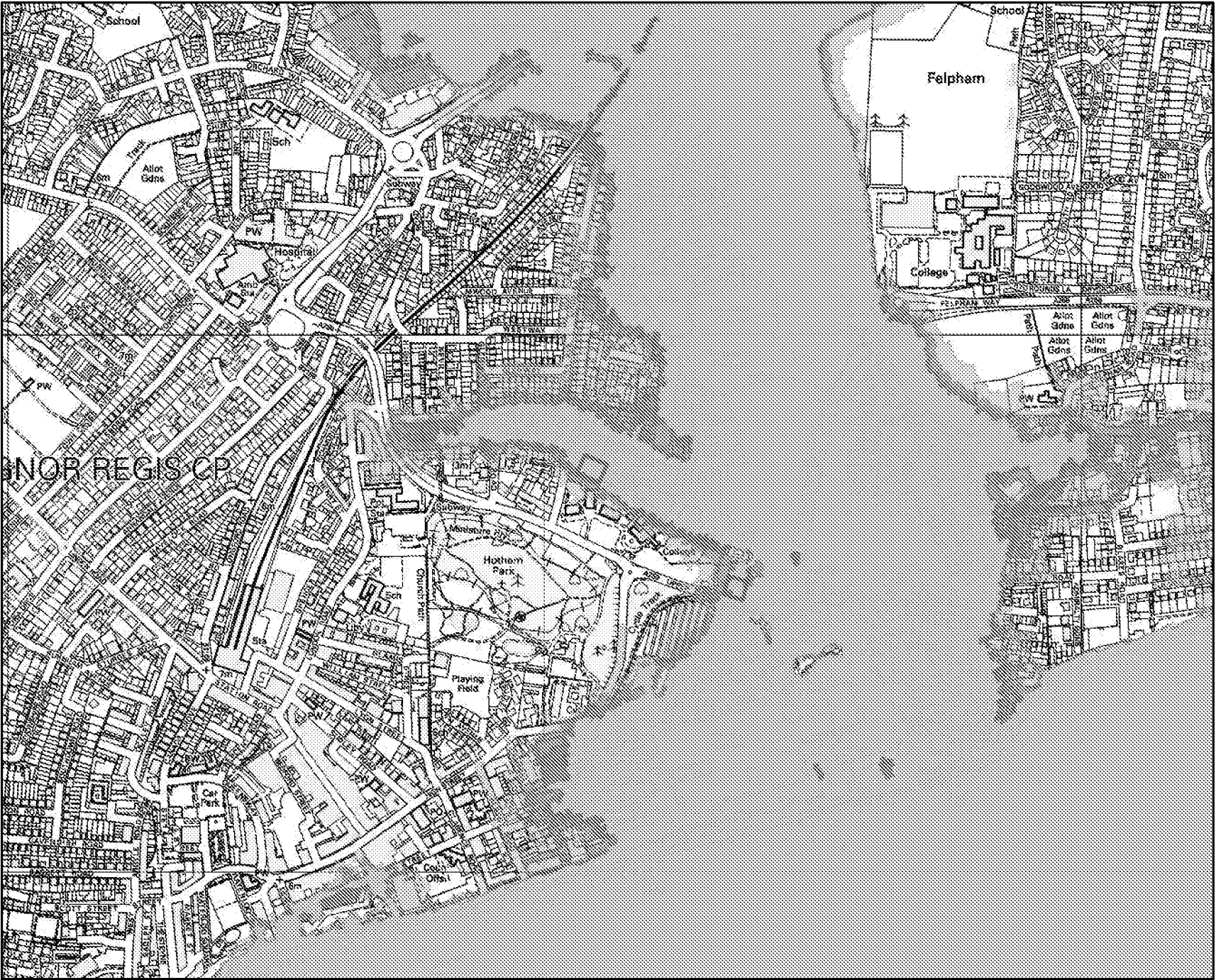
**Legend**

- Site\_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



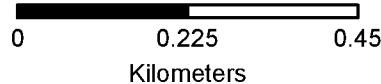


Legend

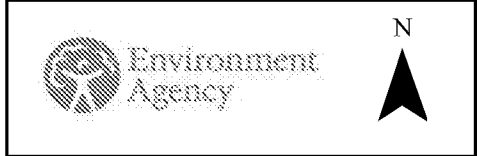
- Site\_Boundary
- 0.5% AEP (Undefended Tidal)
- 0.5% AEP (2070) NPPF (Undefended Tidal)
- 0.5% AEP (2115) NPPF (Undefended Tidal)
- 0.1% AEP (Undefended Tidal)

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

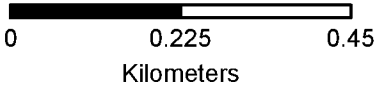
- Site\_Boundary
- 1% AEP + CC (35%) (Defended Fluvial)
- 1% AEP + CC (45%) (Defended Fluvial)
- 1% AEP + CC (105%) (Defended Fluvial)

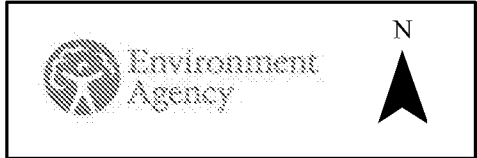
Climate Change (CC) for fluvial models is based on an increase in river flows of 35, 45 & 105% for undefended scenarios.

Defended scenarios only show the superseded 20% increase in flows

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**

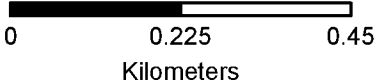
- Site\_Boundary
- 1% AEP + CC (35%) (Undefended Fluvial)
- 1% AEP + CC (45%) (Undefended Fluvial)
- 1% AEP + CC (105%) (Undefended Fluvial)

Climate Change (CC) for fluvial models is based on an increase in river flows of 35, 45 & 105% for undefended scenarios.

Defended scenarios only show the superseded 20% increase in flows

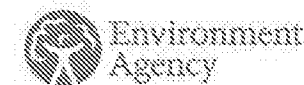
Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000





# Risk of flooding from Surface Water. Centred PO21 1HP. Created 11/12/2019.



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.

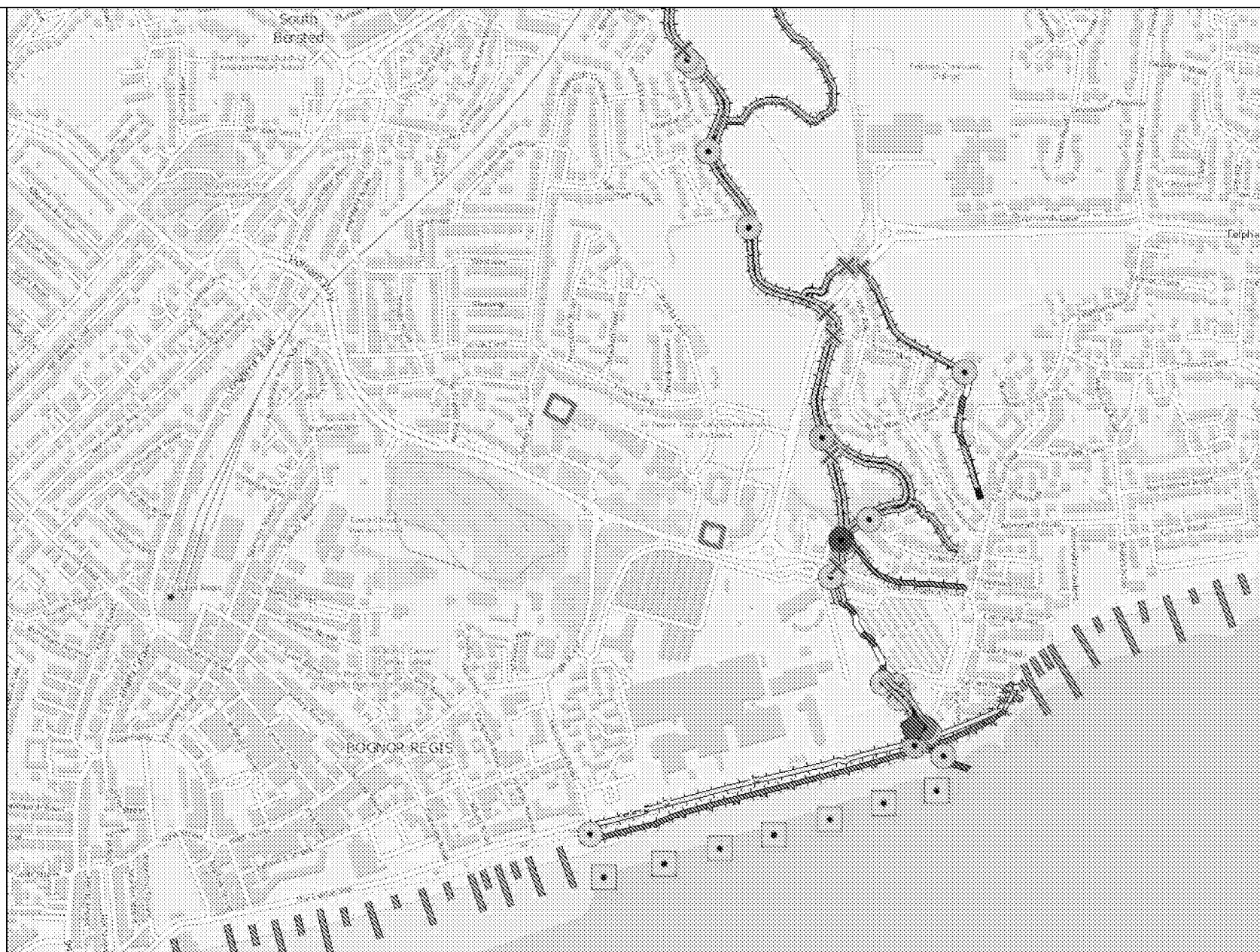
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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). E-mail: [enquires@environment-agency.gov.uk](mailto:enquires@environment-agency.gov.uk)

# Flood Defence Locations. Centred PO21 1HP. Created 11/12/2019.

## Legend

Please see page 2 for asset  
symbology















1: 10,000

0 250






Metres





## Structures

-  Control Gate
-  Draw Off Tower
-  Fish Pass
-  Hydrobrake
-  In Channel Stoplogs
-  Inspection Chamber
-  Jetty
-  Outfall
-  Screen
-  Spillway
-  Stilling Basin
-  Weir

## Beach Structures

-  Breakwater
-  Ramp
-  Slipway
-  Steps
-  Groyne






## Instruments

-  Active Monitoring
-  Passive Monitoring


## Channel Crossings

-  Bridge
-  Utility Services



## Aids to Navigation

-  Beacon
-  Buoy
-  Dolphin
-  Signage
-  Signal

## Building Assets

-  Pump House




## Major Civils

-  Abutment
-  Central Pier




## Defences

-  Embankment
-  Wall
-  Flood Gate
-  Demountable defence
-  Bridge abutment
-  High Ground
-  Beach
-  Barrier Beach
-  Promenade
-  Quay
-  Cliff
-  Dunes











## Channels

-  Open channel
-  Simple culvert
-  Complex culvert


## Land

-  Mudflats
-  Saltmarsh
-  Washland

## Sites


-  Amenity
-  Control Structure
-  Erosion Protection
-  General
-  Harbour
-  Monitoring
-  Navigation Lock
-  Pumping Station
-  Reservoir
-  Tidal Barrier





Environment  
Agency

N



**Legend**

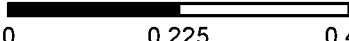
Site\_Boundary

**0.1% AEP**

<VALUE>

- Very Low Hazard- Caution
- Danger for some- Includes children, the elderly and infirm
- Danger for most- Includes the general public
- Danger for all- Includes the emergency services

**Scale: 1:10,000**



0      0.225      0.45  
Kilometers

# Appendix C Sequential Test



# Appendix C Sequential Test and Exception Test

## Sequential Test

This Sequential Test has been prepared for the proposed development on the land to the east of 67 & 69 Upper Bognor Road. Reference has been made to the Planning Practice Guidance 'Flood risk assessment: the sequential test for applicants'<sup>1</sup>.

### Information about proposed site

#### Site Location

The site is referred to as 'Land to east of 67 & 69 Upper Bognor Road'. The Site is located at National Grid Reference SZ 94355 99521 in University of Chichester (Bognor Campus), Bognor Regis, West Sussex.

This location has been selected for the development on two new residential properties. Each of the properties will comprise a workshop at ground level with a stairwell leading to two first floor flats; a two-bedroom flat and a one-bedroom flat. It is proposed that the properties will be built in a style in-keeping with the existing buildings. The development proposals for the proposed properties can be viewed in Figures A2 – A4, Appendix A of the FRA.

It is noted that the wider redevelopment of the site includes plans for a change of use of the existing two storey offices at 71 and 71A Upper Bognor Road from commercial back to residential. A shared 'courtyard' area will form the entrance to the new properties and to existing properties 67, 69, 71 and 71A Upper Bognor Road. However change of use applications do not require the application of the Sequential Test.

Additional parking spaces will be provided; 4 No. spaces to the north east of Charlotte House; and 13 No. spaces to the north west of 71/71A Upper Bognor Road. All parking areas are to be constructed of a permeable paving plastic mesh with SUDS compliant granular fill. Figure A1, Appendix A 'Site Plan Proposed' - also provides details related to the provision of green spaces (gardens), bin and cycle stores, hedges, fences and new trees.

#### Reason for selection

This site is highly sustainable for the intended use due to its location within the curtilage of the University, with excellent public transport links and associated infrastructure, including schools, shops and health services. The proposed development makes efficient and effective use of an area of brownfield/scrub land that has remained unused for many years.

The site is bonded by existing and protected walls, forming a discrete residential community. This proposal therefore brings back into use, currently derelict and redundant properties whilst enhancing the settings of the existing listed buildings. The proposed courtyard development enhances the Conservation Area and is respectful of the local heritage assets. As the site is bounded on three sides by protected walls, this will allow the development to be easily and sensitively separated from the University campus allowing for a pleasant, private, courtyard development. The site will have its own private access and associated parking.

### Information about alternative sites

#### Area of search

Arun District Council (DC) were contacted to agree an appropriate area of search, and to identify alternative development sites, against which to test the Site. A search area of one mile from the development site was agreed with the Principal Planning Officer at Arun DC and the Housing & Economic Land Availability Assessment (HELAA) Brownfield Land and Self-Build Register<sup>2</sup> used to identify additional sites for inclusion within the Sequential Test. Communication with Arun DC can be viewed in Appendix E.

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<sup>1</sup> <https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants>

<sup>2</sup> Housing & Economic Land Availability Assessment (HELAA) Brownfield Land and Self-Build Register. Available at <https://www.arun.gov.uk/helaa-brownfield-land-self-build-registers>. Accessed January 2020.

## Potential alternative sites

Seven alternative sites were identified in agreement with Arun DC. These are:

- Land to North of the main entrance off Felpham Way (UC02)
- Land to the North East of the Sports Pitches (UC03)
- Land to the West of Charlotte House (UC04)
- Land to north-east of The Dome (UC05)
- Land to north of Mordington House (UC06)
- Covers, Richmond Road (BR10)
- Carpark at London Road (BR12)

## Comparing flood risk

The following table provides an assessment of the risk of flooding to each site, as well as considerations for the suitability of the site for the proposed development. The table allows a comparison on the risks to each site with the application site.

Site reference and name	Area (ha)	Current use	Is the site allocated in HELAA? (Updated Feb 2019)	Flood Map for Planning <sup>3</sup>	Risk of tidal flooding (FRA Appendix B, Figures B7, B8)	Risk of fluvial flooding (FRA Appendix B, Figures B5, B6)	Risk of surface water flooding <sup>4</sup>	Risk of groundwater flooding (ASIGWF, Arun DC SFRA) <sup>5</sup>	Summary of comparison of flood risk between sites	Assessment of suitability
Land to east of 67 & 69 Upper Bognor Road (UC01)	0.13	Brownfield / Scrubland	No	Flood Zone 3	Defended scenario – Not at risk. Undefended scenario – At risk (0.5% AEP present day).	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Very low	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	[Application site]	[Reasons for selection have been stated above].
Land to North of the main entrance off Felpham Way (UC02)	0.1	Recreational	No	Flood Zone 3	Defended scenario – Not at risk. Undefended scenario – At risk (0.5% AEP present day).	Defended scenario – At risk. Undefended scenario – At risk.	Low – Medium	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	The risk of flooding to this site from fluvial flooding is greater than for the application site.	This site is not considered suitable for the intended use. The site is a greenfield location, currently being used as a sports pitch. Should the two residential cottages be located on this site then it would lead to a loss of sports and community facilities. The cottages would be isolated from any other residential community and would harm the visual amenity of the gap between settlements, in addition, the site would not benefit from private vehicle access. The cottages would be located adjacent to the University main entrance and would therefore suffer noise and disturbance during the day and night for which no effective remedy would be available.
Land to the North East of the Sports Pitches (UC03)	0.1	Recreational	No	Flood Zone 3	Defended scenario – Not at risk. Undefended scenario – At risk (0.5% AEP present day).	Defended scenario – At risk. Undefended scenario – At risk.	Low	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	The risk of flooding to this site from fluvial flooding is greater than for the application site.	This site is not considered suitable for the intended use. The site is a greenfield location, currently being used a sports pitch. Should the two residential cottages be located on this site, this would be situated on a playing field leading to a loss of sports and community facilities. The cottages would be isolated from any other residential community and would harm the visual amenity of the gap between settlements, in addition the site would not benefit from private vehicle access. This site is very isolated with no direct access via vehicle or foot, leading to the properties being land locked requiring access over neighbouring land. In this location there will still be sporting activities taking place right outside the front door of the properties which will lead to disturbance for the inhabitants and potential damage to the properties.
Land to the West of Charlotte House (UC04)	0.1	Recreational / Parkland	No	Flood Zone 1	Defended scenario – Not at risk. Undefended scenario – eastern fringe at risk (0.5% AEP for 2115).	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Very low	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	Similar flood risk to the application site. Slightly lower residual risk of tidal flooding.	The site is situated in an existing parkland setting in a very sensitive part of the Conservation Area. The development would require the felling of several mature and protected trees, the presence of which significantly enhance the beauty of the setting and its visual and recreational amenity. Animal and bird species that prefer a mature habitat would be lost from this part of the Conservation Area.
Land to north-east of The Dome (UC05)	0.1	Recreational	No	Flood Zone 2/3	Defended scenario – Not at risk. Undefended scenario – At risk (0.5% AEP present day).	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Very low	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	Similar flood risk to the application site.	The site is in the setting of a Grade 1 listed building, The Dome, formally known as Hothampton Crescent. It is considered that the cottages, if built in this location, would harm the setting of this Grade 1 listed building. The site is in the centre of the University campus and is surrounded by academic buildings. As a result of this, there is no private vehicle access to the site and any residents would have no privacy from the University's daily operation. It is considered that this site is completely unsuitable for a residential development.
Land to north of Mordington House (UC06)	0.1	Recreational	No	Flood Zone 1	Defended scenario – Not at risk. Undefended scenario – eastern fringe at risk (0.5% AEP for 2115).	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Low – Medium	Within a 1km square of which 50%-75% is susceptible to groundwater emergence.	Similar flood risk to the application site. Slightly lower residual risk of tidal flooding.	The site is in the setting of a Grade 2 listed building, Mordington House. It is considered that the cottages, if built in this location, would harm the setting of this Grade 2 listed building. The site is in the centre of the University campus and is surrounded by academic buildings. As a result of this, there is no private vehicle access to the site and any residents would have no privacy from the University's daily operation. It is considered that this site is completely unsuitable for a residential development. In addition to this, the site would be situated in the historic gardens to Mordington House and would be harmful to the historic nature of the building.
Covers, Richmond Road (BR10)	1.19	Industrial	Yes BR10	Flood Zone 1	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Low	Within a 1km square of which >75% is susceptible to groundwater emergence.	Similar flood risk to the application site. Not at residual tidal risk, but groundwater flood risk may be higher.	The site is some distance from the University and not in the University's ownership. It is envisaged that the site would be classified as contaminated land due to its current and former industrial use, this would not be appropriate for residential cottages with garden spaces. The site is just over 1 hectare in size and would be better suited to a large-scale comprehensive development. The development of a pair of isolated cottages on such an extensive site would be an inappropriate use of land which could otherwise be better utilised. The site would suffer from noise pollution from the neighbouring train station which cannot be effectively mitigated.
Carpark at London Road (BR12)	0.33	Commercial	Yes Br12	Flood Zone 1	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Defended scenario – Not at risk. Undefended scenario – Not at risk.	Low	Within a 1km square of which >75% is susceptible to groundwater emergence.	Similar flood risk to the application site. Not at residual tidal risk, but groundwater flood risk may be higher.	It is envisaged that the site would be classified as contaminated land due to the current use as a lorry and car park. The site is approximately 0.33ha and would be better suited to a medium scale comprehensive development. The building of two isolated cottages would be inappropriate on a site of this size and the land would be vastly underutilised. This site is not owned by the University.

<sup>3</sup> <https://flood-map-for-planning.service.gov.uk/>

<sup>4</sup> <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>

<sup>5</sup> Areas Susceptible to Groundwater Flooding dataset, available in the Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment, Version 5, September 2016. Available at: <https://www.arun.gov.uk/download.cfm?doc=docm93jijm4n9774.pdf&ver=9670>. Appendix F



## Conclusion

Two of the sites are shown to be at greater risk of flooding than the application site (UC02 and UC03 shaded red in the table) and should not be considered further. Of the remaining sites (shaded orange in the table), the flood risk posed to each site is similar to that for the application site. The suitability assessment provides justification for the application site over the alternative sites.



## Exception Test

The application of the Sequential Test has demonstrated that it is not possible to locate the proposed development in an area with a lower probability of flooding. Therefore, the Exception Test has been completed for the proposed development on the land to the east of 67 & 69 Upper Bognor Road.

## Regulatory Requirements for the Exception Test

Paragraph 160 of the National Planning Policy Framework<sup>6</sup> (NPPF), sets out the requirement for the application of the Exception test, stating:

*160. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:*

*(a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*

*(b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

Section 4.3.2 of the Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment<sup>7</sup> (SFRA) outlines that following the application of a Sequential Test, if it is not possible for the development to be located in an area of lower flood risk, the Exception Test must then be applied.

## The Exception Test

### **(a) The development would provide wider sustainability benefits to the community to outweigh the flood risk;**

This site is highly sustainable for the intended use due to its location within the curtilage of the University, with excellent public transport links and associated infrastructure, including schools, shops and health services. The proposed development makes efficient and effective use of an area of brownfield/scrub land that has remained unused for many years.

The site is bounded by existing and protected walls, forming a discrete residential community. The proposed development brings back into use, currently derelict and redundant properties whilst enhancing the settings of the existing listed buildings. The proposed courtyard development enhances the Conservation Area and is respectful of the local heritage assets. As the site is bounded on three sides by protected walls, this will allow the development to be easily and sensitively separated from the University campus allowing for a pleasant, private, courtyard development. The site will have its own private access and associated parking.

### **(b) The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.**

A site-specific FRA has been completed (to which this document forms Appendix C) and demonstrates that the proposed development when the recommended mitigation measures are incorporated will not cause an increased flood risk to the surrounding area and users of the development will be safe.

## Conclusion

The application of the Exception Test has demonstrated that the proposed development provides wider sustainability developments to the community through its sensitive design and use of an available brownfield site and that a site-specific FRA has been completed.

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<sup>6</sup> Ministry of Housing, Communities and Local Government, (February 2019); National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework-2>. Accessed: February 2019.

<sup>7</sup> Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment, Version 5, September 2016. Available at: <https://www.arun.gov.uk/download.cfm?doc=docm93jijm4n9774.pdf&ver=9670>. Accessed: February 2019.

# Appendix D Southern Water Asset Information



University of Chichester  
Bognor Regis Campus  
Bognor Regis  
West Sussex  
PO21 1HR

Your ref BRC sewer map  
Our ref 354981  
Date 17 October 2019

Attention: James Baird Parker

Dear Customer

**Re: Provision of public sewer record extract**

**Location: University of Chichester, Bognor Regis Campus, Bognor Regis, West Sussex, PO21 1HR**

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

Southern Water Southern House Capstone Road Chatham Kent ME5 7QA

Southern Water Services Ltd Registered Office: Southern House Yeoman Road Worthing BN13 3NX Registered in England No. 2366670

# VAT receipt

## Ordered by:

University of Chichester  
Bognor Regis  
West Sussex  
PO21 1HR

**VAT registration number:** 813 0378 56  
**Order reference:** 354981  
**Your reference:** BRC sewer map

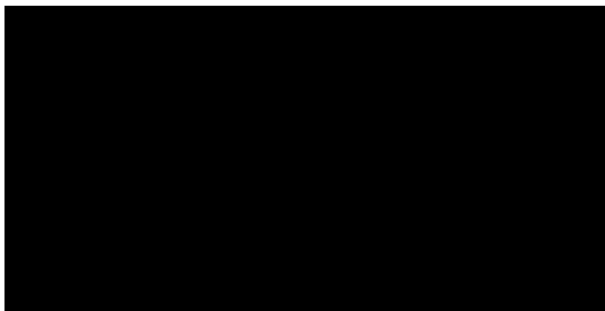
Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
University of Chichester Bognor Regis Campus Bognor Regis West Sussex PO21 1HR	
<b>Net total</b>	
<b>VAT</b>	
<b>Total</b>	
<b>Paid</b>	

Thank you for your payment:

Received on: 7 October 2019

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:



LandSearch  
Southern Water Services  
Southern House  
Capstone Road  
Chatham  
Kent  
ME5 7QA





**493707**

**493707**

**Title:** 354981\_University of Chicheste

Drawn by: gujskew

Scale: 1:2500

Date: 17/10/2019

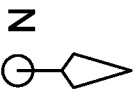
The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

**The actual positions should be determined on site**

Measurements and data were collected at 100000 points throughout the study area.

**WARNING:** Unknown risks may include Bonded Activities Concern

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Licence No. WU 298530.





SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0601X	4.78	2.9	225	VC	CIRC	3405X	2.45	-1.36	375	CP	CIRC	7703X	3.24	0.91	450	CI	CIRC																		
0701X	2.82		UNK	UNK	CIRC	3452X	2.68	1.37	OTHER	VC	CIRC	7704X	3.13	0.97	575	VC	CIRC																		
0702X	2.96		800	CP	CIRC	3501Y	3.415	-0.105	450	CP	CIRC	7751X	2.98	2.24	525	BRE	CIRC																		
0703X	2.97	0.52	800	CP	CIRC	3502X	2.942	-0.266	600	CI	CIRC	7752X	3.14	2.38	600	BRE	CIRC																		
0704X	2.98	0.59	375	VC	CIRC	3504X	2.23	-0.19	450	CI	CIRC	7753X	3.31	2.49	600	BRE	CIRC																		
0705X		0.6	450	CI	CIRC	3552X	3.51	2.43	300	VC	CIRC	7754X	3.57	2.52	375	VC	CIRC																		
0706X	2.84		375	VC	CIRC	3553X	2.89	1.86	300	VC	CIRC	7755X	3.57	2.52	375	VC	CIRC																		
0707X	3.54	0.62	375	VC	CIRC	3554X	2.94	-0.294	750	CO	CIRC	7756X	4.54	3.3	300	VC	CIRC																		
0707X		1.62	UNK	UNK	CIRC	3554X	2.94	-0.294	750	CO	CIRC	7756X	4.54	3.3	300	VC	CIRC																		
0710X			UNK	UNK	CIRC	3555Y	2.9	-0.344	450	UNK	CIRC	7757X	4.54	3.3	300	VC	CIRC																		
0751X	1.91		225	CP	CIRC	3555Y	2.9	-0.344	450	UNK	CIRC	7757X	4.54	3.3	300	VC	CIRC																		
0801X	2.65	1.5	750	CP	CIRC	3601X	1.58	0.41	150	VC	CIRC	7801X	3.76	1.03	450	CI	CIRC																		
0802X	2.34	1.39	225	VC	CIRC	3602X	1.73	0.11	450	CI	CIRC	7802X	4.27	3.03	225	VC	CIRC																		
0803X	2.59		225	VC	CIRC	3603X	2.52	0.12	450	CP	CIRC	7810X	1.07	1.07	375	VC	CIRC																		
0803X	2.59	1.47	225	VC	CIRC	3603X	2.52	0.12	450	CP	CIRC	7810X	1.07	1.07	375	VC	CIRC																		
0804X			UNK	UNK	CIRC	3604X	2.22	0.021	450	CP	CIRC	7830X					CIRC																		
0805X			UNK	UNK	CIRC	3605X	2.44	-0.22	600	CI	CIRC	7853X	3.99	1.94	375	CP	CIRC																		
0806Y			UNK	UNK	CIRC	3701X	2	0.77	150	VC	CIRC	8301X	6.57	4.89	225	VC	CIRC																		
0807X			UNK	UNK	CIRC	3701X	2	0.77	150	VC	CIRC	8351X	6.59	5.35	225	VC	CIRC																		
0807X			UNK	UNK	CIRC	3702X	1.77	0.73	150	VC	CIRC	8651X	5.34	3.28	225	VC	CIRC																		
080DX			UNK	UNK	CIRC	4401X	2.04		750	CI	CIRC	8701X	3.03	0.79	450	CI	CIRC																		
080PX			UNK	UNK	CIRC	4402X	1.99	-1.98	UNK	UNK	CIRC	8751X	3.08	1.93	225	VC	CIRC																		
0813X			UNK	UNK	CIRC	4451X	2.03		300	VC	CIRC	8752X	3.02	2.06	525	BRE	CIRC																		
081DX			UNK	UNK	CIRC	4452X	2.3		UNK	UNK	CIRC	8753X	4.93	3.85	225	VC	CIRC																		
083DX			UNK	UNK	CIRC	4453X	2.24		225	VC	CIRC	8754X	5.28	3.57	225	VC	CIRC																		
084DX			UNK	UNK	CIRC	4603X	1.72	0.03	450	CI	CIRC	8801X	2.86	2.12	225	VC	CIRC																		
0851X	2.64	0.91	450	CP	CIRC	4604X	1.38	0.18	150	CI	CIRC	8804X	2.96	1.82	225	VC	CIRC																		
0852X	2.4	0.8	450	CP	CIRC	4650X	1.68	-0.102	750	CO	CIRC	8804X	2.96	1.82	225	VC	CIRC																		
0853X	2.57	0.84	450	CP	CIRC	4651X	2.33	-0.174	750	CO	CIRC	8805X	2.93	0.85	450	CI	CIRC																		
0854X	2.59		700	BRE	RECT	5401X	2.27	0.82	150	VC	CIRC	8806X	3.03	0.79	375	VC	CIRC																		
1301X	4.89	0.14	525	CI	CIRC	5451X	2.04	0.71	300	VC	CIRC	8809X			150	VC	CIRC																		
1302X	4.32	0.3	525	CI	CIRC	5501Y	1.81	-0.45	525	CI	CIRC	8809X			150	VC	CIRC																		
1401X	5.14	-0.16	525	CI	CIRC	5501X	1.81	-2.24	525	CI	CIRC	8810X			150	VC	CIRC																		
1402X	5.1	-0.01	525	CI	CIRC	5502X	1.47	-0.46	525	CI	CIRC	8851X			450	CP	CIRC																		
1601X	2.04	0.33	375	VC	CIRC	5503X	2.04		300	CI	CIRC	8852X	2.87	1.15	450	CP	CIRC																		
1701X	2.8		800	CP	CIRC	5503Y	2.04		OTHER	CI	CIRC	8853X	2.9	1.15	450	CP	CIRC																		
1703X			UNK	UNK	CIRC	5504Y	1.85	-2.49	750	CI	CIRC	8853X	2.9	1.15	450	CP	CIRC																		
1704X			UNK	UNK	CIRC	5505X	1.85		OTHER	CI	CIRC	8855X	3.28	1.22	450	CP	CIRC																		
1704X			UNK	UNK	CIRC	5506X	3		UNK	UNK	CIRC	8856X	2.8	1.48	600	BRE	CIRC																		
1750X			UNK	UNK	CIRC	5508X			UNK	UNK	CIRC	9651X	5.26	3.33	225	VC	CIRC																		
1751X			750	CP	CIRC	551PX	3.05		UNK	UNK	CIRC	9701X	3.47	0.75	375	VC	CIRC																		
1801X			225	VC	CIRC	5701X	1.86	0.29	175	VC	CIRC	9702X	3.57	0.71	450	CI	CIRC																		
1801X			UNK	UNK	CIRC	6301X	2.56	0.1	UNK	UNK	CIRC	9703X			UNK	UNK	CIRC																		
1802X			UNK	UNK	CIRC	6301X	2.56	0.1	UNK	UNK	CIRC	9703X			UNK	UNK	CIRC																		
1803X			UNK	UNK	CIRC	6503X	1.8	0.38	175	VC	CIRC	971DX			UNK	UNK	CIRC																		
1803X			UNK	UNK	CIRC	6503X	1.8	0.38	175	VC	CIRC	971DX			UNK	UNK	CIRC																		
1806X			UNK	UNK	CIRC	6553X	1.8	0.14	225	VC	CIRC	972DX			UNK	UNK	CIRC																		
1806X			UNK	UNK	CIRC	6553X	1.8	0.14	225	VC	CIRC	972DX			UNK	UNK	CIRC																		
1851X	2.23		450	CP	CIRC	6704X	1.74	-0.04	175	VC	CIRC	973DX	3.56	1.99	225	VC	CIRC																		
1851X			UNK	UNK	CIRC	6705X	1.91	-0.13	175	VC	CIRC	9751X			UNK	UNK	CIRC																		
1853X			UNK	UNK	CIRC	6752X	1.95	0.63	225	VC	CIRC	9752X	4.91	2.96	225	VC	CIRC																		
1855X			UNK	UNK	CIRC	6753X	1.88	0.15	225	VC	CIRC	97ADX			UNK	UNK	CIRC																		
1856X			UNK	UNK	CIRC	6754X	1.77	0.26	225	VC	CIRC	9801X	2.77	1.89	225	VC	CIRC																		
2501X	4.07	-0.37	525	CI	CIRC	6755X	1.9	0.44	225	VC	CIRC	9802X	2.74	1.75	225	VC	CIRC																		
2502X	4.69	-0.27	525	CI	CIRC	6802X	1.8	0.38	175	VC	CIRC	9803X	2.92	1.75	375	VC	CIRC																		
255DX			300	VC	CIRC	680DX			UNK	UNK	CIRC	9804X	2.91		375	VC	CIRC																		
2601X		0.22	300	VC	CIRC	681DX			UNK	UNK	CIRC	9805Y	2.9		375	VC	CIRC																		
261X	1.35		750	CP	CIRC	684DX			UNK	UNK	CIRC	9805X	2.9	0.63	450	CI	CIRC																		
2701X	2.66	0.22	600	CP	CIRC	6851X	1.81	-0.14	225	VC	CIRC	980DX			450	CI	CIRC																		
2702X	2.5	1.01	150	VC	CIRC	6852X	1.81	-0.19	225	VC	CIRC	981DX	2.77	1.02	375	VC	CIRC																		
270DX			UNK	UNK	CIRC	7301																													



# Appendix E Correspondence with Arun DC

## Newman, Martha

---

**From:** Simon Davis <Simon.Davis@arun.gov.uk>  
**Sent:** 02 December 2019 12:52  
**To:** Newman, Martha  
**Subject:** RE: Planning Query - Sequential Test, Upper Bognor Road

Dear Martha,

I do not consider the search area extent to be adequate. I would recommend that you look at alternative sites within a mile radius of the proposed site.

You may find the Council's HELAA (<https://www.arun.gov.uk/helaa-brownfield-land-self-build-registers>) and the HELAA website map useful for identifying sites but note that the HELAA only includes land with potential of 5 or more.

Kind Regards

Simon J Davis MRTPI | Principal Planning Officer, Planning Department, Directorate of Place, Arun District Council |  
Location: Planning, First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF  
Internal: 37874 | External: +44 (0) 1903 737874 | E-mail: [simon.davis@arun.gov.uk](mailto:simon.davis@arun.gov.uk)  
Please note that I typically work from home on Thursdays when I am unreachable on my work phone

Visit Arun's web site at [www.arun.gov.uk](http://www.arun.gov.uk)



Save the environment - think before you print.

---

**From:** Newman, Martha <m[REDACTED]>  
**Sent:** 02 December 2019 12:26  
**To:** Simon Davis <Simon.Davis@arun.gov.uk>  
**Subject:** RE: Planning Query - Sequential Test, Upper Bognor Road

Hi Simon,

I hope you are well. I have spoken to our client at the University of Chichester, and they have proposed 6 sites to be assessed a part of the sequential test, which are marked on the attached plan.

Please can you confirm that you are happy for us to proceed with completing the sequential test for the university, and that the 6 sites highlighted will form a suitable assessment?

Many thanks,  
Martha

---

**From:** Simon Davis <[Simon.Davis@arun.gov.uk](mailto:Simon.Davis@arun.gov.uk)>  
**Sent:** 26 November 2019 12:19  
**To:** Newman, Martha <m[REDACTED]>; Tracey Headley-Smith <[Tracey.Headley-](mailto:Tracey.Headley-)

[Smith@arun.gov.uk](mailto:Smith@arun.gov.uk)>

**Subject:** RE: Planning Query - Sequential Test, Upper Bognor Road

Dear Martha,

It is me that you need to speak to. I will be in the office all day except for lunch between 1.30 and 2.10. If you want to try my number but I am not there, try again 5-10 mins later as I won't be far away.

Kind Regards

Simon J Davis MRTPI | Principal Planning Officer, Planning Department, Directorate of Place, Arun District Council |  
Location: Planning, First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF  
Internal: 37874 | External: +44 (0) 1903 737874 | E-mail: [simon.davis@arun.gov.uk](mailto:simon.davis@arun.gov.uk)  
Please note that I typically work from home on Thursdays when I am unreachable on my work phone

Visit Arun's web site at [www.arun.gov.uk](http://www.arun.gov.uk)



Save the environment - think before you print.

---

**From:** Newman, Martha <[martha.newman@arun.gov.uk](mailto:martha.newman@arun.gov.uk)>  
**Sent:** 26 November 2019 12:12  
**To:** Tracey Headley-Smith <[Tracey.Headley-Smith@arun.gov.uk](mailto:Tracey.Headley-Smith@arun.gov.uk)>  
**Cc:** Simon Davis <[Simon.Davis@arun.gov.uk](mailto:Simon.Davis@arun.gov.uk)>  
**Subject:** RE: Planning Query - Sequential Test, Upper Bognor Road

Hi Tracy and Simon,

Are you available later today for a call about the below flood risk planning query?

I am on site so not available all of the time, but would really appreciate if we could pencil something in.

Many thanks in advance for your time.

Best Regards,  
Martha

**Martha Newman**, BEng (Hons) MSc  
Principal Planning Officer, Planning Department, Directorate of Place, Arun District Council

---

**From:** Tracey Headley-Smith <[Tracey.Headley-Smith@arun.gov.uk](mailto:Tracey.Headley-Smith@arun.gov.uk)>  
**Sent:** 22 November 2019 11:20  
**To:** Newman, Martha <[martha.newman@arun.gov.uk](mailto:martha.newman@arun.gov.uk)>  
**Cc:** Simon Davis <[Simon.Davis@arun.gov.uk](mailto:Simon.Davis@arun.gov.uk)>  
**Subject:** RE: Planning Query - Sequential Test, Upper Bognor Road

Good Morning Martha

Further to our telephone conversation, unfortunately I have been unable to establish where your enquiry had been passed to. However, my colleague Simon Davis will endeavour to call you later today or Monday and may be able to assist.

Regards

Tracey Headley-Smith

| Senior Planning Officer (Compliance), Directorate of Place, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

**Working hours Tues - Fri 8.45-5.15**

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**From:** Nicola Moore <Nicola.Moore@arun.gov.uk> **On Behalf Of** Planning

**Sent:** 22 November 2019 10:59

**To:** Tracey Headley-Smith <Tracey.Headley-Smith@arun.gov.uk>

**Subject:** FW: Planning Query - Sequential Test, Upper Bognor Road

Nicky Moore | Technical Support Assistant, Planning Department, Arun District Council | Location: First floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

Internal: 37944 | External: +44 (0) 1903 737500 ext 37944 | E-mail: nicola.moore@arun.gov.uk

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**From:** Newman, Martha <[REDACTED]>

**Sent:** 04 November 2019 13:33

**To:** Planning <Planning@arun.gov.uk>

**Subject:** Planning Query - Sequential Test, Upper Bognor Road

Hello,

We are investigating the possibility of a development at the University of Chichester, Bognor Regis campus and would appreciate your advice. The site of interest is on Upper Bognor Road, as indicated by the marker point in the image below. The proposed development is two residential properties.

As the proposed location of these properties is partially within Flood Zone 3, we are aware that the completion of the sequential test may be required before as part of the assessment process.

Please can you confirm:

- a) If the Sequential Test as part of the Flood Risk Assessment for these properties;
- b) If the answer to a) is yes, please confirm the appropriate area of search for alternative development sites, and please provide a list of alternative site for comparison



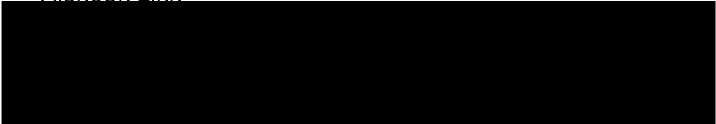
Please don't hesitate to contact me if you have any queries or questions.

Many thanks for your help.

**Martha Newman, BEng (Hons) MSc**



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