



UK Flood Risk
Flood Risk Consultants

Sustainable Urban Drainage Systems (SuDS) Assessment

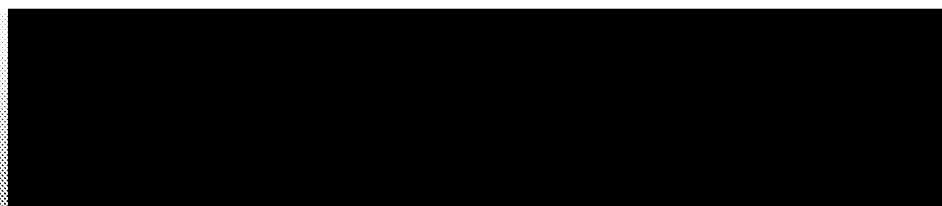
Unit 4, Hawthorn Road,
Littlehampton BN17 7LA

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UK Flood Risk
55 Shepherds Lane
Dartford DA1 2NL



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UK Flood Risk
55 Shepherds Lane
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Executive Summary

UK Flood Risk Consultants has been commissioned to prepare this Sustainable Urban Drainage Systems (SUDS) assessment in support of a proposal consisting of erection of a new office building located at Unit 4, Hawthorn Road, Littlehampton BN17 7LA.

The main sources of information to undertake the SuDS assessment are the flood maps and data of the Environment Agency and the Local Authority together with the guidance and best practices in surface water management such as the Sewers for Adoption, SuDS Manual (C753) and other technical design documents.

The overall risk of surface water flooding to the site is low.

The proposed development will not lead to any increase in the surface runoff from the site.

The surface runoff will be further improved by implementing appropriate SuDS measures. A soakaway will be implemented in order to improve the surface runoff from the site. The landowners will be fully responsible for the repair and management of the implemented SuDS measures throughout the lifetime of the proposed development.

The development will not give rise to backwater affects or divert water towards other properties.

This report demonstrates that the proposal will be safe, in terms of flood risk, for its design life and will not increase the flood risk elsewhere.

Contents

1.0	BACKGROUND	1
2.0	GENERAL DESCRIPTION OF THE SITE AND THE PROPOSALS.....	1
2.1.	Description of the site	1
2.2.	Proposed Development.....	1
3.0	RELEVANT PLANNING POLICES.....	2
3.1.	National Planning Policy Framework (NPPF).....	2
3.2.	Flood and Water Management Act 2010.....	2
4.0	SURFACE WATER DRAINAGE REQUIREMENTS.....	2
4.1.	Sustainable Urban Drainage Systems (SuDS).....	3
4.2.	Assessment of Risk of Surface Water Flooding	3
4.3.	Estimation of Peak Surface Runoff.....	4
4.4.	SuDS Hierarchy and Proposed SuDS Measures	5
5.0	MANAGEMENT AND MAINTENANCE PLAN	7
6.0	ASSESSMENT OF IMPACT ON FLOW OF FLOODWATER	8
7.0	CONCLUSION	8

Appendices

APPENDIX A	EXISTING SITE AND PROPOSED PLANS.....	I
APPENDIX B	SURFACE WATER FLOOD MAPS.....	II
APPENDIX C	PROPOSED SURFACE RUNOFF IMPROVEMENT MEASURES (SUDS).....	III

Abbreviations

Abbreviation	Description
mAOD	Metres Above Ordnance Datum
DEFRA	Department for Environment, Food, and Rural Affairs
EA	Environment Agency
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
SFRA	Strategic Flood Risk Assessment
PFRA	Preliminary Flood Risk Assessment
SuDS	Sustainable Drainage Systems

1.0 Background

UK Flood Risk Consultants has been commissioned to prepare this Sustainable Urban Drainage Systems (SuDS) assessment in support of a proposal consisting of erection of a new office building located at Unit 4, Hawthorn Road, Littlehampton BN17 7LA.

This SuDS has been carried out in accordance with the guidance and best practices in surface water management. Particularly, the guidelines of Sewers for Adoption, SuDS Manual (C753) and other technical design documents have been closely followed.

2.0 General Description of the Site and the Proposals

2.1. Description of the site

The proposal site is located at Unit 4, Hawthorn Road, Littlehampton BN17 7LA approximately centred on the OS NGR TQ 02451 03501 (**Appendix A Figure 1**). The site is located within the administrative boundary of Arun District Council, which is the Local Planning Authority.

The site is currently occupied by a building along with car parking area.

The access to the site is via Hawthorn Road. The surrounding area consists of mix of residential and commercial uses (**Appendix A Figure 2**).

There are no major water watercourses around the site.

Further details about the existing site are provided in **Appendix A**.

2.2. Proposed Development

The proposal consists of erection of a new office building. The footprint area of the proposed building is approximately 170.60m². Further details about the proposals have been provided in **Appendix A**.

3.0 Relevant Planning Policies

3.1. National Planning Policy Framework (NPPF)

The revised National Planning Policy Framework was published on 24 July 2018 and sets out the government's planning policies for England. The NPPF sets out planning and policies related to development planning and flood risk using a sequential characterisation of risk based on planning zones and the Environment Agency's Flood Maps. The aim of the flood risk assessment is to identify which Flood Zones the site is located in and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions. The policy also encourages the developers to incorporate appropriate Sustainable Drainage Systems (SuDS) to address the surface runoff/drainage issues.

3.2. Flood and Water Management Act 2010

The method of drainage of surface water from the site is bound by the Flood and Water Management Act 2010. Schedule 3 Paragraph 5 of the Flood and Water Management Act 2010 states that the following hierarchy is to be applied to surface water runoff in the following order or priority:

- Discharge into the ground (infiltration)
- Discharge to a surface water body (lake, river, drain);
- Discharge to a surface water sewer, highway drain or another drainage system; or Discharge into a combined sewer.

4.0 Surface Water Drainage Requirements

The Environment Agency suggests that the developers should demonstrate that the disposal of surface water from the site will not exacerbate existing flooding from new development within Flood Zones 3 and 2, development greater than 1ha in Flood Zone 1 and within areas that are known to suffer from surface water drainage or sewer flooding.

A surface water drainage assessment should be undertaken to demonstrate that surface water runoff from the proposed development can be effectively managed without increasing flood risk elsewhere. A surface water drainage assessment should include the following:

- Assessment of whether the development will increase the overall discharge from the site by calculating the change in area covered by roofs and hard-standing.
- Details of how overland flow from the new development can be intercepted to prevent flooding of adjacent land.
- Details of how additional onsite surface water attenuation can be provided to mitigate against known flooding problems or as a result of incapacity on the drainage systems.
- Demonstration that overland flows will not increase flood risk to both existing development and receiving watercourses.
- Agreement that the rates of discharge from the development are acceptable to the Environment Agency and utilities authorities.

4.1. Sustainable Urban Drainage Systems (SuDS)

4.1.1. Surface Water Runoff Management

Arun District Council strongly encourages the principles of SuDS on all forms of development. This is particularly important for development sites that lie within flood risk zones, including minor development and building extensions. The developer should seek the most sustainable SuDS solution in order to reduce flood risk, improve water quality and improve the environment overall.

4.2. Assessment of Risk of Surface Water Flooding

The surface water flooding arises when the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded and the excess rainwater flows overland. The severity of surface water flooding depends on several factors such as the degree of saturation of the soil before the event, the permeability of soils and geology, hill slope steepness and the intensity of land use.

Information on the risk of surface water flooding is held by the Environment Agency. The Environment Agency's Surface Water Flood Risk Maps (Risk and flood depth) are provided in **Appendix B** which indicate that the risk of surface water flooding to the site is 'low'.

4.2.1. Estimation of Permeable and Impermeable Areas

The proposed building footprint area is approximately 171m² which has been considered the site area. The changes in land cover have been summarised in **Table 1** below. It can be seen that the proposed building will be located on the hardstanding area. Therefore, the proposed development will not lead to any increase in the hardstanding area.

Table 1 Changes in Land Cover

Land Cover	Pre-development, m ²	Post-development m ²	Change, m ²
Impermeable Surface Area			
Hard standing	171	0	
Building footprint	0	171	
Total Impermeable	171	171	0
Permeable Surface Area			
Grass cover	0	0	
Total Permeable	0	0	0
Total Area	171	171	

4.3. Estimation of Peak Surface Runoff

The Rational Method has been used in order to estimate the peak surface runoff from the site

The Rational Equation is given by:

$$Q = A_r \times P \times R_i$$

Where, A_r = Effective catchment area, m²

P = Impermeability factor

R_i = Rainfall Intensity, mm/hr

Q = Peak surface runoff, m³/s

The peak surface runoff for the existing and proposed site conditions are summarised in **Table 2** below. An impermeability factor of 0.90 has been used for the site. A rainfall intensity of 100 mm per hour has been utilised. The impermeable areas in Table 1 have been used as effective catchment area. **Table 2** shows that the peak runoff rates from the site will be increased by approximately 3.6 litres per second.

Table 2 Estimation of Peak Runoff Rates from the site

SuDS Measures	Pre-development	Post-development
# Rainfall intensity R_i , mm/hr	100	100
Effective catchment area, A_r m ²	171	171
Impermeability factor, P	0.90	0.90
Peak Runoff, m ³ /s	$(A_r \times P \times R_i / 1000) / 3600$ $= (171 \times 0.90 \times 100 / 1000) / 3600$ $= 0.0042 \text{ m}^3/\text{s}$ $= 4.2 \text{ litres/sec}$	$(A_r \times P \times R_i / 1000) / 3600$ $= (171 \times 0.90 \times 100 / 1000) / 3600$ $= 0.0042 \text{ m}^3/\text{s}$ $= 4.2 \text{ litres/sec}$

The rule of thumb is to use a constant rainfall intensity of 35mm/hr for initial sizing of conveyance system. 100mm/hr has been used and provides a more conservative solution (see Environment Agency 2003, Rainfall runoff management for developments, Report-SC030219).

4.4. SuDS Hierarchy and Proposed SuDS Measures

The surface runoff from the site will be improved by implementing appropriate SuDS. The requirements for SuDS will ensure that any redevelopment or new development does not negatively contribute to the surface water flood risk of other properties and instead provides a positive benefit to the level of risk in the area. It will also ensure that appropriate measures are taken to increase the flood resilience of new properties and developments in surface water flood risk areas, such as those identified as being locally important flood risk areas.

The SuDS hierarchy and management train has been discussed in the SuDS Manual (C753) which aims to mimic the natural catchment processes as closely as possible. The general hierarchy of the SuDS measures is provided in **Table 3** below.

Table 3 General Hierarchy of SuDS Measures

Measures	Definition/Description
Prevention	The use of good site design and housekeeping measures to prevent runoff and pollution (e.g. rainwater harvesting/reuse).
Source control	Control of runoff at or very near its source (e.g. soakaways, porous and pervious surfaces, green roofs).
Site control	Management of water in a local area on site (e.g. routing water to large soakaways, infiltration or detention basins)
Regional control	Management of runoff from a site or several sites (e.g. balancing ponds, wetlands).

Table 4 below presents the feasibility assessment of the SuDS measures for the site.

Table 4 General Assessment of SuDS measures for the site

SuDS Measures	Issues/Description	Feasibility for the site
Source Control Porous and pervious materials/soakaways/green roof/infiltration trenches/disconnect downpipes to drain to lawns or infiltrate to soakaway.	Soakaway will improve the surface runoff from the site.	Yes, there is potential for a soakaway.
Site and Regional Control Infiltration/detention basins/ balancing ponds/ wetlands/underground storage/swales/retention ponds.	Balancing pond/storage will not be feasible due to limited space available.	No: Due to limited space available, balancing pond/storage pond will not be feasible.

Based on the general assessment of the potential SuDS measures above, it is proposed that a soakaway will be implemented in order to improve the surface runoff from the site. The indicative layout of the proposed SuDS measures is shown in

Appendix C. However, the location of the soakaway can be changed in order to suit the local condition.

The soakaway will be built with a size of 1.50m in diameter with the effective depth of 1.70m as shown in **Appendix C**.

5.0 Management and Maintenance Plan

The landowners will be fully responsible for regular repair and maintenance of the proposed soakaway as required for the lifetime of the development. The SuDS at this site have been designed for easy maintenance to comprise:

Soakaway

Table 5 below provides details on the regular maintenance of the proposed Soakaway.

Table 5 Regular Maintenance and remedial measures for Soakaway

Regular Maintenance	Actions/Remedial measures
Monthly	- Mow grasses (where required) and remove resultant clippings (during growing season only) - Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required.
Annually	- Remove sediment and debris from pre-treatment devices and floor of chamber - Clean gutters and filters on downpipes (where applicable) - Trim any roots causing blockages - Inspect and document the presence of wildlife.

Following all significant storm events	Inspect and carry out essential recovery works to return the feature to full working order.
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6.0 Assessment of Impact on flow of floodwater

The proposed development consists of erection of a new office building. In order to ensure that the proposed development will not increase flood risk elsewhere the mitigations will ensure that all flood water, surface water and rainwater is processed on-site and not redirected elsewhere through the use of appropriate measures such as soakaway. The development will not give rise to backwater affects or divert water towards other properties.

7.0 Conclusion

The proposal consists of erection of a new office building located at Unit 4, Hawthorn Road, Littlehampton BN17 7LA.

The overall risk of surface water flooding to the site is low.

The proposed development will not lead to any increase in the surface runoff from the site.

The surface runoff will be further improved by implementing appropriate SuDS measures. A soakaway will be implemented in order to improve the surface runoff from the site. The landowners will be fully responsible for the repair and management of the implemented SuDS measures throughout the lifetime of the proposed development.

The development will not give rise to backwater affects or divert water towards other properties.

This report demonstrates that the proposal will be safe, in terms of flood risk, for its design life and will not increase the flood risk elsewhere.

Appendix A Existing Site and Proposed Plans

Appendix B Surface Water Flood Maps

Appendix C Proposed Surface Runoff Mitigations (SuDS)