



Former Waitrose, Littlehampton

Flood Risk Assessment

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This document has been prepared and checked in accordance with
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Comments

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Executive Summary

Waterman has been commissioned by Ropemaker Properties Ltd to undertake a Flood Risk Assessment in relation to the proposed development located at the former Waitrose site at Avon Road, Littlehampton.

Environment Agency mapping indicates that the south eastern part of the Site is located partially within Flood Zones 2 and 3, indicating a medium to high probability of flooding from tidal and/or fluvial sources. The remainder of the Site is located within Flood Zone 1 denoting a low probability of tidal and/or fluvial flooding.

The remainder of the Site would also be at risk of flooding during the future 1 in 200 year event for the year 2115 due to sea level rise caused by climate change. To mitigate against this risk, all more vulnerable residential finished floor levels would be set at 5.20m AOD, 310mm above the future flood level, in accordance with planning policy.

The risk of flooding from fluvial, groundwater and artificial sources has also been assessed and found to be low. There is a risk of pluvial (surface water) flooding in East Street just beyond the south east boundary of the Site with the potential for flows to exceed the kerbs in extreme events. Flood resilience measure would be incorporated to mitigate the potential risk to the retail unit/community space proposed at this location.

Surface water from the proposed development would discharge to the surface water sewer located within Avon Road, as per the existing situation. As works to Avon Road would only comprise minor resurfacing and the drainage would be retained as existing, this has been excluded from the proposed drainage strategy.

The existing runoff rate for the Site (excluding Avon Road) has been calculated to be 61.5 l/s. It is proposed to restrict discharge to 10 l/s, providing a betterment of 84%. Based on this restriction, a total of approximately 253m³ of attenuation storage would be required.

Buildings 1 and Building 2 and 3, are separated by Avon Road and so have been designed as two separate drainage catchments for ease of operation and maintenance. Catchment 1 (south) would require 113m³ of storage and Catchment 2 (north) would require 89m³ of storage, which would be provided in a geo-cellular attenuation tanks in each plot, in addition to permeable surfacing, small integrated swales, and rain gardens.

The pollution hazard level of surface water runoff from the development is classified as 'very low' for the residential roofs and 'low' for the car park and highway. Appropriate treatment would be incorporated through the use of Sustainable Drainage Systems, to ensure that the quality of water discharged is acceptable. This would be provided through the use of pervious surfacing (e.g. permeable tarmac or block paving) used in conjunction with sub-base storage and a shallow permavoid system, green roofs and rain gardens and small swales. This report sets out the principles of the Sustainable Drainage System, however, the final strategy would be confirmed at the detailed design stage.

The on-site drainage network and Sustainable Drainage System would be managed and maintained for the lifetime of the development by an appropriate managing body, ensuring that it remains fit for purpose and functions appropriately.

Foul flows from the Site would discharge by gravity to the Southern Water combined sewer network. The existing and proposed foul discharge rates have been calculated using the water consumption method to be 0.8 l/s and 0.5 l/s respectively.

This report demonstrates that the proposed development has a low probability of flooding from tidal, fluvial, pluvial, groundwater and artificial sources, and confirms that surface water runoff can be managed sustainably to ensure that flood risk is not increased elsewhere. It is considered that the information provided within this report satisfies the requirements of the National Planning Policy Framework and Local Policy.

1. Introduction

- 1.1. Waterman has been commissioned by Ropemaker Properties Ltd to undertake a Flood Risk Assessment (FRA) in relation to the proposed redevelopment at the former Waitrose site (hereafter referred to as 'the Site'), located on Avon Road, Littlehampton, BN17 6AT.

Site Description

- 1.2. The Site is approximately 0.559 hectares (ha) in size and currently comprises a former Waitrose supermarket building to the south, a car park to the north and an alleyway to the west of the Waitrose building (Figure 1). The Site is bounded by Franciscan Way to the north, East Street to the East, Anchor Springs to the South, and existing buildings to the west. The Site is bisected by Avon Road, running east to west.

Figure 1: Site Location Plan



Key



Site Boundary

Source: Google Maps

- 1.3. The topographic survey (Appendix A) indicates that ground levels across the Site generally fall in an easterly direction. Levels surrounding the existing Waitrose building fall from approximately 4.79m AOD in the west to 2.00m AOD in the east. Avon Road falls from 5.55m AOD at the junction with Duke Street to 2.25m AOD at East Street. The car park in the north of the Site falls from around 5.93m AOD in the north-western corner to 4.45m AOD adjacent to the eastern boundary.

Development Proposals

- 1.4. The development proposals (Appendix B) comprise the demolition of the existing disused Waitrose building and redevelopment of the site comprising 50 residential units and flexible commercial

floorspace together with the provision of car and cycle parking, landscaping and associated works.

Scope of Report

- 1.5. This report assesses the potential effects of tidal, fluvial, pluvial (surface water), groundwater and artificial sources of flooding upon the development, in line with national and local planning policy. The management of surface water drainage has also been assessed, and a strategy to effectively manage runoff whilst working within the Site-specific constraints is proposed, so as not to increase flood risk elsewhere.

2. Planning Policy and Guidance

National Planning Policy Framework

- 2.1. The National Planning Policy Frameworkⁱ (NPPF) states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- 2.2. The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.
- 2.3. If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), it may be necessary to demonstrate through the Exception Test that:
- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - 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.
- 2.4. The NPPF states that when determining planning applications, Local Planning Authorities (LPA) should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific Flood Risk Assessment. Development should only be allowed in areas at risk of flooding where it can be demonstrated that:
- Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
 - The development is appropriately flood resistant and resilient;
 - It incorporates Sustainable Drainage Systems (SuDS), unless there is clear evidence that this would be inappropriate;
 - Any residual risk can be safely managed; and
 - Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.
- 2.5. Major developments should incorporate SuDS unless there is clear evidence that this would be inappropriate. The systems used should:
- Take account of advice from the lead local flood authority;
 - Have appropriate proposed minimum operational standards;
 - Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - Where possible, provide multifunctional benefits.

Planning Practice Guidance

- 2.6. The Planning Practice Guidance (PPG)ⁱⁱ provides additional guidance to LPAs to ensure effective implementation of the planning policies set out within the NPPF regarding development in areas at risk of flooding.
- 2.7. The PPG states that developers and LPAs should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS. Referencing information provided by the EA, the PPG provides advice on taking account of climate change, setting out recommended contingency allowances for net sea level rise and peak rainfall intensities, which should be increased by between 5% and 105% from now until the year 2115. It also advises on flood resilience and resistance measures when dealing with the residual risks remaining after applying the sequential approach and mitigating actions.
- 2.8. The PPG also includes advice on flood risk vulnerability and flood zone compatibility. The following flood zones refer to the probability of river and sea flooding, without the presence of defences:
- Zone 1 - low probability: less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year;
 - Zone 2 - medium probability: between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% to 0.1%) in any year;
 - Zone 3a - high probability: 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability flooding from the sea (>0.5%) in any year; and
 - Zone 3b - the functional floodplain: where water has to flow or be stored in times of flood; identification should take account of local circumstances but would typically flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme 1 in 1,000 (0.1%) flood.
- 2.9. Flood risk vulnerability is split into five classifications in Table 2 of the PPG, as follows, and the compatibility of these within each Flood Zone is set out in Table 3 of the PPG:
- Essential Infrastructure, e.g. essential transport and utility infrastructure, wind turbines;
 - Highly Vulnerable, e.g. emergency services (those required to be operational during flooding), basement dwellings;
 - More Vulnerable, e.g. residential dwellings, hospitals, schools, hotels, drinking establishments;
 - Less Vulnerable, e.g. retail, offices, storage and distribution, leisure, restaurants; and
 - Water-Compatible Development, e.g. docks, marinas, wharves.

Sequential and Exception Test

- 2.10. Although the Site is not specifically allocated for housing within the Arun Local Plan, it does fall within the Littlehampton Neighbourhood Plan area, which aims to provide 200 new homes by 2029. Furthermore, the Site is located within the Littlehampton Economic Growth Area which aims to deliver sustainable economic growth and unlock opportunities for new homes. The proposed Development would therefore meet the aims of these two plans and therefore it is considered that the Site has passed the Sequential Test.

- 2.11. As 'More Vulnerable' uses are proposed, namely residential uses, the Exception Test would also need to be satisfied.
- 2.12. In line with the requirements of the NPPF, the Development includes sustainability measures, outlined in the Sustainability: Energy and Renewable Strategy Reportⁱⁱⁱ, which are considered to outweigh the risk of flooding. These include:
- High efficiency gas-fed community heating system for space heating and domestic hot water;
 - High efficiency mechanical ventilation systems with heat recovery (MVHR);
 - Low energy passive design measures and efficient building services to reduce carbon emissions; and
 - Inclusion of photovoltaic panels.
- 2.13. The second requirement is that the Development must be safe and not increase flood risk to others, which is covered in the remainder of this report.

Arun Local Plan

- 2.14. The Arun Local Plan^{iv} was adopted in July 2018. It sets out the vision for Arun up to the year 2031 and beyond. The plan provides the strategic vision, objectives, policies and proposals which encourage sustainable development and manage future growth across the district up to 2029 and beyond.
- 2.15. Policy W DM2, regarding flood risk states that development in areas at risk from flooding will only be permitted where all of the following criteria have been satisfied:
- a. "The sequential test in accordance with the National Planning Policy Framework Technical Guidance has been met;*
 - b. A site specific Flood Risk Assessment demonstrates that the development will be safe, including access and egress, without increasing flood risk elsewhere and reduce overall flood risk;*
 - c. The sustainability benefits to the wider community are clearly identified;*
 - d. The scheme identifies adaption and mitigation measures;*
 - e. Appropriate flood warning and evacuation plans are in place; and*
 - f. New site drainage systems are designed to take account of events which exceed the normal design standard i.e. consideration of flood flow routing and utilising temporary storage areas."*
- 2.16. Policy W DM3 covers the use of Sustainable Drainage Systems (SuDS). This policy requires all development to identify opportunities to incorporate a range of SuDS at an early stage in the design process. Major development proposals must incorporate SuDS within public open spaces and roads, integrate them into the overall design and they must:
- a. "Contribute positively to the appearance of the area;*
 - b. Effectively manage water (including its quality);*
 - c. Accommodate and enhance biodiversity by making connections to existing Green Infrastructure assets;*
 - d. Provide amenity for local residents (ensuring a safe environment);*

- e. Retain the existing drainage network of the site and the wider area; and*
 - f. Be maintained in perpetuity, supported through a maintenance and management plan/regime, including its financing, agreed with the Local Planning Authority."*
- 2.17. In order to ensure that SuDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:
- f. "Follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SuDS manual produced by CIRIA.*
 - g. Undertake up to six months groundwater monitoring within the winter period.*
 - h. Undertake winter percolation testing in accordance with BRE365.*
 - i. The proposed drainage system must be designed to ensure that there is no flooding on a 1 in 30 year storm event.*
 - j. The design must also take account of the 1 in 100 year storm event plus 30% allowance for climate change, on stored volumes, to ensure there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary, and within designated storage areas.*

Arun Strategic Flood Risk Assessment

- 2.18. The Arun District Council (ADC) Level 1 and 2 SFRA^v was published in November 2016. The 2016 SFRA was carried out to take into consideration the latest flood risk policy following key changes to policy and guidance, and the latest flood risk information published since the previous SFRA was carried out.
- 2.19. The 2016 SFRA provides a comprehensive set of maps presenting information on flood risk from all sources that can be used as part of the evidence base for the Local Plan, and to provide initial flood risk analysis information for sites identified by ADC as part of the preparation of the Local Plan.
- 2.20. Additionally, it provides a framework for future flood risk analysis of future potential development locations and for the performance of the Sequential Testing of sites and, where necessary, the consideration of the Exception Test.

West Sussex Local Flood Risk Management Strategy

- 2.21. The West Sussex Local Flood Risk Management Strategy^{vi} (LFRMS) was finalised in May 2014. It sets out how West Sussex County Council carries out its responsibility in regard to flood risk. The overall aim of the LFRMS is to ensure that the risk from flooding and erosion is properly managed by using the full range of options in a coordinated way, and to summarise flood risk knowledge.

West Sussex Preliminary Flood Risk Assessment

- 2.22. The West Sussex Preliminary Flood Risk Assessment (PFRA)^{vii} was published in May 2011. The aim of the PFRA is to provide a high level overview of flood risk from local sources such as surface water, groundwater, ordinary watercourses and canals.
- 2.23. As a part of the PFRA, flood risk data and records of historic flooding were collected from both local and national sources including the seven district and borough councils, the EA, water companies, emergency services and other risk management authorities.

Non-statutory Technical Standards for Sustainable Drainage Systems

- 2.24. The Non-Statutory Technical Standards for Sustainable Drainage Systems^{viii} was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.
- 2.25. The standards set out that the peak runoff rates should be as close as is reasonably practicable to the greenfield rate, but should never exceed the pre-development runoff rate.
- 2.26. The standards also set out that the drainage system should be designed so that flooding does not occur on any part of the Site for a 1 in 30 year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100 year rainfall event.
- 2.27. It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

Water Industry Act

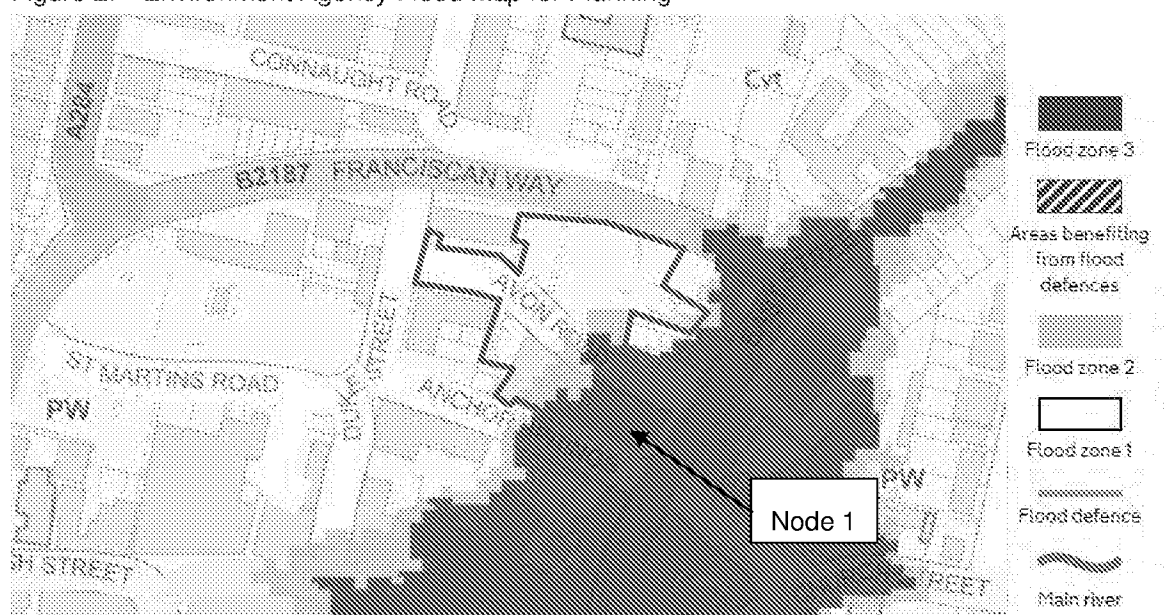
- 2.28. Southern Water is the local Sewerage Undertaker and provides sewerage services under the guidance of the Water Industry Act 1991.
- 2.29. Under Section 106 of the Water Industry Act, the developer currently maintains the automatic right to 'communicate' with the public foul water sewer system.

3. Sources of Potential Flooding

Tidal and Fluvial

- 3.1. The nearest waterbody to the Site is the River Arun, located approximately 380m to the southwest of the Site and is tidal at this location. The EA's Flood Map for Planning (Figure 2) indicates that the south-east part of the Site is located within Flood Zones 2 and 3, denoting a medium to high probability of flooding from tidal and/or fluvial sources. The northwest part of the Site is shown to be located within Flood Zone 1, denoting a low probability of flooding from tidal and/or fluvial sources.
- 3.2. The nearest fluvial waterbody to the Site is the Wick Farm Ditch, located over 900m to the west. It is therefore considered that the primary source of flood risk to the site is tidal and the risk of fluvial flooding is low.

Figure 2: Environment Agency Flood Map for Planning



Key

 Site Boundary

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

Overtopping

- 3.3. The EA records show that the Site is protected up to the 1 in 75 year flood event by defences along the banks of the River Arun. The EA have confirmed (Appendix C) that the current flood defence level in the area ranges from 3.39m AOD downstream to 3.94m AOD upstream. The EA have stated that the defences in this are man-made and privately maintained and are of a 'good' condition.
- 3.4. EA records (Appendix C) provide modelled still water levels for a range of return periods up to the future 1 in 1000 year event for both defended and undefended scenarios. Modelled flood levels are provided in Table 1 below, the approximate location of Node 1 is shown on Figure 1.

Table 1: Environment Agency Modelled Water Levels (m AOD)

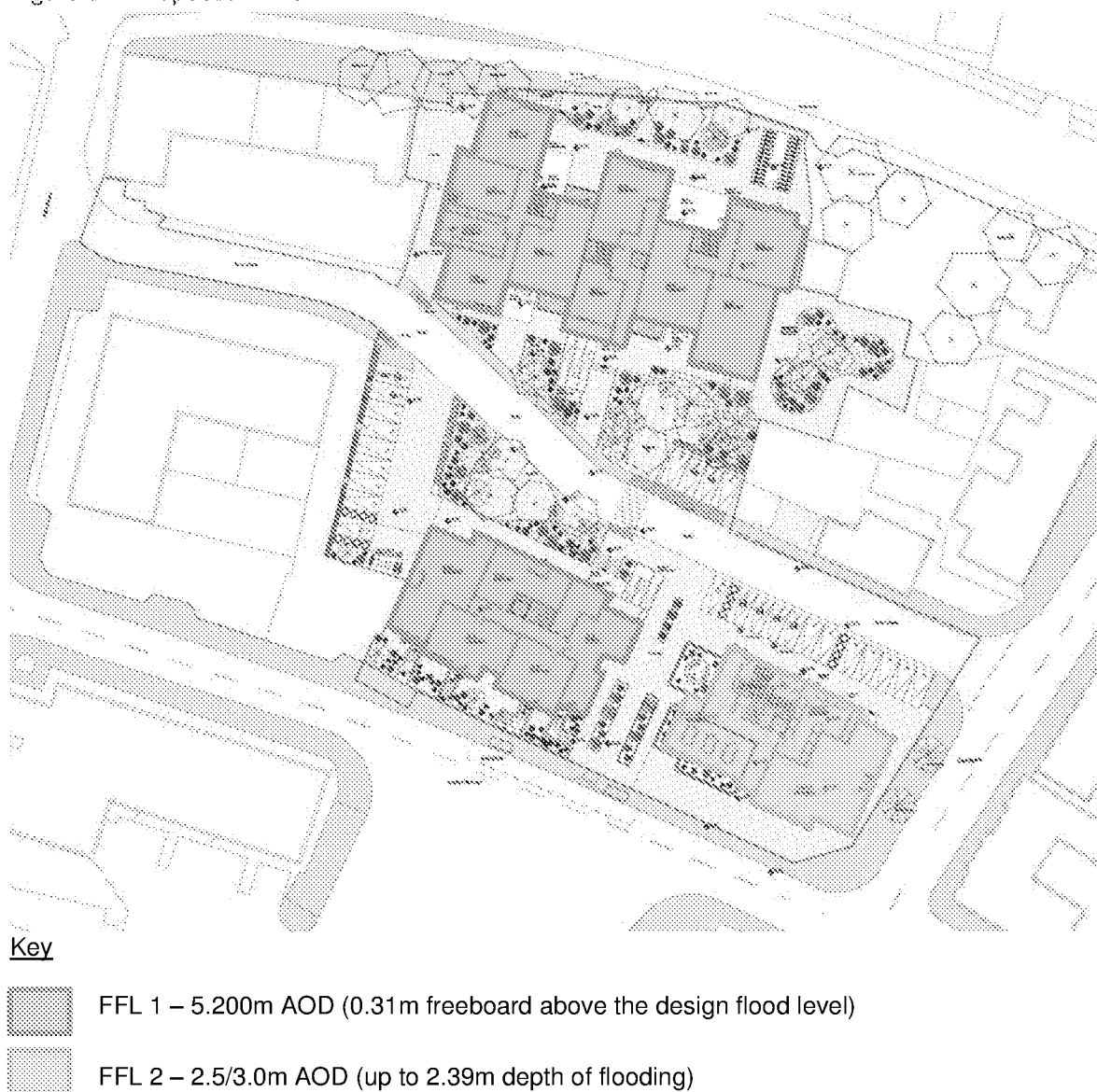
Scenario	1 in 200 year (Present Day)	1 in 1000 year (Present Day)	1 in 200 year (2115)	1 in 1000 year (2115)
Defended	No Flooding	2.94	4.89	5.09
Un defended	3.74	4.05	4.94	Not modelled

- 3.5. Based on the modelled flood levels provided by the EA for the defended scenario, the Site would not be affected by flooding in the present data 1 in 200 year tidal flood event, however it could be affected by flooding to a level of 2.94m AOD in the present day 1 in 1000 year event. When accounting for the impacts of climate change up to the year 2115, the Site could be affected by a flood level of 4.89m AOD in the 200 year event and 5.09m AOD in the 1000 year event.

Management and Mitigation

- 3.6. The defended 2115 1 in 200 year flood level of 4.89m AOD is considered to be the 'design flood level' and has been used to compare the proposed FFLs against. It is worth noting however that consideration has also been given to the 2115 1 in 1000 year defended scenario and the 2115 1 in 200 year undefended scenario, both of which would be below the proposed FFLs.
- 3.7. In order to protect the proposed residential units from tidal flooding, the proposed ground floor finished floor levels (FFL) have been raised to 5.2m AOD. This is summarised in Figure 2 below and on the development proposals in Appendix B. This ensures that the residential elements of the development would remain free of flooding over its lifetime, providing 0.31m and 0.11m freeboard above the 1 in 200 and 1 in 1000 year flood events respectively to the year 2115.
- 3.8. In line with guidance on reducing flood risk contained within the Arun SFRA, the minimum FFL may change depending on the vulnerability of the development. As retail units/community space would be classed as 'less vulnerable' the FFL has therefore been set at a lower level (between 2.5m and 3.0m AOD). In the event of a flood, any users of the retail these areas would be able to make their way a short distance to the north to areas above the flood level or to the first floor.
- 3.9. The FFL of the retail unit/community space would be set at between 2.5m and 3.0m AOD, indicating that these areas would remain free of flooding during the present day 1 in 200 year event due to the presence of the defences, however they could flood to depths of up to 0.56m during the 1 in 1000 year event. When accounting for the effects of climate change to the year 2115, the retail unit/commercial space could experience flooding to a depth of 2.39m and 2.59m during the 1 in 200 and 1 in 1000 year events respectively, based on the EA's model data.
- 3.10. To reduce potential damage caused to the retail units/community by a flood event, flood resilient construction would be incorporated to minimise the clean-up required. Potential flood resilience measures include concrete/tiled floors, horizontal plasterboard and raised electrical plug sockets. Furthermore, it is recommended that the businesses sign up to the EA's Flood Warning Service. The final proposed measures would be confirmed at the detailed design stage.
- 3.11. It is therefore considered that whilst parts of the Site are at risk of tidal flooding, the 'more vulnerable' areas would be protected throughout the lifetime of the development. The retail units/community space would be at risk of flooding during and above the present day 1 in 1000 year flood event, however mitigation measures would be incorporated to reduce the potential damage caused by flooding.

Figure 3: Proposed FFLs



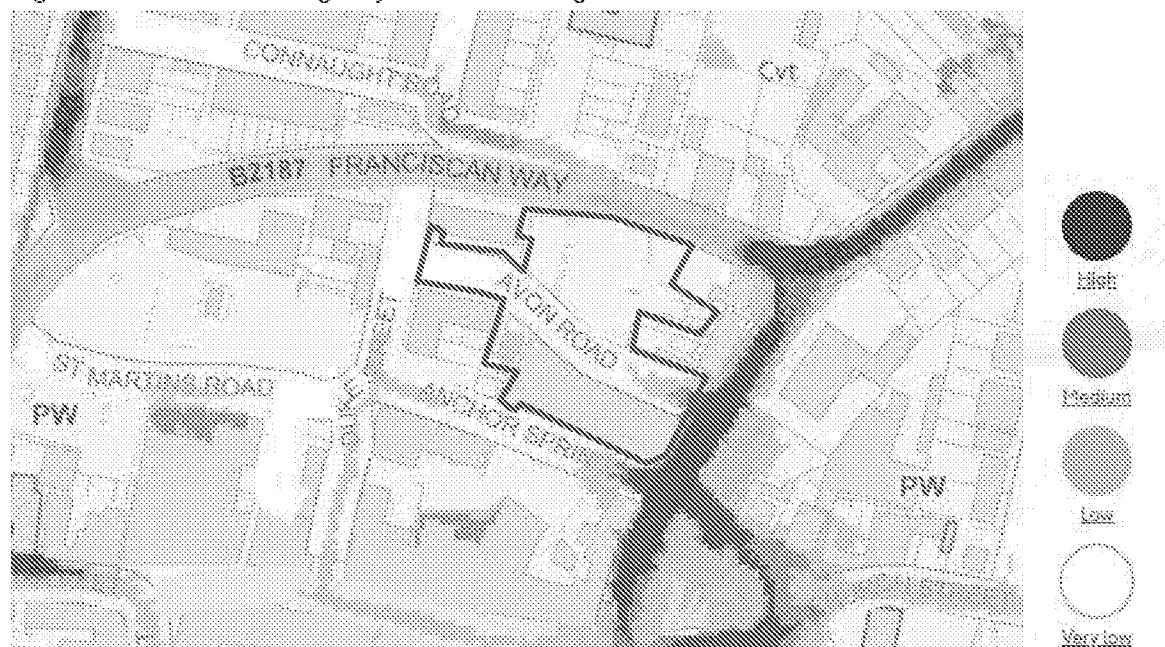
Source: <https://flood-map-for-planning.service.gov.uk>

Pluvial

- 3.12. Pluvial flooding, also known as surface water flooding, occurs when natural and engineered drainage systems have insufficient capacity and are overwhelmed by the volume of rainfall. Pluvial flooding can occur in urban areas during extreme, high intensity, low duration summer rainfall events, or in rural areas during medium intensity, long duration events where saturated ground conditions prevent infiltration into the subsoil. This flood water would then be conveyed via overland flow routes dictated by local topography.
- 3.13. The EA's Risk of Flooding from Surface Water map (Figure 3) indicates that the majority of the Site is at 'very low' risk of flooding from surface water. However, there are areas of 'low' risk within

Franciscan Way to the north and the alleyway to the south of the Site, and an area of 'low' to 'high' risk within East Street and the eastern end of Avon Road.

Figure 4: Environment Agency Risk of Flooding from Surface Water



Key

 Site Boundary

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

- 3.14. Further interrogation of the EA's detailed Risk of Flooding from Surface Water mapping indicates that during the 'high' risk (greater than 1 in 30 chance of occurring within any given year) and 'medium' risk (1 in 100 to 1 in 30 chance of occurring in any given year) scenarios, Franciscan Way, Avon Road and Anchor Springs would remain free of flooding, however, East Street would be at risk of flooding up to a depth of 0.9m.
- 3.15. Based on the proposed ground floor FFL of 5.2m AOD, the residential elements of the Site would be protected from pluvial flooding within East Street. It is anticipated that the flood water within Franciscan Way flow in an easterly direction towards East Street and would be contained within the highway due to the raised kerb. There is the potential for the retail unit to be affected by surface water flooding if flood water exceeded the kerbs, however the flood resilience measures outlined in paragraph 3.10 would limit any potential damage caused.
- 3.16. Appendix H of the ADC SFRA (Appendix D) indicates that there have been two incidents of surface water flooding in the areas surrounding the Site, however, the closest was located approximately 180m to the south.
- 3.17. Southern Water (Appendix E) have confirmed that they do not hold any records of sewer incidents or flooding at the Site.
- 3.18. It is therefore considered that whilst areas in the vicinity of the Site are at risk of pluvial flooding the risk to the proposed buildings would be managed appropriately.

Groundwater

- 3.19. The Site's underlying geological profile has been determined through a review of the British Geological Survey (BGS) online 'Geology for Britain' Mapping and historic borehole data. There are no borehole records present within the Site boundary, however, there are several present within a 500m radius of the Site. The BGS records indicate that the Site geology is likely to comprise clay underlain by sand. The bedrock geology at this location is Lewes Nodular Chalk Formation.
- 3.20. Based on the BGS borehole records, groundwater has been observed at depths between 1.8m and 4.6m below ground level.
- 3.21. Appendix F of the SFRA (Appendix D) indicates that the Site is located within an area with greater than or equal to 75% susceptibility to groundwater flooding.
- 3.22. The development proposals do not include a basement that may impact the flow of groundwater beneath the Site, and therefore it would not result in groundwater flooding in the vicinity.
- 3.23. The risk of groundwater flooding to the Site itself and the impact of the development on groundwater flooding to others is therefore considered to be low.

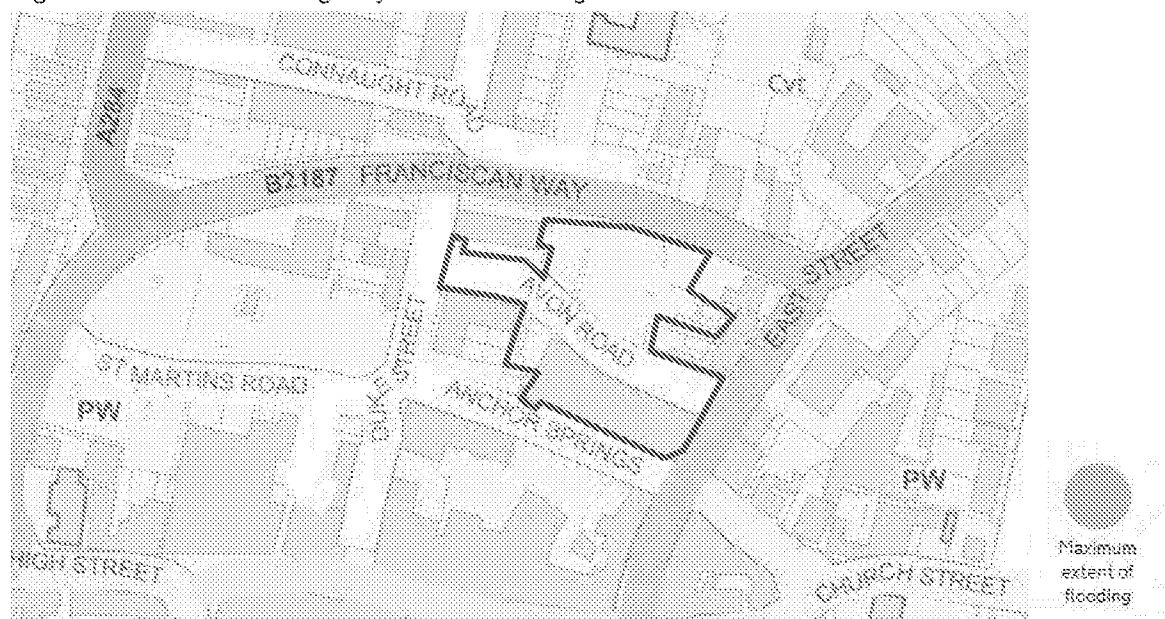
Artificial Sources

- 3.24. The EA's online Risk of Flooding from Reservoirs mapping (Figure 4 overleaf) depicts the largest extent that could potentially be affected by flooding if a reservoir were to fail. This map indicates that the Site lies outside of the maximum extent of the flooding and is therefore at low risk of flooding from a reservoir failure.
- 3.25. The SFRA identifies only one canal within the Arun District Council boundary, namely the Portsmouth to Arundel Canal. However, this canal is not within the vicinity of the Site. Therefore, the risk of flooding from artificial sources is considered to be low.

Summary

- 3.26. The Site is considered to be at low risk of flooding from fluvial, groundwater and artificial sources of flooding. There will be a risk of tidal flooding due to future sea level rise and also the potential for pluvial flooding at East Street but this would not affect the 'more vulnerable' residential units and can be mitigated through design for the retail/community elements. The potential for the Development to increase flood risk through increasing surface water runoff is discussed in Chapter 4.

Figure 5: Environment Agency Risk of Flooding from Reservoirs



Key

 Site Boundary

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

4. Surface Water Drainage

Existing Drainage

- 4.1. Southern Water records indicate several sewers within the vicinity of the Site, as shown in Table 2.

Table 2: Existing Drainage

Location	Sewer
Avon Road	150 to 300mm surface water sewer
Duke Street	225mm foul sewer
East Street	900mm foul sewer

Proposed Drainage

- 4.2. The proposed drainage system would be designed to convey surface and foul water separately. The design would be in accordance with BS EN 752 - Drain and Sewer Systems Outside Buildings^{ix}, BS EN 12056 – Gravity Drainage Systems Inside Buildings^x, and Approved Document H of Building Regulations^{xi}.
- 4.3. In line with Building Regulations and the PPG, the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference.
- I. Discharge to ground;
 - II. Discharge to surface water body;
 - III. Discharge to a surface water sewer; and
 - IV. Discharge to a combined sewer.

Discharge to Ground

- 4.4. The presence of clay beneath the Site would preclude the potential for infiltration.

Discharge to a Surface Water Body

- 4.5. The nearest waterbody to the Site is the River Arun, located approximately 380m to the south west. Given the distance from the Site and the requirement to cross third party land, discharging directly to this waterbody would not be feasible.

Discharge to a Sewer

- 4.6. Southern Water records show that several sewers are present in the vicinity of the Site (see Table 2). It is expected that the existing Site discharges into this network. It is therefore proposed that surface and foul water from the Development continues to discharge into this sewer network as per the existing situation.

Sustainable Drainage Systems

- 4.7. The most sustainable way to drain surface water runoff is through the use of sustainable drainage systems (SuDS), which need to be considered in relation to site-specific constraints.

- 4.8. SuDS mimic the natural drainage system and provide a method of surface water drainage which can decrease the quantity of water discharged, thereby reducing the risk of flooding. In addition to reducing flood risk, SuDS features can improve water quality, and provide biodiversity and amenity benefits.
- 4.9. A variety of SuDS are available to reduce or temporarily attenuate the discharge of surface water runoff. The potential for SuDS was considered throughout the development. Table 3 outlines the potential SuDS devices and their constraints and opportunities at the Site.

Table 3: SuDS Features Constraints

Device	Description	Constraints/Comments	✓/✗
Green/brown roofs (source control)	Provide soft landscaping at roof level which reduces surface water runoff.	There are no constraints to the incorporation of green/brown roofs within the non-pitched areas.	✓
Infiltration devices & Soakaways (source control)	Store runoff and allow water to percolate into the ground via natural infiltration.	The underlying geology at the Site precludes the potential for infiltration.	✗
Pervious surfaces (source control)	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can infiltrate and/or slowly discharge into sewers.	There are no constraints to the incorporation of pervious surfaces.	✓
Rainwater harvesting (source control)	Reduces the annual average rate of runoff from the site by reusing water for non-potable uses e.g. toilet flushing or water butts.	There are no constraints to the incorporation of rainwater harvesting. however, the reduction of surface water runoff cannot be quantified with certainty as this would be dependent on the demand for harvested water.	✓
Swales (permeable conveyance)	Broad, shallow channels that convey/store runoff, and allow infiltration (ground conditions permitting)	The underlying geology at the Site precludes the potential for infiltration. Whilst there is not sufficient space for traditional swales there are opportunities to integrate small swales within the landscaping/rain gardens.	✓
Filter drains & perforated pipes	Trenches filled with granular materials (which are designed to	The underlying geology at the Site precludes the	✗

(permeable conveyance)	take flows from adjacent impermeable areas) that convey runoff while allowing infiltration (ground conditions permitting).	potential for infiltration	
Filter strips (permeable conveyance)	Wide, gently sloping areas of grass or dense vegetation that remove pollutants from runoff from adjacent areas.	The underlying geology at the Site precludes the potential for infiltration. Furthermore, there is not sufficient space for filter strips to be incorporated	×
Infiltration basins (end of pipe treatment)	Depressions in the surface designed to store runoff and allow infiltration through the base.	The underlying geology at the Site precludes the potential for infiltration. Additionally, the limited space available at the site would make infiltration basins unfeasible.	×
Bio-retention systems/ rain garden (end of pipe treatment)	A shallow landscaped depression which allows runoff to pond temporarily on the surface before filtering through vegetation and underlying soils.	There are no constraints to the incorporation of rain gardens on Site, however, the underlying geology precludes the potential for infiltration. As such, the rain garden would discharge into the local sewer network.	✓
Dry ponds (end of pipe treatment)	Depressions in the surface designed to store runoff without infiltration through the base.	The limited space available at the site would make ponds unfeasible.	×
Underground attenuation (end of pipe treatment)	Oversized pipes or geo-cellular tanks designed to store water below ground level.	There are no constraints to the incorporation of underground attenuation at the Site.	✓

Green/Brown Roofs

- 4.10. Green/brown roofs would provide a bio-diverse habitat in addition to capturing rainwater and naturally slowing the rate of runoff. Green roofs are proposed on the flat areas of roof (Appendix B).

Pervious Surfaces

- 4.11. Pervious surfaces allow for the infiltration of runoff through otherwise impermeable surfaces such as roads and pavements. Pervious surfacing is proposed across large areas of the Site (Appendix F), the attenuation capacity of the pervious surfacing however has not been considered as there is a reasonable level drop across the Site, this would be confirmed at detailed design.

Rainwater Harvesting

- 4.12. The inclusion of rainwater harvesting would reduce the demand on potable water and would be used for irrigation of planting. Water butts would be incorporated into the development within some of the residential terraces, however, the demand for harvested water is uncertain and it cannot be guaranteed that an empty tank would be available prior to a high intensity rainfall event, when the storage is most required. Therefore, rainwater harvesting has not been taken into consideration in the surface water runoff calculations presented later in the drainage strategy. This would be investigated further at the detailed design stage.

Rain Gardens

- 4.13. Rain gardens are areas of planting where surface water can infiltrate naturally through the vegetation and soil, providing treatment and removing pollutants before being conveyed into the local surface water sewer network. The location and feasibility of rain gardens would be reviewed and confirmed at detailed design, however the use of them would be maximised across the proposed landscaped areas.

Swales

- 4.14. The inclusion of small integrated swales provides both biodiversity and water quality benefits to the Development. The swales would not only provide attenuation and treatment of runoff, but they would act as an important amenity feature for users of the Development. The exact size and location of swales would be confirmed post-planning.

Underground Attenuation

- 4.15. Due to the limited undeveloped space on the Site, the majority of storage would be provided by underground attenuation. One attenuation tank is proposed for the northern catchment and one for the southern catchment and would discharge to the Southern Water sewer network by gravity. As the detailed design develops the size of these tanks could potentially be reduced once the final locations and sizes of SuDS features has been confirmed post-planning.
- 4.16. If required, the tank could include pollutant-intercepting biomats, which float on the water and are designed to intercept and treat any potential residual pollution that may be present within the surface water. These provide a sustainable solution as they are self-maintaining and 100% recyclable.

Proposed Surface Water Drainage Strategy

- 4.17. The total Site area within the red line boundary is 0.560ha, however 0.075ha of this is Avon Road. Avon Road would be subject to minor resurfacing only, and therefore it is anticipated that the surface water drainage system would remain as existing. Avon Road has therefore been excluded from the proposed drainage strategy.
- 4.18. The Site has therefore been split in to two separate catchments in preparing the drainage strategy which is summarised in Table 4 overleaf.

Table 4: Catchment Summary

Catchment	Total Catchment (ha)	Soft Landscaping (ha)	Drained Area (ha)
1 (South)	0.247	0.021	0.226
2 (North)	0.238	0.051	0.187
Total	0.485	0.072	0.413

- 4.19. The existing combined discharge rate for Catchments 1 and 2 has been calculated for the 100 year 60 minute event based on an area of 0.485ha on the basis that the existing Site is 100% impermeable. Using the Modified Rational Method (Appendix G) this gives an existing runoff rate of 61.5 l/s.
- 4.20. A similar scheme was submitted for this site previously and the drainage strategy prepared within the previous FRA indicated that the discharge rate from each catchment would be restricted to 5.0 l/s. It is proposed that this methodology be taken forward with the current scheme meaning that this proposed discharge from the Site would be 10 l/s representing a reduction of 84% when compared to the existing runoff rate (61.5 l/s).
- 4.21. As noted previously, it is proposed that a combination of permeable paving, below ground attenuation and other SuDS features would be utilised in order to restrict the surface water runoff rate as proposed. However, for the purposes of this planning strategy all attenuation is shown to be within tanks (size to be reduced post planning when accounting for other features). In undertaking the modelling of the attenuation features, the following assumptions have been made:
- MicroDrainage 2019.1 Source Control Module has been used to model the drainage features;
 - FEH 2013 point rainfall data has been used;
 - The surface water drainage features have been designed to accommodate the 1 in 100 year plus 40% climate change scenario with no flooding;
 - A porosity value of 0.95 has been used on the geocellular tanks; and
 - A hydro-brake flow restrictor or equivalent has been assumed.
- 4.22. The results of the modelling can be found in Appendix G and the attenuation feature has been summarised in Table 2 below.

Table 5: Geocellular Tank Details

	Plan Area (m ²)	Depth (m)	Porosity	Attenuation Volume (m ³)	Discharge Rate (l/s)
Catchment 1 (South)	119.0	1.0	0.95	113.1	5.0
Catchment 2 (North)	93.6	1.0	0.95	88.9	5.0

- 4.23. The pollution hazard level of surface water runoff from the development is classified as 'very low' for the residential roofs and 'low' for the car park and highway. Appropriate treatment would be incorporated through the use of Sustainable Drainage Systems, to ensure that the quality of water discharged is acceptable.

Sustainable Drainage Systems Management Plan

- 4.24. The PPG sets out the requirement for developers to consider the operation, management and maintenance of all SuDS proposed. The on-Site drainage networks and SuDS would be privately managed and maintained for the lifetime of the development, ensuring that they remain fit for purpose and function appropriately.
- 4.25. Post construction, an on-Site management company would be responsible for the SuDS included within the scheme. Table 3 presents an indicative maintenance schedule of the anticipated maintenance and repairs, in line with guidance from the CIRIA Suds Manual.

Table 6: SuDS Maintenance Schedule

SuDS Feature/Task	Frequency
Green/Brown Roof	
Inspect system to replace dead plants as required and ensure plants are sufficiently watered (during establishment period)	As required
Inspect system to replace dead plants (post establishment period)	Annually (in autumn)
Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
Inspect system to ensure substrate is not eroded and inlet / outlet drains are not blocked	Annually or as required (after severe storms)
Pervious Surfacing	
Inspection of main structure, pipework and filtration devices and remove any sediment/debris	Quarterly or as required
Jetting of main structure to remove any sediment build-up	Annually or as required
Rainwater Harvesting	
Inspect system for debris and sediment build-up	Annually (and following poor performance)
Cleaning of tank, inlets, outlets, gutters, and roof drain filters of silts and other debris	Annually (and following poor performance)
Swale	
Remove litter and debris. Cut grass for landscaped areas and access routes. Manage other vegetation and remove nuisance plants.	Monthly or as required
Reseed areas of poor vegetation growth.	Annually, or as required
Repair erosion or other damage by reseeding or re-turfing. Repair or rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates. Relevel uneven surfaces and reinstate design levels.	As required

SuDS Feature/Task	Frequency
Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
Rain Gardens	
Inspect infiltration surfaces for silting and ponding, record de-watering time and assess standing water levels to determine if maintenance is necessary	Quarterly
Check operation of underdrains by inspection of flows after rain	Annually
Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
Inspect inlets and outlets for blockage	Quarterly
Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
Remove sediment, litter and debris build-up from around inlets	Quarterly to biannually
Infill any holes or scour in the filter medium	As required
Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
Underground Attenuation	
Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
Remove debris from catchment surface, where it may cause risks to performance	Monthly
For systems where rainfall infiltrates into the tank from above (blue roof), check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
Repair/rehabilitate inlets, outlet, and overflows and vents	As required
Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

5. Foul Drainage

- 5.1. The proposed foul drainage would be designed in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings, BS EN 12056 – Gravity Drainage Systems Inside Buildings, and Approved Document H of Building Regulations.
- 5.2. The proposed foul flows would connect to the 900 x 625mm Southern Water combined sewer located within East Street. New pipework would be required beneath Avon Road to discharge foul flows by gravity to the Southern Water combined sewer network.
- 5.3. The existing and proposed foul discharge rates have been calculated using the water consumption method at 0.8 l/s and 0.5 l/s respectively (Appendix G).
- 5.4. If new connections are required, these would be made to the public sewer system through a S106 agreement with Southern Water, under the Water Industry Act 1991.

6. Conclusions

- 6.1. EA mapping indicates that the south eastern part of the Site is located partially within Flood Zones 2 and 3, indicating a medium to high probability of flooding from tidal and/or fluvial sources. The remainder of the Site is located within Flood Zone 1 denoting a low probability of tidal and/or fluvial flooding.
- 6.2. The remainder of the Site would also be at risk of flooding during the future 1 in 200 year event for the year 2115 due to sea level rise caused by climate change. To mitigate against this risk, all more vulnerable residential finished floor levels would be set at 5.20m AOD, 310mm above the future flood level, in accordance with planning policy.
- 6.3. The risk of flooding from fluvial, groundwater and artificial sources has also been assessed and found to be low. There is a risk of pluvial (surface water) flooding in East Street just beyond the south east boundary of the Site with the potential for flows to exceed the kerbs in extreme events. Flood resilience measure would be incorporated to mitigate the potential risk to the retail unit/community space proposed at this location.
- 6.4. Surface water from the proposed development would discharge to the surface water sewer located within Avon Road, as per the existing situation. As works to Avon Road would only comprise minor resurfacing and the drainage would be retained as existing, this has been excluded from the proposed drainage strategy.
- 6.5. The existing runoff rate for the Site (excluding Avon Road) has been calculated to be 61.5 l/s. It is proposed to restrict discharge to 10 l/s, providing a betterment of 84%. Based on this restriction, a total of approximately 253m³ of attenuation storage would be required.
- 6.6. Buildings 1 and Building 2 and 3, are separated by Avon Road and so have been designed as two separate drainage catchments for ease of operation and maintenance. Catchment 1 (south) would require 113m³ of storage and Catchment 2 (north) would require 89m³ of storage, which would be provided in a geo-cellular attenuation tanks in each plot, in addition to permeable surfacing, small integrated swales, and rain gardens.
- 6.7. The pollution hazard level of surface water runoff from the development is classified as 'very low' for the residential roofs and 'low' for the car park and highway. Appropriate treatment would be incorporated through the use of SuDS, to ensure that the quality of water discharged is acceptable. This would be provided through the use of pervious surfacing (e.g. permeable tarmac or block paving) used in conjunction with sub-base storage and a shallow permavoid system, green roofs and rain gardens and small swales. This report sets out the principles of the SuDS, however, the final strategy would be confirmed at the detailed design stage.
- 6.8. The on-site drainage network and SuDS would be managed and maintained for the lifetime of the development by an appropriate managing body, ensuring that it remains fit for purpose and functions appropriately.
- 6.9. Foul flows from the Site would discharge by gravity to the Southern Water combined sewer network. The existing and proposed foul discharge rates have been calculated using the water consumption method to be 0.8 l/s and 0.5 l/s respectively.
- 6.10. This report demonstrates that the proposed development has a low probability of flooding from tidal, fluvial, pluvial, groundwater and artificial sources, and confirms that surface water runoff can be managed sustainably to ensure that flood risk is not increased elsewhere. It is considered that the information provided within this report satisfies the requirements of the NPPF and Local Policy.

7. References

- ⁱ Ministry of Housing, Communities and Local Government, February 2019. *National Planning Policy Framework*
- ⁱⁱ Ministry of Housing, Communities and Local Government, March 2014. *Planning Practice Guidance*
- ⁱⁱⁱ Hoare Lea, 2018. *Sustainability: Energy and Renewable Strategy Report*
- ^{iv} Arun District Council, July 2018. *Arun Local Plan*.
- ^v JBA Consulting on behalf of Arun District Council, August 2016. *Level 1 Strategic Flood Risk Assessment*.
- ^{vi} West Sussex County Council, May 2014. *Local Flood Risk Management Strategy*.
- ^{vii} Capita Symonds on behalf of West Sussex County Council, January 2010. *Strategic Flood Risk Assessment of West Sussex: Volume II Technical Report*.
- ^{viii} Department for Environment, Food and Rural Affairs, March 2015. *Non-statutory technical standards for sustainable drainage systems*.
- ^{ix} British Standards Institution, April 2008. *BS EN 752:2008 – Drain and Sewer Systems Outside Buildings*.
- ^x British Standards Institution, September 2000. *BS EN 12056-2:2000 – Gravity Drainage Systems Inside Buildings*.
- ^{xi} HM Government, 2010. *The Building Regulations 2010: H, Drainage and Waste Disposal*.



APPENDICES

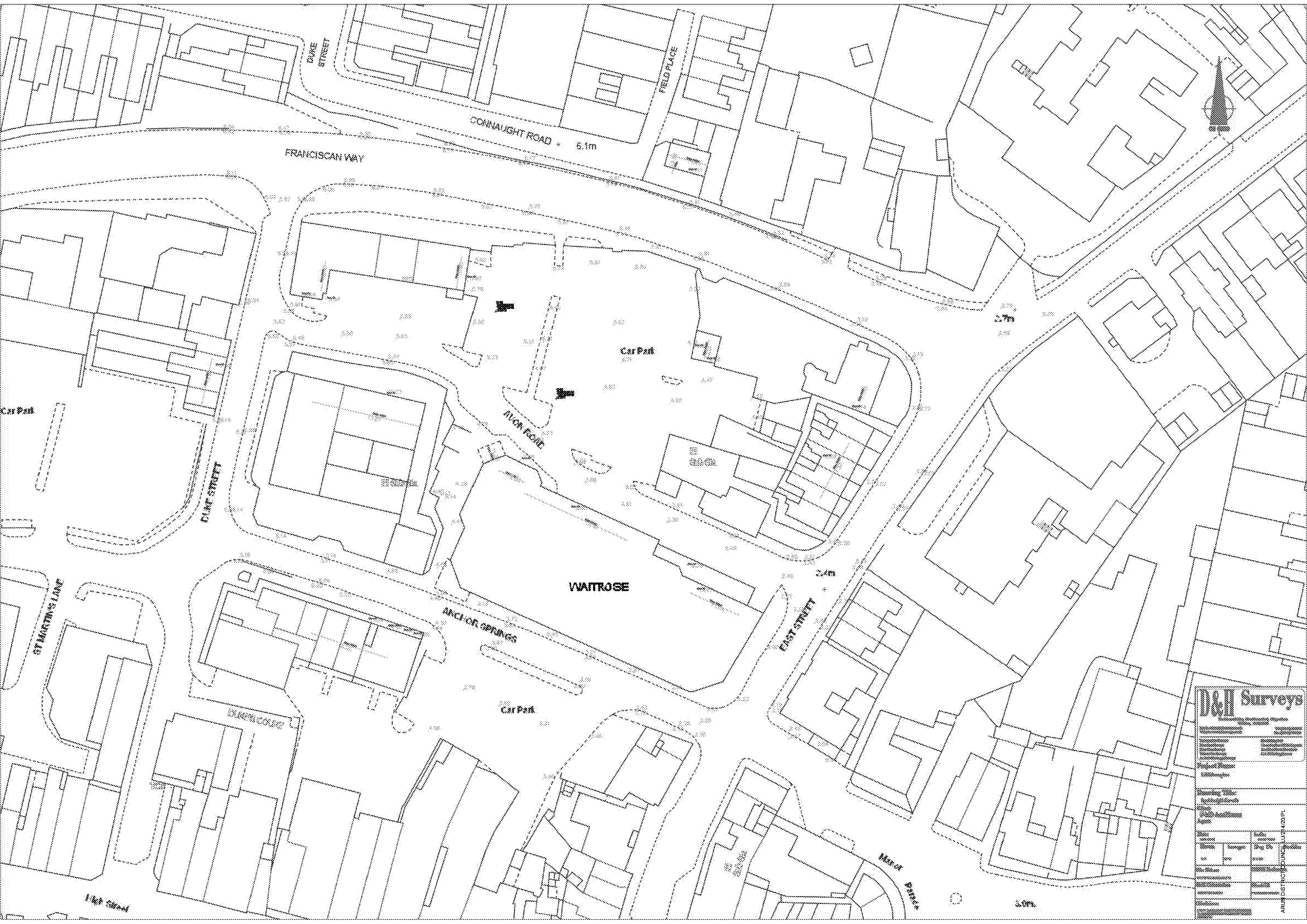
A. Topographic Survey

Appendices

Former Waitrose, Littlehampton

Project Number: WIE14296

Document Reference: WIE14296-100-R-4-1-3-FRA



D&H Surveys

Scale	1:1000
North Arrow	True North
Legend	Buildings, Roads, Greenery, etc.
ARUN DISTRICT COUNCIL	1/20/2014



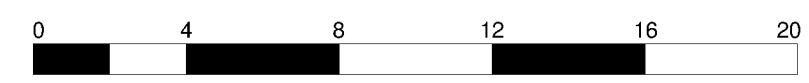
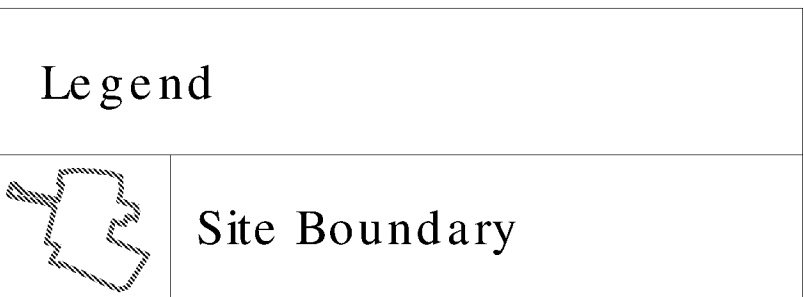
B. Development Proposals

Appendices

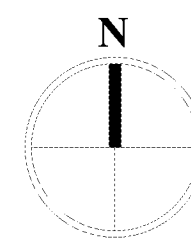
Former Waitrose, Littlehampton

Project Number: WIE14296

Document Reference: WIE14296-100-R-4-1-3-FRA



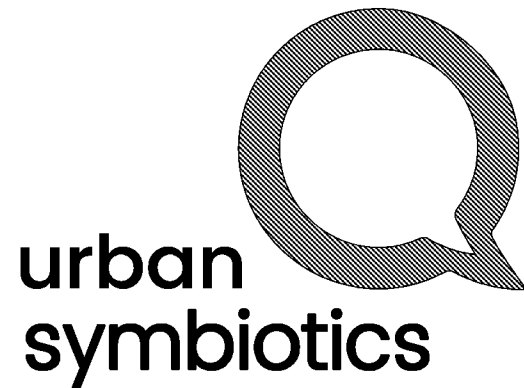
Copyright © 4238 CWGQ I spvqjNueQTf hjt ubxjpo P p0; : 3692



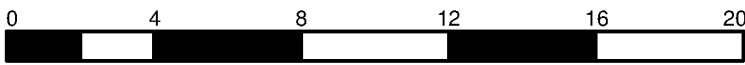
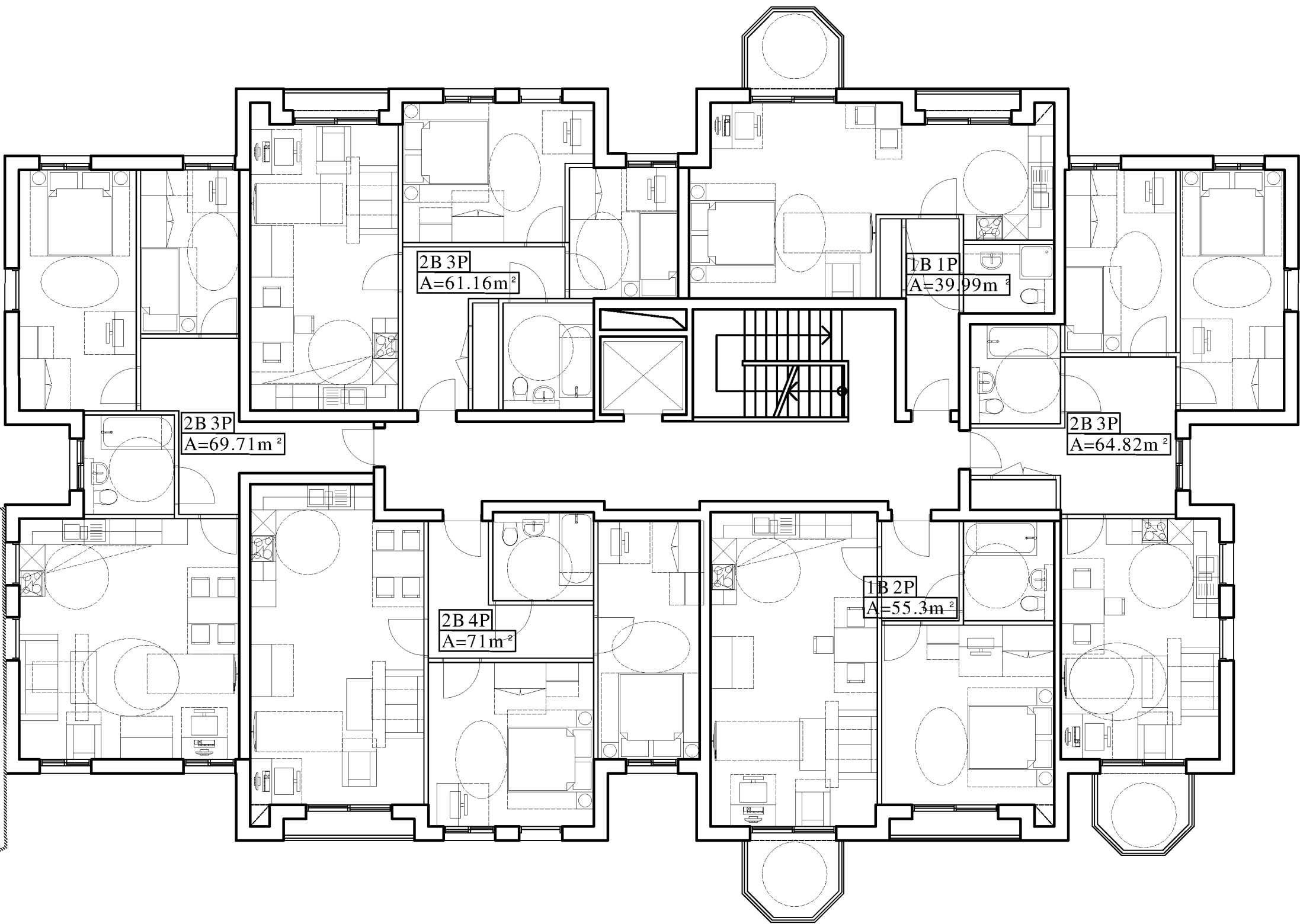
Project
**ANCHOR SPRINGS,
Littlehampton**

Drawing Title
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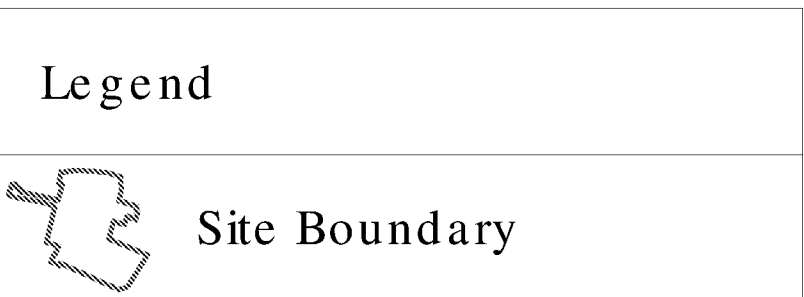
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B2 FIRST FLOOR PLAN | Scale 1:100 @ A1



Project
ANCHOR SPRINGS,
Littlehampton

Drawing Title
**PROPOSED
ROOF TOP PLAN**

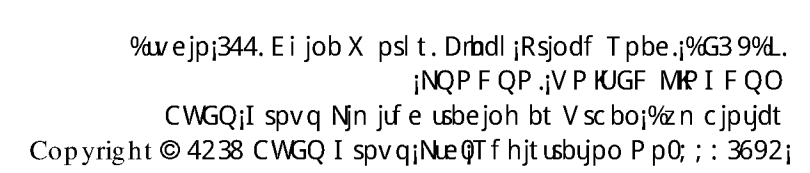
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8.04.2020

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UrbanS

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C. Environment Agency Records

Appendices

Former Waitrose, Littlehampton

Project Number: WIE14296

Document Reference: WIE14296-100-R-4-1-3-FRA

Connor Henderson
Waterman Infrastructure & Environment
Ltd
Pickfords Wharf
Cink Street London
SE1 9DG

Our ref: SSD79071
Your ref:
Date: 15 March 2018

Dear Connor

Enquiry regarding Product 4 for Flood Risk Assessment (FRA)

Thank you for your enquiry which was received on the 8th of March 2018.

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 Flood Zones 3 & 2 as shown on our Flood Map for Planning (Rivers and Sea).

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

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences

There are flood defences in the form of a wall. The Asset ID is 483081. The downstream crest level is 3.39 and the upstream is 3.94. The estimated standard of protection is 1 in 75 (1.3% AEP). The estimated condition grade is good. This is privately maintained.

Model Information

The model used was the Arun to Adur Coastal Model which was completed in 2012 by JBA Consulting.

Flood History

We hold no record of flooding events affecting this site, but a nearby area was previously flooded in 1983 (Flood Event Code: 2068), the source was the main river (River Arun), and the cause was overtopping of the defences.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flooding 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 Former Waitrose Site located on Avon Road, Littlehampton BN17 6AT
Licence	<u>Open Government Licence</u>
Information Warnings	The majority of our models will not have the new climate change allowances. +20% is not suitable for the majority of planning purposes and the new allowances to use should be checked here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.
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 2017 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

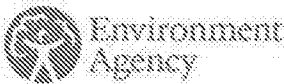
- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

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.

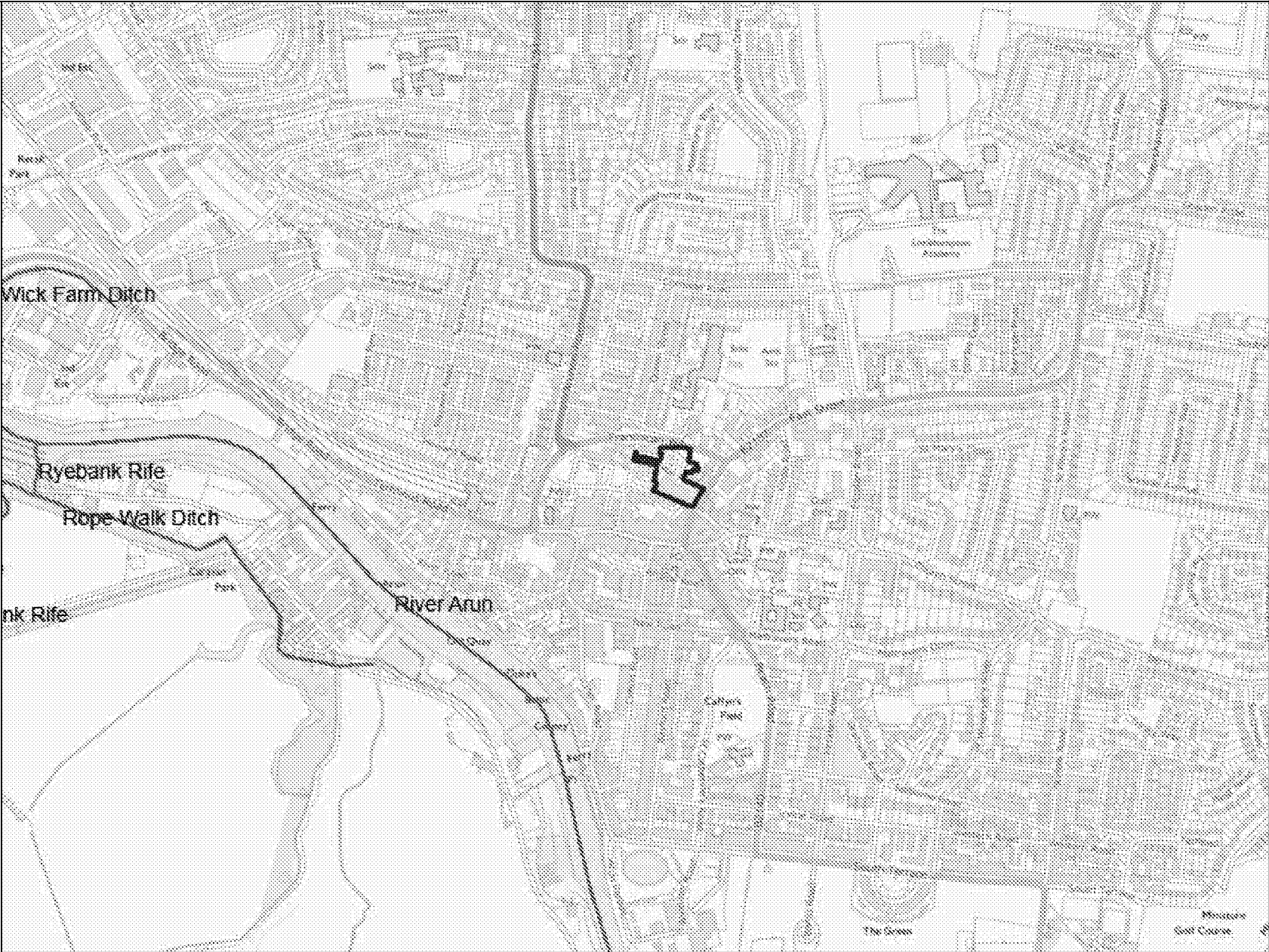
Yours sincerely,

Maurice Ntege
FCRM Officer – PSO West Sussex

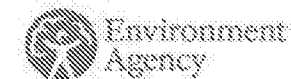
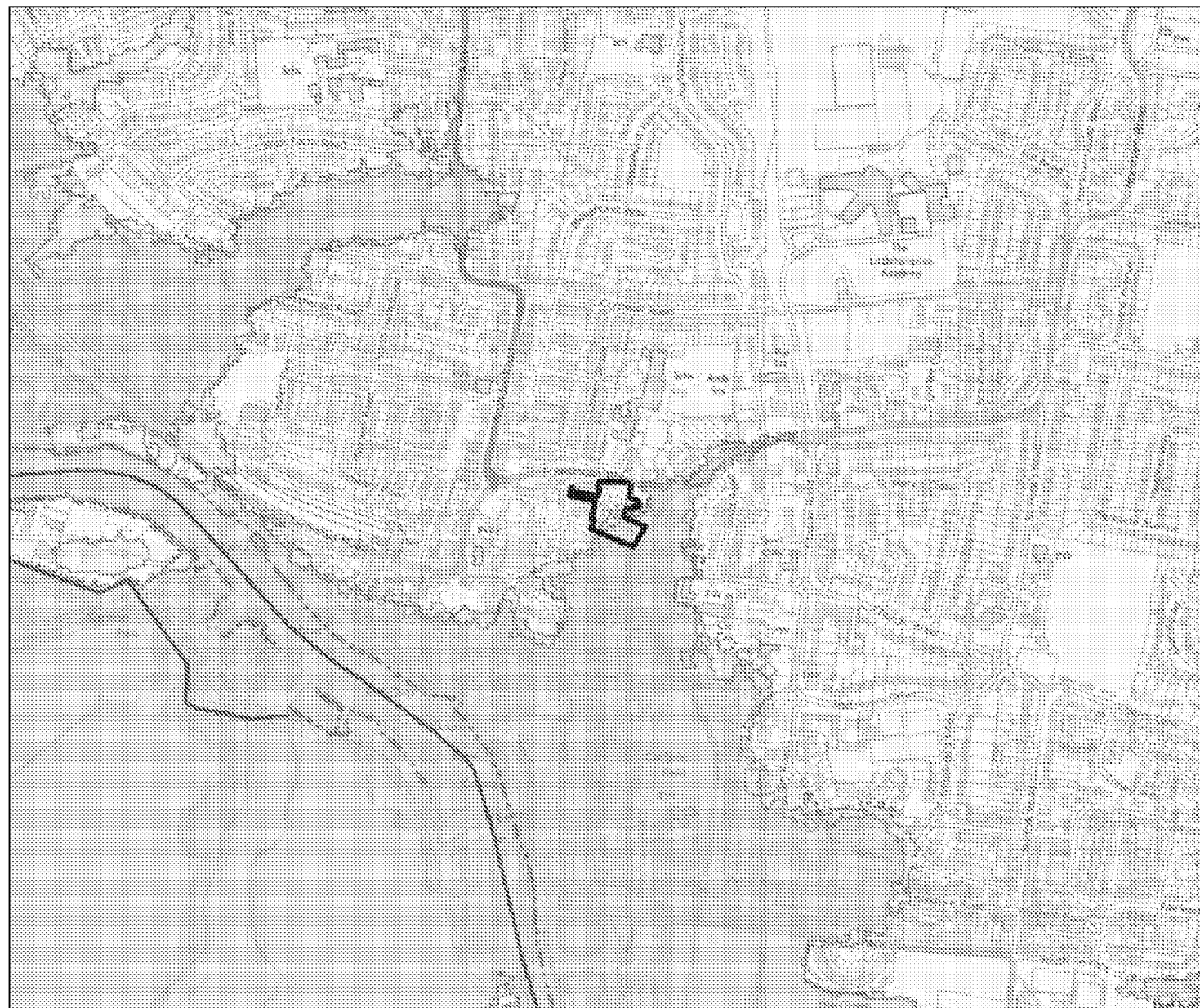
Watercourse Map. Centred at BN17 6AT. Created on 15/03/2018.



- Legend
- Sealed Main Rivers



Flood Map for Planning (Rivers and Sea). Centred at BN17 6AT. Created on 15/03/2018



Scale 1: 10,000



Flood Map for Planning (Rivers & Sea)

- Sealed Main Rivers
- 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.

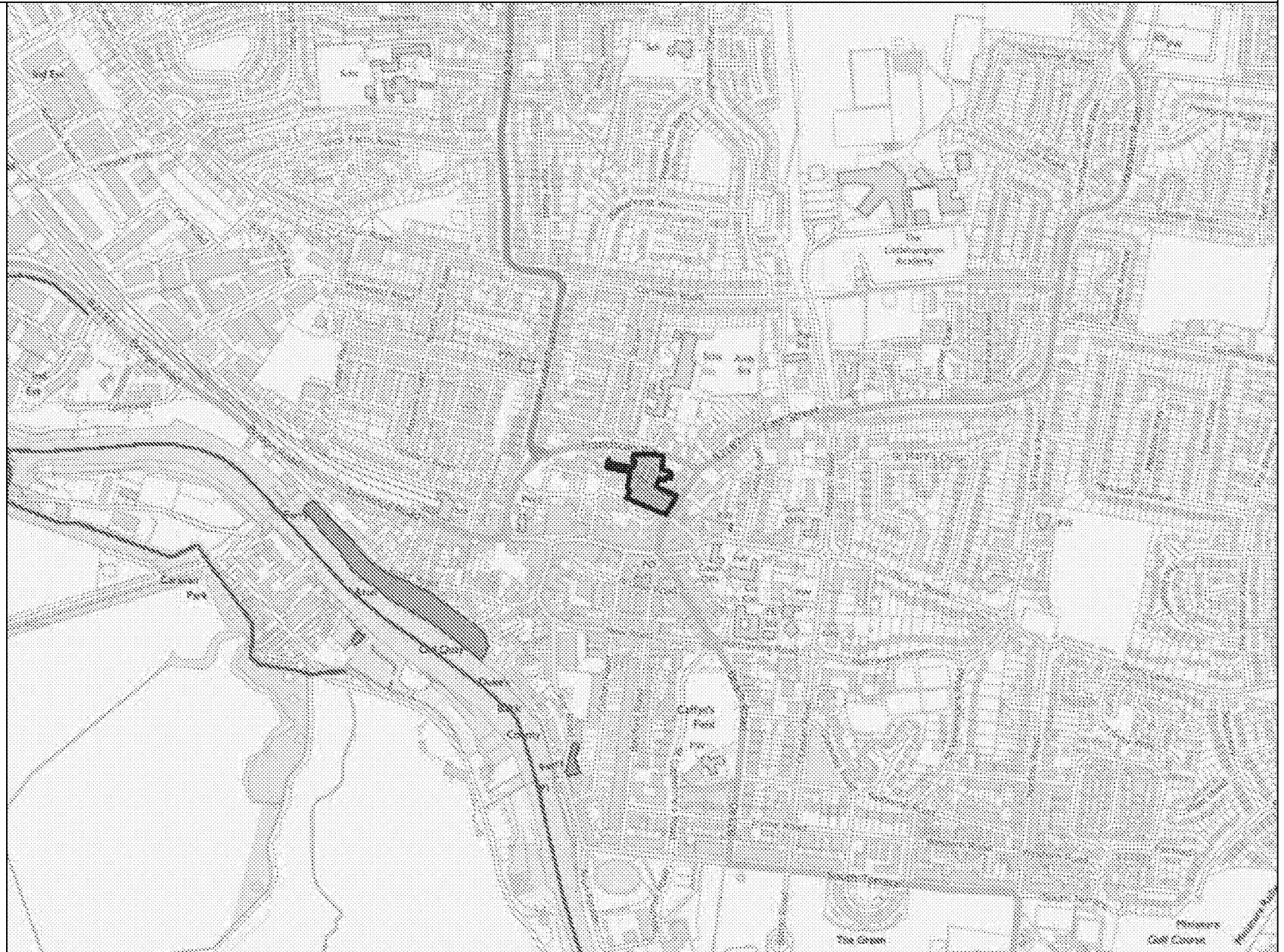
Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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Flood History Map. Centred at BN17 6AT. Created on 15/03/2018

Legend

-  Statutory Main Rivers
-  All recorded flood outlines

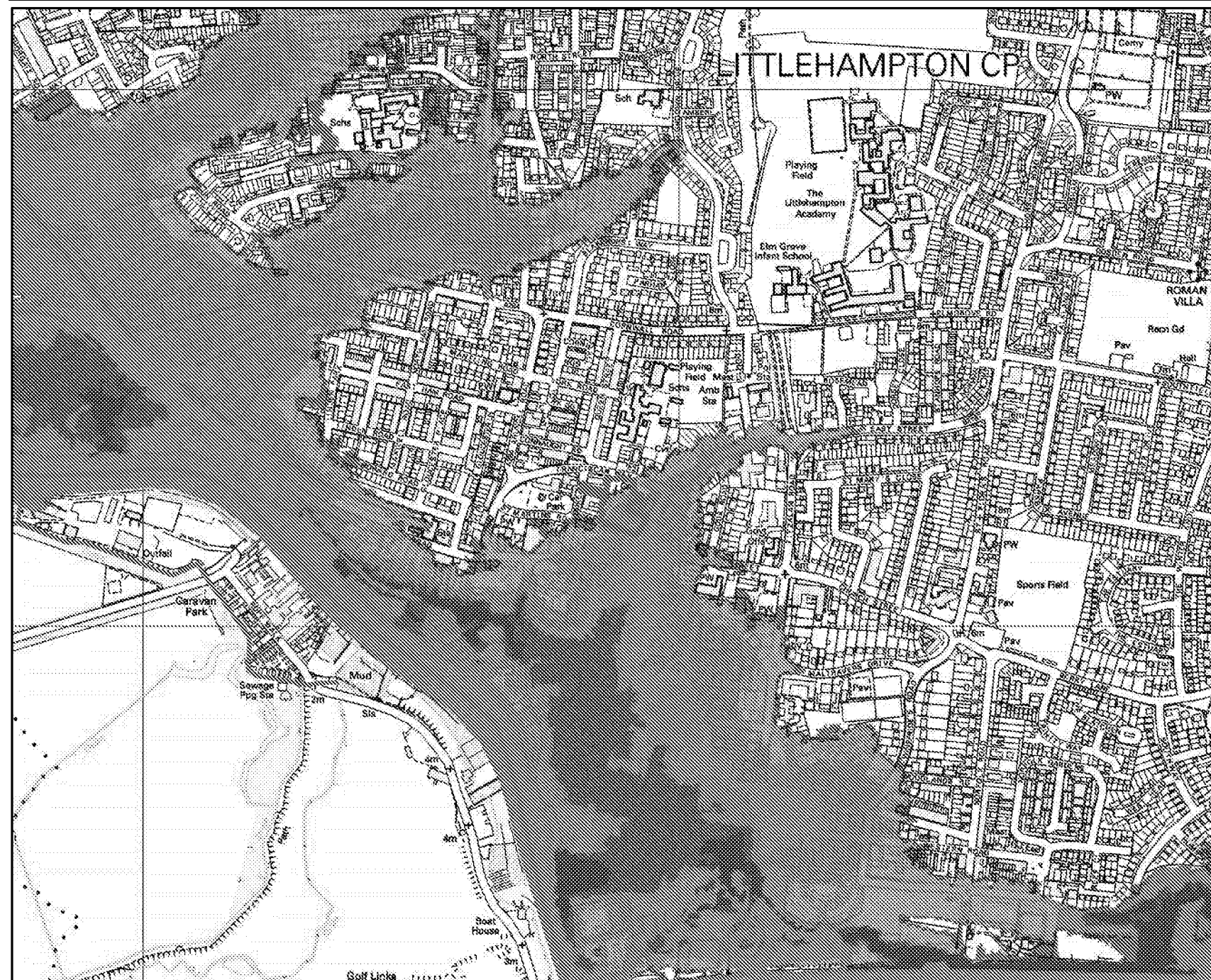


0 100 200 300
Metres



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Modelled Flood Outlines (Defended Tidal). Centred BN17 6AT Created 15/03/2018 (Ref: SSD79071)



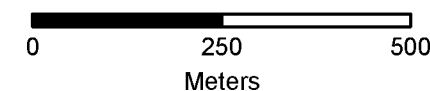
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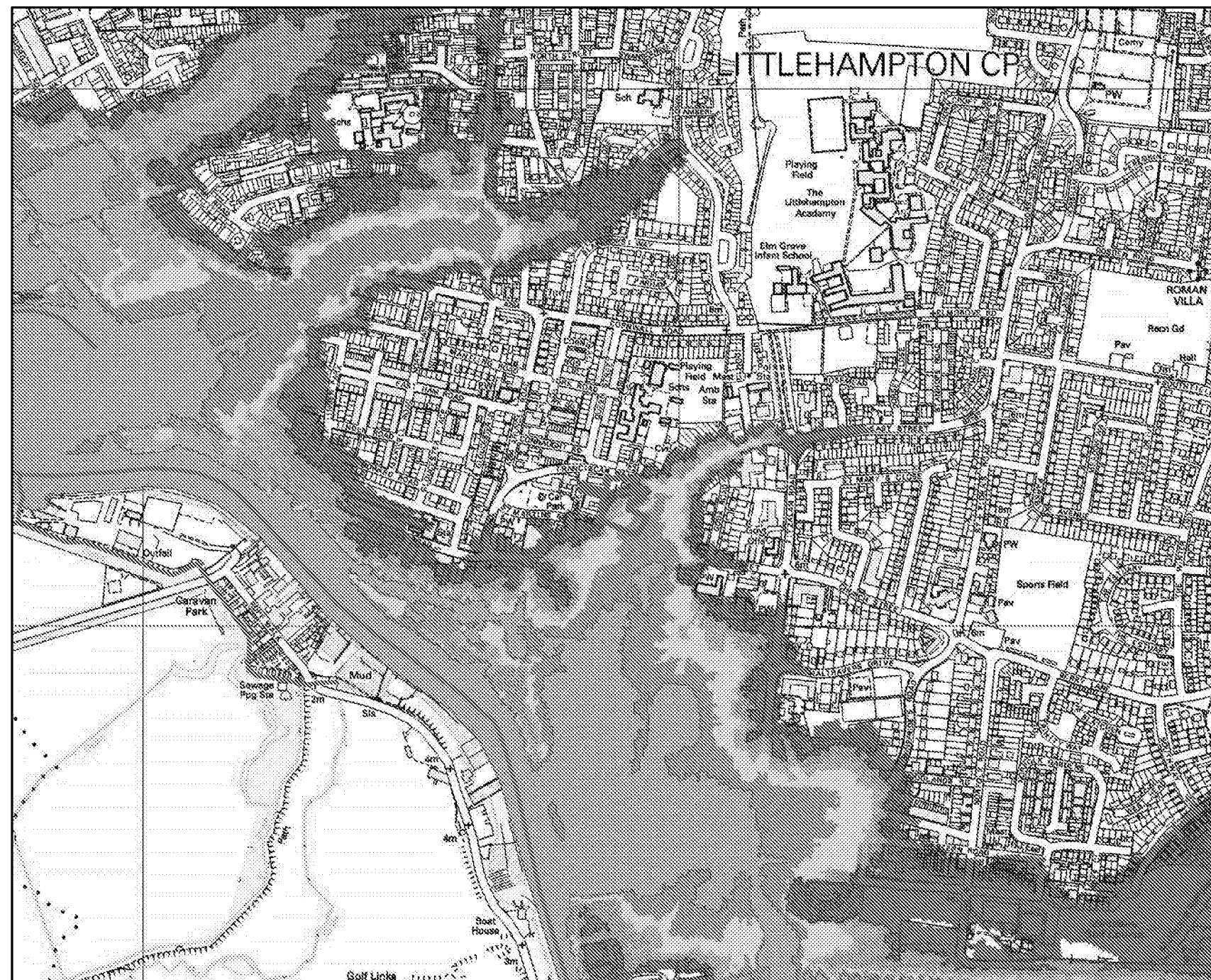
-  Main River
 Site Boundary
 20% AEP (2012) (Defended)
 5% AEP (2012) (Defended)
 1.3% AEP (2012) (Defended)
 1% AEP (2012) (Defended)
 0.5% AEP (2012) (Defended)
 0.5% AEP (2070) (Defended)
 0.5% AEP (2115) (Defended)
 0.1% AEP (2012) (Defended)
 0.1% AEP (2115) (Defended)

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

Climate Change (CC) extent
based on an increase of 20%
in river flows.

Scale: 1:10,000





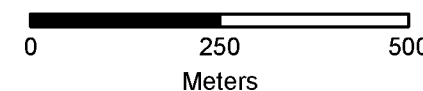
Legend

- Main River
- Site Boundary
- 5% AEP (2012) (Un defended)
- 1.3% AEP (2012) (Un defended)
- 0.5% AEP (2012) (Un defended)
- 0.5% AEP (2070) (Un defended)
- 0.5% AEP (2115) (Un defended)
- 0.1% AEP (2012) (Un defended)
- 0.1% AEP (2115) (Un defended)

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

Climate Change (CC) extent based on an increase of 20% in river flows.

Scale: 1:10,000



Flood Defence Map. Centred at BN17 6AT. Created on 15/03/2018

Legend

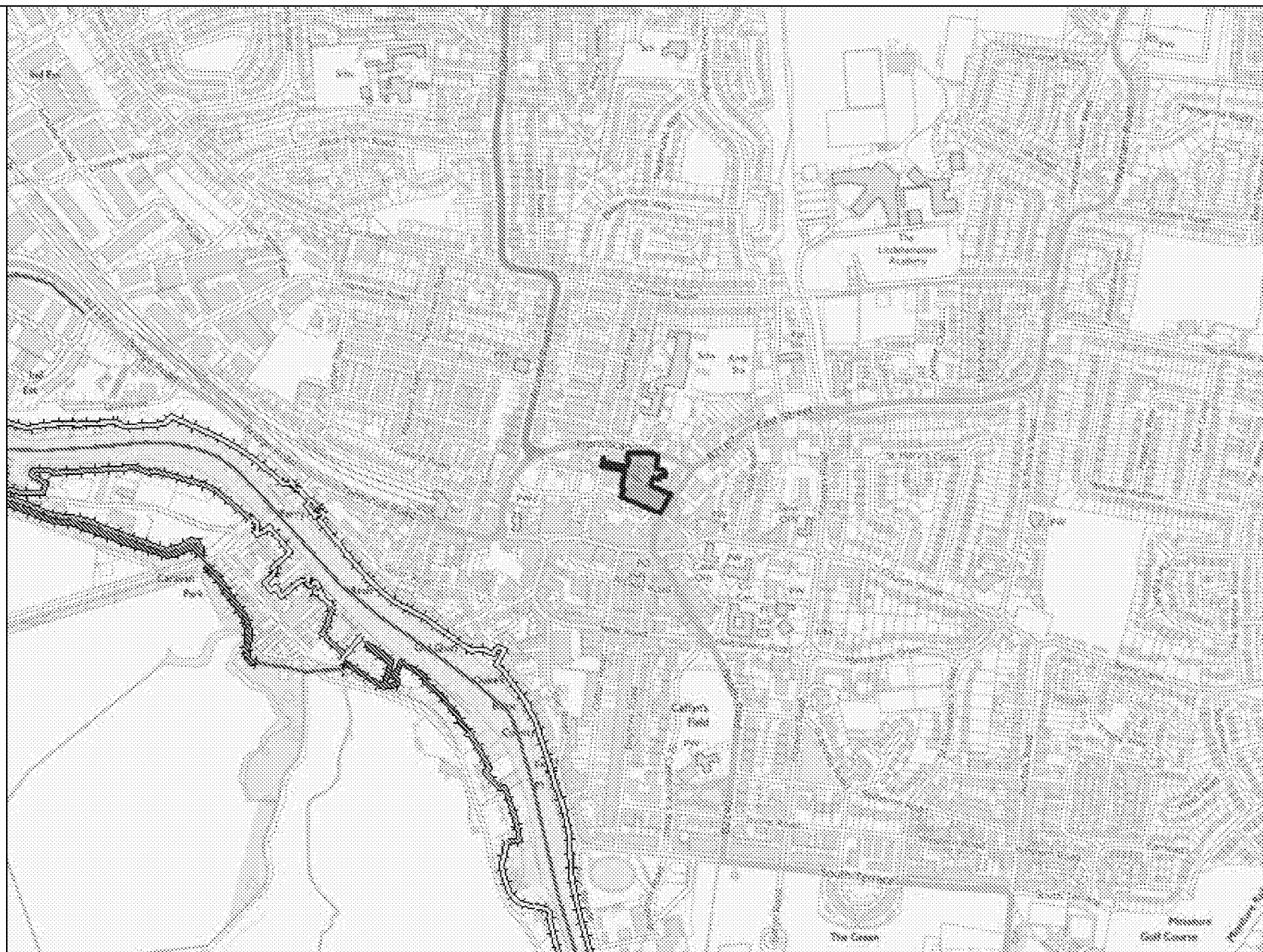
Statutory Main Rivers
Defences (EA maintained)

- Asset type not defined
- Embankment
- Wall
- Flood Gate
- Demountable Defence
- Bridge Abutment
- High Ground
- Beach
- Barrier Beach
- Promenade
- Quay
- Cliff
- Dunes

Defences (3rd party maintained)

- Asset type not defined
- Embankment
- Wall
- Flood Gate
- Demountable Defence
- Bridge Abutment
- High Ground
- Beach
- Barrier Beach
- Promenade
- Quay
- Cliff
- Dunes

0 100 200 300
Metres



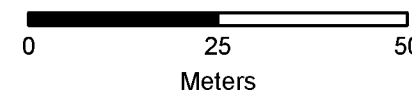
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Legend

-  Main River
-  Site Nodes
-  Site Boundary

Scale: 1:1,000





Product 4 Flood Risk Data Requested by: Waterman Infrastructure & Environment Ltd

Site: Former Waitrose Site located on Avon Road, Littlehampton BN17 6AT

Table 1: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	1.3%	0.5%	0.5% (2115)	0.1%
1	502921	102183	-	3.10	3.74	4.94	4.05
2	502873	102199	-	-	-	4.94	4.05
3	502895	102248	-	-	-	4.94	-

Table 2: Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres						
	Eastings	Northings	Defended Annual Exceedance Probability						
			20%	5%	1.3%	0.5%	0.5% (2115)	0.1%	0.1% (2115)
1	502921	102183	-	-	-	-	4.89	2.94	5.09
2	502873	102199	-	-	-	-	4.89	-	5.09
3	502895	102248	-	-	-	-	4.89	-	5.09

Table 3: Water Depth: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	1.3%	0.5%	0.5% (2115)	0.1%
1	502921	102183	-	0.49	1.30	2.33	1.44
2	502873	102199	-	-	-	1.04	0.15
3	502895	102248	-	-	-	0.26	-

Table 4: Water Depth: Tidal Defended

Node Ref	NGR		Modelled Flood Depths in Metres						
	Eastings	Northings	Defended Annual Exceedance Probability						
			20%	5%	1.3%	0.5%	0.5% (2115)	0.1%	0.1% (2115)
1	502921	102183	-	-	-	-	2.27	0.33	2.48
2	502873	102199	-	-	-	-	0.99	-	1.19
3	502895	102248	-	-	-	-	0.22	-	0.42

All levels taken from: Arun to Adur Coastal Model

Produced on: 15 March 2018

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

What are the benefits of our advice?

A dedicated project manager will be assigned to your enquiry and will be a single point of contact for you at the Environment Agency.

We will provide you with an estimate of costs for our service and we'll agree timescales for responding with you, so you can develop your project plan with certainty.

Our pre-application service can greatly reduce delays to proposals at the planning application stage. Knowing that we have already considered proposals and have no objection to them is a crucial part of a planning authority's considerations.

The evidence we can provide on a range of environmental issues can support your proposals. No two schemes are ever the same and every customer is different so we are able to customise our advice to your needs.

It's important to consider the licenses and permits you will need. We can provide an early indication of permitting requirements, including remediation schemes, discharge consents, waste legislation and flood defence consents so you can be confident of what is needed and when.

Want to know more?

To enquire about, or request, our planning advice you can:

Call on 03708 506 506* (Monday - Friday, 8am to 6pm)

Email us at enquiries@environment-agency.gov.uk

Post your request to:

National Customer Contact Centre
PO Box 544
Rotherham
S60 1BY

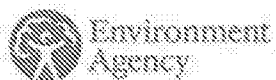
*Details of call charges can be found on the GOV.UK website.

Or visit our website
www.environment-agency.gov.uk

Environment First: If you print a paper copy please use recycled paper. If you are looking at a paper copy, please make sure you re-use or recycle.



Charging for planning advice
from the Environment Agency



We are the Environment Agency. It's our job to look after your environment and make it a better place - for you and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.

What is it?

If you're planning a new development, we want to work with you to make the process as smooth as possible. We provide evidence and advice to a range of customers, including land agents, house builders, consultants, local authorities and the public.

By seeking our advice at the pre-application stage environmental issues can be identified and resolved before formal submission to the planning authority. In 2012/13, in England, we provided advice to approximately 5000 enquiries.



What's changing?

Our current pre-application service has changed. We will continue to provide a free, preliminary opinion to outline our position and any environmental issues regarding your development. Any further advice, including assessment of reports, follow-up meetings or site visits, will now be offered as part of a paid-for service.

If you decide you would like to benefit from our advice we will provide you with an estimate of the cost based on the work we expect to undertake. Our charges will be £84 per hour and we do not charge VAT. A dedicated project manager will supervise your enquiry and ensure you receive the information you need within agreed timescales.

Why?

We are committed to providing our customers with the best evidence and advice we can to support proposals and enhance the environment. Charging for planning advice will ensure we can maintain a sustainable planning advice service into the future.

Published by:
Environment Agency
Horizon House
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Bristol BS1 5AH

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D. Arun District Council Strategic Flood Risk Assessment Mapping

Appendices

Former Waitrose, Littlehampton

Project Number: WIE14296

Document Reference: WIE14296-100-R-4-1-3-FRA

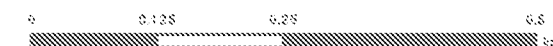


The Historic Flooding Map shows the recorded incidents and flood outlines provided by Arun District Council, West Sussex County Council, Southern Water and Environment Agency. Historical flood extent was obtained from the Environment Agency.

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

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

	Arun District SFRA boundary		Tidal
	Historic flood outline		Surface Water
Source of flooding			Failure
	Fluvial		Unknown
	Coastal		



REF	Date	Comments
A	June 2015	.
B		
C		

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ARUN DISTRICT COUNCIL
LEVEL 1 SFRA: APPENDIX H
HISTORIC FLOODING RECORDS

Sheet No: 25 of 48 Index Number: ADC_25

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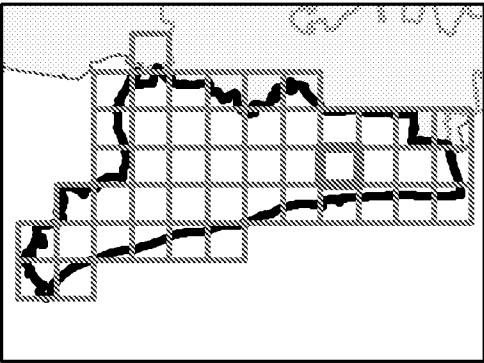
Notes

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

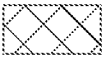
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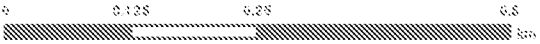
Please note that not all historical records may be shown on this map, and that it is therefore advised you contact Arun District Council for updated information post 2015.

Key Plan



Legend

-  Arun District SFRA boundary
-  Historic flood outline
- Source of flooding**
-  Fluvial
-  Coastal
-  Tidal
-  Surface Water
-  Feature
-  Unknown



REF	Date	Comments
A	June 2015	-
B		
C		

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ARUN DISTRICT COUNCIL LEVEL 1 SFRA: APPENDIX H HISTORIC FLOODING RECORDS

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