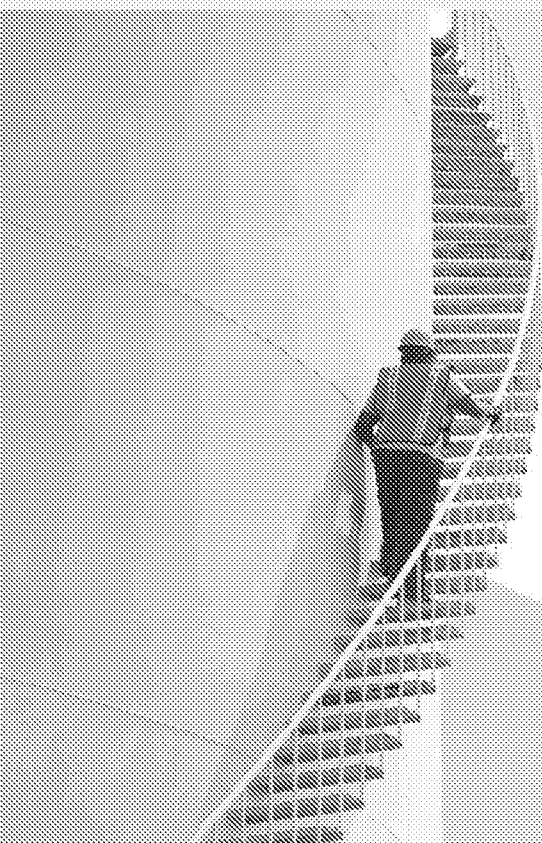


Counterpoint Properties Ltd.

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# **94 - 100 HOOK LANE, BOGNOR REGIS**

## **Flood Risk Assessment**





**Counterpoint Properties Ltd.**

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## **94 - 100 HOOK LANE, BOGNOR REGIS**

### **Flood Risk Assessment**

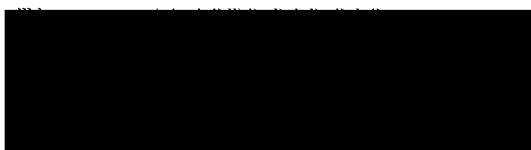
**TYPE OF DOCUMENT (VERSION) PUBLIC**

**PROJECT NO. 70047808**

**OUR REF. NO. ES/SB**

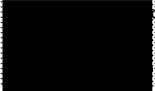
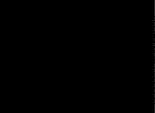
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# QUALITY CONTROL

| Issue/revision | First Issue                                                                                                                                                                                                     | Revision 1 | Revision 2 | Revision 3 |
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| Prepared by    | E. Stoykova                                                                                                                                                                                                     |            |            |            |
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| Checked by     | Steve Brown                                                                                                                                                                                                     |            |            |            |
| Signature      |  Brown, Steven<br><small>18.07.18<br/>13:45:55<br/>+01'00'</small>                                                             |            |            |            |
| Authorised by  | Martin Wheeler                                                                                                                                                                                                  |            |            |            |
| Signature      |  Martin Wheeler<br><small>18.07.18<br/>13:45:21<br/>+01'00'</small>                                                           |            |            |            |
| File reference | \\uk.wspgroup.com\central data\Projects\700478xx\70047808 - Hook Lane, Bognor Regis\02 WIP\EI EIA and flood risk\03 Document\70047808-FRA-01.docx                                                               |            |            |            |



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# 1 INTRODUCTION

---

## 1.1 APPOINTMENT AND BRIEF

- 1.1.1. WSP was commissioned by Counterpoint Properties Ltd. to prepare a site specific Flood Risk Assessment (FRA) including a drainage strategy for a Proposed Development at 94 – 100 Hook Lane hereafter referred to as the Application Site. The site is approximately 0.28 hectares (ha) in size. A location plan is provided in Appendix A.

## 1.2 STUDY OBJECTIVES

- 1.2.1. The FRA has been produced in line with the requirements of the NPPF and the Environment Agency's Standing Advice, and in consultation with West Sussex County Council (WSCC), the Environment Agency and Arun District Council (ADC).
- 1.2.2. Climate change predictions have been considered over the lifetime of the Proposed Development. A key part of the FRA is a conceptual surface water drainage strategy for the Proposed Development.

## 1.3 METHODOLOGY

- 1.3.1. The following tasks have been undertaken in the preparation of this FRA:
- | A desk study and data research including review of relevant national and local policies and guidance (a summary of which is provided in Section 2);
  - | Consultation with regulatory bodies and third parties, including:
    - The Environment Agency;
    - West Sussex County Council; and
    - Arun District Council.
    - (Copies of correspondence exchanged with these stakeholders are provided in Appendix B.)
  - | An assessment of flooding to the Application Site and Proposed Development from the following sources: fluvial, pluvial, groundwater, sewers and man-made infrastructure;
  - | An assessment of the impact of the Proposed Development on local flood risks;
  - | An assessment of the residual flood risk to the Proposed Development and neighbouring property from local flood sources;
  - | An estimation of surface water flows based on the current conditions at the Application Site and existing drainage systems; and
  - | An estimation of post development surface water flows based on the development proposals, and a preliminary drainage strategy.

## 2 POLICY

---

### 2.1 NATIONAL POLICY AND GUIDANCE

#### NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

- 2.1.1. The NPPF requires that a Flood Risk Assessment should be undertaken for all developments greater than 1 Hectare (ha) in size; for any development located in Flood Zone 2 or 3; and for sites less than 1 ha in Flood Zone 1, including a change of use in development type to a more vulnerable class (e.g. from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (e.g. surface water drains, reservoirs).
- 2.1.2. The NPPF requires a flood risk assessment to be undertaken to demonstrate that the Proposed 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.

#### NON-STATUTORY SUSTAINABLE DRAINAGE TECHNICAL STANDARDS (MARCH, 2015)

- 2.1.3. The non-statutory sustainable drainage technical standards document provides significant guidance regarding the management of sustainable drainage systems (SuDS). It states that the rate of discharge from the redevelopment must be as close as reasonably practicable to the greenfield runoff rate but should not exceed that of the pre development condition.

#### FLOOD RISK ASSESSMENTS: CLIMATE CHANGE ALLOWANCES (FEBRUARY 2017)

- 2.1.4. A summary of the Environment Agency's climate change allowances is provided in Section 3. The revised guidance was published in February 2016 and last updated in February 2017 where the temporary exceptions sections were removed and information for Flood Zone 1 was added.

### 2.2 LOCAL POLICY

#### ARUN DISTRICT COUNCIL LOCAL PLAN (2003)

- 2.2.1. Arun District Council are currently in the process of developing a new Local Plan and therefore the 2003 Local Plan is the current document. In 2007 the policies within the Local Plan expired, unless the Secretary of State agreed to save them.
- 2.2.2. Policies relating to Flood Risk and Drainage that have been saved are:

- GEN9: Foul and Surface Water Drainage: *"Planning permission for development which will materially increase foul and/or surface water discharges will be refused unless the Local Planning Authority is satisfied that either adequate drainage capacity exists or appropriate drainage capacity can be provided as part of the development. Consideration should also be given to the use of SuDS as alternatives to conventional drainage where appropriate"*
  - The LPA will promote the use of balancing ponds for the attenuation of surface water run-off where required. Proposals for the long-term management of any facility must be included in any scheme put forward.
  - Developers should consider the use of SuDS at the earliest possible stage.
- GEN10: Tidal Flooding and Coastal Defence: *"Planning permission will be refused for development which would be at an unacceptable risk of tidal flooding and /or where proposals are detrimental to the integrity of tidal defences or the ability to maintain or improve them. In areas identified to be at risk:*
  - *Outside the built-up areas, planning permission will not be granted for new development, or the significant intensification of existing development.*
  - *Within built up areas planning permission will only be granted where the LPA is satisfied that appropriate flood and coastal defence and mitigation measures have been provided so that the*

*development will not itself be at unacceptable risk and does not pose an unacceptable risk to the existing development in the area."*

- GEN11: Inland Flooding: *"permission for development which would be at risk from flooding and/or materially decrease the capacity of a floodplain to store or pass flows of floodwater, will be refused unless the LPA is satisfied that compensatory flood storage/waterway areas can be provided as part of the development and the function and effectiveness of existing watercourses, or their replacements, are not adversely affected."*
- For planning purposes consideration is given to the 1 in 100 year risk of flood and additional 20% allowance on flood flows for changing weather patterns and, when the extent of this is unknown, the developer will be expected to undertake hydraulic analysis and site survey to establish this.
- GEN23: The Water Environment: *"Development will not be permitted if it would have a direct or indirect unacceptable adverse impact on the water environment, notably in relation to rivers, ponds, wetlands, public access in river corridors and water related recreation"*.
- GEN25: Water Resources: *"Development will only be permitted where the Local Planning Authority is satisfied that adequate water resources are available or will be provided in time to serve the development, and that provision is not considered detrimental to existing abstractions, river flows, water quality, fisheries, amenity or nature conservation."*
- GEN26: Water Quality: *"Development will only be permitted where the Local Planning Authority is satisfied that it would not lead to a deterioration in the quality or potential yield of surface and groundwater resources"*.

## **ARUN DISTRICT COUNCIL SUPPLEMENTARY REQUIREMENTS FOR SURFACE WATER DRAINAGE PROPOSALS<sup>1</sup> (2018)**

- 2.2.3. Arun District Council has provided further supplementary requirements for surface water drainage proposals that must be considered for any proposed surface water drainage scheme.
- 2.2.4. The following order of preference for discharge destination must be in line with the hierarchy of discharge from CIRIA C753: The SuDS Manual, BS8582:2013 – Code of Practice for Surface Water Management for Development Sites, and Approved Document H of the Building Regulations
  - Discharge into the ground (infiltration);
  - Controlled discharge to a surface water body; and
  - Controlled discharge to a surface water sewer.
- 2.2.5. There is no provision within this discharge hierarchy for surface water to be discharged to either a combined or foul sewer. Discharge to surface water bodies and surface water sewers must be restricted to an agreed rate
- 2.2.6. The supplementary guidance states that infiltration devices should be designed in accordance with infiltration rates achieved through percolation test undertaken in line with BRE 365, CIRIA R156 or a similar approved method during the winter period at the location and depth of proposed structures.
- 2.2.7. The requirements state that when discharging to a watercourse or surface water sewer, the rate must be restricted to the greenfield mean annual maximum flood (Q<sub>bar</sub>) by means of a controlled outflow. Attenuation storage features must be designed with groundwater monitoring data in mind to ensure that there is no detrimental impact on the structure or storage from groundwater ingress. Where possible, open form storage such as ponds and basins are to be used in preference to underground tanks.
- 2.2.8. Ditches and watercourses (including culverts) should retain a three metre easement with access that allows for its future maintenance.
- 2.2.9. The drainage design should show flow routes through the proposed development, demonstrating where surface water will be conveyed for three types of flow: Low flow routes, overflows and exceedance routes.

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<sup>1</sup>Supplementary Requirements for Surface Water Drainage Proposals - © Arun District Council 2018  
<https://www.arun.gov.uk/surfacewater> - accessed in 20 June 2018

## **STRATEGIC FLOOD RISK ASSESSMENT, ARUN DISTRICT COUNCIL (2016)**

- 2.2.10. The SFRA was commissioned to update the Strategic Flood Risk Assessment for the District outside of the National Park and replaces the Level 1 and Level 2 SFRA originally published by Arun District Council in February 2008.
- 2.2.11. The SFRA establishes flood risk within Arun District at a strategic level. It does not specifically assess flood risk to the Application Site but gives an overview of the flood risk within the area.

## **WEST SUSSEX PRELIMINARY FLOOD RISK ASSESSMENT (PFRA), MAY 2011**

- 2.2.12. The PFRA provides a high level overview of flood risk from local flood sources (surface water, groundwater, ordinary watercourses and canals). It does not specifically assess flood risk to the Application Site.

## **WEST SUSSEX LOCAL FLOOD RISK MANAGEMENT STRATEGY (LFRMS), MAY 2014**

- 2.2.13. The West Sussex LFRMS (2013 – 2018) sets out how West Sussex County Council carries out its flood risk responsibilities that are a statutory requirement of the Flood and Water Management Act 2010.
- 2.2.14. The Strategy states that all new development near areas of flood risk needs to be appropriate, and requires building design and drainage to be scrutinised to ensure risk is managed acceptably. Development should not be granted permission if proposals will increase flood risk to others.
- 2.2.15. Bognor Regis is one of the higher priority wet spots identified in the LFRMS where risk management authorities will initially prioritise work. It is predicted that 900 properties are at risk from surface water flooding, 1200 properties are at risk from fluvial and coastal flooding and 200 properties are at risk of both fluvial / coastal and surface water flooding.

## **BEACHY HEAD TO SELSEY BILL SHORELINE MANAGEMENT PLAN (SMP), MAY 2006**

- 2.2.16. The Beachy Head to Selsey Bill SMP sets the strategic policy for the management of the coastal defences that protect Bognor Regis. The policy for the next 100 years for the relevant policy unit (Felpham to Aldwick – Unit 23) is to 'Hold the Line' of the existing defences. Therefore it is expected that the coastal defences that protect the Proposed Development will be maintained to their current standard for the next 100 years.

## **ARUN AND WESTERN STREAMS CATCHMENT FLOOD MANAGEMENT PLAN (CFMP), DECEMBER 2009**

- 2.2.17. The site is located within the Coastal Plains policy unit of the CFMP which sets the strategic policy for fluvial flood risk management.
- 2.2.18. The policy for the Coastal Plains policy unit is described as 'Areas of low, moderate or high flood risk where flood risk is being effectively managed but where further actions may be necessary to keep pace with climate change.'

## **WATER.PEOPLE.PLACES – A GUIDE FOR MASTER PLANNING SUSTAINABLE DRAINAGE INTO DEVELOPMENTS**

- 2.2.19. This guidance outlines the process for integrating SuDS into the master planning of developments.
- 2.2.20. The guidance stresses that SuDS should be used as an interconnected system, enabling a 'treatment train' to be used to remove sediment and other pollutants and to reduce to the risk of downstream blockages.
- 2.2.21. The document provides techniques for employing SuDS on a range of sites, several of these techniques are relevant for the Application Site:
  - | SuDS in a floodplain area – during storms and heavy rainfall these areas will naturally flood, making them ineffective for storing surface water runoff. However this does not mean that SuDS cannot be used, as they can be used for routine rainfall. As there is likely to be a high groundwater table and vulnerability to erosion floodplain SuDS should be selected and designed accordingly. Design should limit grading and the creation of surface features that could be washed out in a flood. Surface discharge to SuDS should be dispersed (allowed to shed off as sheet flow) and point discharges minimised or eliminated. Attenuation periods for SuDS should be designed so that SuDS empty within 48 hours of rainfall.

- Examples of suitable SuDS include: green roofs, rainwater harvesting, soakaways, permeable paving, filter strips, bioretention areas and swales

§ SuDS in an area with local surface water flooding issues - it is important to understand if the site is within or upstream of local surface water flood risk areas, as this may make it subject to additional surface water runoff restrictions. The site may influence the placement or design criteria for SuDS and flow and attenuation requirements should be discussed with the Lead Local Authority.

§ SuDS on a site with high groundwater level – the depth of the water table below the ground should be determined, a water table near the surface must be protected from contamination and high groundwater may also cause flooding or damage to SuDS features. SuDS should be designed to be on the surface or shallow in depth and to avoid infiltration. SuDS that normally allow infiltration can be lined with an impermeable liner to prevent infiltration.

- Examples of suitable SuDS include: green roofs, rainwater harvesting, permeable paving (with a liner and underdrain), filter strips, bioretention areas (with a liner and under drain), swales (with a liner), hardscape storage (if above ground), and ponds (with a liner)

§ Use of SuDS on a site with poor permeability – where infiltration is not possible due to permeability or other ground conditions, SuDS should be designed to provide the required attenuation and treatment above ground or near the surface.

- Examples of suitable SuDS include: green roofs, rainwater harvesting, permeable paving, filter strips, bioretention areas, swales, hardscape storage, ponds, wetlands and underground storage.

§ Incorporating SuDS on a site that is mainly paved – a number of SuDS are available. Permeable paving can be used for part of the paved area to drain a larger area. Areas of permeable paving should be the least trafficked and outside of service strips where possible. Hardscape depressions and rills can be used to provide above ground storage and double as a water feature in a courtyard and paved public realm areas. Underground storage is an option but with no amenity benefits. Where neighbourhood character will support additional greenery, bioretention gardens provide a small footprint and double as a landscaped area.

§ Prevent reducing the quality of the receiving body of water – different SuDS provide different types of treatment, and a 'treatment train' of SuDS should be used to ensure water is exposed to a variety of filtration mechanisms and attenuated to allow pollutants to settle out.

§ Designing to integrate with existing ecological areas – initial site surveys should identify areas of interest, including designated areas for nature conservation, areas with protection species and locally important habitats. SuDS should be designed to protect or enhance these areas. SuDS can include areas of habitat; these should be well thought out in terms of long-term maintenance to ensure that habitat is not harmed during maintenance activities.

§ Designing for adoption – adoption discussions should be held early in the design process to ensure that SuDS are designed to the standards required by the adoption authority. Where adoption is uncertain it is beneficial to ensure that design accommodated flexibility and favours simple solution with low maintenance costs.

2.2.22. In sites with a high groundwater level the water table should be protected from contamination. SuDS should be selected and designed to be on the surface or shallow in depth and to avoid infiltration. Alternatively those SuDS that normally allow infiltration can be lined with an impermeable liner to prevent infiltration.

## 3 CLIMATE CHANGE

### 3.1 BACKGROUND INFORMATION

- 3.1.1. The NPPF Flood Risk and Coastal Change Planning Practice Guidance (PPG) states that the lifespan of residential development should be considered to be a minimum of 100 years.
- 3.1.2. The Government's Flood Risk Assessments: climate change allowances guidance states that for peak rainfall intensity, which is applied in the surface water drainage design for the Proposed Development, both the central and upper end allowances should be considered in order to understand the range of impacts that may occur as a result of climate change. Over 100 years, these allowances are 20% and 40% respectively. Refer to <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.
- 3.1.3. The drainage strategy appended to this FRA has been prepared on the basis of calculations using a 40% increase in peak rainfall intensity (Upper end allowance) to ensure that the design is robust and that no properties would flood as a result of surface water generated by the Proposed Development for all storm events up to and including this event.
- 3.1.4. The impacts of climate change on the Proposed Development are discussed in Section 8 of this FRA.
- 3.1.5. The climate change allowances relevant to the Site are summarised in Table 1 below.

**Table 1 - Environment Agency Climate Change Allowances, South East River Basin District**

| Climate Change Estimate                                   | for the '2020s'<br>(2015 to 2039) | for the '2050s'<br>(2040 to 2069) | for the '2080s'<br>(2070 to 2115) |
|-----------------------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Fluvial Flows: Upper End<br>(90 <sup>th</sup> Percentile) | + 25% (peak river flow)           | +50% (peak river flow)            | +105% (peak river flow)           |
| Fluvial Flows: Higher Central                             | +15% (peak river flow)            | +30% (peak river flow)            | +45% (peak river flow)            |
| Fluvial Flows: Central                                    | +10% (peak river flow)            | +20% (peak river flow)            | +35% (peak river flow)            |
| Rainfall: Upper End                                       | +10% (peak rainfall intensity)    | +20% (peak rainfall intensity)    | +40% (peak rainfall intensity)    |
| Rainfall: Central                                         | +5% (peak rainfall intensity)     | +10% (peak rainfall intensity)    | +20% (peak rainfall intensity)    |

| Climate Change Estimate                             | 1990 to 2025 | 2026 to 2055 | 2056 to 2085 | 2086 to 2115 |
|-----------------------------------------------------|--------------|--------------|--------------|--------------|
| Sea Level allowance in mm per year                  | 4 mm         | 8.5 mm       | 12 mm        | 15 mm        |
| Cumulative Sea Level allowance in mm for each epoch | 140 mm       | 255 mm       | 360 mm       | 450 mm       |

## 4 BACKGROUND

### 4.1 SITE LOCATION

- 4.1.1. The Application Site is situated off Hook Lane, Bognor Regis. The Ordnance Survey (OS) grid reference for the Application Site is (494296, 099738) and the nearest post code is PO22 8AT. Refer to Appendix A for the Site Location Plan.
- 4.1.2. The Application Site is bordered by Hook Lane to the north, to a residential dwelling to the west, and by the University of Chichester to the east and south. To the east of the Site for which WSP prepared the Flood Risk Assessment, an extension of the University's Campus is currently under construction which includes student accommodations, an academic building and car park spaces.
- 4.1.3. WSP was commissioned by Counterpoint Properties Ltd. to prepare a site specific Flood Risk Assessment (FRA) including a Drainage Strategy for a Proposed Development at 94 – 100 Hook Lane hereafter referred to as the Application Site. The site is approximately 0.28 hectares (ha) in size. A location plan is provided as in Appendix A.

### 4.2 SITE DESCRIPTION

- 4.2.1. The Application site is approximately 0.28ha and is situated at 94 – 100 Hook Lane, Bognor Regis. The site boundaries extend to the limits of the current curtilage, and the current use of the Site is residential.

**Table 2 - Application Site Characteristics**

| CHARACTERISTIC     | DESCRIPTION                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area               | Approximately 0.28 ha                                                                                                                                                                                                                     |
| General Topography | The site topography is predominantly flat; the ground levels ranging between approximately 1.2 mAOD in the east to approximately 2.2m AOD in the north-west (refer to Drawing 42858-TOP-001 in Appendix A and Site Survey in Appendix D). |
| Existing Surfacing | As noted above, the site is partially covered by hardstanding (mainly the footprint of the existing buildings) and the rest are gardens.                                                                                                  |
| Current Use        | Residential                                                                                                                                                                                                                               |
| Boundaries         | North Hook Lane                                                                                                                                                                                                                           |
|                    | South University of Chichester campus                                                                                                                                                                                                     |
|                    | East University of Chichester campus                                                                                                                                                                                                      |
|                    | West University of Chichester campus under construction                                                                                                                                                                                   |
| Access             | Vehicular access is understood to be provided via Hook Lane.                                                                                                                                                                              |

### 4.3 TOPOGRAPHY AND SITE FEATURES

- 4.3.1. In June 2018 Stuart Bailey Land Surveyor completed a topographic survey for the Application Site. The topographical survey indicates levels on site range from 1.2m in the eastern and south eastern part of the Site and 2.2m in the north-western corner of the Site.
- 4.3.2. The topographic survey did not cover the entirety of the Site, i.e. the properties 96 and 98 Hook Lane were not surveyed.
- 4.3.3. The Environment Agency 1m Digital Terrain Model (DTM) provides the general topography of the surrounding area (refer to Drawing 47808-TOP-001 in Appendix A). The DTM indicates that the land to the north-west and south-west is slightly higher and the general ground levels reduce towards to the east, towards the Aldingbourne Rife.

- 4.3.4. The DTM also shows higher ground adjacent to the Site. The topographic survey however indicates that this is due to a line of trees/vegetation which is not reflected in the DTM data and therefore it shows that the land slopes to the east at that location.

## **4.4 GEOLOGY AND HYDROGEOLOGY**

- 4.4.1. The British Geological Survey (BGS) mapping shows that the Site is underlain by both bedrock and superficial deposits. The bedrock geology consists mainly of the Chalk Formation which is classed as a Principal Aquifer by the Environment Agency. The Lambeth Group (clay, silt and sand) is classified as a Secondary A Aquifer by the Environment Agency and is present in the southern part of the Site. For the bedrock geology refer to Drawing 47808-BGS-001 in Appendix A.
- 4.4.2. Superficial deposits of raised marine deposits (clay, silt, sand and gravel) are cover the Site entirely (refer to Drawing 47808-BGS-002 in Appendix A).
- 4.4.3. Online Government sources (available at [www.magic.gov.uk](http://www.magic.gov.uk) and accessed in June 2018) indicate the Application Site is not within a Groundwater Source Protection Zone (SPZ).
- 4.4.4. The land adjacent to the east of the Site, is owned by the University of Chichester and is currently under construction. WSP undertook the Flood Risk Assessment for the University of Chichester campus extension. This FRA was undertaken in March 2016, has been approved and currently is a publicly available document (Arun District Council planning records - BR/54/16/PL).
- 4.4.5. British Geological Survey borehole records are not available at the Application Site. The closest BGS borehole record is SZ99NW42 located approximately 150m to east of the Site and situated in the Raised marine deposits (refer to Appendix H). The ground materials found in this borehole indicate that the site is underlain by silty clay and sandy silt. Groundwater was found at approximately 2.5m bgl.
- 4.4.6. Site specific ground investigations have not been undertaken at the Site, however, a soil infiltration test for the adjacent site indicated a low infiltration rate for the underlying geology. In the publicly available FRA for the University of Chichester, groundwater monitoring was undertaken on three occasions in December 2015 and the groundwater levels 25m to 40m to the east of the Site were between 0.6m bgl and 0.9m bgl.

## **4.5 EXISTING WATERCOURSES**

- 4.5.1. The Aldingbourne Rife (Main River) runs south approximately 200m to the east of the eastern boundary of the Site.
- 4.5.2. The SFRA Appendix B – Watercourses (refer to Appendix I) shows that an ordinary watercourse runs to the rear of the properties, south-east of the Site. The watercourse starts approximately 200m to the west of the Site and Southern Water asset plan (refer to Appendix E) shows that this watercourse has been culverted by a 750mm surface water sewer; and the outfall is located immediately downstream of the Site. It continues running as an open ditch, through the University of Chichester proposed campus development and it joins another unnamed ordinary watercourse near Felpham Way.

## **4.6 EXISTING FLOOD DEFENCES**

- 4.6.1. Environment Agency correspondence (Appendix C) confirms that no formal Environmental Agency flood defences are in place to protect the Application Site from fluvial flooding. Tidal flood defences are in place and offer a standard of protection equivalent to the 0.5% annual probability tidal event.
- 4.6.2. The Arun District SFRA gives further details of the tidal defences and the associated Felpham pumping station. The Aldingbourne Rife usually discharges beneath the tidal flood defences and across the foreshore through two flapped gravity outfall structures. However, when tidal conditions and river flows dictate, the Felpham pumping station pumps water over the sea wall discharging to a stilling basin on the upper foreshore.

## 4.7 EXISTING SEWER AND DRAINAGE INFRASTRUCTURE

- 4.7.1. Southern Water asset records (Appendix E), obtained in May 2018 indicate that a 150mm diameter foul sewer runs along Hook Lane and continues next to the eastern site boundary in a north-south direction. Near the south-eastern boundaries the 150mm foul sewer follows a south-eastern direction.
- 4.7.2. A 600mm diameter foul sewer runs to the south-east; and is located to the southern site boundary.
- 4.7.3. A 750mm diameter surface water sewer is present at the southern site boundary which discharges into an unnamed watercourse to the southeast of the site. The flow direction of both the surface water sewer and the ditch is understood to be to the east.

## 4.8 HISTORIC FLOOD RECORDS

- 4.8.1. Table 3.2 summarises the historic flood records obtained through consultation and liaison with the various bodies contacted in the production of this FRA.

**Table 3 – Historic Flood Records**

| Information Source         | Flood records / Details                                                                                                                                          |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment Agency         | Environment Agency correspondence confirms that they have no records of previous flood events affecting this site.                                               |
| West Sussex County Council | The LLFA was contacted on 21 June 2018 regarding historic flood records and surface water drainage. Response was not received at the time of preparing this FRA. |
| Arun District Council      | Arun District Council does not hold historic flood records at the Site.                                                                                          |

## 5 PROPOSED DEVELOPMENT

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- 5.1.1. Outline planning permission is sought for a Proposed Development comprising 6 residential units and an access road. The preliminary layout of the Proposed Development has been produced by Crossley Design Architecture and is included in Appendix C.
- 5.1.2. The residential housing development is proposed in the rear gardens of properties 96, 98 and 100 Hook Lane.
- 5.1.3. The proposals include the removal of the existing property on 94 Hook Lane for the construction of an access road for the new houses. The proposed residential dwellings comprise one bungalow and five 1.5 and 2 storey houses. Each property has a rear garden which extends to the site boundary.
- 5.1.4. A vehicular access will be provided through the access road connected to Hook Lane. The proposal also incorporates space for vehicle turning in the central part of the Site.

## 6 SEQUENTIAL AND EXCEPTION TEST

### 6.1 INTRODUCTION

- 6.1.1. The purposes of the Sequential Test is to ensure that land use planning takes due regard of flood risks, to ensure that areas at low or no risk of flooding are developed in preference to areas at higher risk.

### 6.2 VULNERABILITY CLASSIFICATION

- 6.2.1. The vulnerability classification is defined as Table 3, as part of the PPG Flood Risk and Coastal Change. The purpose of the vulnerability classification is to identify appropriate land use activities relative to the level of flood risk.
- 6.2.2. Within Table 2 (Flood Risk Vulnerability Classification) of the NPPF Planning Practice Guidance, the Proposed Development is classified as 'More Vulnerable' as it provides residential development.

### 6.3 FLOOD ZONE DEFINITION

- 6.3.1. According to the Environment Agency's Flood Map for Planning, the Proposed Development is located in Flood Zone 3.

### 6.4 COMPATIBILITY TEST

- 6.4.1. The PPG identifies different land use vulnerabilities that are appropriate within each of the Flood Maps for Planning flood risk classification, see Table 4 below.

**Table 4 - Flood risk vulnerability and flood zone compatibility (PPG Table 3)**

| Flood Zone | Essential Infrastructure   | Highly Vulnerable                   | More Vulnerable                     | Less Vulnerable                     | Water Compatible           |
|------------|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------|
| Zone 1     | Development is appropriate | Development is appropriate          | Development is appropriate          | Development is appropriate          | Development is appropriate |
| Zone 2     | Development is appropriate | Exception test required             | Development is appropriate          | Development is appropriate          | Development is appropriate |
| Zone 3A    | Exception test required    | Development should not be permitted | Exception test required             | Development is appropriate          | Development is appropriate |
| Zone 3B    | Exception test required    | Development should not be permitted | Development should not be permitted | Development should not be permitted | Development is appropriate |

- 6.4.2. Arun District Council SFRA indicates that the Application Site is entirely within Flood Zone 3A (refer to Appendix I).

### 6.5 CONCLUSION ON THE SEQUENTIAL AND EXCEPTION TESTS

- 6.5.1. As the Proposed Development is allocated within Flood Zone 3A, and in order to develop this land, the Exception Test is required.

The Exception Test requires the proposed development to show that:

- It will provide wider sustainability benefits to the community outweigh flood risk and issues of wider sustainability benefits to the community are addressed by the wider supporting planning application documents;
- It will be safe for its lifetime without increasing flood risk elsewhere and where possible reduce flood risk overall.

Part 2 of the Exception Test is covered by this FRA. Part 1 should be considered by the Local Planning Authority on the basis of the supporting information presented in the planning application.