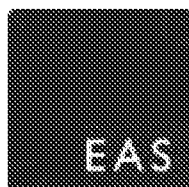


**Proposed Car Rental Depot at the
South Bersted Garage
Bognor Regis
West Sussex**

Flood Risk Assessment

April 2018





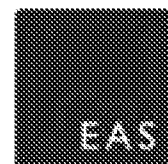
Document History

JOB NUMBER: 1646
DOCUMENT REF: Proposed Car Rental Depot FRA
REVISIONS: Final

Revision	Comments	By	Checked	Authorised	Date
Draft 1	For comment	RC	SA	SA	26/03/2018
Final	For submission	RC	SA	SA	05/04/2018

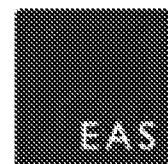
Unit 23
The Maltings
Stanstead Abbotts
Hertfordshire SG12 8HG

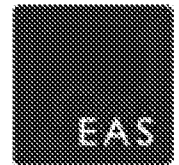




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1 Introduction

- 1.1 EAS has been commissioned to prepare a Flood Risk Assessment (FRA) in support of a proposed car rental depot located South Bersted Garage, Shripney Road, Bognor Regis, West Sussex PO22 9LL. A location plan is contained in **Appendix A** and the proposed development plans are in **Appendix B**.
- 1.2 The site is located in Flood Zone 3 on the Environment Agency (EA) Floodmap for Planning. The risk is tidal and the Zone 3 designation indicates that the site is a 'high' risk area with a greater than 1 in 200 annual probability of flooding from the sea; however EA modelling shows the site to benefit from defences and is unlikely flood. It is necessary nonetheless to prepare a Flood Risk Assessment to assess the risk to the new development and recommend some mitigation measures.
- 1.3 This report is based on the following data: Environment Agency Detailed Flood Mapping, British Geological Society (BGS) information, OS mapping, and topographic survey covering the site.
- 1.4 The contents of each section of this document are as follows:

Section 2 sets out the national, regional and local flood risk policies.

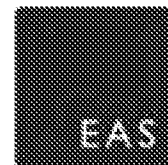
Section 3 described the site conditions.

Section 4 describes the potential sources of flooding.

Section 5 discusses the mitigation measures included in the proposed development

Section 6 discussion of drainage strategy for proposed development

Section 7 concludes the assessment.



2 Policy Framework

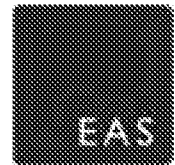
National Policy

- 2.1 The contents of this FRA are based on the advice set out in The National Planning Policy Framework (NPPF) published March 2012 and the Planning Practice Guidance (PPG), published March 2014. The climate change allowances published in February 2016 have also been included in this assessment.
- 2.2 The Planning Practice Guidance NPPF Table 1 (Paragraph 065) defines each Flood Zone along with appropriate land use and FRA requirements. The flood risk zones are defined as follows:
- Flood Zone 1 – This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river flooding (<0.1%).
 - Flood Zone 2 – This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding.
 - Flood Zone 3a – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), and for tidal flooding at least a 0.5% annual probability of flooding from tidal sources.
 - Flood Zone 3b – This zone comprises land where water has to flow or be stored in times of flood.
- 2.3 The site is located in Flood Zone 3 on the Environment Agency (EA) Floodmap for Planning. A copy of the Environment Agency's Flood Map is included in **Appendix C**.
- 2.4 The risk is tidal and the Zone 3 designation indicates that the site is a 'high' risk area with a greater than 1 in 200 annual probability of flooding from the sea; however EA modelling shows the site to benefit from defences and is unlikely flood.

Local Policy

Arun Local Plan 2011-2031

- 2.5 The Arun Local Plan published in October 2011 outlines the district's council approach to development, growth and strategic vision for the area. The Local Plan aims to guide development and encourages a sustainable approach.
- 2.6 Flood risk is an important issue within the district as all of the district is at risk of flooding. Large areas of the district are in either Flood Zones 2 or 3. The majority of the coastline, including the town of Bognor Regis, is low lying and at risk of coastal flooding despite the presence of coastal defences. The Local Plan acknowledges that as a consequence of climate change the district will become more at risk to flooding.
- 2.7 Bognor Regis specifically is identified as an area important to the economy and tourist industry within the district and therefore proposes that any development in the area should aim to reduce run off and implement SUDs where possible.

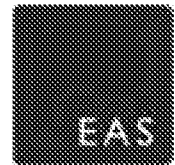


Arun District Council SFRA

- 2.8 The Strategic Flood Risk Assessment (SFRA) published in August 2016 replaces the Level 1 and Level 2 SFRA originally published by Arun District Council in February 2008. The document was published to help inform decisions on the location of new development and guide long-term management of flood risk.
- 2.9 The key objectives of the 2016 SFRA are:
- To take into account the latest flood risk policy following key changes to policy and guidance that have occurred since the previous SFRA was published.
 - To take into account the latest flood risk information and available data since the previous SFRA.
 - To provide a comprehensive set of maps presenting flood risk from all sources that can be used as part of the evidence base for the Local Plan.
 - To provide initial flood risk analysis information for sites identified by the Council as part of their Local Plan preparation.
- 2.10 Historic Flood Maps located in Appendix H of the SFRA show that the site has not experienced any kind of flooding in the past.
- 2.11 A Surface Water Flood Risk map located in Appendix E in the SFRA shows that the site is located on the boundary of a 1 in 1,000 year surface water flood event.
- 2.12 Appendix F, a map showing areas susceptible to groundwater flooding in the SFRA, identifies that the site is at a <25% risk groundwater flooding.

West Sussex District Council SFRA (January 2010)

- 2.13 The Level 1 Strategic Flood Risk Assessment (SFRA) was published in January 2010 to inform planning and development and to aid the development of a flood risk management policy. The document assesses flood risk from a variety of sources including artificial, surface water, sewers, fluvial and surface water.
- 2.14 Flood risk assessments are required for specific developments.
- 2.15 The document states the Bognor Regis is an important tourist and economic hub for the district however is located in Flood Zone 2 and Flood Zone 3a and has experienced coastal flooding in the past. Groynes have been strengthened to protect Bognor Regis.



3 Site Description

- 3.1 The proposed development will be located South Bersted Garage, Shripney Road, Bognor Regis, West Sussex PO22 9LL. The site location is shown in **Appendix A**.
- 3.2 The site is located on an existing petrol station which has been present on the site since the 1940's. The wider area comprises primarily of urban development. The site is approximately 8.6km south-east of Chichester and approximated 1.5km north of the coastline at Bognor Regis.
- 3.3 A petrol station has historically been present at the site however the site is currently used for vehicle repairs and vehicle hire. The main building on the site comprises of an office, a vehicle repair room and residential space on the first floor.
- 3.4 The development proposes to demolish the existing main building and replace it with a modular building however the canopy will remain. The building will cover 62m² and the site area is 0.1 ha.
- 3.5 Proposed development plans have been included in **Appendix B**.

Site Levels

- 3.6 A topographic survey of the site located in **Appendix D** show levels vary from 1.68m AOD in the north of the site to 2.14m AOD in the southern area of the site. The area in which the modular building is proposed to be installed is approximately 1.8m AOD.

Proximity to Watercourses

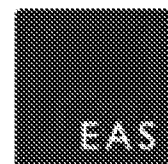
- 3.7 The Aldingbourne Rife, shown as a 'Main River' on the EA Flood Map for Planning, is located approximately 360m east of the site.

Proximity to Coast

- 3.8 The site is located approximately 1.5km north of the coastline at Bognor Regis. The EA Flood map for Planning shows defences present at the coastline at Bognor Regis.

Geology

- 3.9 The online British Geological Survey (BGS) mapping shows the site to be located in an area with a bedrock of Lewes Nodular Chalk Formation- Chalk. There are also superficial deposits of River Terrace Deposits (undifferentiated)- Sand, Silt and Clay. Chalk is typically permeable and therefore infiltration drainage methods would usually be considered, however there is also a risk of contamination to the underlying aquifer as discussed in Section 6 of this report.



Sewers

- 3.10 A 300mm surface water sewer is located on Shripney Road flowing north east west. A foul rising main is also located along Shripney Road. The sewer mapping is located in **Appendix E**.



4 Potential Sources of Flooding

Tidal

- 4.11 The site is shown on the EA Flood Map for Planning to be located entirely in Flood Zone 3, at high risk of flooding from sea. This means this area has a risk of flooding of greater than 1 in 200 per year or greater than 0.5% annual exceedance probability. However the Flood Map for Planning does not take account of flood defences and south of the site along the coast there are defences in the form of a Foreshore and wave return wall (on seafront), deemed in good condition by the EA.
- 4.12 The level of defence offered currently by the defence is up to the 1 in 200 year event, however this will need to be raised in response to climate change. In the defended situation the site is therefore not shown to be affected by a 200 year flood event. The EA defended flood map data is contained in **Appendix C**, along with undefended flood maps and flood level data.
- 4.13 As the site is not identified to be at risk of flooding in the defended situation, no flood levels have been provided for the site for this scenario. Flood levels have however been provided for the undefended situation, which indicate a flood level of 2.24m AOD in the 200 year event, and 2.58m and 3.60m AOD in the 200 year event in 2070 and 2115 allowing for climate change. The site has an average level of approximately 1.8m AOD, as such in the undefended situation it can be seen that the flood depth would range from 0.4m to 1.8m depending on the allowance for climate change.
- 4.14 The Arun District Council SFRA states that maintaining the level of protection should be considered, however sustainability and financial concerns may arise; however it is highly unlikely that the flood defences would not be raised in-line with climate change due to the risk this would pose to the residents of Bognor Regis.
- 4.15 In summary despite being located within Flood Zone 3, the data provided by the EA indicates that in a defended situation the site is likely to remain unaffected by flooding; and as it is highly unlikely that the defences will not be maintained in-line with climate change, no mitigation measures are considered necessary for the proposed car hire garage considering the less vulnerable use class.

Surface Water Flooding (Pluvial)

- 4.16 Surface water flooding refers to flooding caused when the intensity of rainfall, particularly in urban areas, can create runoff which temporarily overwhelms the capacity of the local drainage systems or does not infiltrate into the ground. The water ponds on the ground and flows towards low-lying land. This source of flood risk is also known as 'pluvial'.
- 4.17 The EA surface water flood map, published on the GOV.UK website and shown in Figure 1, shows the

majority of the site to be in a 'low' surface water risk area. The southernmost perimeter of the site is shown not to be affected by surface water flooding and is likely to remain dry.

- 4.18 Figure 1 shows that in a high-risk scenario, with a probability of flooding each year greater than 1 in 30, the site is unlikely to be affected by surface water flooding.
- 4.19 Figure 2 shows that in a medium risk scenario, with probability of flooding each year between 1 in 30 and 1 in 100, the north-west corner of the site is likely to experience surface water flooding however to depths below 300mm. The rest of the site is unlikely to experience surface water flooding and is shown to remain dry.
- 4.20 Figure 3 shows in a low risk scenario, thus the scenario lest likely to happen with a probability of occurring each year between 1 in 100 and 1 in 1000, the northern perimeter and much of the western perimeter is likely to experience flood depths between 300mm and 900mm. The central area of the site is shown to experience flood depths below 300mm and the most southern boundary is still shown to remain dry and unlikely to experience any surface water flooding.

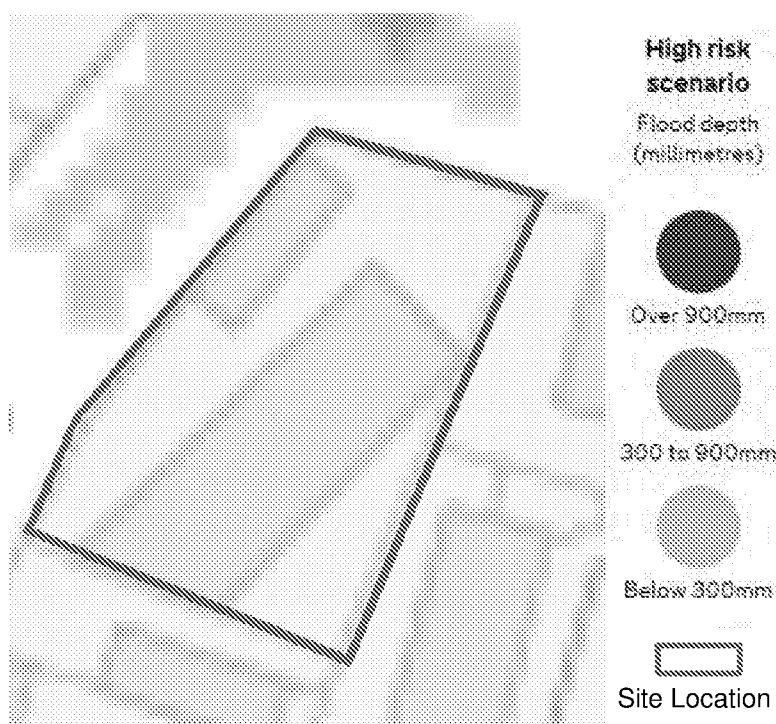


Figure 1: EA Surface Water Flood Map

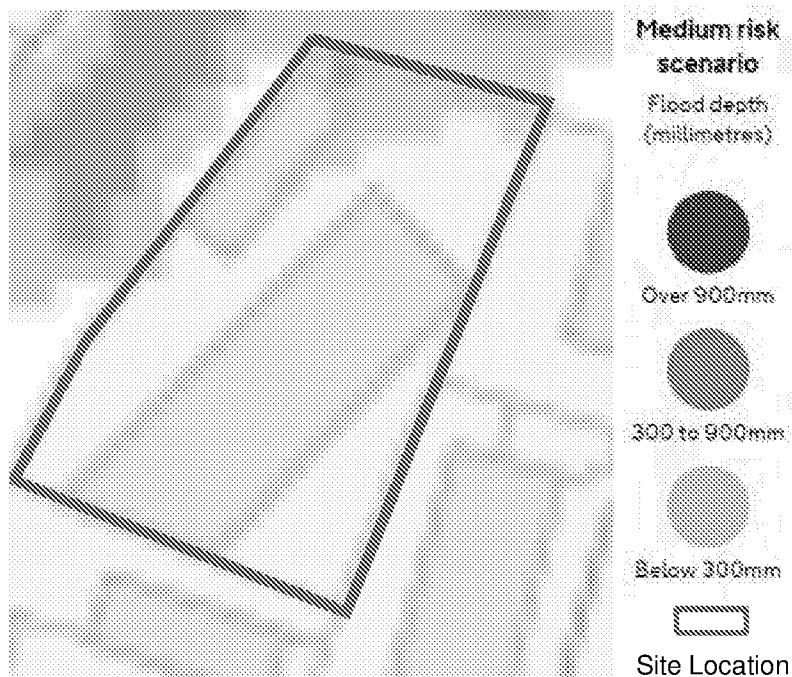


Figure 2: EA Surface Water Flood Map

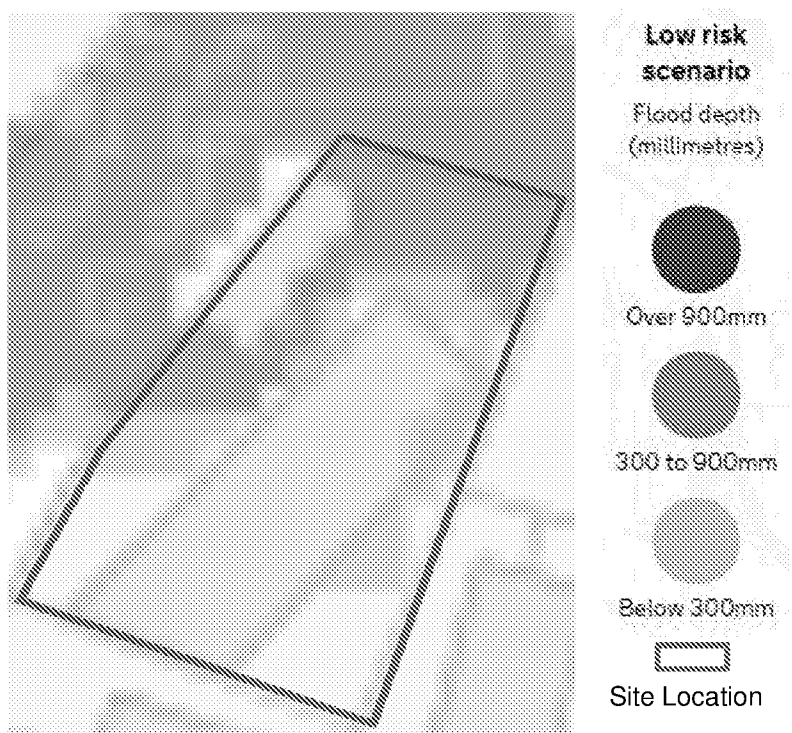
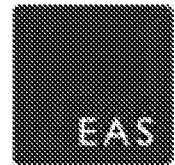


Figure 3: EA Surface Water Flood Map



Groundwater

- 4.21 The site is not shown on the EA website to be within a Source Protection Zone.
- 4.22 The site is shown to be located above a Principle Aquifer based on the bedrock designation.
- 4.23 A Principle Aquifer is defined on the EA website as "layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer".
- 4.24 The groundwater vulnerability map shows the site to be in an area classed as 'medium' risk. This indicates that although there may be some groundwater resources present beneath the site.
- 4.25 An Environmental Investigation report undertaken by SUBADRA provided 5 borehole readings within the site. The groundwater at rest levels range between 0.92m bgl and 1.34m bgl indicating fairly high groundwater levels at the site.

Sewer Flooding

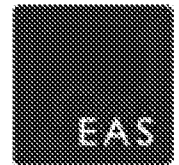
- 4.26 The SFRA notes that the site is located within a post code that frequently experiences sewer flooding however information provided by the EA shows there are no recorded flood events specific to the site.

Artificial Sources

- 4.27 The site is not shown to be within the EA reservoir flood extent on the GOV.UK website.
- 4.28 There are no nearby artificial flood sources, therefore the proposed development is considered to be at low risk of flooding from artificial sources

Historical Flood Events

- 4.29 Appendix H of the Arun District Council SFRA show two unknown flood events approximately 900m south of the site. The site has not been identified specially to have been impacted by flooding in the past.



5 Mitigation Measures

- 5.30 As the site is shown to be protected by tidal defences, is a less vulnerable use and will mainly be used for storing vehicles, it is not necessary to provide extensive mitigation measures.

Finished Floor Levels

- 5.1 As the surface water flood depths are shown to be 300mm and below where the modular building is proposed, the building finished floor level is proposed to be set approximately 300mm above the existing ground levels. Based on the current ground level of approximately 1.8m, a proposed finished floor level of 2.1m AOD is recommended.

Groundwater Flooding Mitigation

- 5.2 High groundwater levels have identified, and this may need to be a consideration with regard to foundation design (although they should be fairly shallow for the proposed modular building) and this is also a consideration for the SuDS Strategy as reviewed in the next section of this report.
- 5.3 The proposed 300mm raised floor level would also mitigate against groundwater flooding.

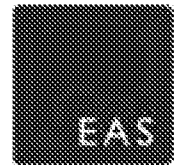


6 Drainage Strategy

- 6.1 At this stage it is unclear whether the existing hardstandings and building slabs will be retained within the site, which will be dependent upon their levels and conditions. If this is the case which appears likely then there will be no increase in impermeable area on the site and it is unlikely that a new surface water drainage system will need to be introduced and the existing connections can be retained. However if it appears likely that the hardstandings throughout the site would be replaced then the rest of this section advises on a suitable SuDS strategy.
- 6.2 The environmental investigation report identified hydrocarbons in soil samples as well as total petroleum hydrocarbons, BTEX compounds and PAHs in the groundwater samples. As a result an infiltration strategy is not recommended as it could mobilise contaminants and pollute the underlying aquifer, an attenuation strategy is proposed.
- 6.3 The site is currently 100% impermeable (0.1ha). Using the Modified Rational Method detailed in Butler, D and Davies, J. (2006), Urban Drainage, 2nd ed., SPON, the surface water runoff for the existing site has been calculated as follows:-
- $Q = CiA$** where
- Q = maximum flow rate (l/s)
C= PIMP/PR
i= rainfall intensity (mm/hr),
A=area (ha)
- 6.4 It should be noted that a fixed rainfall intensity of 50mm/hr is used in this case, which has been recommended by Butler & Davies (2006) to avoid using inappropriately high intensities for very low concentration times, i.e. small sites.
- 6.5 Using the Modified Rationale Method (Butler and Davies, 2006), and assuming an impermeable area on the existing site of 1012.5m², the total rate of runoff from the impermeable areas of the existing site is estimated to be **14.0 l/s**. The runoff calculations are included at **Appendix F**.
- 6.6 It is assumed that the existing site drains unattenuated to the southern water surface water sewer located in Shripney Road.

Potential SuDS Drainage Strategy

- 6.7 Should the hardstandings throughout the site need to be replaced it is recommended that permeable paving be utilised. It is proposed that the roof areas of the canopy and modular building could be allowed to runoff to the permeable paving either direct from the RWP's, or via permeable pipe or distribution box connection direct to the permeable paving sub-base.
- 6.8 The proposed permeable paving layout is indicated on the drawing in **Appendix H**. As borehole investigations have shown potentially high groundwater at the site as high as 0.92m bgl and an



environmental investigation discovered hydrocarbons present in the soil at the site, the permeable paving will be lined to prevent infiltration occurring which could cause environmental harm.

- 6.9 The following typical construction could be expected for the permeably paved areas (depending on the chosen construction type, with the specification below based on guidance from Marshalls for the popular Piora Paving system):
- 1) 80mm paving course
 - 2) 50mm laying course (generally a 6mm aggregate)
 - 3) 80mm layer of perforated Asphalt Concrete (DBM)
 - 4) A calculated depth of course grade aggregate (calculated as 225mm of a 30mm aggregate)
 - 5) An additional sub-base / capping layer if required.
- 6.10 It is proposed that the rate of surface water runoff leaving the site will be limited by a 50mm orifice plate located at the final control manhole within the line permeable paving (as identified on the drawing in **Appendix H**).
- 6.11 A WINDES MicroDrainage calculation sheet is contained in **Appendix G**. The WINDES source control calculation indicated that based on the total 0.1ha site area draining to the 860sqm of permeable paving and with a 50mm orifice plate, the maximum discharge rate from the site will be 3.4l/s for the critical 1 in 100 year (+40%CC) storm event. A minimum sub-base requirement of 150mm was identified from the model.
- 6.12 The proposed SuDS measures therefore achieve a reduction in runoff rates of a total of 10.6 l/s, from 14.0l/s to 3.4l/s in the 100 year plus climate change event.
- 6.13 It is proposed that the restricted runoff will be directed to the adopted Southern Water surface water sewer located in Shripney Road either via an existing connection should it exist; or via a new saddle connection with the adopted sewer if required. A new connection would require a S106 Agreement with Southern Water.

Maintenance of Permeable Paving

- 6.14 It is proposed that the maintenance of the surface water drainage system will be responsibility of the site owner/ manager. A regular maintenance schedule must be prepared for the lined permeable paving to ensure it is carefully managed throughout the year. Table 1 sets out a number of tasks required at different points in the year based on Ciria guidance.
- 6.15 The downpipes and guttering on the modular building should also be cleared of debris to prevent any blockages.



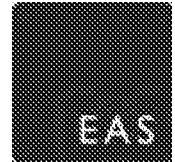
Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing and vacuuming.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas. Removal of weeds.	As required. As required.
Remedial actions	Remediate any landscaping which, through vegetation maintenance of soil slip, has been raised to within 50mm of the level of the paving. Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance of a hazard to the user. Rehabilitation of surface and upper sub-surface.	As required As required As required (if infiltration performance is reduced as a result of significant clogging.)
Monitoring	Initial inspection Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Monitor inspection chambers.	Monthly for 3 months after installation. 3 monthly, 48 hours after large storms. Annually. Annually.

Table 1: Maintenance tasks for lined permeable paving (The SUDS Manual C753, CIRIA)



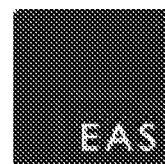
7 Summary and Conclusions

- 7.16 EAS has been commissioned to prepare a Flood Risk Assessment (FRA) in support of a proposed car rental depot located South Bersted Garage, Shripney Road, Bognor Regis, West Sussex PO22 9LL.
- 7.17 A petrol station has historically been present at the site however the site is currently used for vehicle repairs and vehicle hire. The development proposes to demolish the existing main building and replace it with a modular building however the canopy will remain. The building will cover 62m² and the site area is 0.1 ha.
- 7.18 The site is shown on the EA Flood Map for Planning to be located entirely in Flood Zone 3, at high risk of flooding from sea. This means this area has a risk of flooding of greater than 1 in 200 per year or greater than 0.5% annual exceedance probability. However despite being located within Flood Zone 3, the data provided by the EA indicates that in a defended situation the site is likely to remain unaffected by flooding; and as the site is shown to be protected by tidal defences, is a less vulnerable use and will mainly be used for storing vehicles, it is not necessary to provide extensive mitigation measures.
- 7.19 Some surface water flooding is shown on the EA Surface Water Flood Maps within the site. The surface water flooding is only shown to enter the main body of the site in the low risk scenario. As the surface water flood depths are shown to be up to 300mm where the modular building is proposed, the building finished floor level is proposed to be set approximately 300mm above the existing ground levels. Based on the current ground level of approximately 1.8m, a proposed finished floor level of 2.1m AOD is recommended.
- 7.20 At this stage it is unclear whether the existing hardstandings and building slabs will be retained within the site, which will be dependent upon their levels and conditions. If this is the case which appears likely then there will be no increase in impermeable area on the site and it is unlikely that a new surface water drainage system will need to be introduced and the existing connections can be retained. However if it appears likely that the hardstandings throughout the site would be replaced then a SuDS strategy is proposed which will utilise lined permeable paving across the site with a restricted outfall to the adopted surface water sewer in Shripney Road.
- 7.21 It has been demonstrated that the development proposals comply with the guidance provided by the NPPF and that no reason exists to object to the proposals in terms of flood risk.



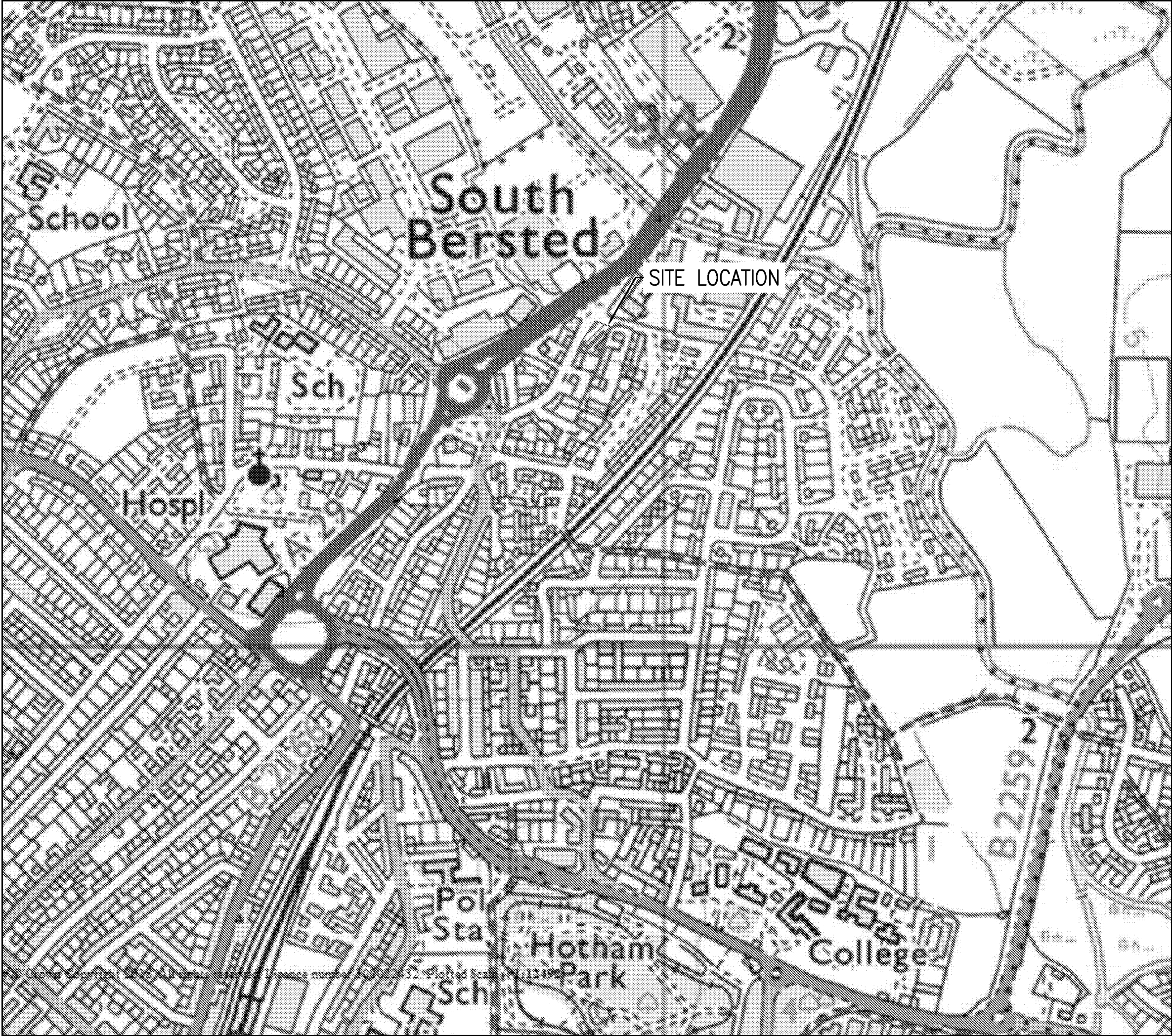
8 Appendices

Appendix: A	Location Plan
Appendix: B	Proposed Development Plans
Appendix: C	EA Flood Data
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Appendix: F	Existing Site Runoff Rates
Appendix: G	WINDES MicroDrainage Output
Appendix: H	SuDS Sketch



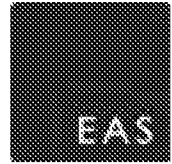
Appendix: A

LOCATION PLAN



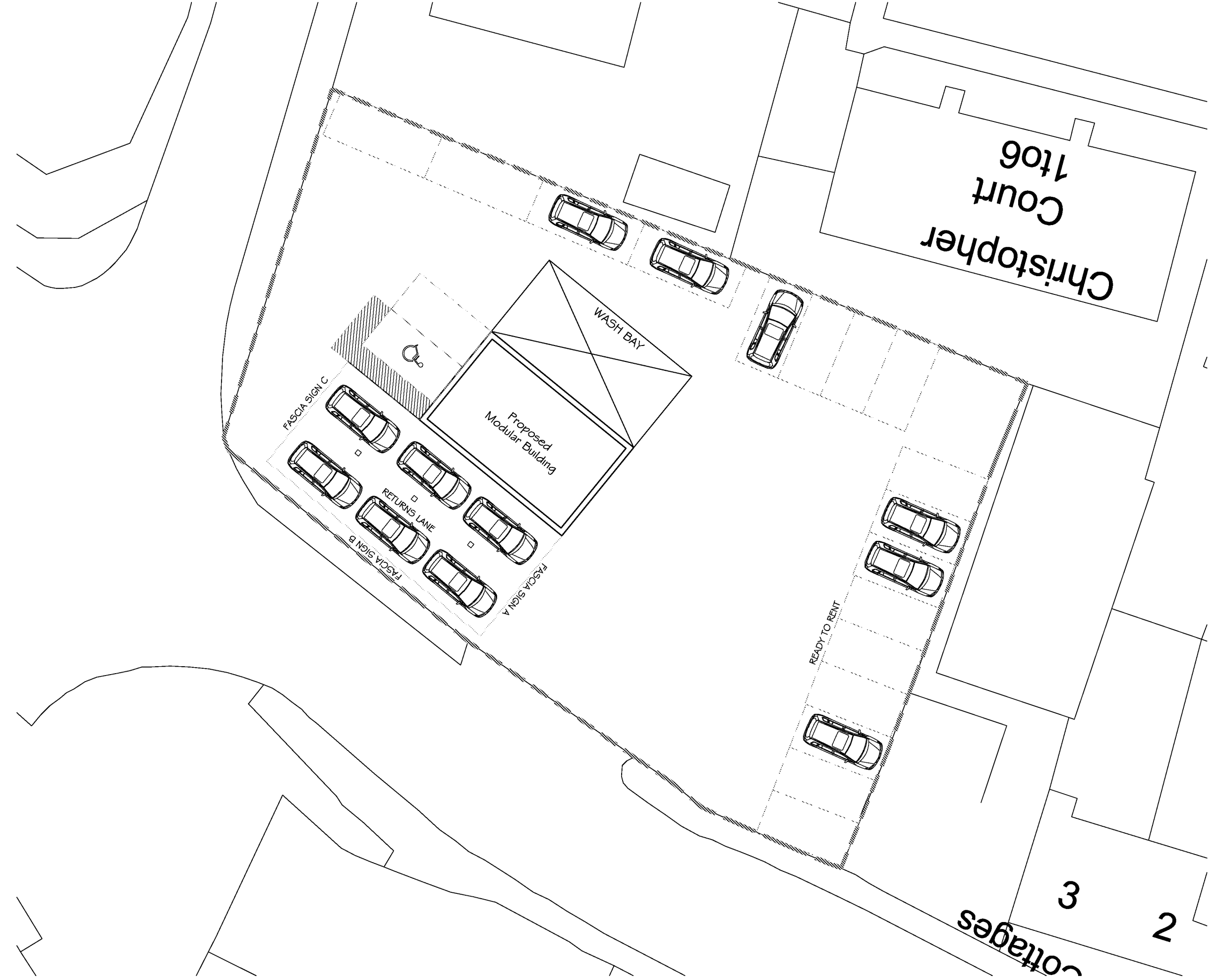
ARUN DISTRICT COUNCIL BR/18/18/PL

REV	DATE	BY	DESCRIPTION	CHK	APD
DRAWING STATUS:					
EAS Unit 23, The Maltings, Stanstead Abbots, Hertfordshire, SG12 8HG Tel: 01920 871777 www.ecstp.co.uk					
CLIENT:					
ARCHITECT:					
PROJECT: PROPOSED CAR RENTAL GARAGE SOUTH BERSTEAD, BOGNOR REGIS					
TITLE: LOCATION PLAN					
SCALE ● A3: 1:5000			DESIGN-DRAWN: RC		DATE: 26/03/2018
PROJECT No: 1646			DRAWING No: FIGURE 01		



Appendix: B

PROPOSED DEVELOPMENT PLANS



Rev.	Date	Details	Drawn	Checked
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Issued for:

PLANNING APPLICATION

Project/Client: Shripney Road, Bognor Regis, Sussex.

Project No: E.17.106

Dwg No: 002

Enterprise Rent-a-Car

Rev: *

Drawing: Proposed Site Plan

Scale: 1:200 @A3

Drawn By: SD

Date: 26.10.17

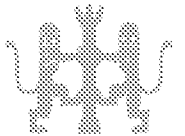
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Date: *

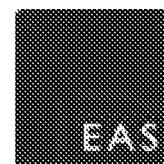
3rd Floor,
70-72 Norwich Avenue West,
Bournemouth,
BH2 6AW

T: 01202 376918
info@lmaarchitects.co.uk
www.lmaarchitects.co.uk

LMA
ARCHITECTS



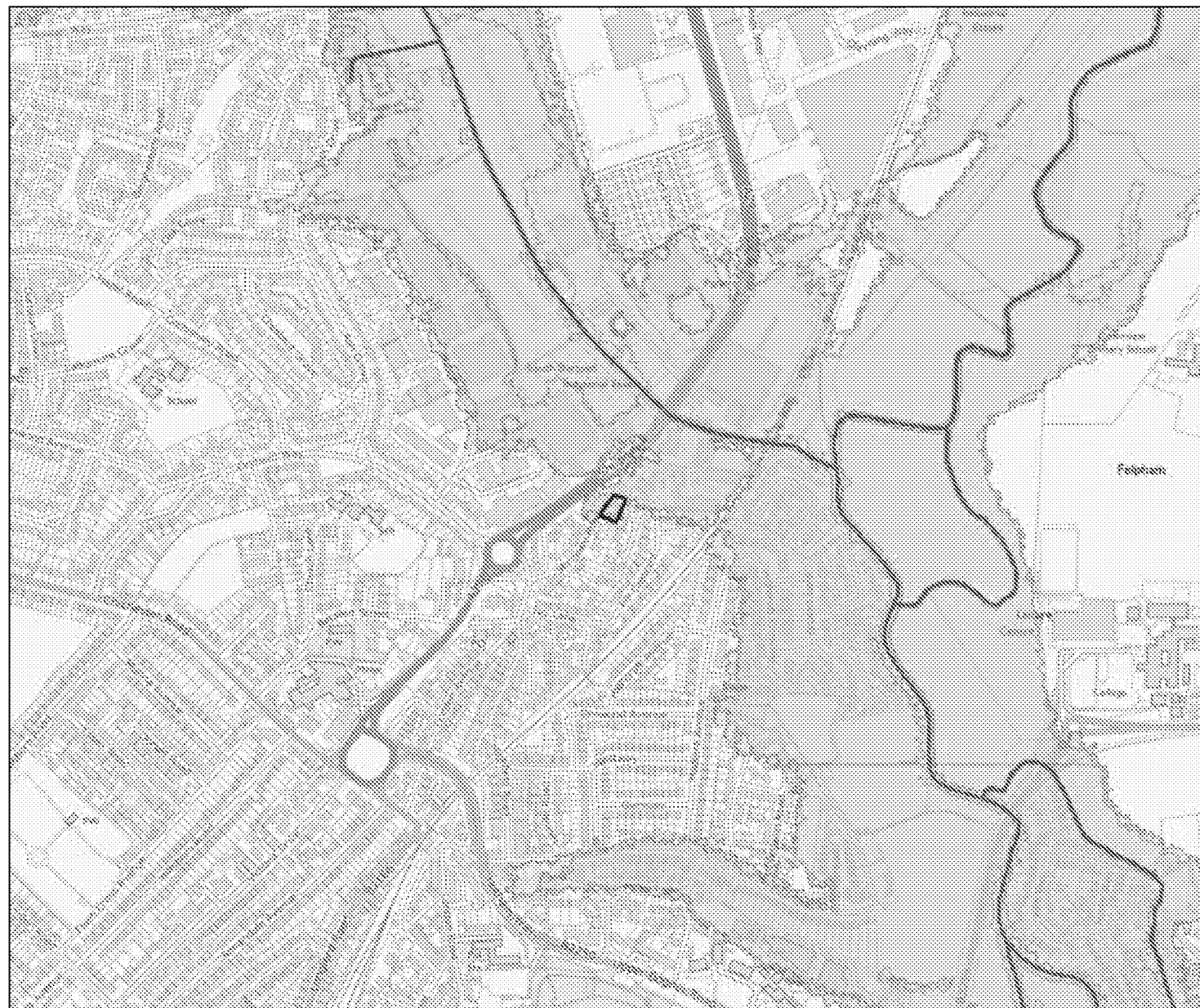
Site Plan (1:200)



Appendix: C

EA FLOOD DATA

Flood Map for Planning (Rivers and Sea). Centred on PO22 9LN. Created 14/2/18.



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.

Modelled Flood Outlines (Un defended Tidal) Map 1. Centred PO22 9LL. Created 16/2/18.

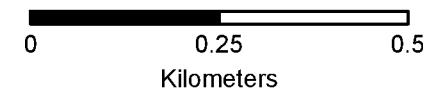


Legend

-  Site Boundary
-  20% AEP (Un defended Tidal)
-  5% AEP (Un defended Tidal)
-  3.3% AEP (Un defended Tidal)
-  1.3% AEP (Un defended Tidal)
-  1% AEP (Un defended Tidal)

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

Scale: 1:10,000



BOGNOR REGIS CP

Modelled Flood Outlines (Undefended Tidal) Map 2. Centred PO22 9LL. Created 16/2/18.

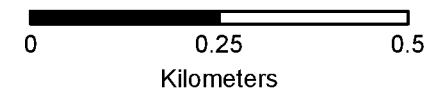


Legend

-  Site Boundary
-  0.5% AEP (Undefended Tidal)
-  0.5% AEP (2070) (Undefended Tidal)
-  0.5% AEP (2115) (Undefended Tidal)

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

Scale: 1:10,000



BOGNOR REGIS CP

Modelled Flood Outlines (Undefended Tidal) Map 3. Centred PO22 9LL. Created 16/2/18.

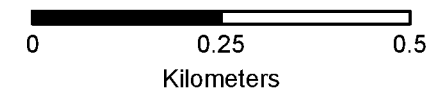


Legend

-  Site Boundary
-  0.2% AEP (Undefended Tidal)
-  0.1% AEP (Undefended Tidal)

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

Scale: 1:10,000



BOGNOR REGIS CP

FRA Site Boundary & Site Node Map. Centred PO22 9LL. Created 16/2/18.

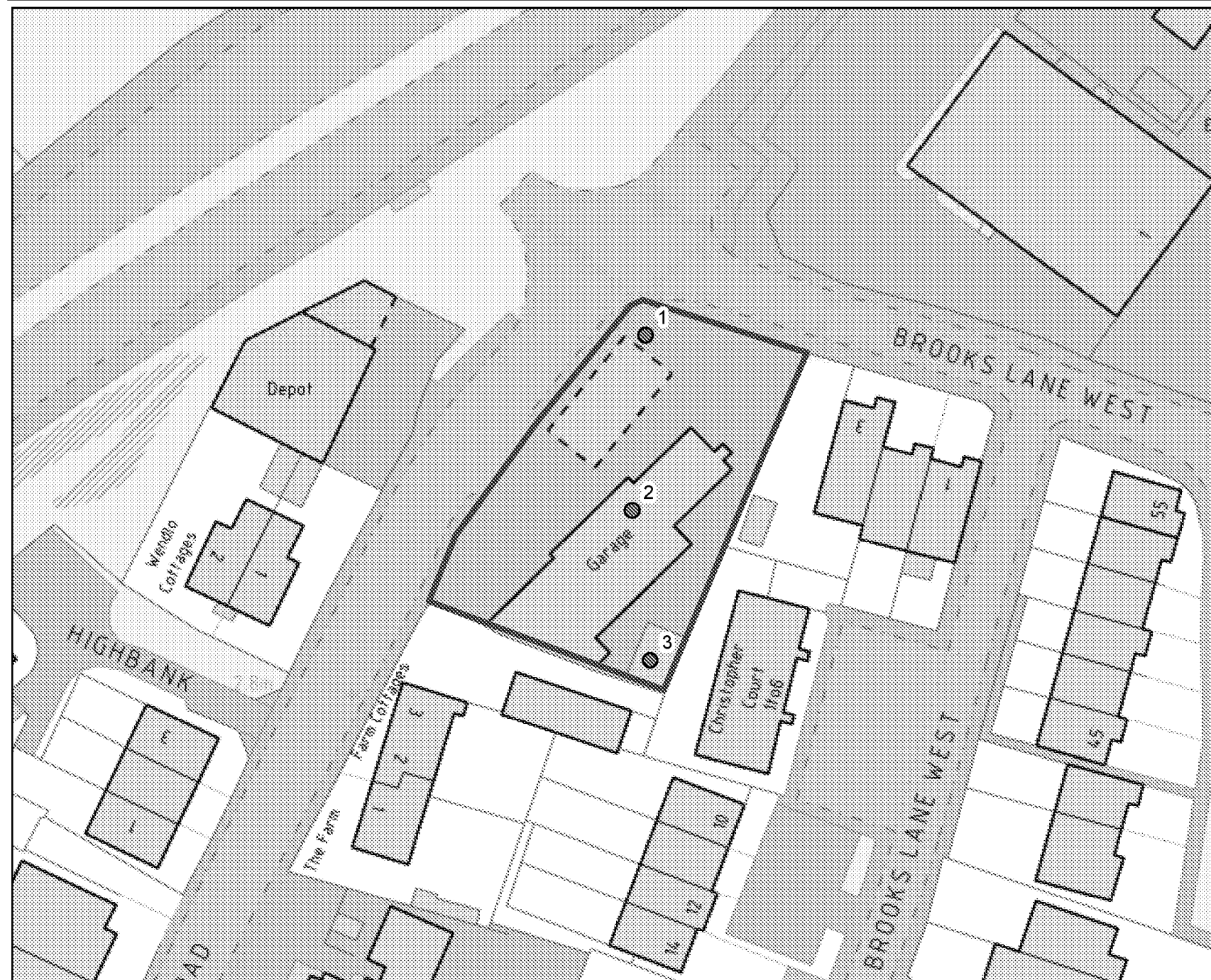
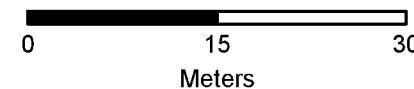


Legend

● Site Nodes

□ Site Boundary

Scale: 1:600



Product 4 Flood Risk Data Requested by: EAS
Site: South Bersted Garage, Shripney Road, South Bersted, Bognor Regis PO22 9LL

Table 1: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres				
			Undefended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	493919	100431	2.11	2.24	2.85	3.60	2.40
2	493917	100411	2.11	2.24	2.85	3.60	2.40
3	493919	100394	2.11	2.24	2.85	3.60	2.40

Table 2: Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres				
			Defended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	493919	100431	N/A	N/A	N/A	N/A	N/A
2	493917	100411	N/A	N/A	N/A	N/A	N/A
3	493919	100394	N/A	N/A	N/A	N/A	N/A

Table 3: Water Depth: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres				
			Undefended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	493919	100431	0.49	0.63	1.23	1.98	0.79
2	493917	100411	0.27	0.40	1.01	1.76	0.56
3	493919	100394	0.00	0.00	0.04	0.66	0.01

Table 4: Water Depth: Tidal Defended

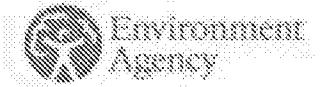
Node Ref	NGR		Modelled Flood Depths in Metres				
			Defended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	493919	100431	N/A	N/A	N/A	N/A	N/A
2	493917	100411	N/A	N/A	N/A	N/A	N/A
3	493919	100394	N/A	N/A	N/A	N/A	N/A

All levels taken from: River Arun to East Head Model (2016)

Produced on: 16/2/18

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>

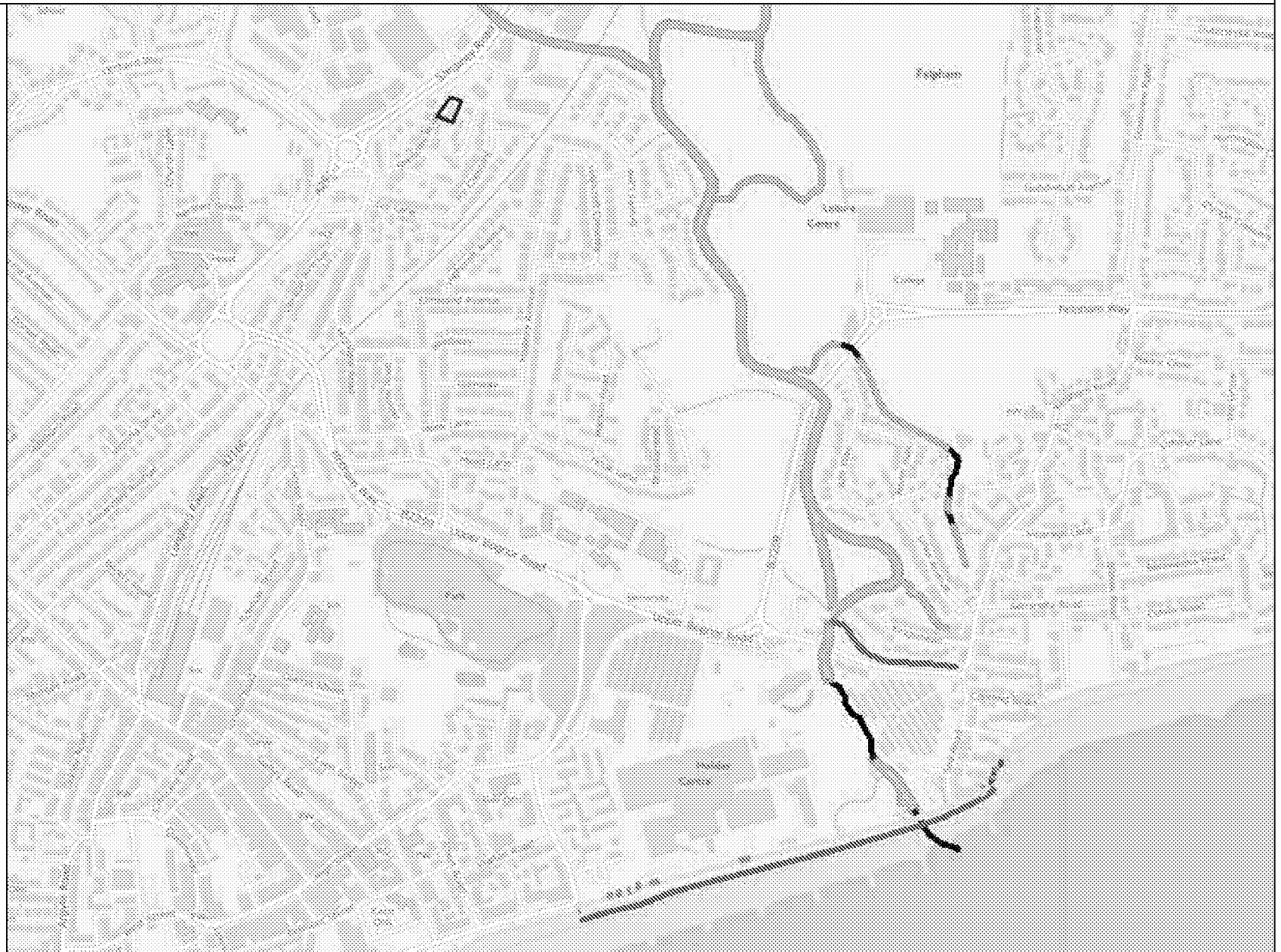
AIMS Flood Defence Map. Centred on PO22 9LL. Created 16.2.18.



Legend

Defences

-  Embankment
-  Wall
-  Flood Gate
-  Demountable Defence
-  Bridge Abutment
-  High Ground
-  Beach
-  Barrier Beach
-  Promenade
-  Quay
-  Cliff
-  Dunes
-  Culvert



0 100 200 300
Metres



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Louisa Wade
EAS
Unit 23
The Maltings
Stanstead Abbotts
Hertfordshire
SG12 8HG

Our ref: SSD73384

Date: 16/2/18

Dear Louisa Wade,

Enquiry regarding Product 4 for South Bersted Garage, Shripney Road, South Bersted, Bognor Regis PO22 9LL

Thank you for your enquiry which was received on 19/2/18.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The site is in an area located within Flood Zone 3 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 Foreshore and wave return wall (on seafront). The Asset ID is 149096. The estimated standard of protection is 1 in 200 (0.5% AEP). The estimated condition grade is 2.

Model Information

The model used was the River Arun to East Head Model which was completed in 2016 by JBA Consulting.

Flood History

We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local 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 South Bersted Garage, Shripney Road, South Bersted, Bognor Regis PO22 9LL
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 2018 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

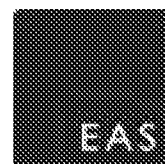
- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Leanne Prentice

FCRM Officer, Partnerships & Strategic Overview Team West Sussex



Appendix: D

TOPOGRAPHIC SURVEY

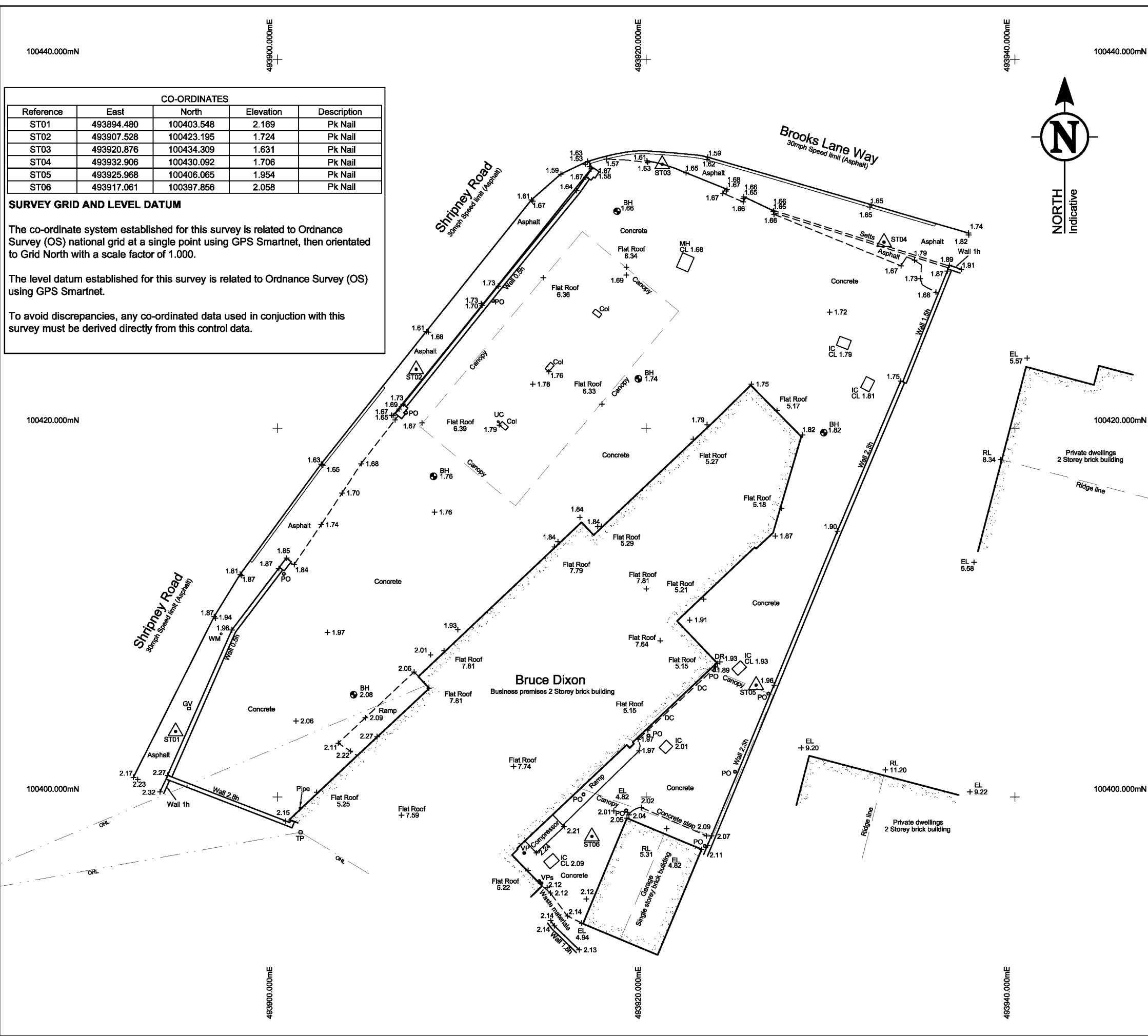
CO-ORDINATES				
Reference	East	North	Elevation	Description
ST01	493894.480	100403.548	2.169	Pk Nail
ST02	493907.528	100423.195	1.724	Pk Nail
ST03	493920.876	100434.309	1.631	Pk Nail
ST04	493932.906	100430.092	1.706	Pk Nail
ST05	493925.968	100406.065	1.954	Pk Nail
ST06	493917.061	100397.856	2.058	Pk Nail

SURVEY GRID AND LEVEL DATUM

The co-ordinate system established for this survey is related to Ordnance Survey (OS) national grid at a single point using GPS Smartnet, then orientated to Grid North with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies, any co-ordinated data used in conjunction with this survey must be derived directly from this control data.



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Height	FH	Fire Hydrant	RSJ	Roller Steel Joist
AR	Assumed Route	FBD	Floor Board Direction	SI	Sign Post
AV	Air Valve	FH	Fire Hydrant	SP	Arch Spring Point Height
BB	Beilaha Beacon	FL	Floor Level	SV	Stop Valve
BH	Bore Hole	FP	Flag Pole	SW	Surface Water
BL	Bed Level	FW	Foul Water	SY	Stay
BO	Bollard	GG	Gully Grate	Tac	Tactile Paving
BrP	Brace Post	GV	Gas Valve	TC	Telecom Cover
BS	Bus Stop	HH	Head Height	TH	Thresh Level
BU	Bush	IC	Inspection Cover	THL	Threshold Level
B/W	Barbed Wire Fence	IL	Invert Level	TL	Traffic Light
BX	Box (Utilities)	I/R	Iron Railings	ToW	Top of Wall
C/B	Close Board Fence	KO	Kerb Outlet	TP	Telegraph Pole
CH	Cill Height	LP	Lamp Post	TV	Cable TV Cover
CL	Cover Level	MH	Manhole	UB	Universal Beam
C/L	Chain Link Fence	MP	Marker Post	UC	Unknown Cover
C-Lev	Ceiling Level	NB	Name Board	UK	Unknown Tree
Col	Column	OHL	Overhead Line (approx)	USB	Under Side Beam
C/P	Chestnut Paling Fence	Par	Panel Fence	UTL	Unable To Lift
CR	Cable Rise	PB	Post Box	VP	Vent Pipe
DC	Drainage Channel	PM	Parking Meter	WB	Waste Bin
DH	Door Head Height	PO	Post	WH	Weep Hole
DP	Down Pipe	P/R	Post & Rail Fence	WL	Water Level
DR	Drain	P/W	Post & Wire Fence	WM	Water Meter
EL	Eaves Level	P/Wall	Partition Wall	WO	Wash Out
EP	Electric Pole	RE	Rodding Eye	⊙	Floor to Ceiling Height
ER	Earth Rod	RL	Ridge Level	⊙	F/C Floor to False Ceiling Ht
ET	EP+Transformer	RP	Reflector Post	⊙	F/C Floor to False Ceiling Ht
FB	Flower Bed	RS	Road Sign	⊙	F/C Floor to False Ceiling Ht
FBD	Floor Board Direction	RSD	Roller Shutter Door	⊙	F/C Floor to False Ceiling Ht

DRAWING NOTE

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

Cill heights are measured as floor to the cill and head heights are measured from cill to the top of window.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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Do not scale from this drawing.

REV	DESCRIPTION	DRAWN	APPR	DATE
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Ipswich Coventry Yeovil Norwich Perth Nottingham Brentwood

Tel No: 0845 0405 969 Fax No: 0845 0405 970
www.survey-solutions.co.uk enquiries@survey-solutions.co.uk

LAND SURVEYING BUILDING SURVEYING UNDERGROUND SURVEYING

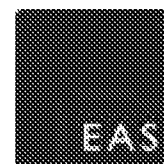
PROJECT TITLE
SOUTH BERSTED GARAGE, SHRIPNEY ROAD,
BOGNOR REGIS, PO22 9LN.

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 1 of 1

CLIENT ENTERPRISE RENT-A-CAR				SCALE 1:200
SURVEYOR SB	SURVEY DATE 09/03/2018	CHECKED BY RM	APPROVED BY JM	DWG STATUS FINAL
DRAWING NUMBER 21435se-01			REVISION	ISSUE DATE 15/03/2018

Original Sheet Size A2H

© Land Survey Solutions Limited 01/01/2010

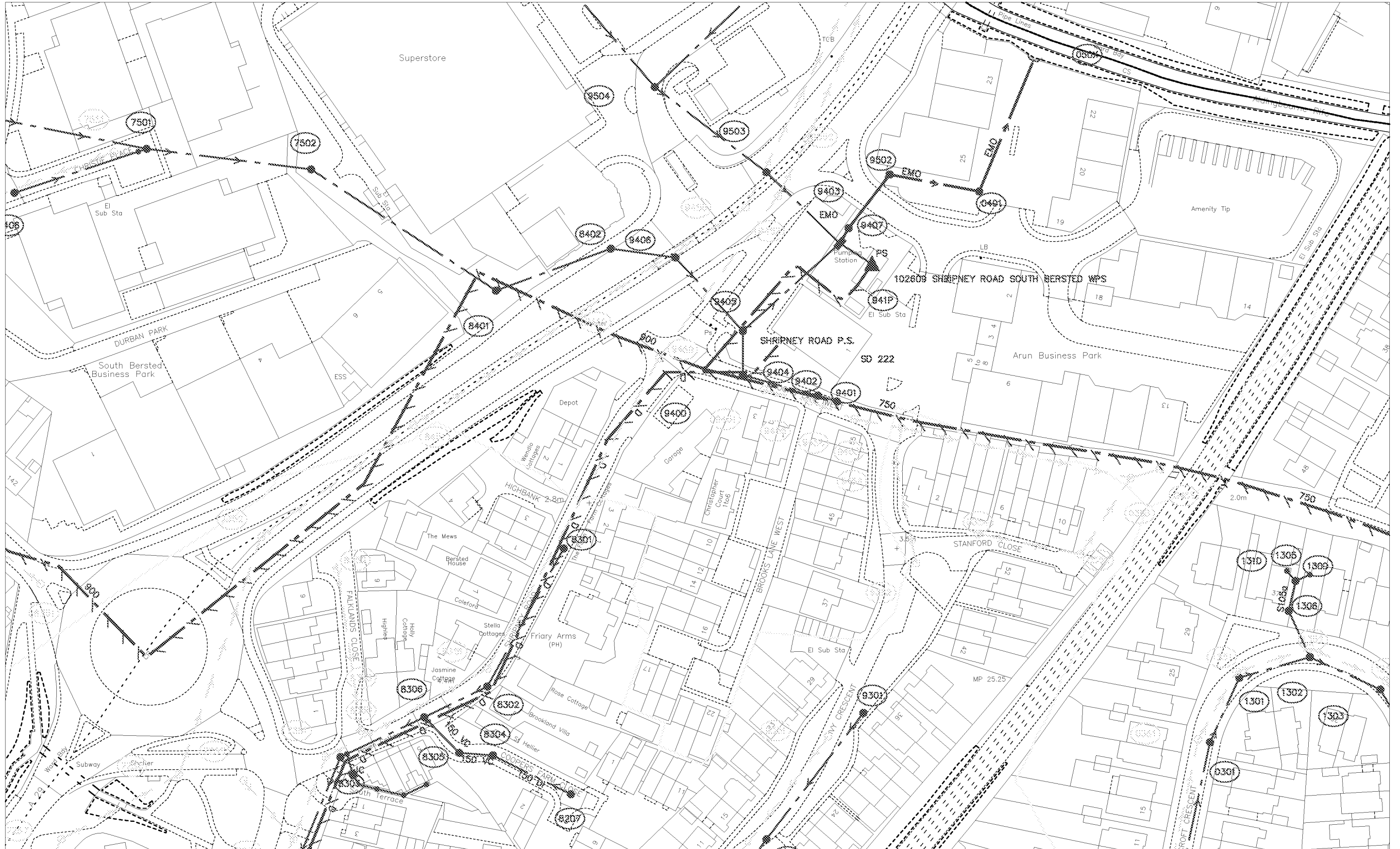


Appendix: E

SEWER MAPPING

SEWER RECORDS PAGE 1 OF 2

100561



100272

493687

O.S. REF.

SU9300SE

Title: 278081_South Bersted Garage, S

Drawn by: yadavsa

Scale: 1:1250

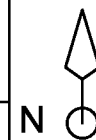
Date: 26/01/2018

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

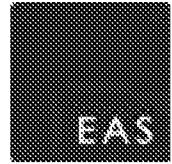
The actual positions should be determined on site.

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

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Licence No. WU 298530.



401450



Appendix: F

EXISTING SITE RUNOFF RATES

Run-off from Existing Site

Methodology

Using the Modified Rational Method, the surface water run-off rate, has been calculated for the existing site which is assumed to be 100% impermeable.

Ref: Butler, D and Davies, J. (2006), Urban Drainage, 2nd ed, SPON.

$$Q = CiA$$

where

$$C = \frac{PIMP}{PR}$$

PIMP = Percentage of impervious area to total area
PR = Percentage Runoff

	Surface Area (m ²)
Existing Impervious Areas	1012.5
Total Area	1012.5

i (Rainfall intensity, mm/hr) = 50.00
i (Rainfall intensity, m/hr) = 0.050
i (Rainfall intensity, m/s) = 1.38×10^{-5}

Percentage run-off (PR)

Existing Impervious Area = 100%

Percentage of impervious area to total area (PIMP)

PIMP = $1012.5/1012.5 = 100\%$

$$\text{Therefore } C = \frac{PIMP}{PR} = 1$$

Runoff from existing site:

$$Q = CiA$$

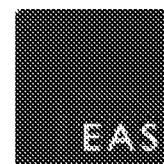
$$Q = 1 \times 1.38 \times 10^{-5} \times 1012.5 \text{ m}^2$$

$$Q = 0.01397 \text{ m}^3 \text{ s}^{-1}$$

$$Q = 13.97 \text{ ls}^{-1}$$

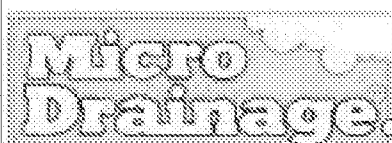
Total Q for the existing site = 13.97 ls⁻¹

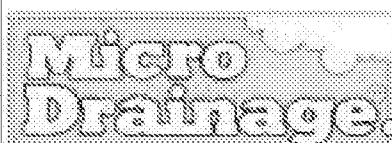
X1000 to get from m3 to ls

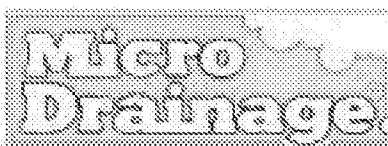


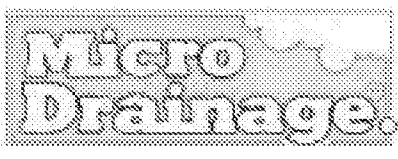
Appendix: G

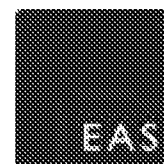
WINDES MicroDRAINAGE OUTPUT

EAS				Page 1			
Unit 108 The Maltings Stanstead Abbotts Hertfordshire SG12 8HG							
Date 20/03/2018 09:27 File Permeable Paving...		Designed by Maz Checked by					
Micro Drainage		Source Control 2013.1.1					
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 96 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	9.780	0.080	0.0	3.1	3.1	16.9	Flood Risk
30 min Summer	9.804	0.104	0.0	3.2	3.2	22.9	Flood Risk
60 min Summer	9.821	0.121	0.0	3.3	3.3	27.4	Flood Risk
120 min Summer	9.827	0.127	0.0	3.3	3.3	29.0	Flood Risk
180 min Summer	9.824	0.124	0.0	3.3	3.3	28.2	Flood Risk
240 min Summer	9.819	0.119	0.0	3.3	3.3	26.9	Flood Risk
360 min Summer	9.808	0.108	0.0	3.2	3.2	24.2	Flood Risk
480 min Summer	9.798	0.098	0.0	3.2	3.2	21.4	Flood Risk
600 min Summer	9.788	0.088	0.0	3.1	3.1	18.8	Flood Risk
720 min Summer	9.778	0.078	0.0	3.1	3.1	16.3	Flood Risk
960 min Summer	9.761	0.061	0.0	3.0	3.0	11.9	Flood Risk
1440 min Summer	9.735	0.035	0.0	2.9	2.9	5.3	Flood Risk
2160 min Summer	9.711	0.011	0.0	2.8	2.8	0.5	Flood Risk
2880 min Summer	9.700	0.000	0.0	2.4	2.4	0.0	O K
4320 min Summer	9.700	0.000	0.0	1.7	1.7	0.0	O K
5760 min Summer	9.700	0.000	0.0	1.4	1.4	0.0	O K
7200 min Summer	9.700	0.000	0.0	1.1	1.1	0.0	O K
8640 min Summer	9.700	0.000	0.0	1.0	1.0	0.0	O K
10080 min Summer	9.700	0.000	0.0	0.9	0.9	0.0	O K
15 min Winter	9.791	0.091	0.0	3.2	3.2	19.7	Flood Risk
30 min Winter	9.818	0.118	0.0	3.3	3.3	26.5	Flood Risk
60 min Winter	9.839	0.139	0.0	3.4	3.4	32.0	Flood Risk
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
15 min Summer		124.633	0.0	19.0	18		
30 min Summer		83.789	0.0	27.0	32		
60 min Summer		53.779	0.0	36.0	60		
120 min Summer		33.337	0.0	45.5	96		
180 min Summer		24.832	0.0	51.3	128		
240 min Summer		20.006	0.0	55.4	164		
360 min Summer		14.706	0.0	61.3	232		
480 min Summer		11.818	0.0	65.8	300		
600 min Summer		9.966	0.0	69.4	364		
720 min Summer		8.665	0.0	72.5	428		
960 min Summer		6.943	0.0	77.4	550		
1440 min Summer		5.071	0.0	84.5	782		
2160 min Summer		3.696	0.0	91.6	1104		
2880 min Summer		2.949	0.0	96.7	0		
4320 min Summer		2.142	0.0	103.6	0		
5760 min Summer		1.705	0.0	108.1	0		
7200 min Summer		1.427	0.0	111.3	0		
8640 min Summer		1.235	0.0	113.7	0		
10080 min Summer		1.093	0.0	115.5	0		
15 min Winter		124.633	0.0	21.9	18		
30 min Winter		83.789	0.0	30.7	32		
60 min Winter		53.779	0.0	40.8	60		
©1982-2013 Micro Drainage Ltd							

EAS				Page 2			
Unit 108 The Maltings Stanstead Abbotts Hertfordshire SG12 8HG							
Date 20/03/2018 09:27		Designed by Maz					
File Permeable Paving...		Checked by					
Micro Drainage			Source Control 2013.1.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
120 min Winter	9.847	0.147	0.0	3.4	3.4	34.0	Flood Risk
180 min Winter	9.843	0.143	0.0	3.4	3.4	33.1	Flood Risk
240 min Winter	9.836	0.136	0.0	3.3	3.3	31.2	Flood Risk
360 min Winter	9.819	0.119	0.0	3.3	3.3	26.8	Flood Risk
480 min Winter	9.802	0.102	0.0	3.2	3.2	22.5	Flood Risk
600 min Winter	9.786	0.086	0.0	3.1	3.1	18.5	Flood Risk
720 min Winter	9.772	0.072	0.0	3.1	3.1	14.8	Flood Risk
960 min Winter	9.748	0.048	0.0	3.0	3.0	8.5	Flood Risk
1440 min Winter	9.713	0.013	0.0	2.8	2.8	0.7	Flood Risk
2160 min Winter	9.700	0.000	0.0	2.2	2.2	0.0	O K
2880 min Winter	9.700	0.000	0.0	1.7	1.7	0.0	O K
4320 min Winter	9.700	0.000	0.0	1.2	1.2	0.0	O K
5760 min Winter	9.700	0.000	0.0	1.0	1.0	0.0	O K
7200 min Winter	9.700	0.000	0.0	0.8	0.8	0.0	O K
8640 min Winter	9.700	0.000	0.0	0.7	0.7	0.0	O K
10080 min Winter	9.700	0.000	0.0	0.6	0.6	0.0	O K
Storm Event	Rain (mm/hr)		Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
120 min Winter	33.337		0.0	51.4	110		
180 min Winter	24.832		0.0	58.0	138		
240 min Winter	20.006		0.0	62.6	178		
360 min Winter	14.706		0.0	69.1	252		
480 min Winter	11.818		0.0	74.2	322		
600 min Winter	9.966		0.0	78.2	392		
720 min Winter	8.665		0.0	81.8	456		
960 min Winter	6.943		0.0	87.3	578		
1440 min Winter	5.071		0.0	95.4	768		
2160 min Winter	3.696		0.0	103.6	0		
2880 min Winter	2.949		0.0	109.5	0		
4320 min Winter	2.142		0.0	117.6	0		
5760 min Winter	1.705		0.0	123.0	0		
7200 min Winter	1.427		0.0	126.8	0		
8640 min Winter	1.235		0.0	129.9	0		
10080 min Winter	1.093		0.0	132.2	0		
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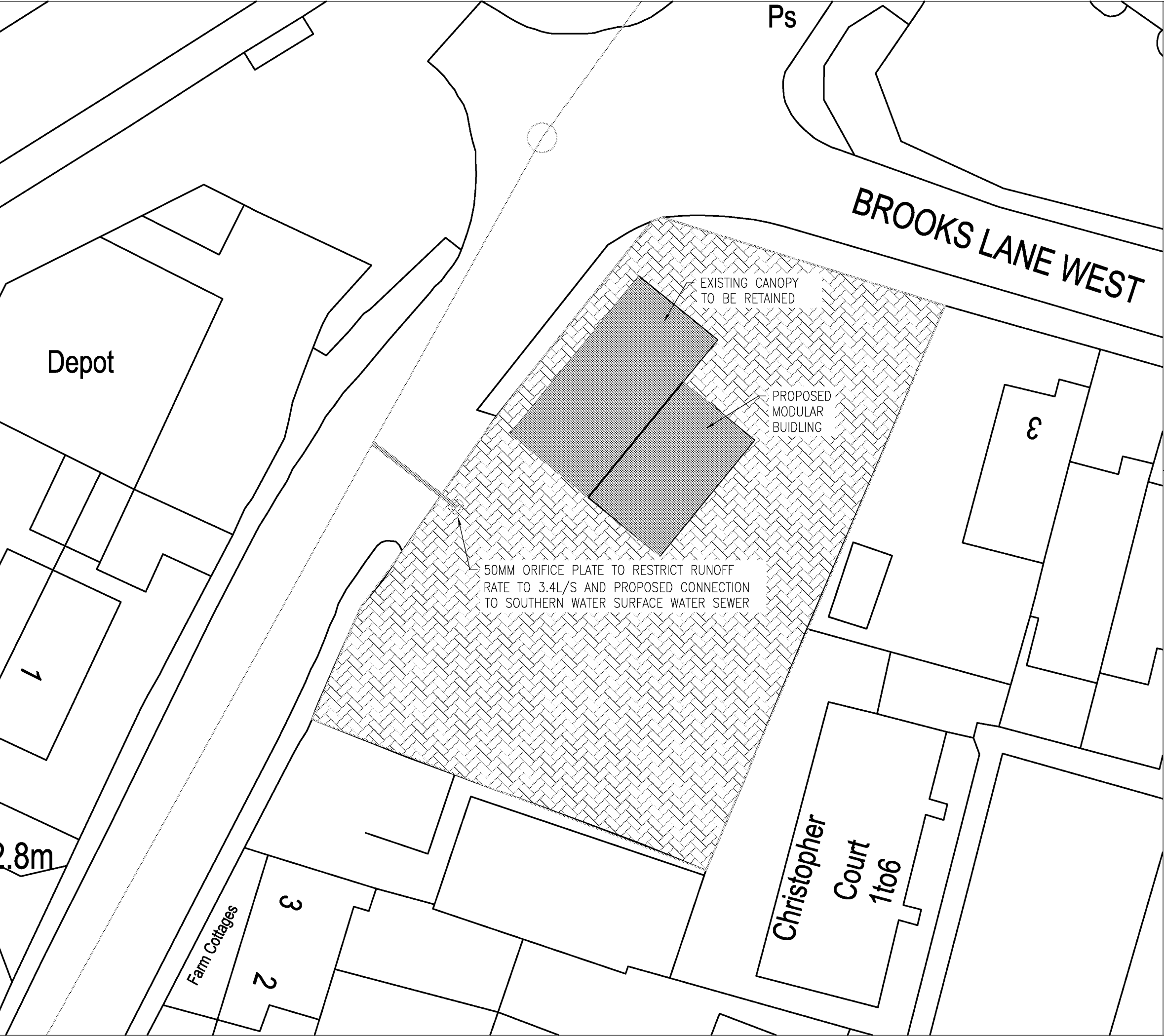
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Unit 108 The Maltings Stanstead Abbotts Hertfordshire SG12 8HG																																
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Micro Drainage Source Control 2013.1.1																																
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.000</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.100 <table> <tr> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To: (ha)</th> </tr> <tr> <td>0</td> <td>4 0.100</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.000	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From:	To: (ha)	0	4 0.100
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Date 20/03/2018 09:27 File Permeable Paving...	Designed by Maz Checked by													
Micro Drainage Source Control 2013.1.1														
<u>Model Details</u> Storage is Online Cover Level (m) 10.000 <u>Porous Car Park Structure</u> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Infiltration Coefficient Base (m/hr) 0.00000</td> <td style="width: 50%;">Width (m) 29.3</td> </tr> <tr> <td>Membrane Percolation (mm/hr) 1000</td> <td>Length (m) 29.3</td> </tr> <tr> <td>Max Percolation (l/s) 238.5</td> <td>Slope (1:X) 1000.0</td> </tr> <tr> <td>Safety Factor 2.0</td> <td>Depression Storage (mm) 5</td> </tr> <tr> <td>Porosity 0.30</td> <td>Evaporation (mm/day) 3</td> </tr> <tr> <td>Invert Level (m) 9.700</td> <td>Cap Volume Depth (m) 0.000</td> </tr> </table> <u>Orifice Outflow Control</u> Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 9.400			Infiltration Coefficient Base (m/hr) 0.00000	Width (m) 29.3	Membrane Percolation (mm/hr) 1000	Length (m) 29.3	Max Percolation (l/s) 238.5	Slope (1:X) 1000.0	Safety Factor 2.0	Depression Storage (mm) 5	Porosity 0.30	Evaporation (mm/day) 3	Invert Level (m) 9.700	Cap Volume Depth (m) 0.000
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APPENDIX: H

SUDS SKETCH



KEY

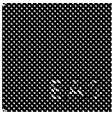
SOUTHERN WATER SURFACE
WATER SEWER

PROPOSED PERMEABLE
PAVING AREA 860SQM

SITE AREA— 0.1 HECTARES

REV	DATE	BY	DESCRIPTION	CHK	APD
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DRAWING STATUS:



Unit 23, The Maltings, Stanstead Abbots, Hertfordshire, SG12 8HG
Tel: 01920 871777
www.eastp.co.uk

CLIENT:

ARCHITECT:

PROJECT:
**PROPOSED CAR RENTAL GARAGE
SOUTH BERSTEAD, BOGNOR REGIS**

TITLE:
PROPOSED SUDS LAYOUT

SCALE Ⓢ A3: 1:250	DESIGN—DRAWN: RC	DATE: 26/03/2016
PROJECT No: 1646	DRAWING No: SK01	