

Littlehampton Skate Park Flood Risk Assessment



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1. Introduction

This Flood Risk Assessment for a new skate park in Littlehampton has been prepared by Arun District Council (ADC) in accordance with the requirements of National Planning Policy Framework¹ (NPPF) with particular focus on Chapter 14 “Meeting the challenge of climate change, flooding and coastal change” and accompanying technical guide. The assessment is required in order to ascertain whether the development will increase the risk of flooding elsewhere in the catchment or is at risk of flooding itself.

NPPF sets out the framework for planning decisions made by the local, regional and national government whilst also considering statutory consultees such as the Environment Agency (EA). In order for planning authorities to make informed decisions on the development of sites in areas at risk of flooding, NPPF requires the developer to carry out an assessment of flood risk. The objectives of a site-specific flood risk assessment are to establish:

- whether a proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

This report addresses the requirements of NPPF and other issues which are deemed relevant to flood risk. It is based on information and modelling shared through the EA, West Sussex County Council, Arun District Council Strategic Flood Risk Assessment (SFRA), and via a desk top study of the existing conditions on site.

¹ National Planning Policy Framework, 2019.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

2. Site Location and Development Details

2.1 Development and location

The proposed location for the new Littlehampton Skate Park is off Sea Road, close to the current steel ramp skate park facility. The newly designated skate park is to the far West of this site as shown in the location plan. The space is broadly rectangular in shape and measures approximately 40m x 15m. The site is bordered by a hedge to the West, a low-level brick wall to the South and tarmac pathways to the East.

The nearest bodies of water to the site are; the sea, which is located approximately 70m south of the area and Mewsbrook Park Boating Lake, which is located approximately 250m north-east of the site. The site is located within Flood Zone 3 of the local SFRA. The proposed site plan is shown in **Appendix 1**.

2.2 Geology

The geology of the area is shown on British Geological Survey maps which indicate the site is underlain by Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation, with superficial deposits of Raised Beach Deposits, sand and gravel. These maps are shown in **Appendices 2 and 3**.

2.3 Vulnerability classification

Table 2 of the Flood risk and coastal change guidance² defines the proposed infrastructure as 'water compatible development', falling under the 'outdoor sports and recreation' sub-heading. The development in question is therefore exempt from the Exception Test as demonstrated in Table 3: flood risk vulnerability and flood zone 'compatibility'.

2.4 Development design life

For the purposes of this assessment, a maximum design life of 100 years has been assumed. This is considered to be a worst case scenario for a development of this type. The lifetime of a non-residential development depends on its specific characteristics; therefore, the assumed lifetime can be changed at a later date if there is enough justification for considering a shorter period.

² Flood risk and coastal change guidance notes, 2014.

<https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>

3. Sequential Test

A sequential test should be applied to determine whether the development is located on the most appropriate site. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding. As the proposed skate park is located in Flood Zone 3 it is necessary to apply the test.

In this particular case other locations were excluded from development due to a number of contributing factors. The first, and most important in terms of planning, is the vulnerability of the infrastructure which can be classed as very low given its water compatible classification. Secondly, by maintaining the existing site as Littlehampton's 'destination' skate park the facility meets Arun District Councils Local Plan Policy HWB SP1.

As such the priority of this document is to show that the development will not increase the risk of flooding off-site.

It is considered that safe access and egress in a 1% Annual Exceedance Probability (AEP) event could be made via the Flood Zone 1 area approximately 100m to the west of the site if necessary.

4. Risk of Flooding to the Site

4.1 Risk of flooding from rivers and seas

Based on the Environment Agency Flood Map for Planning³ (see Appendix 4) and the available SFRA⁴ the site is located in Flood Zone 3a which is classified as land having a 1% AEP of river flooding; or land having a 0.5% AEP or greater of sea flooding.

However this data does not take into account local flood defences. Appendix 5 shows the Environment Agency map of long term flood risk from rivers and the sea, which takes into account the effect of any flood defences in the area. This classifies the site as low risk, meaning that each year there is an AEP of between 0.1% and 1%. It can be seen that the defences reduce, but do not completely stop, the chance of flooding as they can be overtopped or fail.

In addition, the SFRA confirms that there have been instances of coastal flooding occurring within the vicinity of the development site and that the site falls within a coastal risk area. The recorded incidents have resulted in flooding to the adjacent road.

The Environment Agency map of long term flood risk from rivers and the sea provides the extents of flooding for the 0.5% AEP (future flood zone 3) in 2115 with a modelled level of 3.71m. A topographical survey of the site is shown in Appendix 6, it shows the lowest survey point (in the area where the skate park is to be located) to be 3.66m. However, there is a considerable slope across the site which rises to 4.87m at the southern boundary and it is likely that the site will need to be levelled to install the proposed scheme. After this takes place it is expected that the site will exceed the 3.71m threshold. Nevertheless, the average elevation of the site will not differ from the pre-developed area and therefore it is not anticipated that the proposal will displace flood water.

4.2 Risk of flooding from surface water

Environment Agency maps show the flood risk from surface water, Appendix 7 identifies the location as being at very low risk. This means that each year this area has a chance of flooding of less than 0.1%.

In addition the SFRA does not identify any occurrences of surface water flooding within the direct vicinity of the development site.

There will be an increase in impermeable surface area from the installed skate park however the scheme allows for a sustainable drainage system which will counteract any increase in flow from the site.

³ Environment Agency Flood Map for Planning, 2019. <https://flood-map-for-planning.service.gov.uk/confirm-location?easting=504196&northing=101358&placeOrPostcode=sea%20road%20littlehampton>

⁴ ADC Strategic Flood Risk Assessment, 2016.

<https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n9615.pdf&ver=9488>

West Sussex County Council Strategic Flood Risk Assessment, 2010. http://www2.westsussex.gov.uk/mlp/eb017_vol_ii.pdf

4.3 Risk of flooding from groundwater

The SFRA illustrates that the site falls within a high groundwater flood risk area, although it is worth noting that there are no recorded instances of groundwater flooding historically. See **Appendix 8** for a map showing the susceptibility of flooding due to groundwater. This data shows where geological and hydrogeological conditions indicate that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring, nor does it take account of the chance of flooding from groundwater rebound (rising groundwater levels resulting from a reduction in abstraction rates from groundwater). This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

4.4 Risk of flooding from sewers

No Flood Risk Areas have been identified in the SFRA based on critical sewer/surface water problems. However, the information available in the SFRA confirms that there have been some occurrences of sewer flooding within the vicinity of the site, although it is unclear whether this is from foul or surface drains. In addition it is important to recognise that the information does not present whether flooding incidences were caused by general exceedance of the sewer system, or by operational issues such as blockages.

If a sustainable drainage solution is put in place at detailed design stage then the development should not impact the existing sewers.

4.5 Climate Change

Over the lifetime of the development peak rainfall intensity is likely to increase due to climate change. An increase should be allowed for peak rainfall intensity for the 1% AEP scenario, to account for climate change.

The Environment Agency provides guidance of total potential change percentages for different areas of the UK and over applicable time periods⁵, these are shown in **Table 1**. For the purposes of this assessment a 40% potential change in rainfall intensity is assumed and incorporated into the development surface water drainage design. This ensures that the site will be adequately drained for the lifetime of the development.

Table 1- Anticipated Changes in Rainfall Intensity (from EA guidance)

Applies across all of England	Total potential change anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

⁵ Environment Agency, Flood Risk Assessments and Climate Change, 2019.
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

As detailed in **section 4.1**, the assessment of flood risk from rivers and sea provides the predicted extents of flood zone 3 in 2115 taking into account allowances for sea level rise. Therefore, increase in flood risk due to climate change has been adequately considered.

5. Development Proposals

5.1 Surface water management

The drainage strategy has been prepared according to SuDS best practise guidance⁶.

The requirements for surface water management are to have no on-site flooding in a 3.33% AEP event and no off-site flooding in a 1% AEP event. The surface water drainage design will go above this requirement and be designed to have no on site flooding in the 1% AEP plus 40% climate change event.

The hierarchy for sustainable drainage will be followed and the first option for surface water management (discharge to ground via infiltration) will be adopted.

Infiltration testing was carried out during initial site investigations. As a result of the underlying strata it was not possible to fill the trial pit with water and complete testing in accordance with BRE365. Therefore, a conservative value of $1 \times 10^{-4} \text{ms}^{-1}$ will be used in the design. This is in line with values associated with sand and gravel soils.

At the time of writing this report, provisional surface water drainage design has occurred to dictate the space required for SuDS and therefore, the space available for the skate park. Detailed surface water drainage design will be completed following the finalisation of the skate park design. The design will be completed in accordance with CIRIA 753 and WSCC policy for surface water drainage.

5.2 Foul water management

No foul water drainage is required for the site.

⁶ CIRIA C753, The SuDS Manual, 2015.

6. Summary

- Based on the Environment Agency map and the local Strategic Flood Risk Assessment the proposed development is within Zone 3 which is technically a flood risk area. However alternative EA maps which account for local flood defences place the site at low or very low risk of flooding.
- The proposed skate park is considered a 'water compatible' development and as such is appropriate for any flood zone designation.
- The impermeable area of the site is increased with the installation of the skate park, however the new drainage design will ensure that there is no on-site flooding in a 1% AEP rainfall event.
- The drainage design accounts for a potential of 40% increase in extreme rainfall intensity due to climate change, as appropriate for upper design limits up to the '2080s'.
- Final design and detail for the drainage proposals should be developed during the detailed design period, and agreed with the Lead Local Flood Authority.

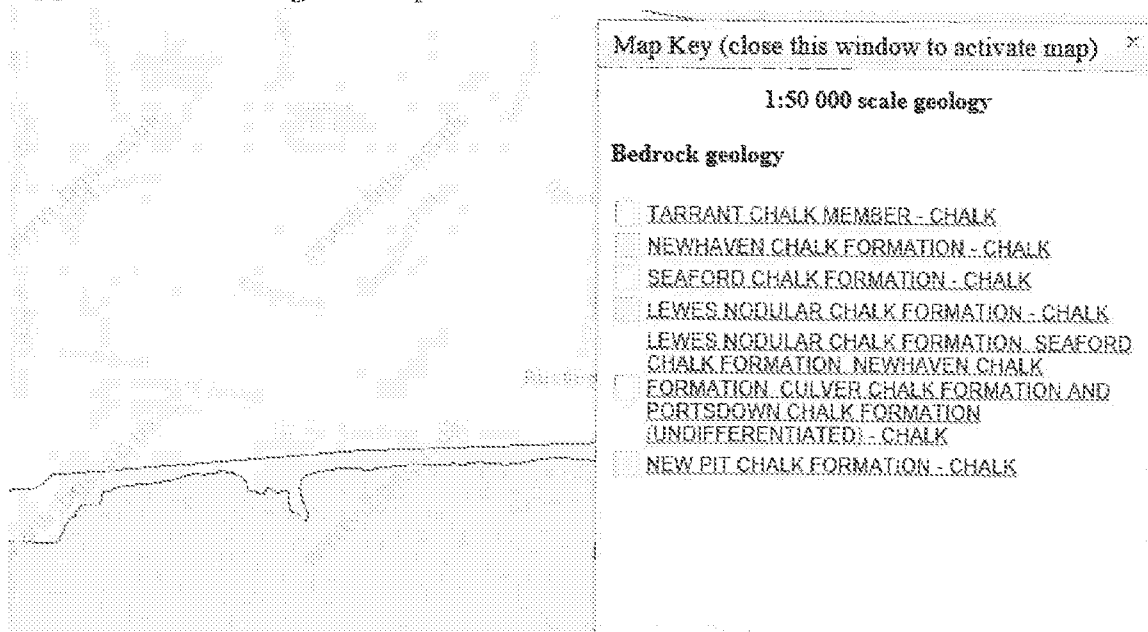
Appendices

Appendix 1: Proposed Site Plan



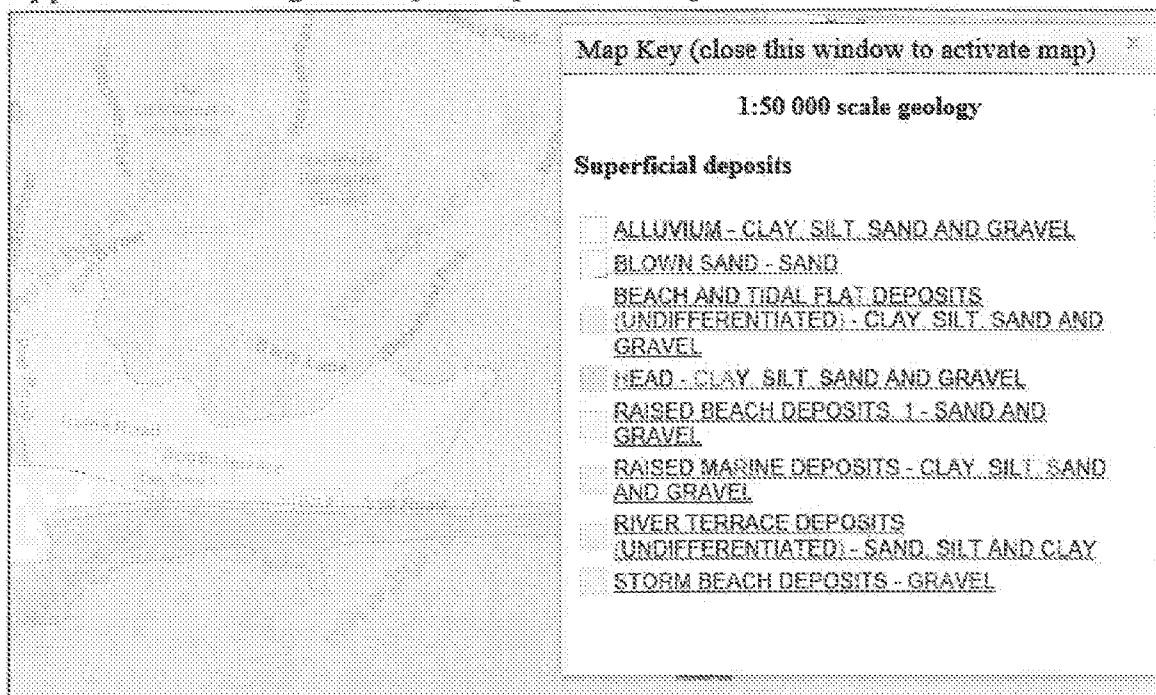
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Appendix 2: Geological Map of the Bedrock



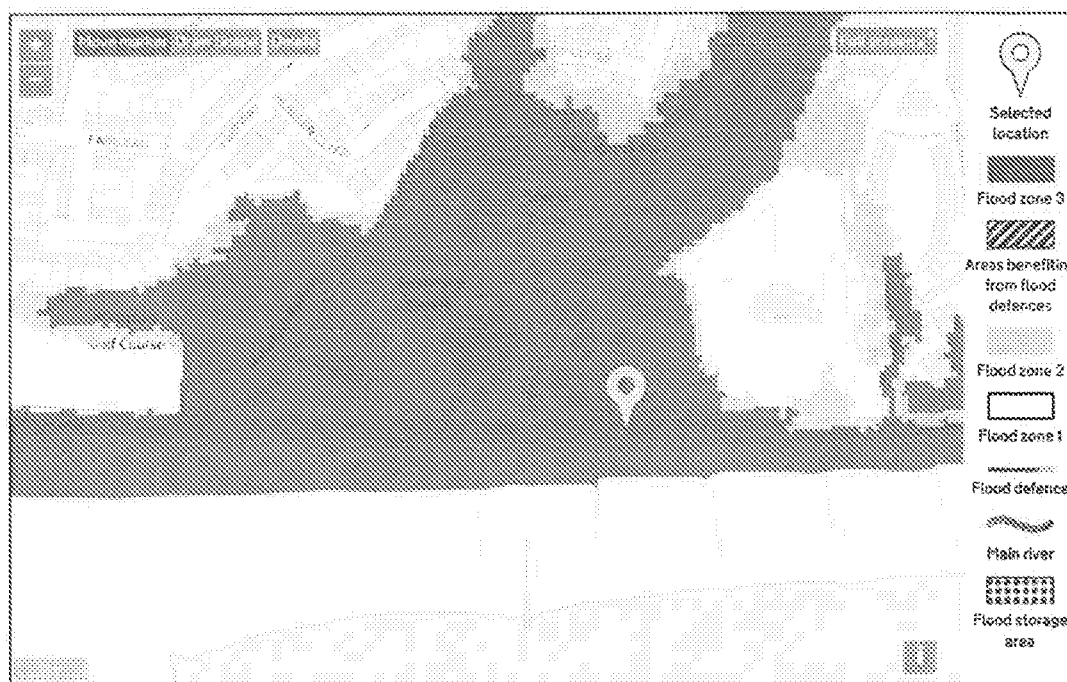
[<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>]

Appendix 3: Geological Map of Superficial Deposits



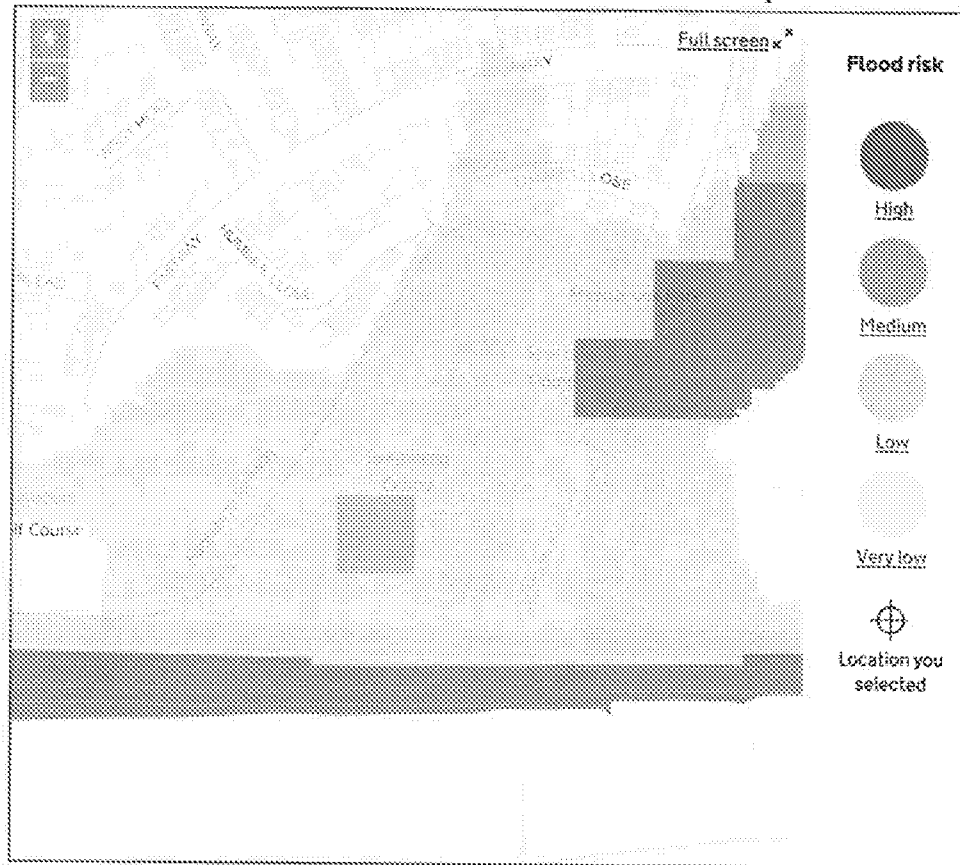
[<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>]

Appendix 4: Flood Map for Planning Showing Flood Zones 2 and 3



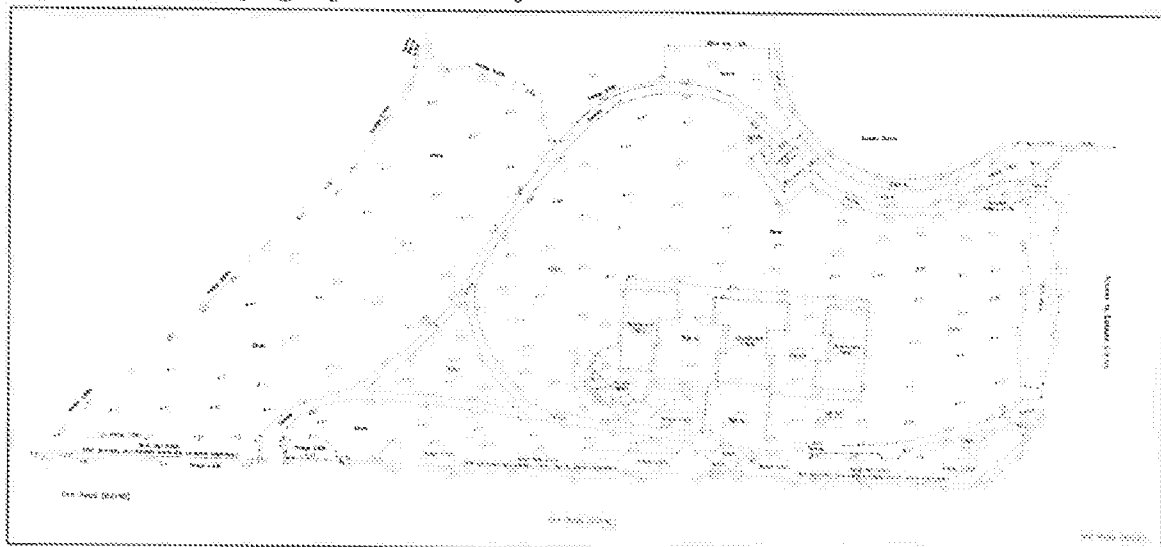
[<https://flood-map-for-planning.service.gov.uk/confirm-location?easting=504196&northing=101358&placeOrPostcode=sea%20road%20littlehampton>]

Appendix 5: Flood Risk from Rivers or the Sea Map



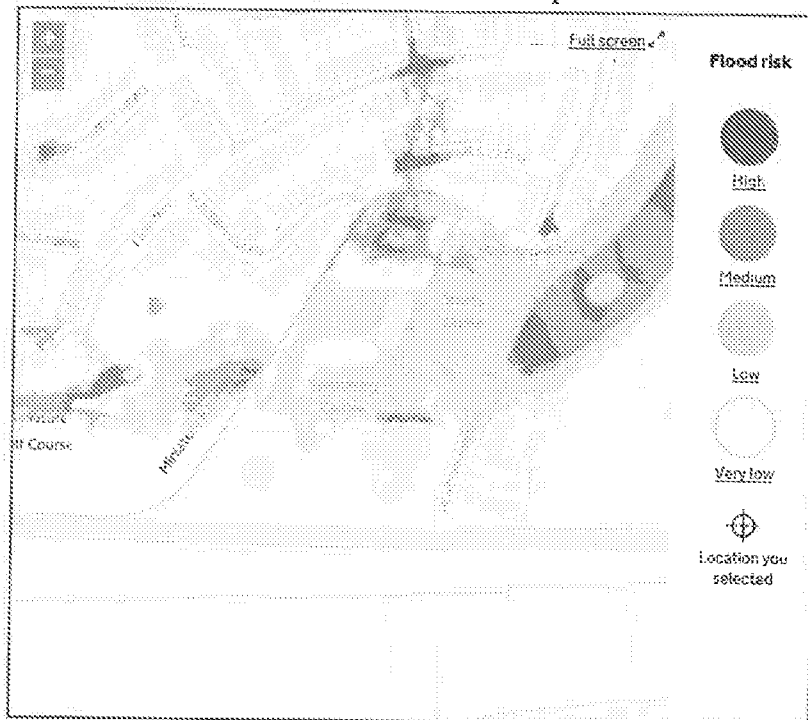
[<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=504085&northing=101415&address=200002717790&map=RiversOrSea>]

Appendix 6: Topographical survey of the site



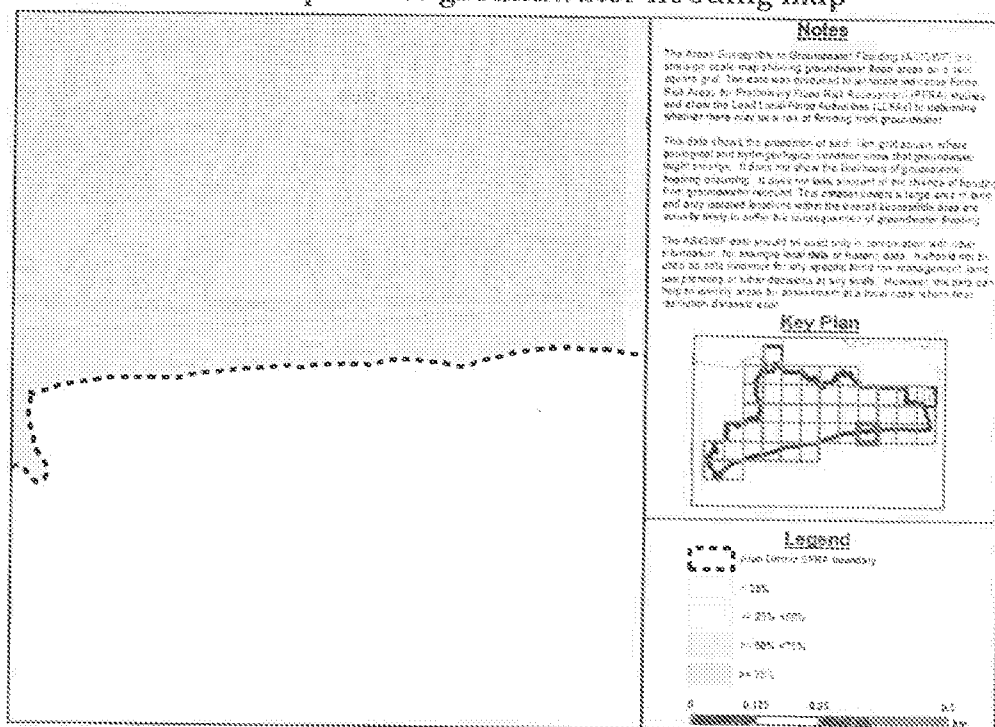
[Macleod Simmonds]

Appendix 7: Flood Risk from Surface Water Map



[<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=504085&northing=101415&address=200002717790&map=SurfaceWater>]

Appendix 8: Areas susceptible to groundwater flooding map



<https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n9398.pdf&ver=9254>

