



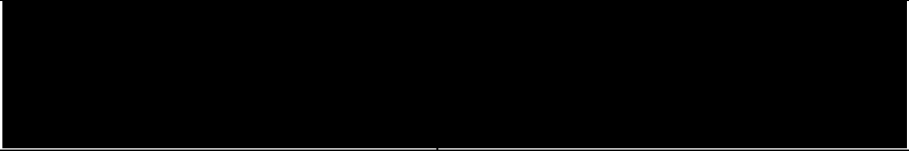
FLOOD RISK ASSESSMENT

for the site at

**KINGSTON CORNER ANNEX, BROKSID ROAD, EAST PRESTON,
WEST SUSSEX BN16 1SE**

on behalf of

DAVID STATION C/O NICO WARR ARCHITECTS

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1.0 INTRODUCTION

1.1 General

Ground and Water Limited were instructed by David Station c/o Nico Warr Architects on the 3rd May 2018 to conduct a Flood Risk Assessment at Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE. The scope of the investigation was detailed within the Ground and Water Limited email fee proposal Ref: GWQ3853 dated 30th April 2018.

1.2 Aims of the Investigation

The aims and objective of the report was to supply the client with a Flood Risk Assessment to support a planning application.

This report has been prepared to consider the risk of flooding to the site and to consider measures that may be required to manage this risk. The potential impacts of climate change together with the risk of flooding to others have also been taken into account. The disposal of surface water has also been addressed.

This FRA report should be submitted to the Local Authority for comment.

1.3 Legislative Background, Conditions and Limitations

Ground and Water Limited have prepared this report following the principals of the National Planning Policy Framework (NPPF) and Technical Guidance-Flooding, published March 2012, Planning Policy Statement Note 25, Development and Flood Risk (PPS25), published in December 2006 and the Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment Final Report published in November 2016. Details on the legislative background are provided in Appendix A.

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

The report has been prepared using desk based information, the findings of an onsite survey and information provided by the client, local authority and Groundsure.

2.0 SITE SETTING

2.1 Site Location

The site comprised 0.50ha rectangular shaped plot of land, orientated in an east to west direction, and located on the eastern side of Brookside Road. The site was located in the private estate of Kingston Gorse, to the west of Ferring in West Sussex.

The approximate O.S. National Grid Reference for the centre of the site was TQ 08924 01754. A site location plan can be seen in Figure 1 with a plan showing the site area presented in Figure 2.

2.2 Site Description

The site was occupied by an existing two storey detached residential property and areas of front, side and rear gardens. A tennis court was located in the rear garden. Numerous mature trees (apple, beech, poplar and cedar) and bushes were located across and around the boundaries of the site.

The southerly flowing Ferring Rife located ~20m east of the eastern boundary of the site and ~105m east of the proposed structure. The coast was located ~300m to the south.

An aerial view of the site showing the site and approximate site boundary is given within Figure 3.

2.3 Site Topography

A review of a topographical survey undertaken onsite revealed the elevation of the western boundary ranged between 4.16 – 4.58m AOD. The upper bank of the Ferring Rife on the eastern boundary ranged between 2.07 – 2.74m AOD. In the area of the proposed structure the elevation of the site was ~3.60m AOD. The elevation of the existing house was ~3.80-4.00m AOD. The topographical survey can be seen in Figure 4.

A review of topographical data for the site's environs revealed a gentle slope in an easterly direction towards the Ferring Rife.

2.4 Proposed Development

At the time of reporting, July 2018, the proposed development was understood to comprise the construction of a single storey guest house with a mezzanine floor. Whilst no basement is to be excavated, it is proposed to sink the building into the ground by about 0.80m (~2.80 m AOD). French drains are proposed to be installed around the perimeter of the new building. A plan of the proposed development is given in Figure 5 and a section is given in Figure 6.

2.5 Geology

The BGS Geological Map for the East Preston area (Chichester and Bognor Sheet No. 317/332) revealed that the site was located on Brickearth and Undifferentiated River Terrace Deposits overlying the Lewes Nodular Chalk Formation.

There were no areas of Made Ground or Worked Ground within a 250m radius of the site.

Brickearth

Brickearth comprises a geologically recent deposit of brown structureless sandy clay of limited thickness that usually overlies Marine Gravels in the area of the site. Its name is derived from its former use in the manufacture of bricks.

Undifferentiated River Terrace Deposits

In the south, flanking the rivers draining into the Solent, these deposits consist of gravels and sandy gravels, commonly clayey in the higher terraces. In places, clayey and sandy silty and silty clay overlie the aggregate, perhaps an indication of the preservation of overbank or Aeolian deposits at the top of each fluvial cycle. In general the terrace deposits are up to 6m thick.

Lewes Nodular Chalk Formation

The Lewes Nodular Chalk Formation comprises hard to very nodular chalks and hardgrounds with interbedded soft to medium hard chalks (some grainy) and marls. The softer chalks become more abundant towards the top. Nodular chalks are typically lumpy and iron stained (usually marking sponges). Brash is rough and flaggy or rubbly and tends to be dirty. The first regular seams of nodular flint, some large, commence near the base and continue throughout.

Occasional erosional features, such as pipes, swallow holes and solution cavities, usually in-filled with drift deposits; can be found in the chalk deposits. These features sometimes manifest themselves at the surface as shallow circular depressions. Solution features may be reactivated by the concentrated ingress of water from leaking drains or soakaways. Reactivation may lead to surface collapse.

There were no BGS borehole records in a close proximity to the site.

2.6 Hydrogeology and Hydrology

An examination of the DEFRA website revealed the site to be located on a **Secondary A Aquifer** relating to the superficial deposits of the Undifferentiated River Terrace Deposits, overlying a **Principal Aquifer** corresponding to the bedrock deposits of the Lewes Nodular Chalk Formation.

Superficial (Drift) deposits are permeable unconsolidated (loose) deposits, for example, sands and gravels. The bedrock is described as solid permeable formations e.g. sandstone, chalk and limestone.

Secondary aquifers include a wide range of drift deposits with an equally wide range of water permeability and storage capacities. Secondary (A) Aquifers consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

A Principal Aquifer is a layer 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.

Examination of the Environment Agency records showed that the site was not located within a Groundwater Source Protection Zone (SPZ) as classified in the Policy and Practice for the Protection of Groundwater.

The nearest surface water features was the southerly flowing Ferring Rife located ~20m east of the eastern boundary of the site and ~105m east of the proposed structure. The coast was located ~300m to the south.

From analysis of hydrogeological and topographical maps groundwater was anticipated to be

encountered at shallow depth (<3m bgl)) and it was considered that the groundwater was flowing in an easterly direction towards the Ferring Rife and in a southerly direction in alignment with local topography towards the coast, ~300m to the south.

3.0 FLOOD RISK

3.1 Environment Agency Flood Risk Zones

National Planning Policy Framework and Technical Guidance-Flooding, published March 2012, and Planning Policy Statement 25: Development and Flood Risk, (PPS25), published in December 2006 provides guidance on assessing flood risk and seeks to guide development away from areas at risk of flooding. PPS25 defines a number of 'Flood Zones' based on the probability of flooding and provides guidance on the most appropriate forms of development within each zone. The Environment Agency's primary concern is that lives are not put at risk and that the possibility of pollution is reduced to acceptable levels. It is not so concerned about damage to property.

The Flood Zones are summarised in Table 1 (from Table D.1 of PPS25) below:

Environment Agency Defined Flood Zones		
Zone	Annual Probability of Flooding In Any Year	
	Fluvial Flooding	Tidal Flooding
Zone 1: Low Probability	Less than 1 in a 1000 (<0.1%)	Less than 1 in a 1000 (<0.1%)
Zone 2: Medium Probability	Between 1 in 1000 and 1 in 100 (0.1% - 1%)	Between 1 in 1000 and 1 in 200 (0.1% - 0.5%)
Zone 3a: High Probability	Greater than 1 in 100 (>1%)	Greater than 1 in 200 (>0.5%)
Zone 3b: Functional Floodplain	Greater than 1 in 20 (>5%)	n/a

These zones do not take account of any flood defences that may exist as these could be overtopped or breached by a more severe flood event than designed for or maintained against.

3.2 Site Assessment

A review of the 1:10,000 Flood Map and Environment Agency website revealed the area of the proposed structure, in the western portion of the site, was located within a Flood Zone 1 (an area with a low probability of river or sea flooding).

The eastern portion of the total site area, away from the proposed development, fell within a Flood Zone 2. **Environment Agency Zone 2** floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea.

The extreme eastern boundary of the total site area, close to the Ferring Rife, fell within a Flood Zone 3. **Environment Agency Zone 3** shows the extent of a river flood with a 1 in 100 (1% or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

3.3 Groundsure FloodInsight Datasheet

Groundsure FloodInsight Datasheets were obtained for the site. A copy of the datasheets are presented in Appendix B and a summary is given in Table 2 overleaf.

Environmental Significance Of Data Search	
Source	Nearest Distance from Site/Dated/Type
Environmental Agency Flood Zones	
Environmental Agency River and Coastal Zone 2 Floodplains	1 record onsite and 46 records within a 250m radius: 1 x Flood Zone 2 onsite. 2x Flood Zone 2 4-27m east 1x Flood Zone 2 36m east 1x Flood Zone 2 58m south-east 3x Flood Zone 2 66-88m south-east 2x Flood Zone 2 102-107m south-east 3x Flood Zone 2 116-123m south 3x Flood Zone 2 133-139m south-east 5x Flood Zone 2 142-165m south 3x Flood Zone 2 165-171m south 3x Flood Zone 2 168-178m south-east 3x Flood Zone 2 171-199m south 5x Flood Zone 2 196-208m south-east 1x Flood Zone 204m north 6x Flood Zone 2 202-222m south 2x Flood Zone 2 210-229m south-east 1x Flood Zone 2 224m south
Environmental Agency Zone 3 Floodplains	1 record onsite and 2 records within a 250m radius: 1 x Flood Zone 3 onsite 2 x Flood Zone 3 82-87m south.
River and coastal Flood Defences	2 records within a 250m radius. 4m and 30m east.
Areas Benefiting from Flood Defences	None within a 250m radius.
Proposed Flood Defences	None within a 250m radius.
Flood Water Storage Areas	None within a 250m radius.
Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS)	
Risk of Flooding from Rivers and the Sea (RoFRaS)	4 records within a 250m radius High Risk on-site. RoFRaS data for the study site indicated the property is in an area with a High (1 in 30 or greater) chance of flooding in any given year. Medium Risk on-site. RoFRaS data for the study site indicated the property is in an area with a medium (<1 in 30 (3.3%) but >1 in 100 (1%)) chance of flooding in any given year. Low Risk 7m south-east. RoFRaS data for the study site indicated the property is in an area with a medium (<1 in 100 (1%) but >or equal to 1 in 1000 (0.01%)) chance of flooding in any given year. Medium Risk 49m south-east. RoFRaS data for the study site indicated the property is in an area with a medium (<1 in 30 (3.3%) but >1 in 100 (1%)) chance of flooding in any given year.
Environment Agency Historic Flooding Events	
Historic Flooding recorded by the Environment Agency	None within a 250m radius.
JBA Records of Surface Water (Pluvial) Flooding	17 records on-site and 3 records within a 250m radius Low to Significant Risk on site. Low Risk – on-site (x5), 2m and 45m south, 32m north, 45m east, 50m east. Low to Moderate Risk – on-site (x7). Moderate Risk – 50m north-east. High Risk – on-site (x3). Significant Risk – on-site (x2).
The definition of each risk category is given below:	
Negligible.	Less than 0.1m in a 1 in 1000 year rainfall event
Low.	Greater than 0.1m in a 1 in 1000 year rainfall event
Low to Moderate.	Between 0.1m and 0.3m in a 1 in 200 year rainfall event
Moderate.	Between 0.3m and 1m in a 1 in 200 year rainfall event
Moderate to High.	Greater than 1m in a 1 in 200 year rainfall event
High.	Between 0.1m and 0.3m in a 1 in 75 year rainfall event
Significant.	Between 0.3m to 1m in a 1 in 75 year rainfall event
Highly Significant.	Greater than 1m in a 1 in 75 year rainfall event

Cont'd Overleaf:

Environmental Significance Of Data Search Cont'd	
Source	Nearest Distance from Site/Dated/Type
Environmental Agency Flood Zones (cont)	
Surface Water Features	
Surface Water Features	1 record noted onsite and 16 noted within a 250m radius: onsite 7m and 17m east 34m, 189m, 213m and 242m north-east 38m, 68m, 115m, 117m, 130m, 187m and 207m north 51m, 199m and 203m south-east
BGS Groundwater Flooding	
Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of study site?	Yes
What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?	Potential for groundwater flooding of property below ground level – Clearwater Flooding. Where potential for groundwater flooding of property situated below ground level is indicated, this means that given the geological conditions there may be a groundwater flooding hazard to basements and other below surface infrastructure. Unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area you need take no further action in relation to groundwater flooding hazard. If there are records of previous incidences of groundwater flooding, then is recommended that other information e.g. rainfall history, property type, and land drainage information in addition to previous records of flooding be investigated in order to establish relative, but not absolute, risk of groundwater flooding.
What is the British Geological Survey confidence rating in this result?	High
BGS Geological Indicators of Flooding	
Geological Indicators of Flooding	2 records onsite and 1 record within a 250m radius. On-site: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment. On-site: Lower flood potential from rivers: areas affected by secondary flooding in extreme cases as a result of a prolonged flood event. 45m east: Lower flood potential from rivers: areas affected by secondary flooding in extreme cases as a result of a prolonged flood event.
JBA Reservoir and Canal Data	
JBA Reservoir Failure Modelling	None required
JBA Canal Break Modelling	No record within 500m from the site.

It should be noted that although the Groundsure Flood Insight indicated that the site was located on both a Flood Zone 2 and Flood Zone 3, closer inspection of the site boundary revealed the proposed structure to be located on just a Flood Zone 1. The Flood Zone 2 related to the eastern portion of the site with the Flood Zone 3 related to the site boundary along the Ferring Rife, noted ~125m east of the site.

3.4 Flood Defence Structures

The Groundsure datasheets, presented in Appendix B, and examination of the Environmental Agency Data, presented in Appendix C revealed the site **was** within an area benefiting from flood defences. There were coastal defences in the form of a shingle beach and embankments along the Ferring Rife. The estimated standard of protection was 1 in 200 (0.5% AEP). The estimated condition grade was good. These were maintained by the Environment Agency and Arun District Council.

3.5 Vulnerability Classification

NPPF and Table D.2 of PPS25 defines the 'Flood Risk Vulnerability Classification' of a particular land use. This classification was based partly on Defra/Environment Agency research on flood risk to people and also the need of some uses to keep functioning during flooding.

The site comprises a residential property and it is considered that the existing vulnerability classification was 'more vulnerable'.

The site's vulnerability classification will not change on development, given the proposed structure is a residential property with a sunken ground floor of ~1.00m bgl rather than a basement and is therefore still '**more vulnerable**'.

3.6 Sequential Test

NPPF and PPS25 requires that at all stages of planning; a Sequential Test is completed with the aim of steering new development to areas at the lowest probability of flooding (Zone 1). The Sequential Test would normally be completed by the Local Planning Authority (LPA) to inform the preparation of the Local Development Framework (LDF) where one exists.

Only where the Sequential Test can demonstrate that 'there are no reasonably available sites in Flood Zone 1' will development in Zone 2 be considered and in general only if an Exception Test can be passed. The Exception Test is only applied after the Sequential Test and is intended to ensure that vulnerable types of property are not developed in areas of high flood risk.

The location of the proposed structure fell within a Flood Zone 1 (an area with a low probability of river or sea flooding). The eastern portion of the total site close to the Ferring Rife but away from the proposed development fell within a Flood Zone 2. **The eastern boundary of the site fell within a Flood Zone 3.** However, given the 'more vulnerable' classification is suitable for a Flood Zone 2, it was deemed acceptable. Therefore, the sequential test is passed and there is no requirement for an exception test.

3.7 Historic Flooding

The GroundSure Datasheets revealed no historic flood events within a 250m radius of the site.

3.8 Modelled Flood Levels and Depth

The Environment Agency has provided some information regarding flood modelling, which can be viewed in Appendix C of this report. The Environment Agency has supplied data taken from the site modelled of 2No. nodes. Node 1 is located adjacent to the proposed structure and Node 2 was located midway between the proposed structure and the Ferring Rife to the east of the site. All flood levels are measured in Above Ordnance Datum (mAOD). The Environment Agency has supplied data taken from the Arun to Adur Coastal Modelling (JBA Consulting, 2012).

A summary of the data can be seen overleaf.

Table 3: Tidal Modelled Levels (undefended)							
Location (Node)	Easting	Northing	Modelled Flood levels in Metres AOD				
			Defended Annual Exceedance Probability				
			5% AEP (1:20 yr)	0.5% AEP (1:200 yr)	0.5% AEP (2070)	0.5% AEP (2115)	0.1% AEP (1:1000 yr)
1	508895	101757	-	-	-	5.14m	-
2	508970	101767	-	-	2.57m	5.12m	-

Table 4: Tidal Modelled Levels (defended)							
Location (Node)	Easting	Northing	Modelled Flood levels in Metres AOD				
			Undefended Annual Exceedance Probability				
			5% AEP (1:20 yr)	0.5% AEP (1:200 yr)	0.5% AEP (2070)	0.5% AEP (2115)	0.1% AEP (1:1000 yr)
1	508895	101757	-	-	-	-	-
2	508970	101767	-	-	-	2.81m	-

Table 5: Tidal Modelled Depths (undefended)			
Location (Node)	Easting	Northing	Modelled Flood Depths in Metres AOD
			Undefended Annual Exceedance Probability
			5% AEP (1:20 yr) 0.5% AEP (1:200 yr) 0.5% AEP (2070) 0.5% AEP (2115) 0.1% AEP (1:1000 yr)
1	508895	101757	- - - 1.42m -
2	508970	101767	- - 0.36m 2.82m -

Table 6: Tidal Modelled Depths (defended)			
Location (Node)	Easting	Northing	Modelled Flood Depth in Metres AOD
			Defended Annual Exceedance Probability
			5% AEP (1:20 yr) 0.5% AEP (1:200 yr) 0.5% AEP (2070) 0.5% AEP (2115) 0.1% AEP (1:1000 yr)
1	508895	101757	- - - - -
2	508970	101767	- - - 0.58m -

Table 7: Fluvial Modelled Levels (undefended)			
Location (Node)	Easting	Northing	Modelled Flood levels in Metres AOD
			Undefended Annual Exceedance Probability
			0.1% AEP (1:1000 yr)
1	508895	101757	-
2	508970	101767	3.21m

Table 8: Fluvial Modelled Depth (undefended)			
Location (Node)	Easting	Northing	Modelled Flood Depths in Metres AOD
			Undefended Annual Exceedance Probability
			0.1% AEP (1:1000 yr)
1	508895	101757	-
2	508970	101767	0.93m

3.9 Flood Defence Structures

The Groundsure datasheets, presented in Appendix B, and examination of the Environmental Agency Data, presented in Appendix C revealed the site **was** within an area benefiting from flood defences. There were coastal defences in the form of a shingle beach and embankments along the Ferring Rife. The estimated standard of protection was 1 in 200 (0.5% AEP). The estimated condition grade was good. These were maintained by the Environment Agency and Arun District Council.

3.10 Design Flood Levels

Based on the above the defended tidal flood levels and undefended fluvial levels have been used in design.

Based on Node 2 the defended tidal flood level based on a 0.5% probability with climate change was 2.81m AOD. No modelling data for Node 1 was present.

For fluvial sources, a 0.1% probability current flood level was 3.21m AOD. This was based on a flood depth of 0.93m.

Based on Environment Agency guidance a 35% and 45% climate change increase should be reviewed for a design life up to 2115.

This would indicate a design flood level, plus climate change, of 3.54 – 3.64m AOD.

Strategic flood risk assessments usually recommend a 300mm freeboard above the climate change anticipated flood level.

This indicated a flood design level (including an allowance for climate change) of 3.94m AOD.

3.11 Detailed River Network

The nearest surface water features was the southerly flowing Ferring Rife located ~20m east of the eastern boundary of the site and ~105m east of the proposed structure. The coast was located ~300m to the south.

The Groundsure Flood Insight datasheet, presented in Appendix B of this report, revealed 1No. on-site record and 16 records within a 250m radius (7m and 17m east; 34m, 189m, 213m and 242m north-east; 38m, 68m, 115m, 117m, 130m, 187m and 207m north; and 51m, 199m and 203m south-east).

Based on Figure 4, the proposed development will be no closer to the Ferring Rife than the exiting Kingston Corner.

The Groundsure datasheets, presented in Appendix B, and examination of the Environmental Agency Data, presented in Appendix C revealed the site **was** within an area benefiting from flood defences. There were coastal defences in the form of a shingle beach and embankments along the Ferring Rife. The estimated standard of protection was 1 in 200 (0.5% AEP). The estimated condition grade was good. These were maintained by the Environment Agency and Arun District Council.

3.12 Surface Water Flooding Maps

A review of the online Environment Agency's Maps for Long Term Flood Risk, associated with surface water flooding, revealed there was a low risk to surface water flooding in the area of the proposed

structure and the eastern portion of the site with a low to high risk along the eastern boundary closest to the Ferring Rife. A summary showing the extent of surface water flooding on site and the surrounding area can be seen tabulated below.

Summary of Extent of Surface Water Flooding						
Location	LOW RISK		MEDIUM RISK		HIGH RISK	
	Flood Depth	Flood Velocity	Flood Depth	Flood Velocity	Flood Depth	Flood Velocity
Proposed Structure	<300mm	>0.25m/s	NOT AT RISK	NOT AT RISK	NOT AT RISK	NOT AT RISK
Eastern Half of the Site	300 – 900mm	>0.25m/s	NOT AT RISK	NOT AT RISK	NOT AT RISK	NOT AT RISK
Eastern Boundary	>900mm	<0.25m/s	300 - 900mm	<0.25m/s	<300mm	<0.25m/s

The Surface Flood Risk Maps, together with the associated velocity maps can be seen within Figures 7 - 12.

3.13 Flood Risk To and From Other Sites

NPPF and PPS25 requires that for development proposals on sites within a Flood Zone 2, the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off should be considered.

Surface water run-off is a major consideration for Flood Risk Assessments because a sudden influx of surface water can easily flood the site. The current proposed development is likely to increase the area of hardstanding; therefore possibly affecting the amount of infiltration and surface water run-off on the site. This means the potential Flood Risk posed to the site and its surrounding may be affected.

Methods of keeping the flood risk to a minimum can be applied by the correct implementation of Sustainable Urban Drainage Systems (SUDS). The principles of SUDS should be applied throughout the site and wherever possible; this is discussed in Section 4.

3.14 Local Authority Strategic Flood Risk Assessment (SFRA)

A review of the Arun District Council Level 1 and Level 2 Strategic Flood Risk Assessment Final Report November 2016 revealed the following:

- The Ferring Rife was defined as a **Flood Zone 3b**;
- The flood zones appear clearly defined with an extensive Flood Zone 3b. The flood zones show the area north of the A2032 at Yeoman Way and Southern House to be at risk of flooding, as well as part of the Northbrook College site. The residential area southwest of the A2032 towards May Bridge on the A259 is also shown to be at flood risk, including: Boxgrove, The Greenway, Patching Close, The Strand and Coleridge Close;
- There are no formal raised defences along the Ferring Rife;

4.0 SURFACE WATER FLOODING & DRAINAGE SYSTEMS

4.1 Existing Drainage

It has been assumed that formal drainage systems, both foul and surface, would be present on the site associated with the residential dwelling onsite and the surrounding area.

4.2 Proposed System

The site was occupied by an existing two storey detached residential property and areas of front, side and rear gardens. A tennis court was located in the rear garden. Numerous mature trees (apple, beech, poplar and cedar) and bushes were located across and around the boundaries of the site. The nearest surface water features was the southerly flowing Ferring Rife located ~20m east of the eastern boundary of the site and ~105m east of the proposed structure. The coast was located ~300m to the south.

At the time of reporting, July 2018, the proposed development was understood to comprise the construction of a single storey guest house with a mezzanine floor. Whilst no basement is to be excavated, it is proposed to sink the building into the ground by about 0.80m (~2.80 m AOD). French drains are proposed to be installed around the perimeter of the new building. A plan of the proposed development is given in Figure 5 and a section is given in Figure 6.

The proposed developed is expected to increase the amount of hardstanding present onsite.

The majority of new developments are encouraged to use Sustainable Urban Drainage Systems (SUDS) to manage surface water drainage. This ensures that any volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same effect.

SUDS techniques include:

- Soakaways and other infiltration devices (where permeability allows);
- Swales and filter strips on sloping areas;
- Ponds, wetlands and basins;
- Filter drains and permeable paving, possibly with storage;
- Green roofs;
- Bioretention areas.

The above methods can be used individually but typically a solution that combines some or all of the above will be more effective.

It was considered that the Undifferentiated River Terrace Deposits may provide a suitable medium for the disposal of storm water. Soakaway tests to BRE365 should be undertaken to confirm this since the cohesive soils may restrict the design infiltration rate.

Adequate freeboard must be provided between the base of the soakaway structure and the highest recorded groundwater level identified in that location.

The principles of sustainable urban drainage system (SUDS) should be applied, where possible, to reduce the risk of flooding from surface water ponding associated with construction of the basement.

To account for climate change, surface water drainage on the site needs to allow for the recommended national precautionary sensitivity range for peak rainfall intensities in accordance with Table B.2 of PPS25. The development must take into account the potential for surface water flooding and a suitable drainage strategy must be implemented.

Whilst no basement is to be excavated, it is proposed to sink the building into the ground by about 1.00m. The provision of additional bathrooms/foul drainage systems is unknown. The design of an appropriate foul drainage system should be undertaken by a suitably qualified civil engineer.

5.0 CONCLUSIONS

5.1 Overview

The site was located at Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE.

The following findings and conclusions have been made:

- The geology of the site comprised superficial Brickearth and Undifferentiated River Terrace Deposits overlying the bedrock of the Lewes Nodular Chalk Formation.
- A study of the aquifer maps on the Environment Agency website revealed the site to be located on a **Secondary (A) Aquifer** comprising the superficial Undifferentiated River Terrace Deposits. The bedrock deposits of the Lewes Nodular Chalk Formation were classed as a **Principal Aquifer**.
- Examination of the Environment Agency records showed that the site **did not** fall within a Groundwater Source Protection Zone, as classified in the Policy and Practice for the Protection of Groundwater.
- The nearest surface water features was the southerly flowing Ferring Rife located ~20m east of the eastern boundary of the site and ~105m east of the proposed structure. The coast was located ~300m to the south.
- A review of a topographical survey undertaken onsite revealed the elevation of the western boundary ranged between 4.16 – 4.58m AOD. The upper bank of the Ferring Rife on the eastern boundary ranged between 2.07 – 2.74m AOD. In the area of the proposed structure the elevation of the site was ~3.60m AOD. The elevation of the existing house was ~3.80-4.00m AOD.
- From analysis of hydrogeological and topographical maps groundwater was anticipated to be encountered at shallow depth (<3m bgl) and it was considered that the groundwater was flowing in an easterly direction towards the Ferring Rife and in a southerly direction in alignment with local topography towards the coast, ~300m to the south.
- At the time of reporting, July 2018, the proposed development was understood to comprise the construction of a single storey guest house with a mezzanine floor. Whilst no basement is to be excavated, it is proposed to sink the building into the ground by about 0.80m (~2.80 m AOD). French drains are proposed to be installed around the perimeter of the new building. A plan of the proposed development is given in Figure 5 and a section is given in Figure 6.
- A review of the 1:10,000 Flood Map and Environment Agency website revealed the area of the proposed structure, in the western portion of the site, was located within a Flood Zone 1 (an area with a low probability of river or sea flooding). The eastern portion of the total site area, away from the proposed development, fell within a Flood Zone 2. **Environment Agency Zone 2** floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. The extreme eastern boundary of the total site area, close to the Ferring Rife, fell within a Flood Zone 3. **Environment Agency Zone 3** shows the extent

of a river flood with a 1 in 100 (1% or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year.

- RoFRS Data revealed the site to be at **high and medium risk** of Flooding from Rivers and the Sea (RoFRaS). The chance of flooding from rivers or the sea is considered to be between 1% and >3.3%.
- Strategic flood risk assessments usually recommend a 300mm freeboard above the 1 in 100year plus climate change anticipated flood level.
- A review of the Groundsure FloodInsight Datasheet revealed the site was located in an area benefiting from flood defences. Examination of the Environmental Agency Data revealed there were coastal defences in the form of a shingle beach and embankments along the Ferring Rife. The estimated standard of protection was 1 in 200 (0.5% AEP). The estimated condition grade was good. These were maintained by the Environment Agency and Arun District Council.
- A review of the online Environment Agency's Maps for Long Term Flood Risk, associated with surface water flooding, revealed there was a low risk to surface water flooding in the area of the proposed structure and the eastern portion of the site with a low to high risk along the eastern boundary closest to the Ferring Rife.

The location of the proposed structure had a low risk to surface waterflooding, meaning that each year this area has a chance of flooding of between 0.1% and 1%. The flood depths are likely to be <300 – 900mm with a flood velocity of >0.25m/s. The eastern portion of the site also had a low risk to surface water flooding with likely flood depths of 300 – 900mm and a flood velocity of >0.25m/s.

The eastern boundary of site closest to the Ferring Rife has a localised low to high risk of flooding. A medium risk means that each year this area has a chance of flooding of between 1% and 3.3% and a high risk means that each year this area has a chance of flooding of greater than 3.3%. There is a low risk to flood depths ranging between >900mm with a flood velocity of <0.25m/s. There is a medium risk to flood depths ranging between 300mm – 900mm with a flood velocity of <0.25m/s. There is a high risk to flood depths of <300mm with a velocity of <0.25m/s.

- Based on Node 2 the defended tidal flood level based on a 0.5% probability with climate change was 2.81m AOD. No modelling data for Node 1 was present. For fluvial sources, a 0.1% probability current flood level was 3.21m AOD. This was based on a flood depth of 0.93m. Based on Environment Agency guidance a 35% and 45% climate change increase should be reviewed for a design life up to 2115. This would indicate a design flood level, plus climate change, of 3.54 – 3.64m AOD. Strategic flood risk assessments usually recommend a 300mm freeboard above the climate change anticipated flood level. This indicated a flood design level (including an allowance for climate change) of 3.94m AOD.
- The current proposed development is expected to increase the area of hardstanding, therefore the amount of infiltration and surface water run-off on the site is expected to be affected.

5.2 Flood Risk Reduction Measures and Recommendations

The site is mainly at risk of surface water and fluvial flooding. The ground floor would be flooded during a 0.1% plus climate change event.

To try and prevent or reduce the flood risk posed to this site, the following measures should be taken into account:

- As shown in Figure 6, the proposed structure has sleeping accommodation at mezzanine level. No sleeping accommodation should be present at ground floor level.
- Flood resilient construction methods should be adopted to 3.94m AOD.
- French drainage around building will aid attenuation of flood waters and flood resilience.
- Safe access from the property should be formed at the rear, where the property is not sunken at 3.94m AOD.
- The proposed developed is expected to increase the amount of hardstanding present on-site. The implementation of appropriate SUDS must be maintained in the surface water flooding design/strategy.

General Guidance:

The majority of new developments are encouraged to use Sustainable Urban Drainage Systems (SUDS) to manage surface water drainage. This ensures that any volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same effect.

SUDS techniques include:

- Soakaways and other infiltration devices (where permeability allows);
- Swales and filter strips on sloping areas;
- Ponds, wetlands and basins;
- Filter drains and permeable paving, possibly with storage;
- Green roofs;
- Bioretention areas.

The above methods can be used individually but typically a solution that combines some or all of the above will be more effective.

The principles of sustainable urban drainage system (SUDS) should be applied, where possible, to reduce the risk of flooding from surface water ponding associated with proposed.

To account for climate change, surface water drainage on the site needs to allow for the recommended national precautionary sensitivity range for peak rainfall intensities in accordance with NPPF/Table B.2 of PPS25. The development must take into account the potential for surface water flooding and a suitable drainage strategy must be implemented.



APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

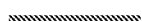
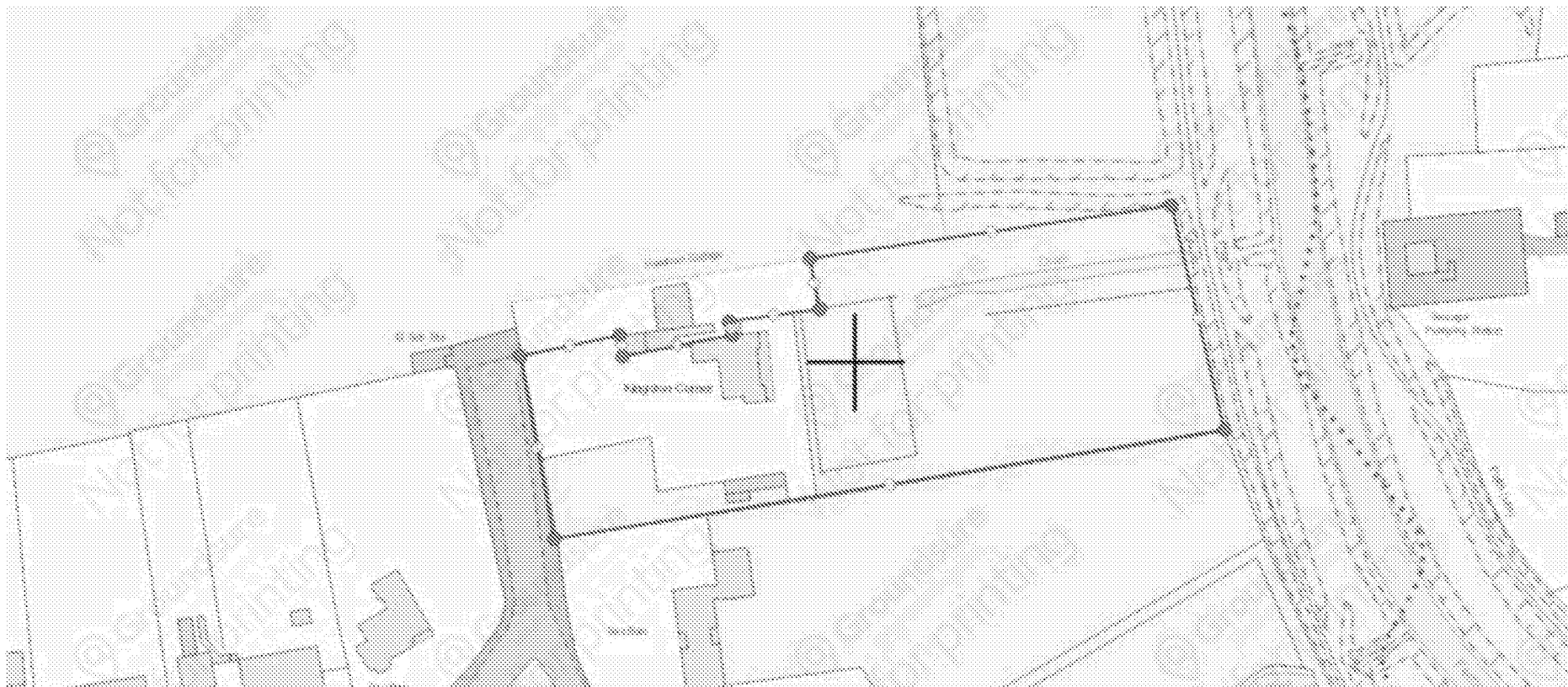
Site Location Plan

Ref:

GWPR2607

Figure 1

ground&water



APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

Site Development Area

Ref:

GWPR2607

Figure 2

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----- APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

Aerial View of the Site

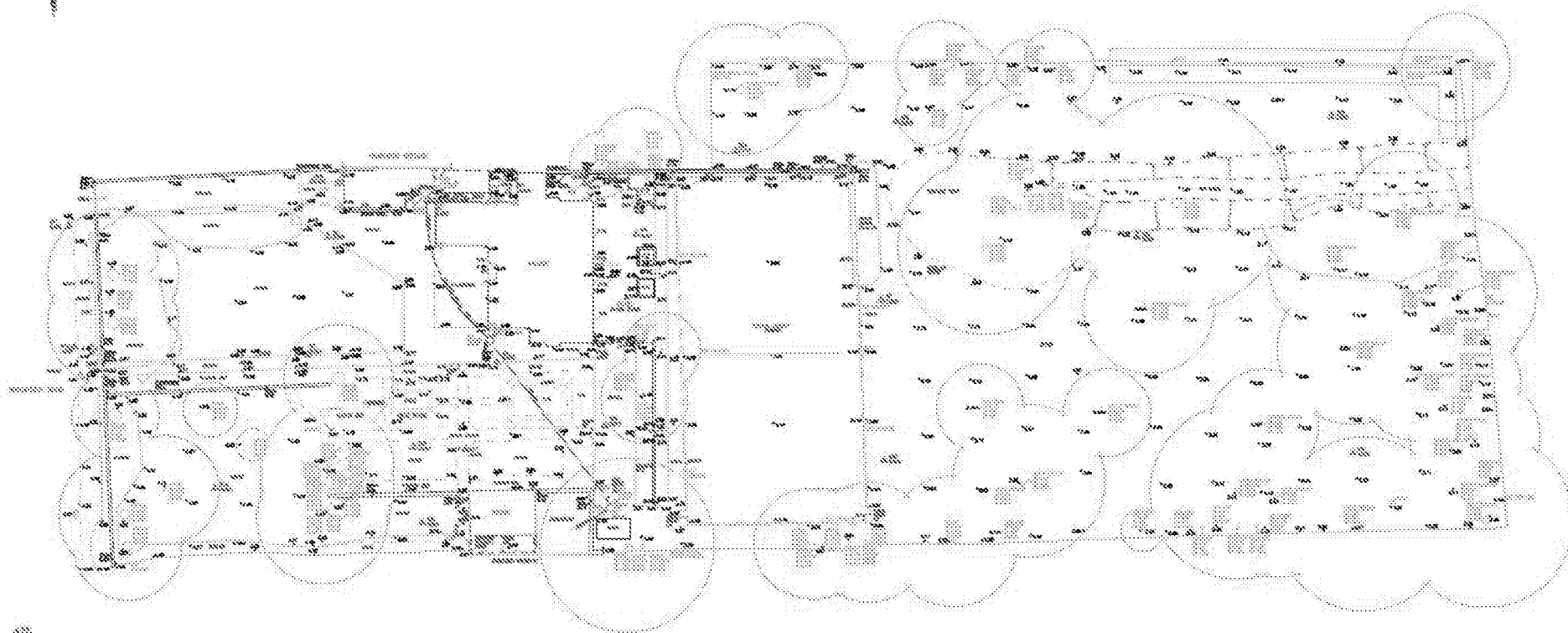
Ref:

GWPR2607

Figure 3

ground&water

ALL LEVELS RELATIVE TO THE 1985 ADJUSTED
 MEAN SEA LEVEL DATUM
 DATUM POINT: 100.000m AOD
 DATUM POINT: 100.000m AOD
 DATUM POINT: 100.000m AOD



----- APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project: Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client: David Station c/o Nico Warr Architects

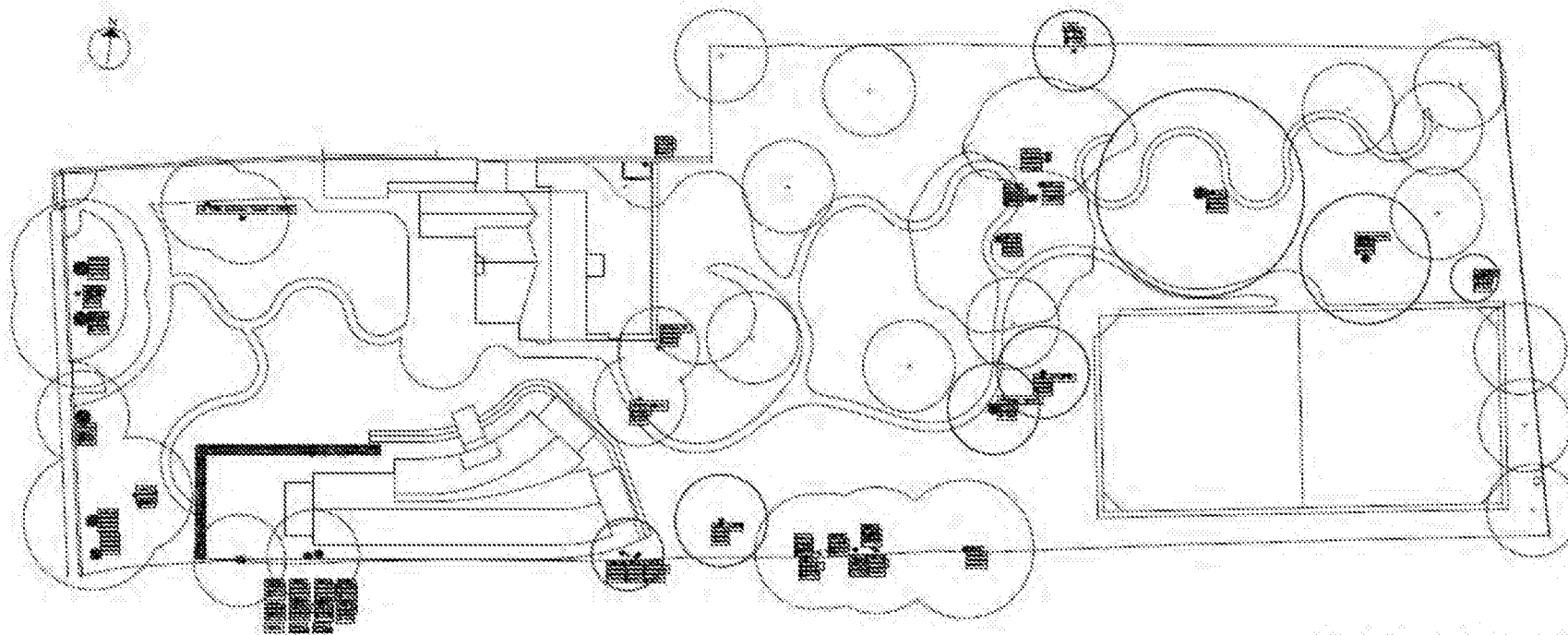
Date: July 2018

Topographic Survey

Ref: GWPR2607

Figure 4

ground&water



① GA Plan - Ground Floor
1:200

----- APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project:
Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:
David Station c/o Nico Warr Architects

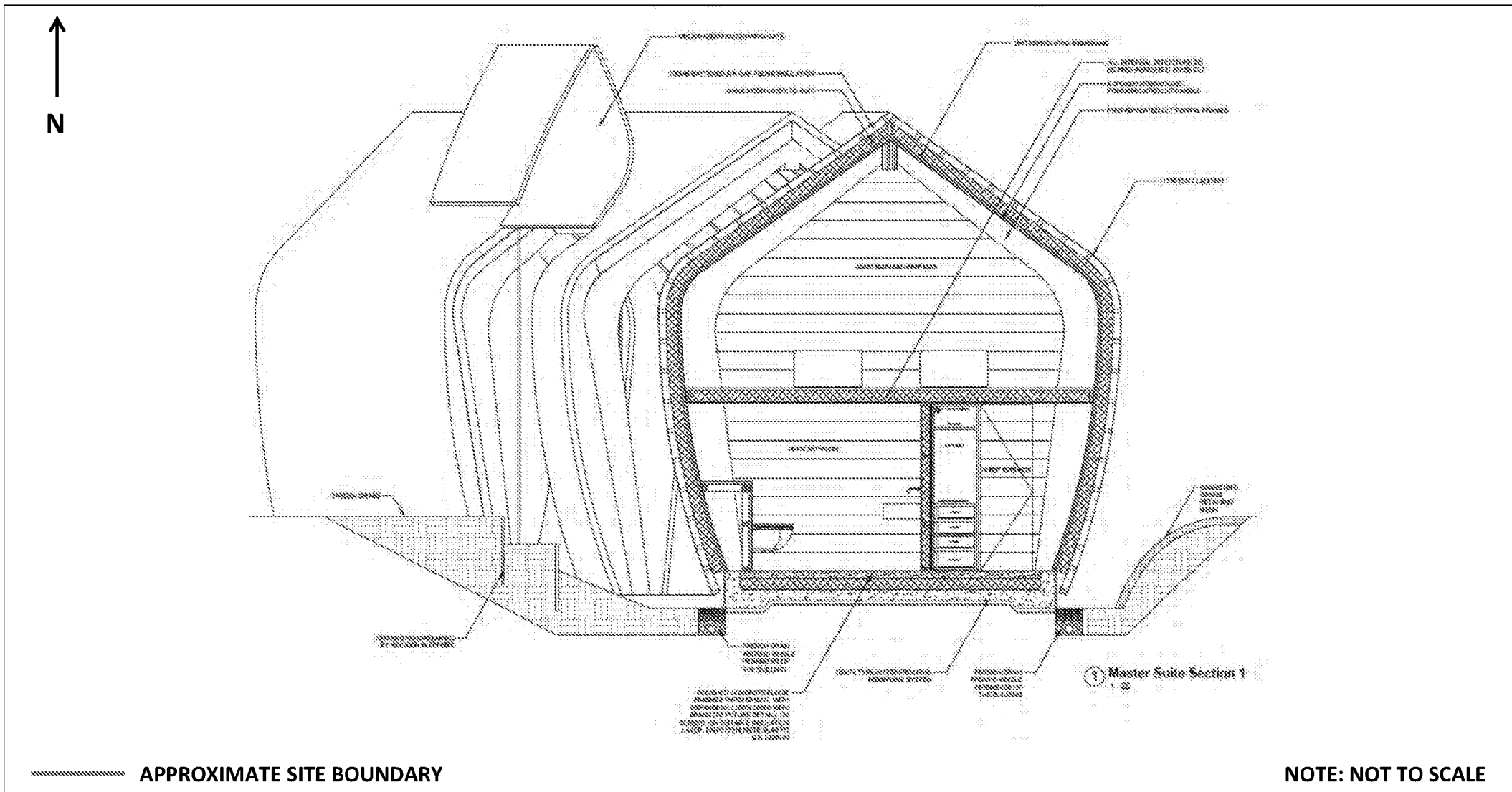
Date:
July 2018

Proposed Development - Plan View

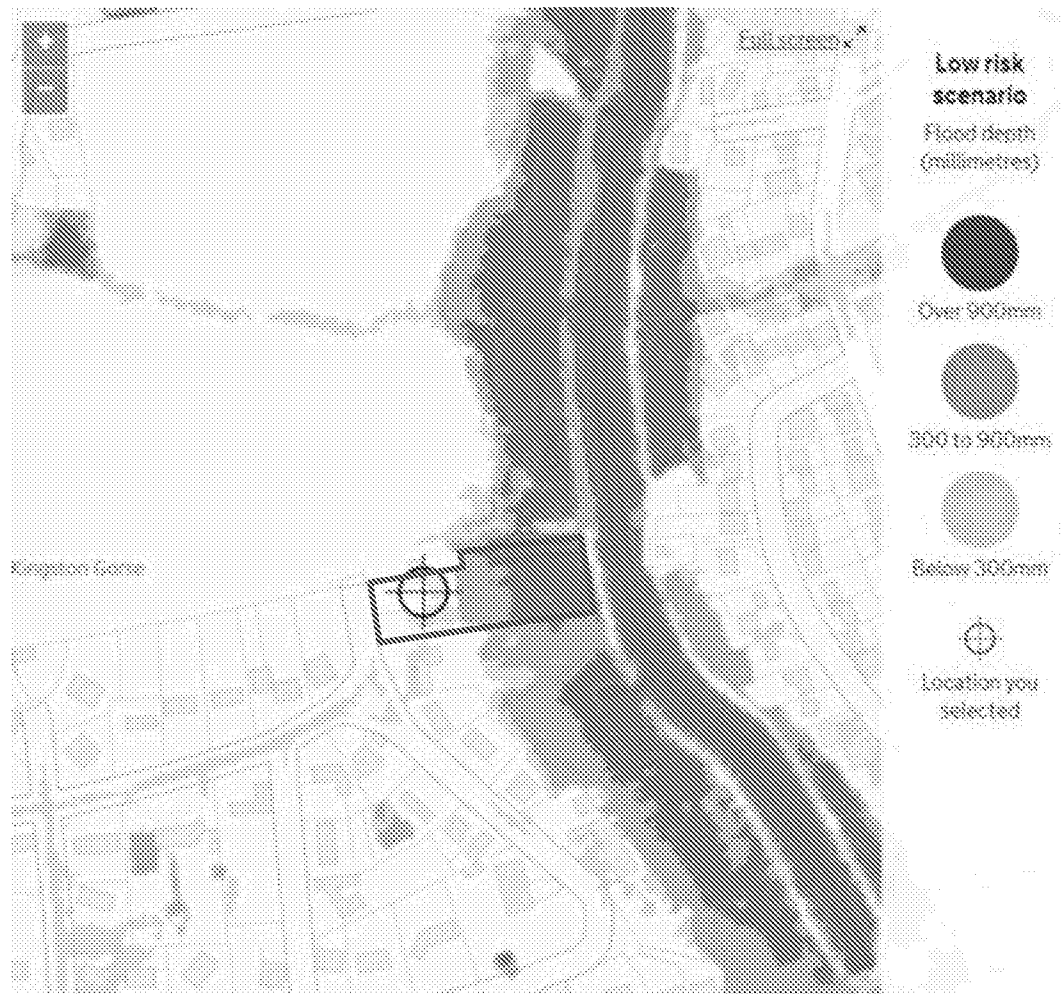
Ref:
GWPR2607

Figure 4

ground&water



Project: Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE		Figure 5 ground&water
Client: David Station c/o Nico Warr Architects	Date: July 2018	
Proposed Development - Section View	Ref: GWPR2607	



APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

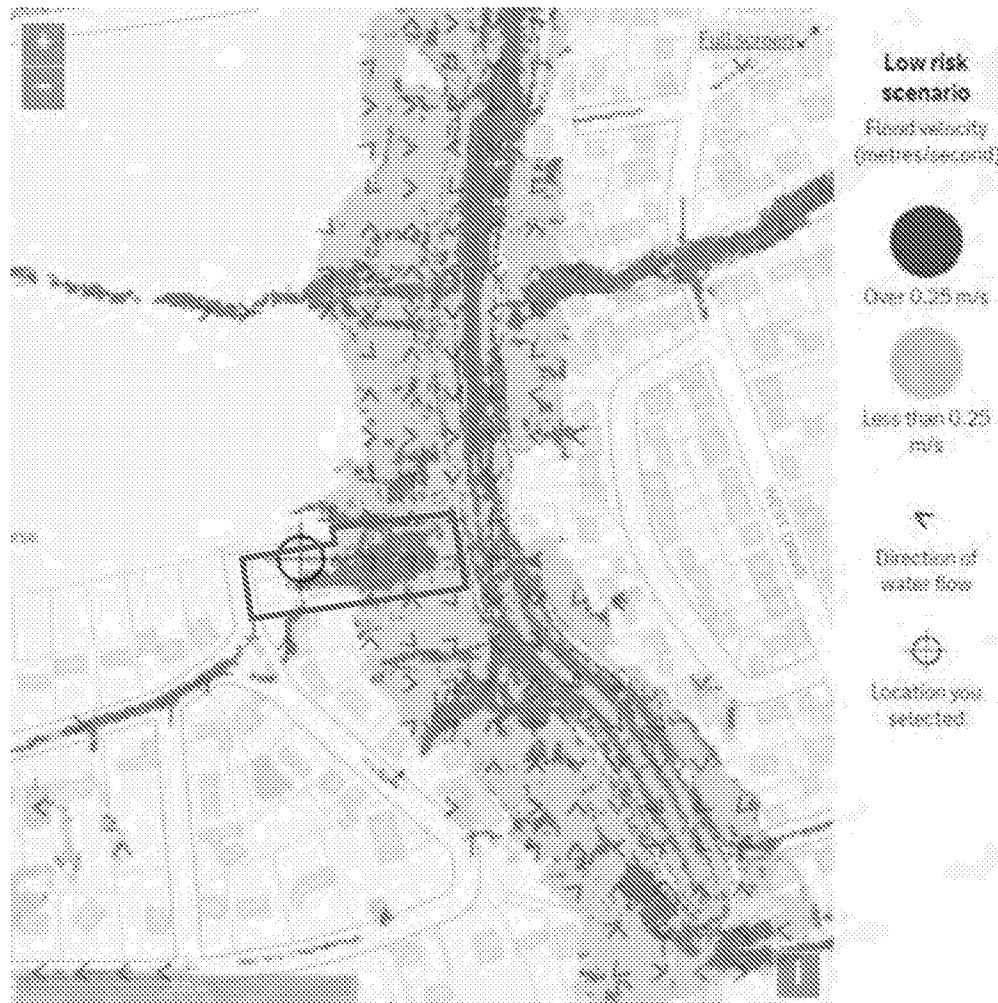
EA Surface Water Flood Map (Low Risk, Depth)

Ref:

GWPR2607

Figure 7

ground&water



APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:
Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:
David Station c/o Nico Warr Architects

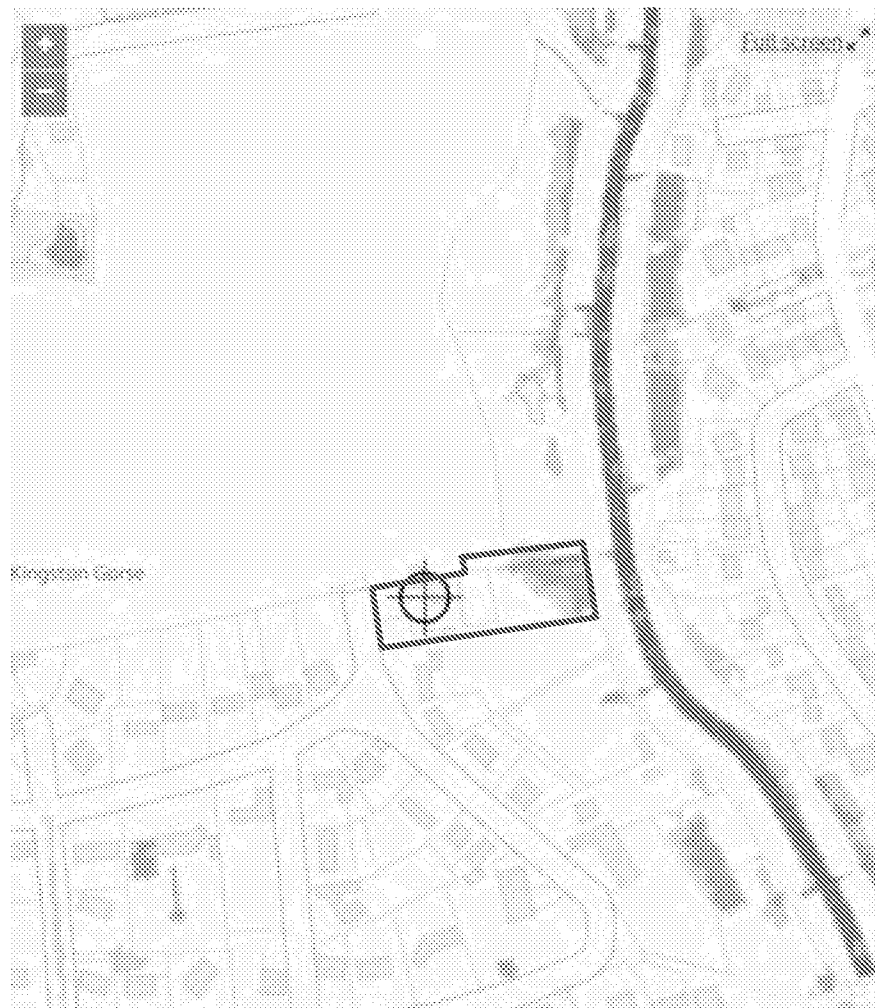
Date:
July 2018

EA Surface Water Flood Map (Low Risk, Velocity)

Ref:
GWPR2607

Figure 8

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APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

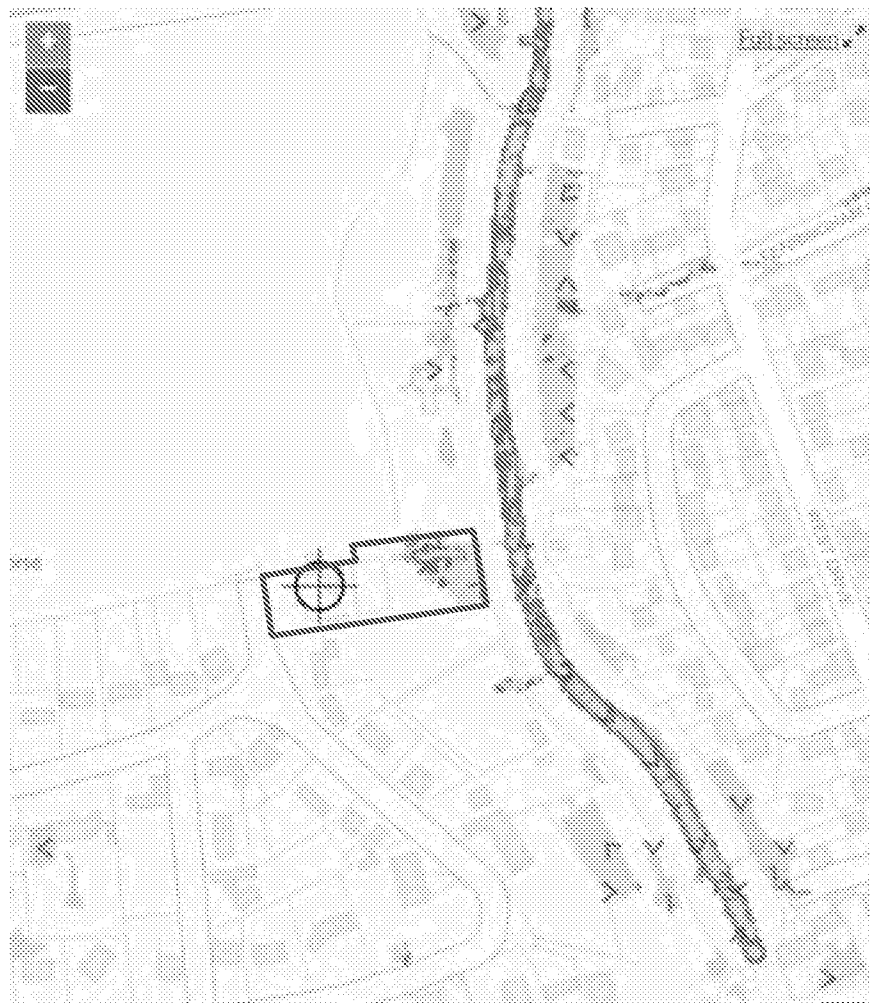
EA Surface Water Flood Map (Medium Risk, Depth)

Ref:

GWPR2607

Figure 9

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Medium risk scenario

Flood velocity
(metres/second)



Over 0.25 m/s



Less than 0.25
m/s



Direction of
water flow



Location you
selected



APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:

Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:

David Station c/o Nico Warr Architects

Date:

July 2018

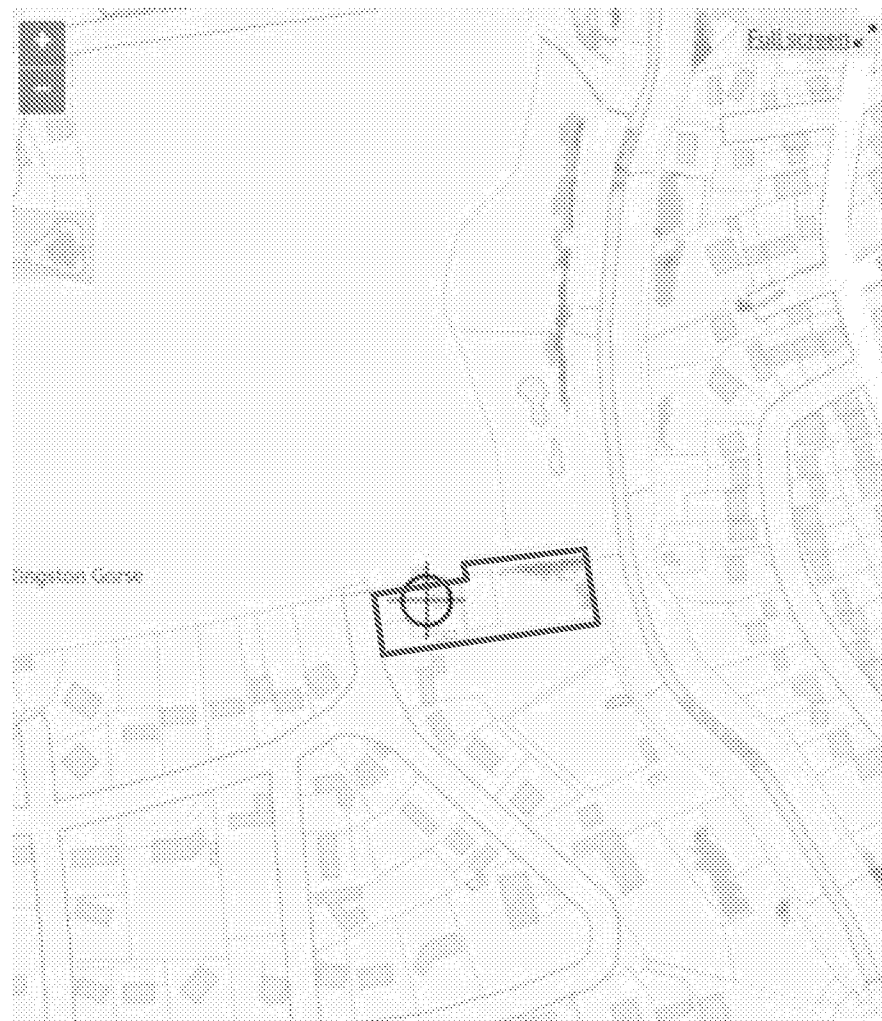
EA Surface Water Flood Map (Medium Risk, Velocity)

Ref:

GWPR2607

Figure 10

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APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:
Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:
David Station c/o Nico Warr Architects

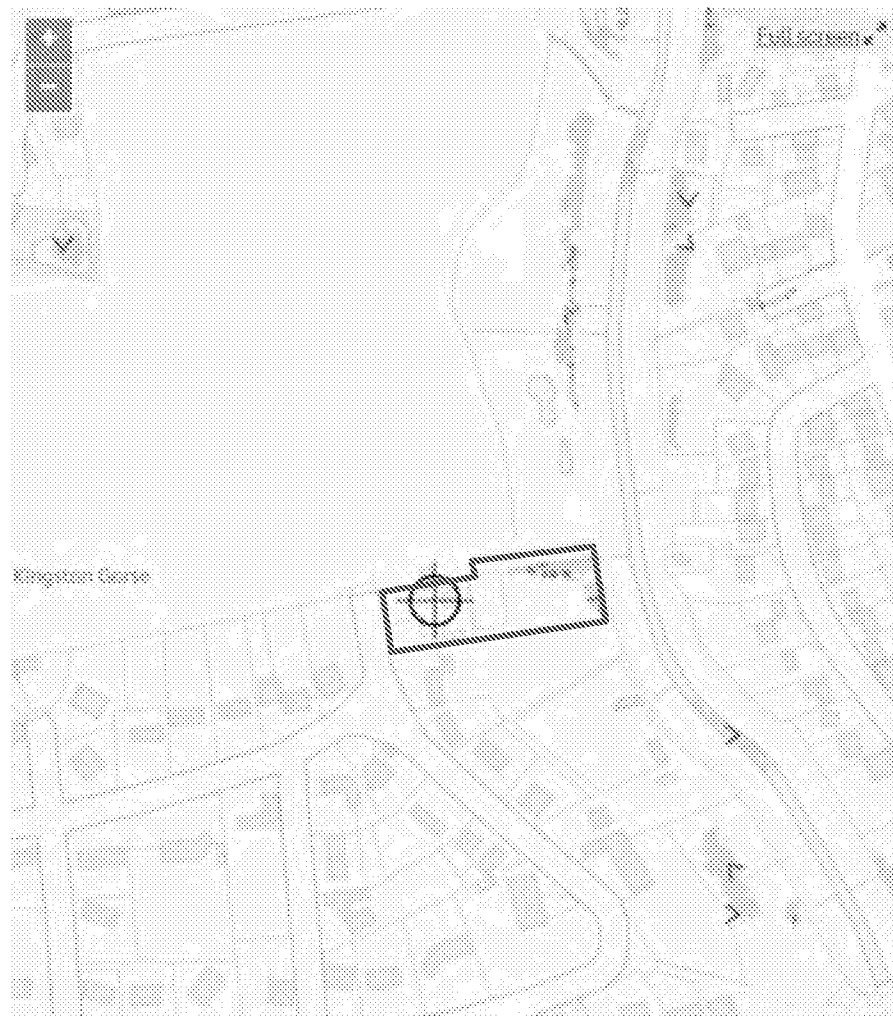
Date:
July 2018

EA Surface Water Flood Map (High Risk, Depth)

Ref:
GWPR2607

Figure 11

ground&water



**High risk
scenario**
Flood velocity
(metres/second)

Over 0.25 m/s

Less than 0.25
m/s

Direction of
water flow

Location you
selected

APPROXIMATE SITE BOUNDARY

NOT TO SCALE

Project:
Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE

Client:
David Station c/o Nico Warr Architects

Date:
July 2018

EA Surface Water Flood Map (High Risk, Velocity)

Ref:
GWPR2607

Figure 12

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APPENDIX A

Legislative Background, Conditions and Limitations

The conclusions and recommendations relate to Kingston Corner Annex, Brookside Road, East Preston, West Sussex BN16 1SE.

Legislative Background

National Planning Policy Framework and Technical Guidance-Flooding, published March 2012, Planning is the current legislation that controls Flooding and associated Flood risk. It requires that consideration should be given to Flood Risk Assessment in the planning process. The guidance states that any flood risk assessments should:

- Identify land at risk from and the degree of risk of flooding from a river, watercourse, sea or other sources in the area;
- Consider the risk of flooding arising from the development in addition to the risk of flooding to the development;
- Take the impact of climate change into account;
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure;
- Consider the vulnerability of those that could occupy and use the proposed development, taking account of the sequential and exception test and the vulnerability classification, including arrangements for safe access;
- Consider and quantify different types of flooding and identify flood risk reduction measures so that the assessments are fit for the purpose of the decisions being made;
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- Include the assessment of the remaining risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems;
- Be supported by appropriate data and information, including historical information on previous event.

This is the information that should be included in a FRA which the Environment Agency has requested. The Environment Agency is the regulatory body with regard to Flood Risk Assessments.

Conditions and Limitations

Any information contained within this Flood Risk Assessment makes use of the best available information at the time of submission of the application.

A precautionary approach has been taken throughout this report and supported by information where possible.

The findings, recommendations and conclusions of this report are based on information obtained from a variety of external sources which are understood to be reputable. However, Ground and Water Limited cannot guarantee the authenticity or reliability of any data from third parties and no liability can be accepted for any erroneous information or the conclusion drawn from it.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground/groundwater/flooding behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

It was not part of the scope of this report to comment on environment/contaminated land considerations.

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APPENDIX B
Groundsure FloodInsight Datasheet



Groundsure

LOCATION INTELLIGENCE

Ground and Water Limited
15, Bow Street,
Alton, GU34 1NY

Groundsure
Reference:

HMD-445-5186612

Client Reference: GWPR2607

Report Date 2 Jul 2018

Report Delivery xml
Method:

Client Email: francis.williams@groundandwater.co.uk

Flood Insight

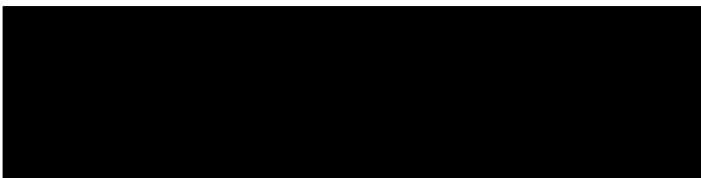
Address: KINGSTON CORNER, BROOKSIDE ROAD, KINGSTON, BN16 1SE

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Flood Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Floodinsight

Flood Insight

Address: KINGSTON CORNER, BROOKSIDE ROAD, KINGSTON, BN16 1SE
Date: 2 Jul 2018
Reference: HMD-445-5186612
Client: Ground and Water Limited



Aerial Photograph Capture date: 20-May-2015
Grid Reference: 508903,101762
Site Size: 0.51ha

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed.

Section 1: Environment Agency/Natural Resources Wales Flood Zones

1.1 Are there any Environment Agency Zone 2 floodplains within 250m of the study site?	Yes
1.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site?	Yes
1.3 Are there any Flood Defences within 250m of the study site?	Yes
1.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
1.5 Are there any Proposed Flood Defences within 250m of the study site?	No
1.6 Are there any areas used for Flood Storage within 250m of the study site?	No

Section 2: Risk of Flooding from Rivers and the Sea (RoFRaS)

2.1 What is the Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating for the study site?	High
--	------

Section 3: Historic Flood Events

3.1 Has the site been subject to past flooding as recorded by the Environment Agency/Natural Resources Wales?	No
---	----

Section 4: JBA Surface Water (Pluvial) Flood

4.1 Is the site or any area within 50m at risk of Surface Water (Pluvial) Flooding?	Yes
---	-----

Section 5: Surface Water Features

5.1 Are there any surface water features within 250m of the study site?	Yes
---	-----

Section 6: Groundwater Flooding

6.1 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential below Surface
6.2 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 7: BGS Geological Indicators of historic flooding

7.1 Are there any geological indicators of historic flooding within 250m of the study site?	Yes
---	-----

Section 8: JBA Reservoir and Canal Data

8.1 Is the property located in an area identified as being at potential risk in the event of a reservoir failure?	No
8.2 Is the property located in an area identified as being at potential risk in the event of a canal break?	No

Additional Matters

Riparian ownership

If your land abuts a river, stream or ditch, you may have responsibility to maintain this watercourse, even if Title Deeds show the property boundary to be adjacent to the watercourse. This includes the responsibility for clearing debris and obstructions which may impede the free passage of water and fish, and also includes the responsibilities to accept flood flows through your land, even if these are caused by inadequate capacity downstream. There is no duty in common law for a landowner to improve the drainage capacity of a watercourse. Please contact Groundsure if you need further advice on riparian ownership issues relating to this property.

Sewerage Flooding

Extreme rainfall events may overwhelm sewerage systems and cause local flooding. The water and sewerage companies within the UK are required to maintain 'DG5 - At Risk Registers' which record properties that have flooded from sewers and/or are considered to be at risk of flooding from sewers in the future. If your property is on the 'At Risk' Register, this may be recorded within a standard CON29 Drainage and Water search.

Using this Report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client.

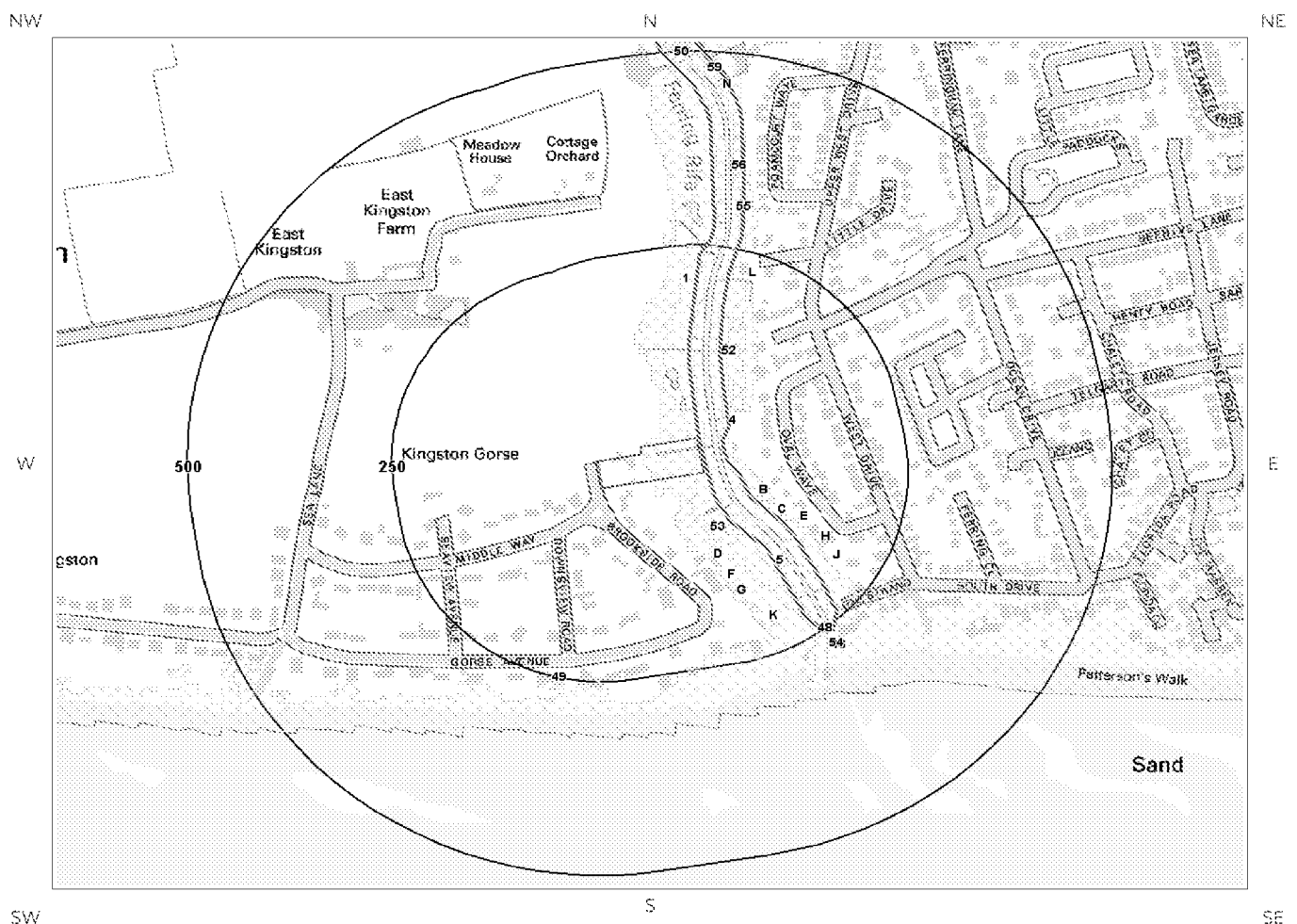
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



Environment Agency/Natural Resources Wales Flood Map for Planning Legend

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Ordnance Survey license 100035207.

- | | | |
|--|---|---|
|  Search Centre |  Zone 2 Floodplain |  Area used for Flood Storage |
|  Search Buffers (m) |  Zone 3 Floodplain |  Proposed Flood Defence Scheme |
| |  Flood Defences |  Area Benefiting from Flood Defences |

Report Reference: HMD-445-5186612
Client Reference: GWPR2607

1. Environment Agency/Natural Resources Wales Flood Zones

1.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? **Yes**

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 1 – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	0.0	On Site	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
2A	4.0	E	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
3A	27.0	E	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
4	36.0	E	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
5	58.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
6B	66.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
7B	81.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
8B	88.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
9C	102.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
10C	107.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
11D	116.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
12D	117.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
13D	123.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
14E	133.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
15E	135.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
16E	139.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
17F	142.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
18F	149.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
19F	150.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)

ID	Distance (m)	Direction	Update	Type
20F	154.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
21F	161.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
22G	165.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
23H	168.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
24G	170.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
25G	171.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
26I	171.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
27H	172.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
28H	178.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
29I	189.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
30J	194.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
31J	196.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
32I	199.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
33J	201.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
34K	202.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
35K	202.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
36J	203.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
37	204.0	N	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
38K	205.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
39J	208.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
40K	208.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
41L	209.0	N	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
42M	210.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
43L	211.0	N	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
44K	220.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
45K	222.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
46	224.0	S	29-May-2018	Zone 2 - (Fluvial /Tidal Models)
47M	229.0	SE	29-May-2018	Zone 2 - (Fluvial /Tidal Models)

1.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 1 – Flood Map for Planning.

The following floodplain records are represented as green shading on the Flood Map (1):

ID	Distance (m)	Direction	Update	Type
52	0.0	On Site	30-May-2018	Zone 3 - (Fluvial Models)
53	82.0	S	30-May-2018	Zone 3 - (Fluvial Models)
54	87.0	S	30-May-2018	Zone 3 - (Fluvial Models)

1.3 River and Coastal Flood Defences

Are there any Flood Defences within 250m of the study site? Yes

This search consists only of flood defences present in the dataset provided by the Environment Agency/Natural Resources Wales. Any relevant data is represented on Map 1 – Flood Map for Planning.

The following flood defence records are represented as lines on the Flood Map (1):

ID	Distance (m)	Direction	Update
68	4.0	E	11-May-2018
69	30.0	E	11-May-2018

1.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

Any relevant data is represented on Map 1 – Flood Map for Planning.

1.5 Areas of Proposed Flood Defences

Are there any Proposed Flood Defences within 250m of the study site? No

* This illustrates the number of households that move from 'very significant' or 'significant' to 'moderate' or 'low' probability of flood risk bands if the proposed flood scheme is to be implemented.

Any relevant data is represented on Map 1 – Flood Map for Planning.

Guidance: This search consists only of proposed flood defences present in the dataset provided by the Environment Agency/Natural Resources Wales. Please note that proposed flood defence schemes will not influence the current RoFRaS ratings for the site.

1.6 Areas used for Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

Flood Storage Areas are considered part of the functional floodplain, and are areas where water has to flow or be stored in times of flood. Technical Guidance to the National Planning Policy Framework states that only water-compatible development and essential infrastructure should be permitted within flood storage areas, and existing development within this area should be relocated to an area with a lower risk of flooding. Any relevant data is represented on Map 1 – Flood Map for Planning.

Notes on Flood Zone Data:

This data relates solely to flooding from rivers or the sea. The Environment Agency/Natural Resources Wales estimate that over 2.5 million properties are at risk of flooding within England and Wales. River flooding occurs when a watercourse cannot cope with the water draining into it from the surrounding land. This can happen, for example, when heavy rain falls on an already waterlogged catchment. Coastal flooding results from a combination of high tides and stormy conditions. If low atmospheric pressure coincides with a high tide, a tidal surge may happen which can cause serious flooding.

The Groundsure Flood Insight Report comments upon whether a property lies in proximity to Environment Agency/Natural Resources Wales Zone 2 and Zone 3 floodplains. The Government's Technical Guidance to the National Planning Policy Framework explains how flood risk should be considered at all stages of the planning and development process in order to reduce future damage to property and potential loss of life. The Government looks to planning authorities to ensure that flood risk is properly taken into account in the planning of developments to reduce the risk of flooding and the damage which floods cause.

Flood Zones enable planning authorities to apply the sequential test (see Technical Guidance to the National Planning Policy Framework) for development proposals and prevent inappropriate development.

Technical Guidance to the National Planning Policy Framework defines the flood zones as: -

Zone 1 – little or no risk with an annual probability of flooding from rivers and the sea of less than 0.1%

Zone 2 – low to medium risk with an annual probability of flooding of 0.1-1.0% from rivers and 0.1-0.5% from the sea.

Zone 3 – high risk with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.

Flood Zone 3b/Flood Storage Areas - very high risk with the site being used as part of the functional flood plain or as a Flood Storage Area.

The flood zones are the main constraint map underpinning decisions on development and flood risk.

Existing Flood Defences

Flood defences seek to reduce the risk of flooding and to safeguard life, protect property, sustain economic activity and the natural environment. Flood defences are designed to protect against flood events of a particular magnitude, expressed as risk in any one year. For example, defences in urban areas may be built to provide protection against flood events of a size which might occur on average once in one hundred years or less.

Proposed Flood Defences

This information is taken from the Environment Agency/Natural Resources Wales's database of Areas to Benefit from New and Reconditioned Flood Defences under the Medium Term Plan (MTP). The dataset contains funding allocation for the first financial year (from April). Funding for the following four financial years is not guaranteed, being only indicative, and will be reviewed annually. Projects within the Medium Term Plan qualify for inclusion in this dataset if:

- the investment leads to a change in the current standard of protection (change projects);
- the investment is a replacement or refurbishment in order to sustain the current standard of protection (sustain projects);
- the project has an initial construction budget of £100,000 or more; and
- the project is included within the first five years of the MTP

The data includes all the Environment Agency/Natural Resources Wales's projects over £100K that will change or sustain the standards of flood defence in England and Wales over the next 5 years. It also includes the equivalent schemes for all Local Authority and Internal Drainage Boards. The number of households and areas of land contributing to DEFRA's Outcome Measures (OM) are also attributed i.e. could benefit from major work on flood defences.

These data also contain Intermittence Flood Maintenance Programme that show the annual maintenance programme of work scheduled to be carried by the Environment Agency/Natural Resources Wales, Local Authority or Internal Drainage Board on flood defences. Data details routine maintenance as well as intermittent work that has been funded for the coming year. The data contains a start and end coordinate defining the relevant river section where work is planned.

Information Warning

Please note that the maps show the areas where investment is being made to reduce the flood and coastal erosion risk and are not detailed enough to account for individual addresses. Individual properties may not always face the same risk of flooding as the areas that surround them. Also, note that funding figures are indicative and any use or interpretation should account for future updates where annual values may change.

Every possible care is taken to ensure that the maps reflect all the data possessed by the Environment Agency/Natural Resources Wales and that they have applied their expert knowledge to create conclusions that are as reliable as possible. The Environment Agency/Natural Resources Wales consider that they have created the maps as well as they can and so should not be liable if the maps by their nature are not as accurate as might be desired or are misused or misunderstood, despite their warnings. For this reason, they are not able to promise that the maps will always be accurate or completely up to date.

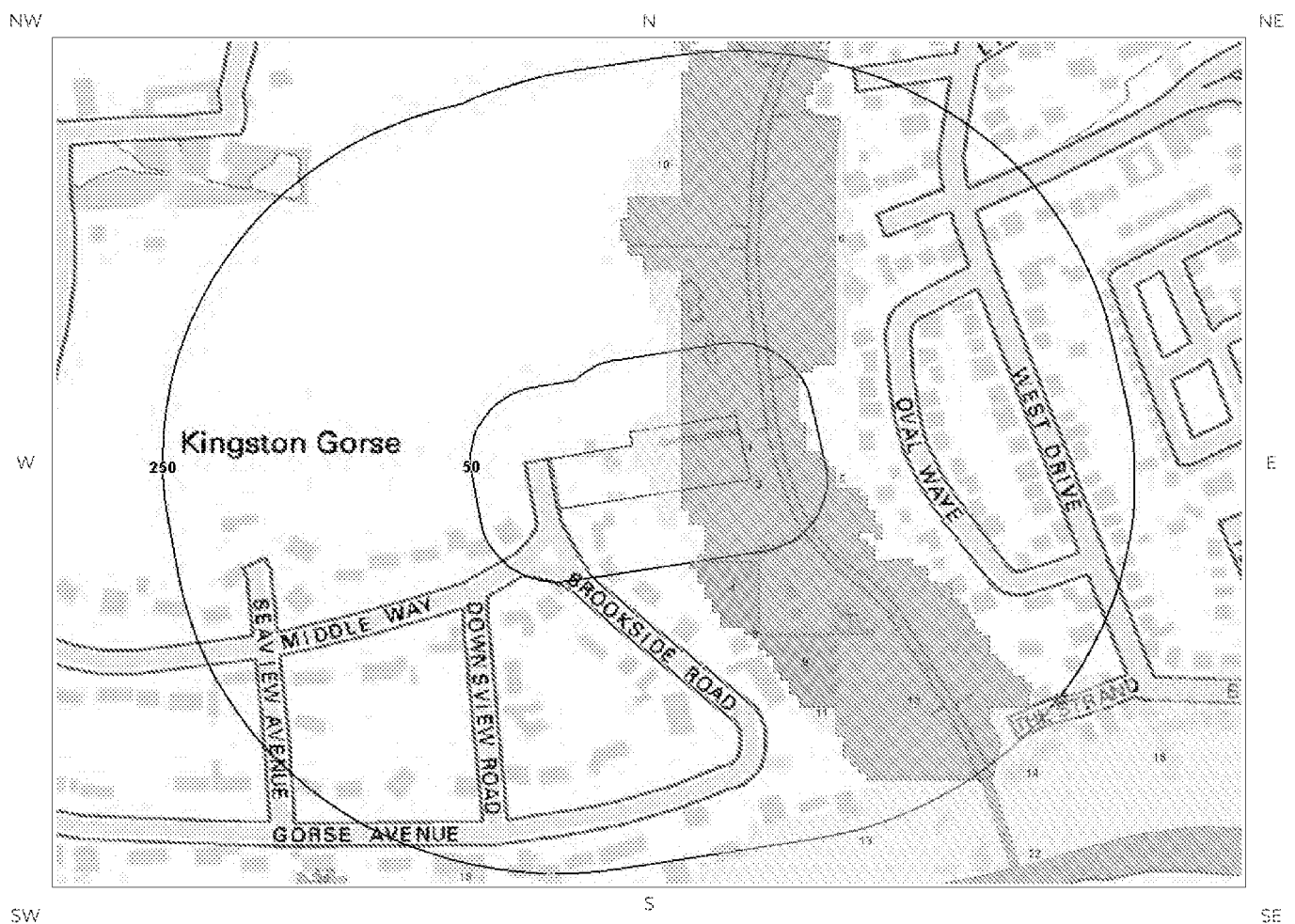
This site includes mapping data licensed from Ordnance Survey used for setting the Environment Agency/Natural Resources Wales's data in its geographical context. Ordnance Survey retains the copyright of this material and it can not be used for any other purpose.

Flood Storage Areas

Flood Storage Areas may also act as flood defences. A flood storage area may also be referred to as a balancing reservoir, storage basin or balancing pond. Its purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer time interval.

A flood storage area may take the form of a wet or dry reservoir. A wet reservoir is a water storage facility in which storage can be effected by allowing water levels to rise during flood times. A dry reservoir is typically adjacent to a river and comprises an enclosed area that accepts water only at peak times. These areas are also referred to as Zone 3b or 'the functional floodplain' and has a 5% or greater chance of flooding in any given year, or is designed to flood in the event of an extreme (0.1%) flood or another probability which may be agreed between the Local Planning Authority and the Environment Agency/Natural Resources Wales, including water conveyance routes. Development within Flood Storage Areas is severely restricted.

2. Environment Agency/Natural Resources Wales RoFRaS Flooding Map



Environment Agency/Natural Resources
 Wales RoFRaS Flooding legend

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 Site Outline
 Search Buffers (m)

RoFRaS Rating
 Very Low
 Low
 Medium
 High

Report Reference: HMD-445-5186612
 Client Reference: GWPR2607

2. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS)

2.1 Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating (River and Coastal)

What is the highest risk of flooding onsite?

High

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a High (1 in 30 or greater) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRaS Flood Risk
1	0.0	On Site	High
2	0.0	On Site	Low
3	7.0	SE	Low
4	49.0	S	Medium

Notes on RoFRaS data:

This information is based on the very latest Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) data. This data has been created by dividing the flood plain into 50m squares, or smaller areas where a square is intersected by a river or coastline. These are called impact cells. The method then calculates the likelihood that the centre of each impact cell will start to flood using a number of different flood scenarios.

A number of insurance companies providing cover for flood risk use this data as the basis of their risk model, although they may also utilise additional information such as claims histories, which may further influence their decision. Where a high risk of flooding is identified flood risk insurance may be difficult to obtain without further work being undertaken. Property owners of sites within Low and Medium risk areas are still considered to be at risk of flooding and insurance premiums may be increased as a result. Owners of properties within Low, Medium and High risk areas are advised to sign up to the Environment Agency/Natural Resources Wales's Flood Warning scheme. The probability estimates for RoFRaS risk bands are as follows:

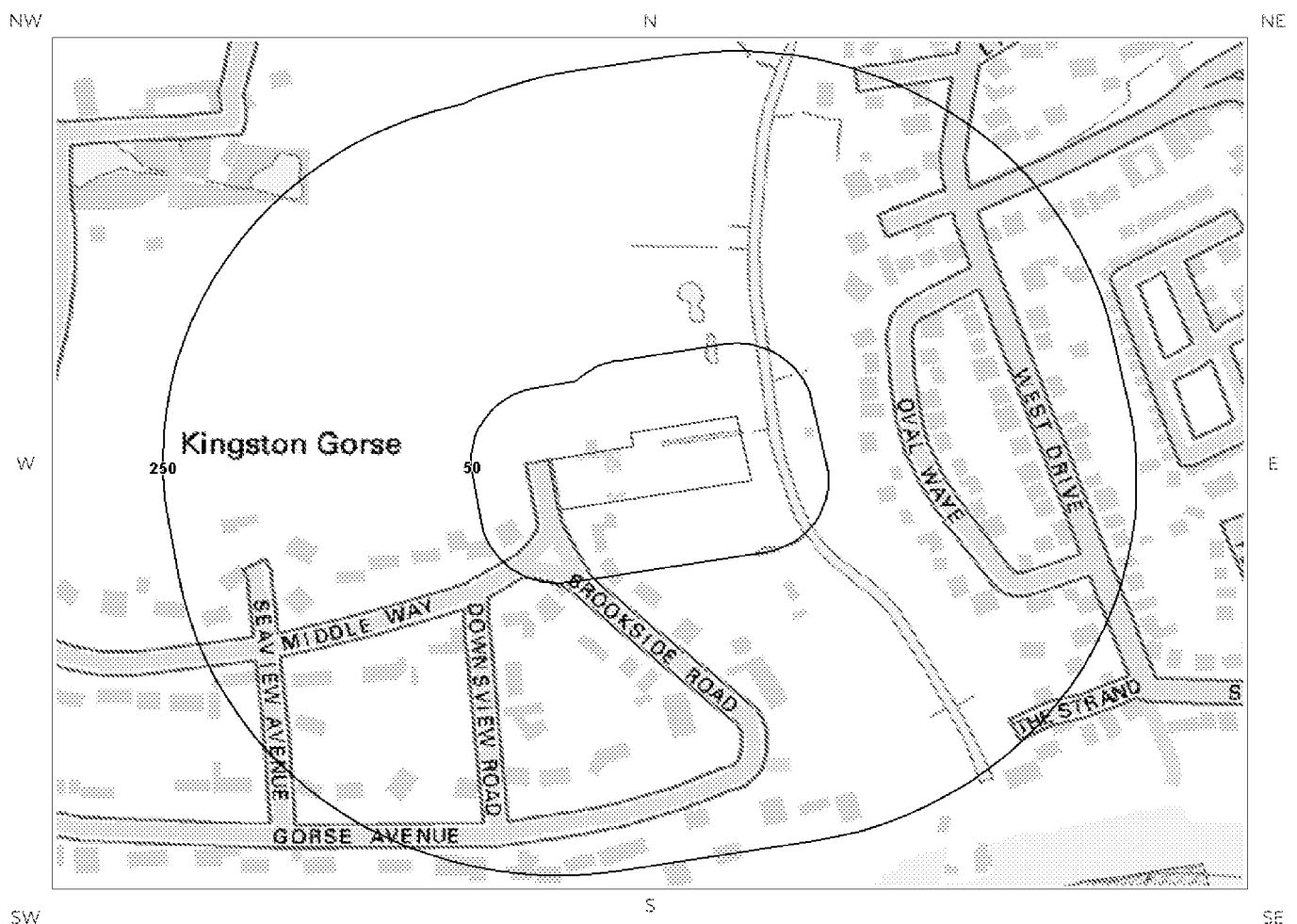
Very Low – the chance of flooding from rivers or the sea is considered to be less than 1 in 1000 (0.1%) in any given year.

Low – the chance of flooding from rivers or the sea is considered to be less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) in any given year.

Medium – the chance of flooding from rivers or the sea is considered to be less than 1 in 30 (3.3%) but greater than 1 in 100 (1%) in any given year.

High – the chance of flooding from rivers or the sea is considered to be greater than or equal to 1 in 30 (3.3%) in any given year.

3. Environment Agency/Natural Resources Wales Historic Flooding Events Map



Environment Agency/Natural Resources
Wales Historic Flooding Events legend

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Report Reference: HMD-445-5186612
Client Reference: GWPR2607

3. Environment Agency/Natural Resources Wales Historic Flooding Events

3.1 Historic Flood Outlines

Has the site or any area within 250m been subject to historic flooding as recorded by the Environment Agency/Natural Resources Wales? No

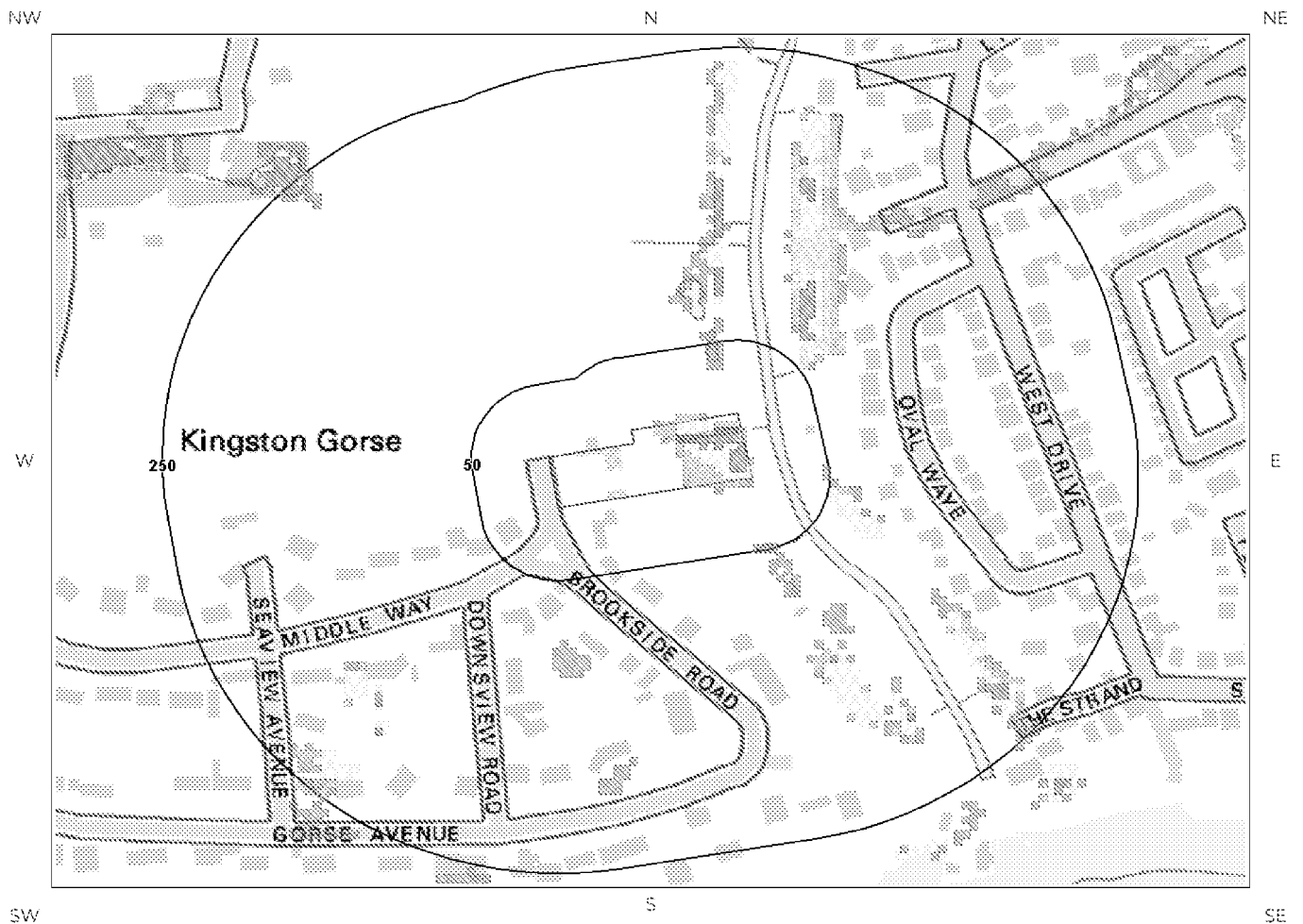
This database shows the individual footprint of every flood event recorded by the Environment Agency/Natural Resources Wales and previous bodies.

Any records found within the search radius are displayed on Map 3 – Historic Flooding Events.

Notes on Historic Flooding data:

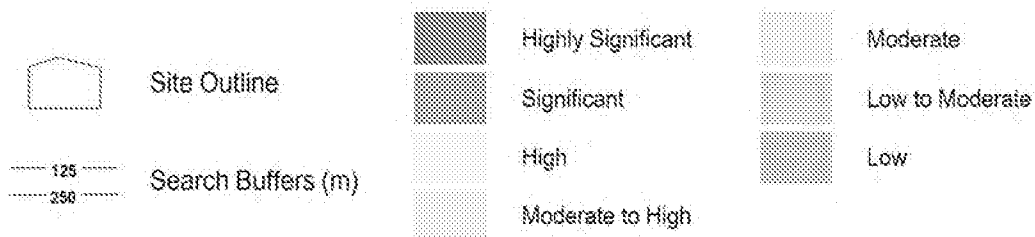
Over 21,000 separate events are recorded within this database, dating back to 1947. This data is used to understand where flooding has occurred in the past and provides details as available. Absence of a historic flood event for an area does not mean that the area has never flooded, but only that the Environment Agency/Natural Resources Wales do not currently have records of flooding within the area. Equally, a record of a flood footprint in previous years does not mean that an area will flood again, and this information does not take account of flood management schemes and improved flood defences.

4. JBA Surface Water (Pluvial) Flood Map



JBA Surface Water (Pluvial) Flood
Legend

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Report Reference: HMD-445-5186612
Client Reference: GWPR2607

4. JBA Surface Water (Pluvial) Flooding

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flow before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and surface watercourses may be entirely overwhelmed.

Surface Water (pluvial) flooding will usually be a result of extreme rainfall events, though may also occur when lesser amounts of rain falls on land which has low permeability and/or is already saturated, frozen or developed. In such cases overland flow and 'ponding' in topographical depressions may occur.

What is the risk of pluvial flooding at the study site? Significant

Guidance: The site or an area in close proximity has been assessed to be at Significant Risk of surface water (pluvial) flooding. This indicates that this area would be expected to be affected by surface water flooding in a 1 in 75 year rainfall event to a depth of between 0.3m to 1m.

Flood data provided by JBA RISK MANAGEMENT LIMITED Copyright © JBA RISK MANAGEMENT LIMITED 2008-2018

The following pluvial (surface water) flood risk records within 50m of the study site are shown on the JBA Surface Water Flooding Map:

Distance	Direction	Risk
0.0	On Site	High
0.0	On Site	High
0.0	On Site	High
0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Low to Moderate
0.0	On Site	Significant
0.0	On Site	Significant
2.0	S	Low
32.0	N	Low
45.0	E	Low

Distance	Direction	Risk
45.0	S	Low
50.0	E	Low
50.0	NE	Moderate

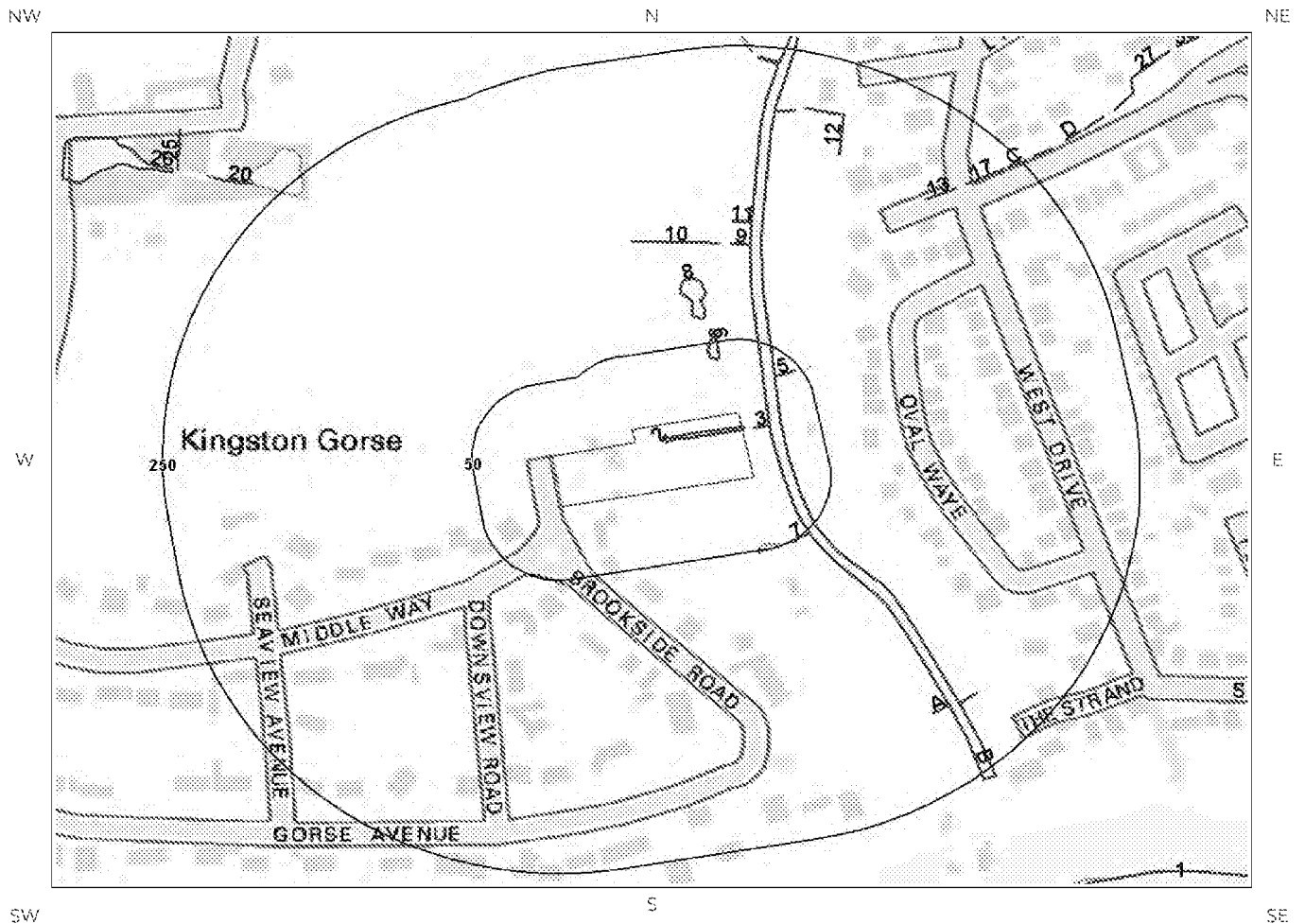
Notes on Surface water (Pluvial) Flooding data:

JBA Consulting surface water flood map identifies areas likely to flood following extreme rainfall events, i.e. land naturally vulnerable to surface water or “pluvial” flooding. This data set was produced by simulating 1 in 75 year, 1 in 200 year and 1 in 1000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though older ones may even flood in a 1 in 5 year rainstorm event.

The model provides the maximum depth of flooding in each 5m “cell” of topographical mapping coverage. The maps include 7 bands indicating areas of increasing natural vulnerability to surface water flooding. These are:-

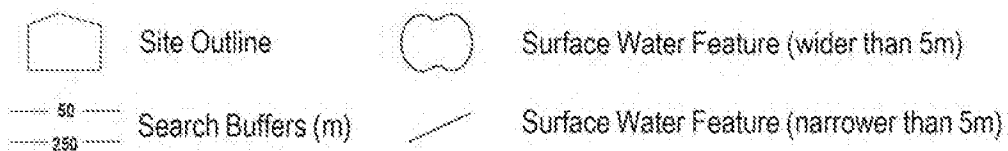
- Less than 0.1m in a 1 in 1000 year rainfall event - Negligible
- Greater than 0.1m in a 1 in 1000 year rainfall event - Low
- Between 0.1m and 0.3m in a 1 in 200 year rainfall event – Low to Moderate
- Between 0.3m and 1m in a 1 in 200 year rainfall event – Moderate
- Greater than 1m in a 1 in 200 year rainfall event – Moderate to High
- Between 0.1m and 0.3m in a 1 in 75 year rainfall event – High
- Between 0.3m to 1m in a 1 in 75 year rainfall event - Significant
- Greater than 1m in a 1 in 75 year rainfall event – Highly Significant

5. Surface Water Features map



Surface Water Features legend

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5. Surface Water Features

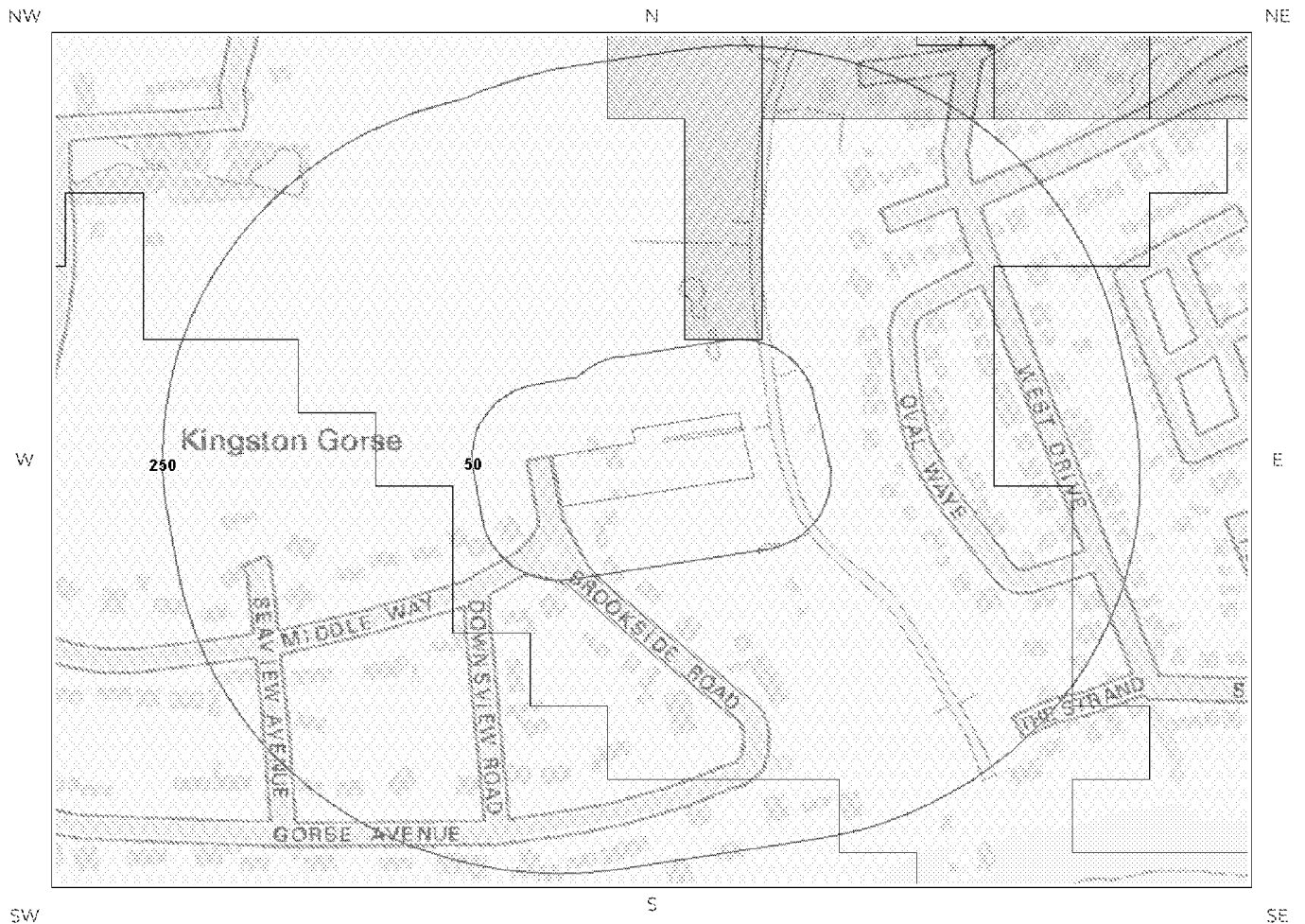
Are there any surface water features within 250m of the study site?

Yes

The following surface water records are represented on mapping:

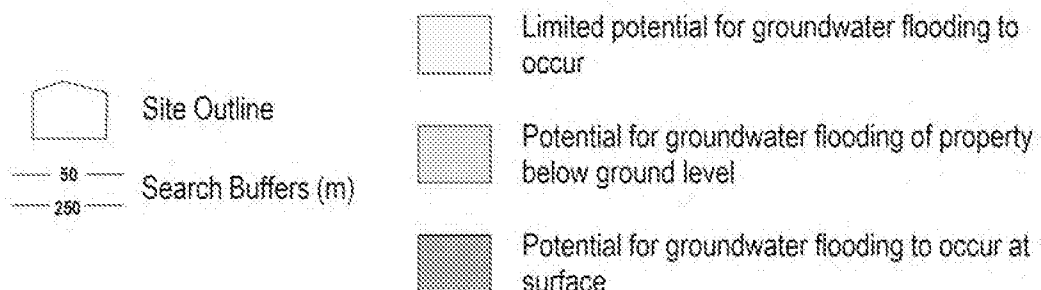
ID	Distance (m)	Direction
2	0.0	On Site
3	7.0	E
4B	17.0	E
5	34.0	NE
6	38.0	N
7	51.0	SE
8	68.0	N
9	115.0	N
10	117.0	N
11	130.0	N
12	187.0	N
13	189.0	NE
14A	199.0	SE
15A	203.0	SE
16B	207.0	N
17	213.0	NE
19C	242.0	NE

6. BGS Groundwater Flooding Map



BGS Groundwater Flooding legend

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Report Reference: HMD-445-5186612
 Client Reference: GWPR2607

6. Groundwater Flooding

6.1 Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site? Yes

What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? Potential for groundwater flooding of property below ground level

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

Where potential for groundwater flooding of property situated below ground level is indicated, this means that given the geological conditions there may be a groundwater flooding hazard to basements and other below surface infrastructure. Unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area you need take no further action in relation to groundwater flooding hazard. If there are records of previous incidences of groundwater flooding, then is recommended that other information e.g. rainfall history, property type, and land drainage information in addition to previous records of flooding be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

6.2 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? High

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

Notes on Groundwater Flooding data:

The BGS Susceptibility to Groundwater Flooding hazard dataset identifies areas where geological conditions could enable groundwater flooding to occur and where groundwater may come close to the ground surface.

Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

The susceptibility data is suitable for use for regional or national planning purposes where the groundwater flooding information will be used along with a range of other relevant information to inform land-use planning decisions. It might also be used in conjunction with a large number of other factors, e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information, to establish relative, but not absolute, risk of groundwater flooding at a resolution of greater than a few hundred metres. The susceptibility data should not be used on its own to make planning decisions at any scale, and, in particular, should not be used to inform planning decisions at the site scale. The susceptibility data cannot be used on its own to indicate risk of groundwater flooding.

7. BGS Geological Indicators of Flooding

Are there any geological indicators of flooding within 250m of the study site?

Yes

This dataset identifies the presence of superficial geological deposits which indicate that the site may be, or have been in the past, vulnerable to inland and/or coastal flooding. This assessment does not take account of any man-made factors such as flood protection schemes, and the data behind the report are purely geological.

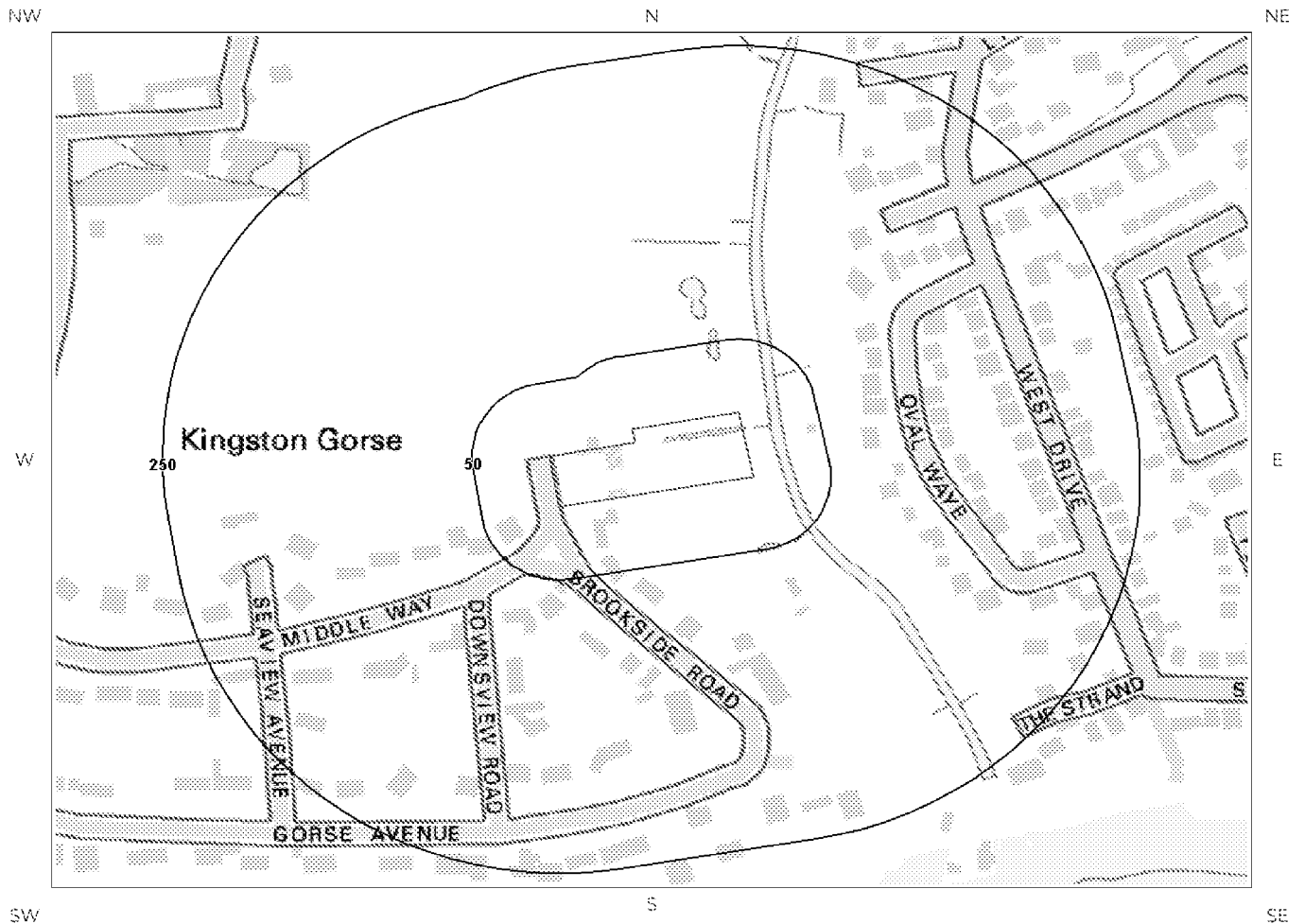
Distance	Direction	Description
0.0	On Site	Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment.
0.0	On Site	Lower flood potential from rivers: areas affected by secondary flooding in extreme cases as a result of a prolonged flood event.
45.0	E	Lower flood potential from rivers: areas affected by secondary flooding in extreme cases as a result of a prolonged flood event.

Notes on BGS Geological Indicators of Flooding data:

The BGS Geological Indicators of Flooding (GIF) data set is a digital map based on the BGS Digital Geological Map of Great Britain at the 1:50,000 scale (DiGMapGB-50). It was produced by characterising Superficial (Drift) Deposits on DiGMapGB-50 in terms of their likely vulnerability to flooding, either from coastal or inland water flow. These Superficial Deposits are considered 'recent' in geological terms, most having been formed in the later parts of the Quaternary geological period (i.e. within the last few tens of thousands of years). Observations made during recent major inland and coastal flooding events have demonstrated that the erosion and deposition of these recent geological sediments have produced subtle topographical variations, resulting in landforms such as fluvial and coastal floodplains. The mapping of these landforms, in conjunction with the fluvial and/or coastal deposits that underlie them, has in turn determined the extent of previous coastal and inland flooding.

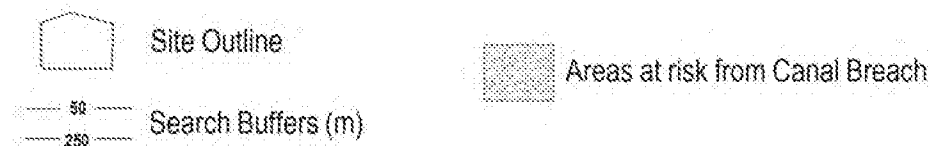
On this basis, the floodplains which are at greatest risk from flooding can be both visualised and defined by Superficial Deposits as depicted on geological maps. These include deposits such as river alluvium and lacustrine (lake) alluvium, as well as the First River Terrace or 'Floodplain terrace' (raised flat areas adjacent to or within floodplains, which represent the level of the floodplain prior to the most recent episode of down-cutting). Older and higher river terraces have been excluded as they lie outside the geologically defined floodplain. Areas at risk from coastal inundation are similarly characterised by a range of estuarine or marine deposits that include, for example, tidal flats.

8. JBA Canal Break map



JBA Canal Break legend

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8. JBA Reservoir and Canal Data

8.1 JBA Reservoir Failure Impact Modelling

Is the property located in an area identified as being at potential risk in the event of a reservoir failure? No

JBA consulting have modelled the flooding impact from 1,700 reservoirs in England and Wales, should there be a catastrophic failure of a reservoir wall or embankment. This data is not displayed on mapping.

Guidance: None required

Notes on Reservoir Failure Impact data:

This dataset identified areas that are most likely to flood following the sudden catastrophic failure of a reservoir and is provided by JBA Consulting. JBA has identified over 1,700 reservoirs that pose a risk to people and property. These maps identify properties that would flood in the unlikely event of the failure of the reservoir's dam or embankment. Empirical methods were used to predict the flow that would result from the failure which was then modelled onto high resolution Digital Terrain Models (DTM) using JBA's advanced 2D hydraulic modelling techniques. The model provides the maximum depth of flooding in each cell of the DTM.

8.2 JBA Canal Break Modelling

Is the property located within 500m of an area identified as being at potential risk in the event of a canal break? No

Database searched and no data found.

Notes on Canal Break modelling data

Canal failure mapping includes two types of failure:

- Breach of raised canal embankments - failure of the embankment due to weaknesses; these are typically caused by erosion or animal burrowing but can also arise from poor maintenance.
- Aqueduct failure - an aqueduct is where the canal passes over infrastructure such as roads, railways and subways, or over other canals and rivers. Failures of these are typically caused by the collapse of the underlying culvert.

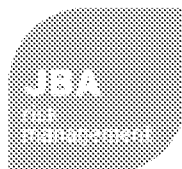
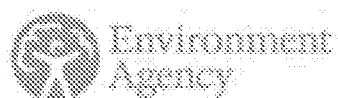
A length of over 1,700km of canal covering England, Wales and Scotland was modelled. The canal modelling is restricted to the areas where LIDAR is available as the raised embankments are more defined in the LIDAR than in the Photogrammetry data. Each canal is categorised as part of the Merchant Shipping Notice (MSN 1776 (M)). The majority of the modelled canals are categorised as A, with a few exceptions, which fell under category B.

- Category A: narrow rivers and canals where the depth of water is generally less than 1.5m.
- Category B: wider rivers and canals where the depth of water is generally 1.5m or more and where the significant wave height could not be expected to exceed 0.6m at any time.
- Category C: tidal rivers and estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2m at any time.
- Category D: tidal rivers and estuaries where the significant wave height could not be expected to exceed 2m at any time.

The canal map provides flood extent data only and show flooded areas with a depth greater than 0.1m.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com



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Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
<https://www.groundsure.com/terms-and-conditions-may25-2018>

APPENDIX C

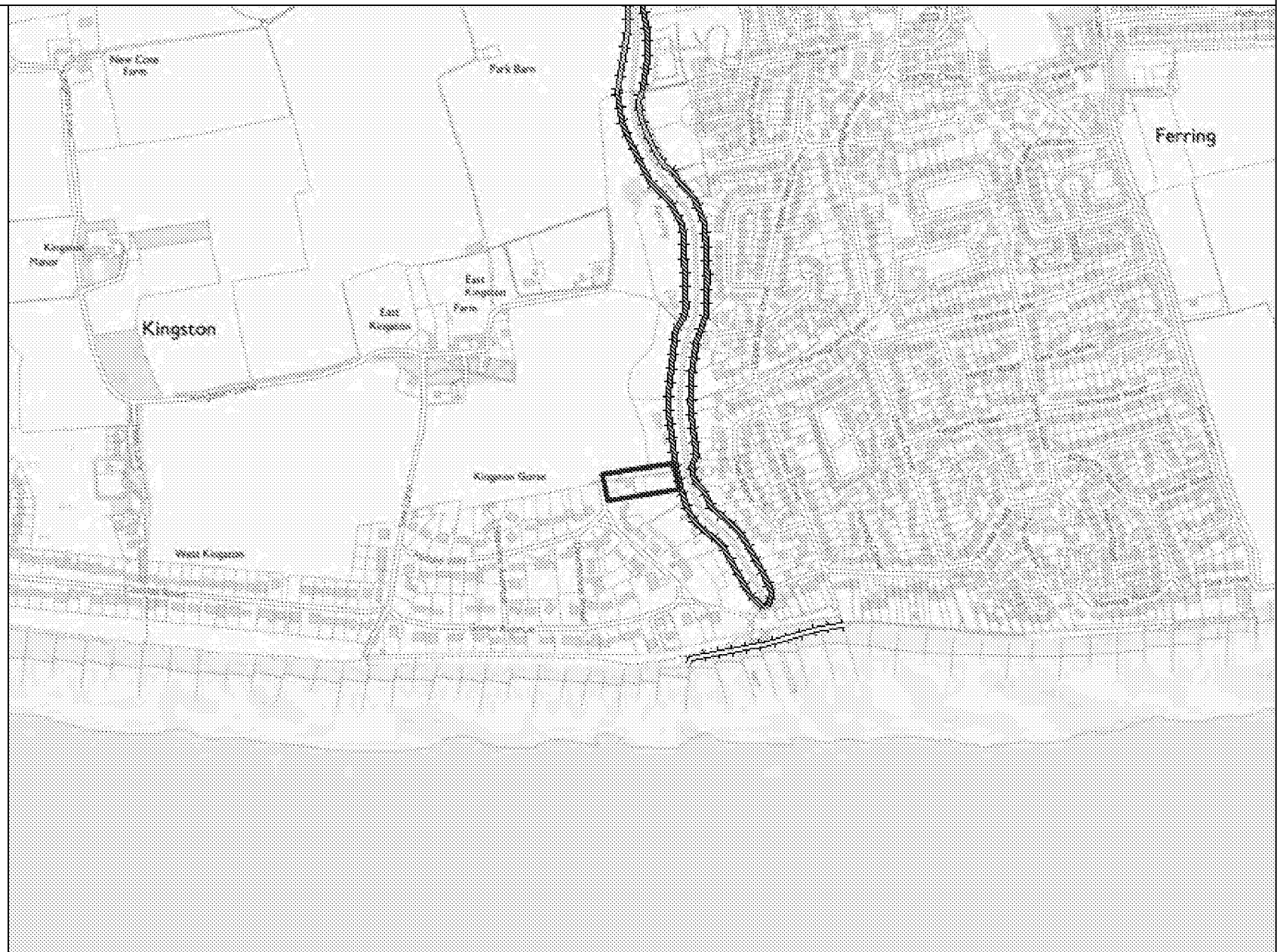
Environment Agency Data and Maps

AIMS Flood Defence Map. Centred on BN16 1SE. Created 28/6/18.

Legend

Defences (EA 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



Rob Terrell
Ground & Water Ltd.
2 The Long Barn
Norton Farm
Selborne Road
Alton
Hampshire
GU34 3NB

Our ref: SSD89144

Date: 28/06/2018

Dear Rob,

Enquiry Regarding Product 4 for Flood Risk Assessment for Kingston Corner, Brookside Road, East Preston, BN16 1SE.

Thank you for your enquiry which was received on 25 April 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 within Flood Zone 3 as shown on our Flood Map for Planning (Rivers and Sea).

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

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

Flood Defences

There are coastal defences in the form of a shingle beach. The estimated standard of protection is 1 in 200 (0.5% AEP). The estimated condition grade is good. This is maintained by the Environment Agency and Arun District Council.

Model Information

For tidal flood risk the model used is the Arun to Adur Costal Model which was completed in 2012 by JBA Consulting.

We do not have detailed modelling for fluvial flood risk in this area. All fluvial levels and depths are taken from the improved JFLOW 2008. JFLOW 2008 modelled outlines will be the same as the Flood Map for Planning outlines showing flood zones 2 and 3.

Flood History

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

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County Council** or the Local Authority, **Arun District Council** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for Kingston Corner, Brookside Road, East Preston, BN16 1SE
Licence	<u>Open Government Licence</u>
Information Warnings	None
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:

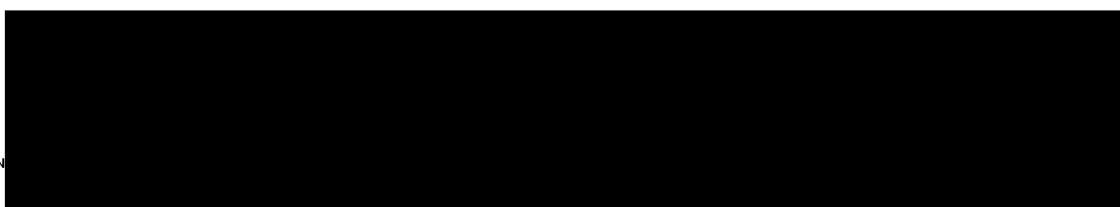
- [Flood Map For Planning \(Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences\)](#)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

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.

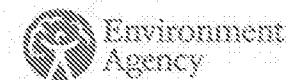
Yours sincerely,

Leanne Prentice

FCRM Officer - West Sussex



Flood Map for Planning (Rivers and Sea). Centred on BN16 1SE. Created 28/6/18.



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.

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:



You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

Product 4 Flood Risk Data Requested by: Ground & Water Ltd.

Site: Kingston Corner, Brookside Road, East Preston, BN16 1SE

Table 1: Water Levels: Fluvial Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD
			Undefended Annual Exceedance Probability
	Eastings	Northings	0.1%
1	508895	101757	-
2	508970	101767	3.21

Table 2: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD				
			Undefended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	508895	101757	-	-	-	5.14	-
2	508970	101767	-	-	2.57	5.24	-

Table 3: Water Levels: Tidal Defended

Node Ref	NGR		Modelled Flood Levels in Metres AOD				
			Defended Annual Exceedance Probability				
	Eastings	Northings	5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	508895	101757	-	-	-	-	-
2	508970	101767	-	-	-	2.81	-

Table 4: Water Depth: Fluvial Undefended

Node Ref	NGR		Modelled Flood Depths in Metres
			Undefended Annual Exceedance Probability
	Eastings	Northings	0.1%
1	508895	101757	-
2	508970	101767	0.93

Table 5: Water Depth: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres				
	Eastings	Northings	Undefended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	508895	101757	-	-	-	1.42	-
2	508970	101767	-	-	0.36	2.92	-

Table 6: Water Depth: Tidal Defended

Node Ref	NGR		Modelled Flood Depths in Metres				
	Eastings	Northings	Defended Annual Exceedance Probability				
			5%	0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	508895	101757	-	-	-	-	-
2	508970	101767	-	-	-	0.58	-

All tidal levels/depths taken from: Arun to Adur Coastal Modelling completed in 2012 by JBA Consulting.

We do not have detailed modelling for fluvial flood risk in this area. All fluvial levels and depths are taken from the improved JFlow 2008.

Produced on: 28/06/2018

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

Modelled Flood Outlines (Defended Tidal) Map. Centred BN16 1SE. Created 28/06/2018



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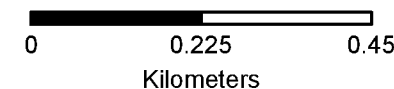


Legend

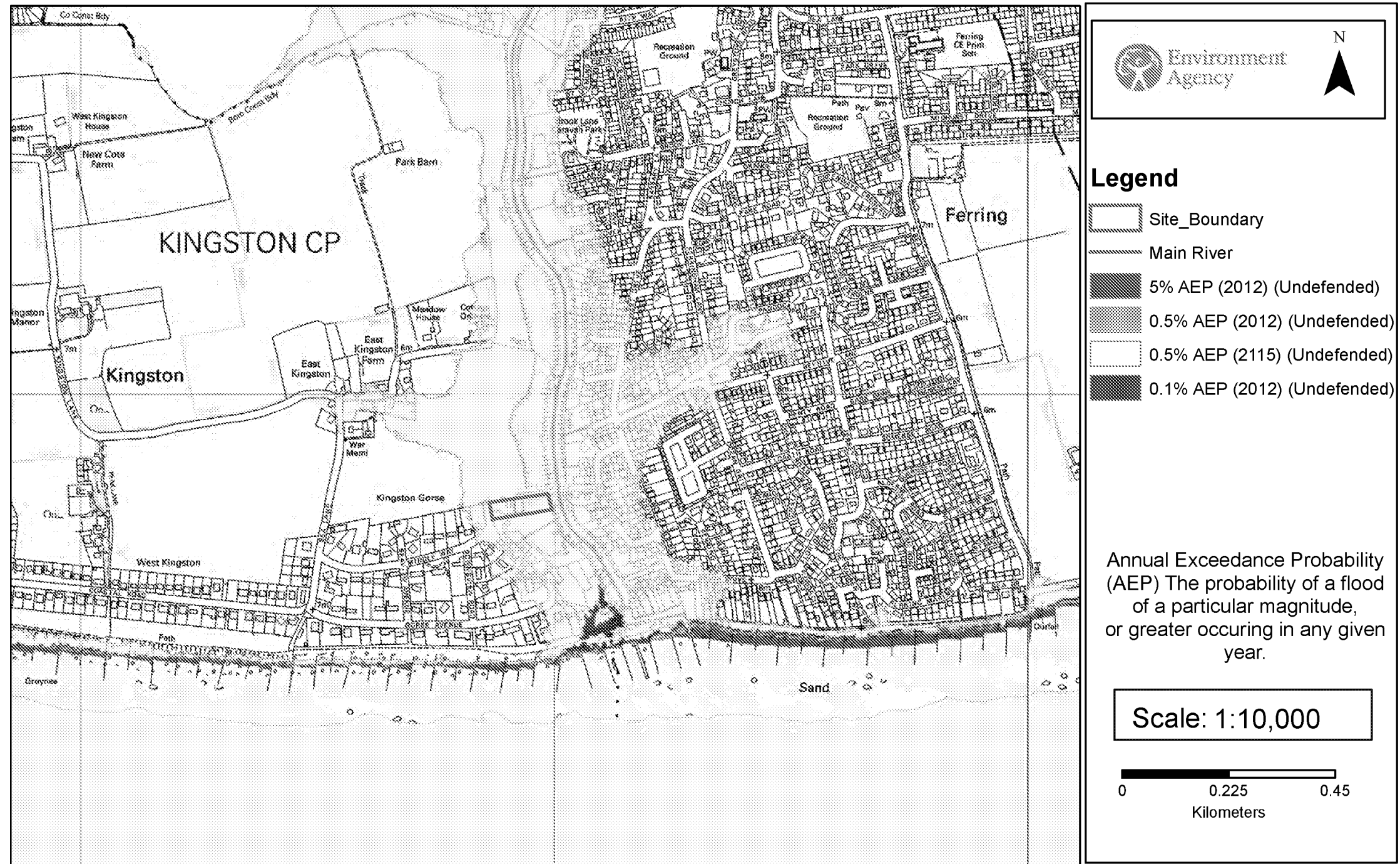
-  Site_Boundary
-  Main River
-  5% AEP (2012) (Defended)
-  0.5% AEP (2012) (Defended)
-  0.5% AEP (2115) (Defended)
-  0.1% AEP (2012) (Defended)

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

Scale: 1:10,000



Modelled Flood Outlines (Tidal Undefended) Map. Centred BN16 1SE. Created 28/06/2018



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

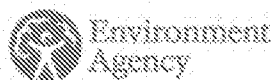
*Details of call charges can be found on the GOV.UK website.

Or visit our website

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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.

Published by:
Environment Agency
Horizon House
Deanery Road
Bristol BS1 5AH

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?

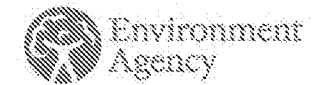
Our current pre-application service has changed. We will continue to provide a free, preliminary opinion to outline our position and any environmental issues regarding your development. Any further advice, including assessment of reports, follow-up meetings or site visits, will now be offered as part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

Risk of flooding from Surface Water. Centred on BN16 1SE. Created 28/6/18.



Scale 1:10,000



Likelihood of flooding from Surface Water

-  High ($\geq 3.3\%$)
-  Medium (3.3% - 1%)
-  Low (1% - 0.1%)
- Very Low

Likelihood of flooding from Surface Water

- High:** Greater than or equal to 3.3% (1 in 30) chance in any given year
- Medium:** Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low:** Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low:** Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

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

Site Boundary & Node Point Map. Centred BN16 1SE. Created 28/06/2018



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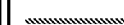
Legend



Site_Boundary



Node_Points



Main River

Scale: 1:1,000

0 0.0225 0.045

Kilometers

