



FRA and Drainage Strategy Report

C240600684 Land at Norway Lane, LITTLEHAMPTON

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Prepared for:

HALLWAY PROPERTIES LIMITED

CONTACT DETAILS

Name	Position	Email	Telephone	Mobile
Lizzie Roberts	Apprentice Civil Technician			
Anthony Cabria	Principal Civil Engineer			

APPROVALS

	Name	Position	Date
Prepared by	Lizzie Roberts	Apprentice Civil Technician	04.04.25
Reviewed by	Anthony Cabria	Principal Civil Engineer	04.04.25
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1 INTRODUCTION

Pinnacle Consulting Engineers Ltd had been commissioned by Hallway Properties Limited to carry out a combined Flood Risk Assessment/ Drainage Strategy report for a proposed refurbishment/ repurposing development of an existing developed site off Norway Lane, Watersmead Business Park, Toddington, BN17 6LS. The proposed development consist part demolition, conversion, refurbishment and re-elevation of Units 5 and 6 and construction of retail (food and non-food), leisure and food & beverage units (Use Class E), together with associated car parking, access, loading areas, landscaping and associated works. A site location plan is enclosed in *Appendix A*.

1.1 Site description

The proposed site comprises vacant distribution warehouses (Units 5 & 6), a vacant office building (Unit 7) and associated service yards, parking, circulation routes and landscaping. Unit 7 (i.e. the former Body Shop headquarters) is currently under demolition to facilitate the proposed development and as a first enabling phase. The demolition of Unit 7 forms part of an earlier Prior Notification of demolition application (ref. LU/27/25/DEM). The site is located at National Grid Reference (NGR) 503814 , 103531 off Norway Lane, Watersmead Business Park, Toddington, Littlehampton BN17 6LS.

The existing curtilage of the proposed site consists of three vacant logistical warehouse buildings, associated service yards, circulation routes and HGV parking areas. The site is located to the east of Wick, in the north of Toddington and just north of A259. The site is bound to the north by an existing building and railway tracks between Angmering and Ford, to the south by parking and circulation roads associated with the Bodyshop HQ building and the “kids unlimited” pre-school, to the west by The Co-operative Childcare nursery and residential dwellings along Gratwicke Drive and to the northeast by a large feature lake running northwards towards Black Ditch. This approximately 0.5ha feature lake can be identified to the northeast of the site and appears to run into a complex of interconnecting tributaries and reservoirs roughly 140m north of the site. The Black Ditch borders the site further up north the railway line, and the proposed site is bounded by the Arun River further west.



Figure 1.1 – Aerial View of the existing development site (approximate site boundary edged red)

1.2 Topography

The development site is relatively flat with ground levels across the site varying between approximately 5m and 4m Above Ordnance Datum (AOD). The site falls generally in a south direction.

Topographical survey has been commissioned to confirm the levels across the site.

Details of existing development site levels are enclosed in *Appendix B*.

1.3 Geological ground conditions

Geological conditions at the site are detailed below and are based on a British Geological Survey (BGS) report and the Short Form Geotechnical Report carried out by DeltaSimons in March 2019. This GI Report forms the basis of the subsoil geotechnical and ground conditions report for this site development. This associated GI report is appended on *Appendix D*. The focus of this study on geology is on the potential movement of water through Made Ground, Superficial Geology, and Bedrock Geology.

Formation	Description
Artificial Ground (Made Ground)	Artificial deposits delineated in available Dynamic Sampler on site identify Made Ground prove to approximately 0.45m bgl.
Superficial Deposits (Drift Deposits)	River Terrace Deposits (undifferentiated) - Sand, Silt and Clay. These deposits are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary. These deposits have been proven to approximately 2.43m bgl.
Bedrock	New Pit Chalk Formation - Chalk. These sedimentary rocks are shallow-marine in origin. They are biogenic and detrital, generally comprising carbonate material (coccoliths), forming distinctive beds of chalk. Chalk deposits have been proven to 45.72m bgl.
Water Table	Available boreholes identify a water table at 5.18m deep that is not expected to significantly impact drainage design or associated earthworks activities.

Table 1.0 – Geological Ground Conditions

1.4 Proposed Development

The proposed development consist of part demolition, conversion, refurbishment and re-elevation of Units 5 and 6 and construction of retail (food and non-food), leisure and food & beverage units (Use Class E), together with associated car parking, access, loading areas, landscaping and associated works.

The proposed development plans are enclosed in *Appendix F*.

2 EXISTING SURFACE WATER MANAGEMENT

2.1 Existing surface water management

A drainage CCTV Survey was recently carried out by Laser Surveys on 20/03/2025 and also a GPR/EML Utilities Survey was conducted by Utilimap on 31/03/2025 to define the location of existing underground drainage and utilities infrastructure, respectively, within the proposed site. Also, survey records from an older CCTV Surveys (carried out by Malcolm Hughes Land Surveyors in Feb 2019) identify that the site has two fully operational, primary, positive surface water networks, with separate discharge locations serving the existing site. Due to the lack of evidence to suggest otherwise, it has been inferred that the identified networks discharge into the large feature lake situated approximately ca. 50m to the northeast of the site. Assumed outfall locations are positioned along the eastern perimeter of the site. One of sewers are assumed to outfall from the north east corner of the site via a Ø375mm and the other discharges immediately to the east of the central service yard via a Ø1050mm pipe. Following an assessment of the existing drainage networks, it was assumed that surface water runoff discharges into the existing lake (retention pond) at an unrestricted rate.

A series of gullies are shown running along the inner kerb lines bordering the large warehouse to the north (outside of the red line boundary or RLB) and are assumed to connect into the adjacent sewers, which roughly follow the centre line of the existing circulation routes. A series of surface water sewers are identified running parallel to the existing buildings along the centre of the site; they are shown to serve the central service yard, the large distribution centre to the north (outside the RLB) and both warehouse buildings to the south of the proposed site (within the RLB).

The existing drainage arrangement shown on the drainage CCTV Survey undertaken by Laser Surveys is provided on Appendix C whilst the GPR Utilities Survey prepared by Utilimap is enclosed on *Appendix B*.

The Environmental Agency's Flood map for planning (Gov.UK website) indicates that the site is generally located within Flood 1 which has little or no risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year). However, the adjacent areas just bordering/ outside of the red line boundary (RLB) to the southeast corner of the site falls within Flood Zone 2 and/or Flood Zone 3a - high risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.

3 NATIONAL, REGIONAL AND LOCAL PLANNING POLICY

3.1 National/ Regional Planning Policy

With reference to the indicative flood maps published by the Environment Agency, the site appears to lie within Flood Zone 1. This report has been prepared in accordance with the requirements contained within National Planning Policy Framework (NPPF, February 2025) and the associated Planning Practice Guidance (February 2024). The guidance refers to the Environment Agency's "standing advice" on flood risk. Based on requirements set by the Environment Agency, a Flood Risk assessment is needed to support the planning application.

This report has been prepared in accordance with (i) National Planning Policy Framework (NPPF), (Department for Communities and Local Government, 12 December 2024, updated 7 February 2025) and the accompanying (ii) Planning Practice Guidance (Ministry of Housing, Communities and Local Government, Feb 2024); and (iii) Level 1 and 2 Strategic Flood Risk Assessment (SFRA) undertaken on behalf of Arun District Council by JBA Consulting, Nov 2016 (iv) Other statutory laws and local bylaws and rules.

It is stated in Paragraph 20 of the Flood Risk and Coastal Change chapter within the Planning Practice Guidance that "a site-specific flood risk assessment is carried out by (or on behalf of) a developer to assess the flood risk to and from a development site. Where necessary the assessment should accompany a planning application submitted to the local planning authority. The assessment should demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users".

This report has been prepared to address the requirements of the NPPF/ LDP and has referenced the data/information from various sources including but not limited to the following:

- National Planning Policy Framework (NPPF), 12 December 2024 (as amended 07 Feb 2025);
- Planning Practice Guidance (PPG) on flood risk and coastal change, 14 February 2024;
- Arun District Council's Adopted Local Plan (July 2018);
- Level 1 and 2 Strategic Flood Risk Assessment (SFRA) undertaken on behalf of Arun District Council by JBA Consulting, Nov 2016
- Flood and Water Management Act 2010 (DEFRA, 2010);
- DEFRA Non-statutory technical standards for sustainable drainage systems (March 2015);
- Interim Code of Practice for Sustainable Drainage Systems (DEFRA, 2004);
- British Geological Survey website www.bgs.ac.uk;
- Magic Maps [Magic Map Application \(defra.gov.uk\)](http://Magic Map Application (defra.gov.uk));
- Site-specific topographical surveys, GPR/ EML utilities survey, and drainage CCTV surveys;
- Site Plan Drawing Ref.11631-PL108 rev. B (dated 28/02/2025 prepared by RGP Architects)

3.2 Arun District Council's Adopted Local Plan (July 2018)

The information provided below is an extract from Arun District Council's Adopted Local Plan (July 2018) found on the council website (<https://www.arun.gov.uk/adopted-local-plan>). The excerpt is part of Policy W DM3 found under section 18.4 titled "Sustainable Drainage Systems". The following policy is applicable to flood risk and management of drainage:

Sustainable Urban Drainage Systems

“To increase the levels of water capture and storage and improve water quality, all development must identify opportunities to incorporate a range of Sustainable Urban Drainage Systems (SUDS), appropriate to the size of development, at an early stage of the design process. Proposals for both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design. These features include:

- Green roofs*
- Permeable driveways and parking*
- Soakaways*
- Water harvesting and storage features including water butts.*

Proposals for major development must also integrate SUDS within public open spaces and roads, reflecting discussion with the appropriate bodies. SUDS must therefore be integrated into the overall design of a development and must:

- a) Contribute positively to the appearance of the area, integrating access to allow maintenance of existing watercourses and the system.*
- b) Effectively manage water (including its quality)*
- c) Accommodate and enhance biodiversity by making connections to existing Green Infrastructure assets and*
- d) Provide amenity for local residents (ensuring a safe environment)*
- e) Retain the existing drainage network of the site and the wider area,*
- f) Be maintained in perpetuity, supported through a Maintenance and Management Plan/Regime, including its financing, agreed with the Local Planning Authority.*

In order to ensure that SUDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:

- g) Follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SUDS manual produced by CIRIA.*
- h) Undertake up to six months groundwater monitoring within the winter period.*
- i) Undertake winter percolation testing in accordance with BRE365.*
- j) The proposed drainage system must be designed to ensure that there is no flooding on a 1 in 30 year storm event.*
- k) The design must also take account of the 1 in 100 year storm event plus 30% allowance for climate change, on stored volumes, to ensure that there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary, and within designated storage areas.”*

4 PROBABILITY OF FLOODING

The NPPF identifies six potential sources of flooding:-

- Flooding from rivers (fluvial flooding);
- Flooding from the sea (tidal flooding);
- Flooding from land;
- Flooding from sewers;
- Flooding from groundwater; and
- Flooding from reservoirs, canals, and other artificial sources.

These are considered below.

4.1 Flooding from rivers (fluvial flooding) & sea (tidal flooding)

The assessment of flood risk in this report is based on the definitions in Table 1 in the Flood Risk and Coastal Change, Planning Practice Guidance, which recognises the following Flood Zones:

- Flood Zone 1 - little or no risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year)
- Flood Zone 2 - low to medium risk, with annual probability of flooding between 0.1% and 1.0% from rivers and between 0.1% and 0.5% from the sea
- Flood Zone 3a - high risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.
- Flood Zone 3b – the ‘Functional Floodplain’ with an annual probability of flooding of 5% or greater.

An extract from the Environment Agency’s online flood map published on their website is shown in Figure 4.1 below. Also shown below on Figure 4.2 is the updated Gov.UK online flood maps for planning-rivers and the sea (undefended). The site is located within Flood Zone 1 which has little or no risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year). However, the adjacent areas just bordering the RLB to the southeast corner of the site falls within Zone 2 or Zone 3a. Refer to Figure 4.5 which shows these adjacent areas within Flood Zones 2 and 3.

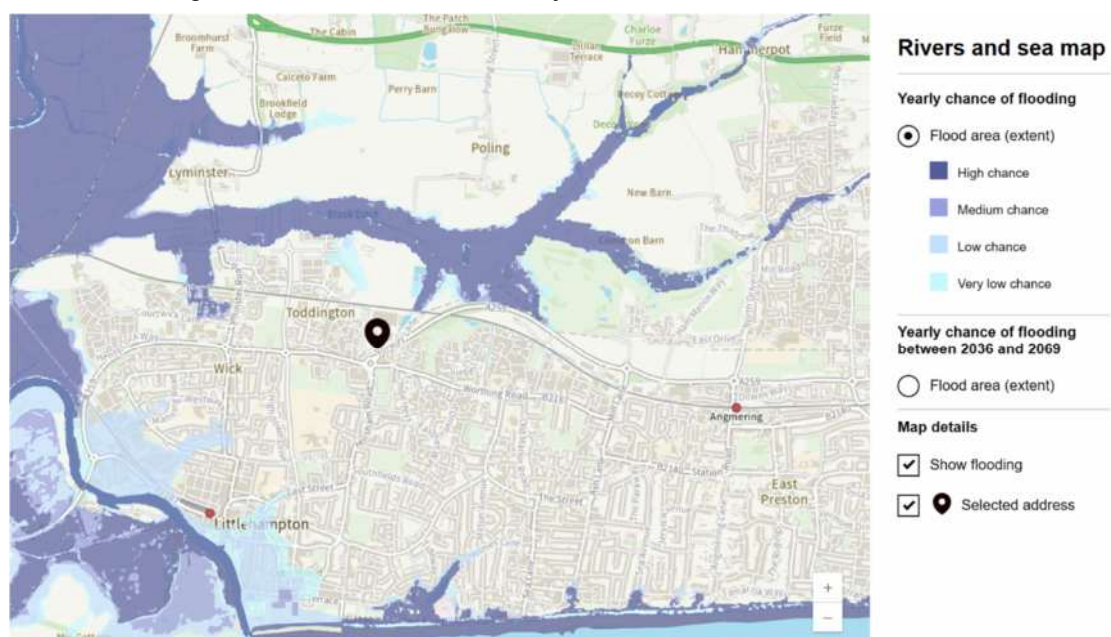


Figure 4.1- EA Online Flood Map for Planning- Flooding from Rivers and the Sea

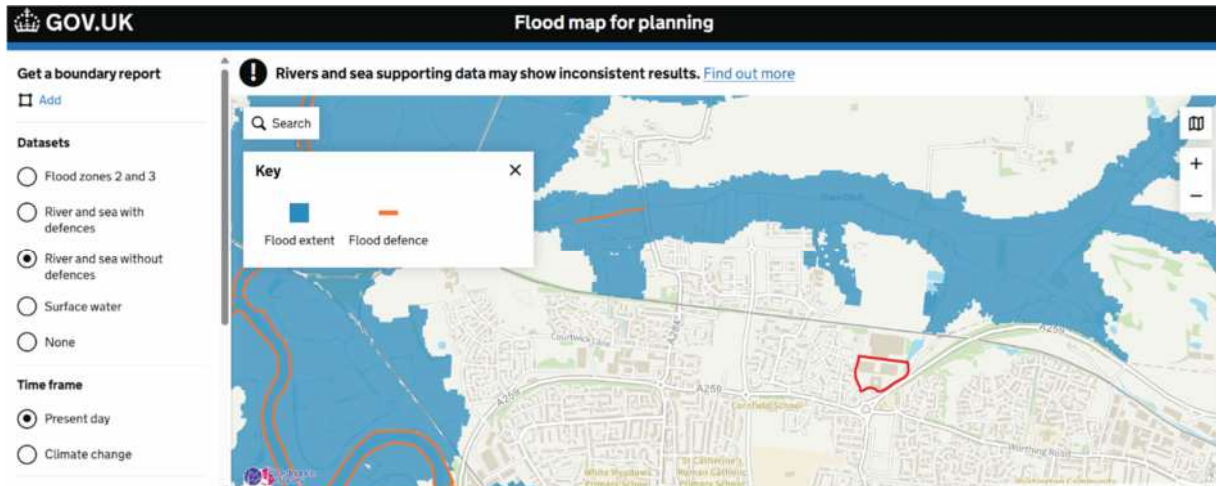


Figure 4.2- GOV.UK Online Flood Map for Planning- Rivers and the Sea (undefended). Proposed site edged red.

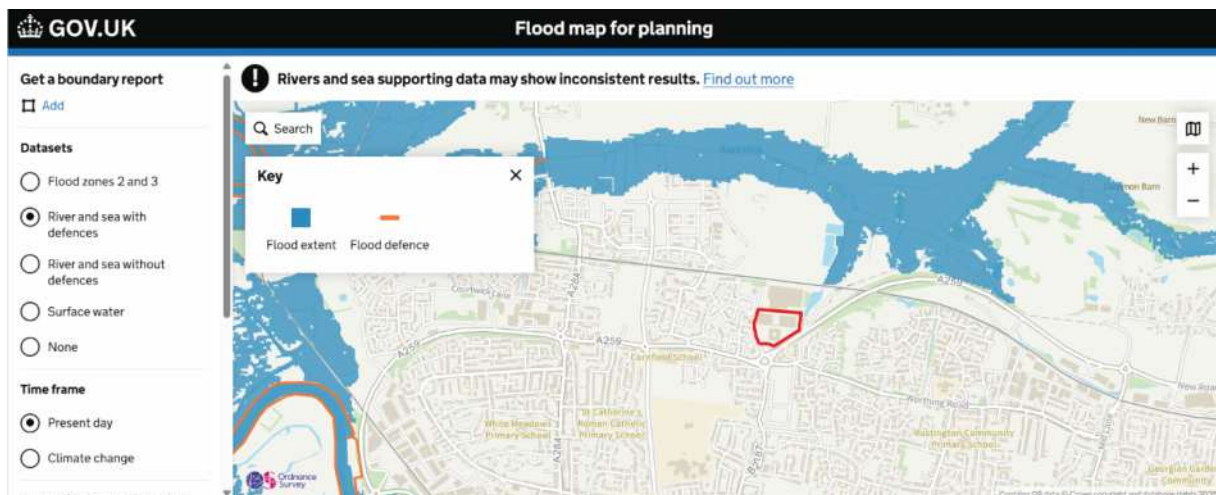


Figure 4.3- GOV.UK Online Flood Map for Planning- Rivers and the Sea (defended). Proposed site edged red.

4.2 Flooding from land & sewers

Based on the surface water flood risk map on the gov.uk website, the site is indicated to be at high risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea. This surface water flood risk appears to be associated with flows along the north and the northwest of the site. Figure 4.4 below shows an extract of this flood map with the majority of the site being at a chance of surface water flooding at this location could be more than 3.3% (1 in 30) each year.

The information about the existing surface water sewer system onsite is as per the drainage CCTV surveys as shown on Appendix C. The public drainage asset data currently operated and maintained by Southern Water is also appended on Appendix C. Public sewer flooding historical record data is, however, not available during the preparation of this report.

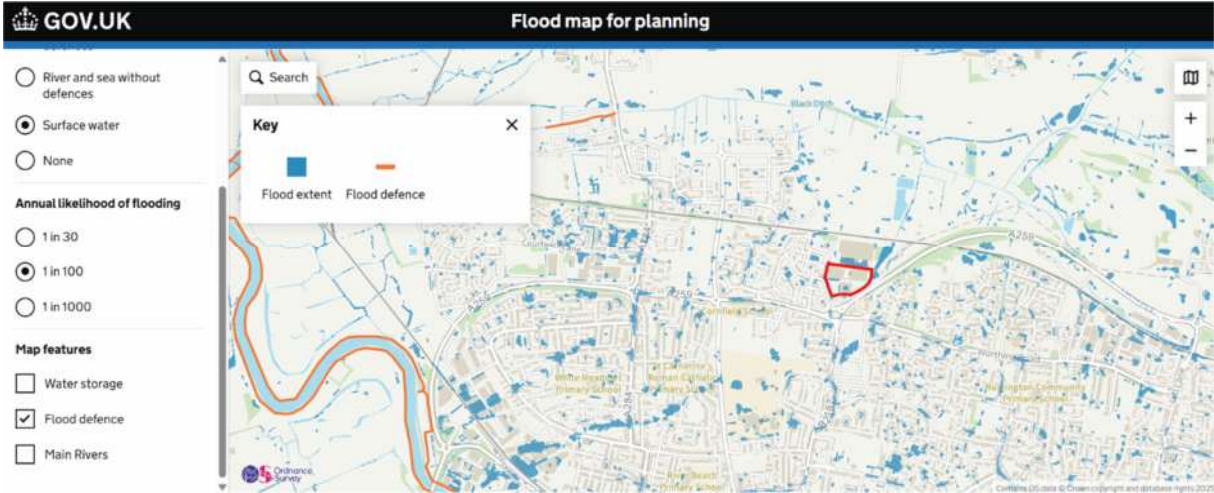


Figure 4.4- Gov.UK Flood Map for Planning- Surface Water (defended). Proposed site edged red.



Figure 4.5- Flood Zones 2 & 3 areas adjacent to the proposed site

4.3 Flooding from Groundwater

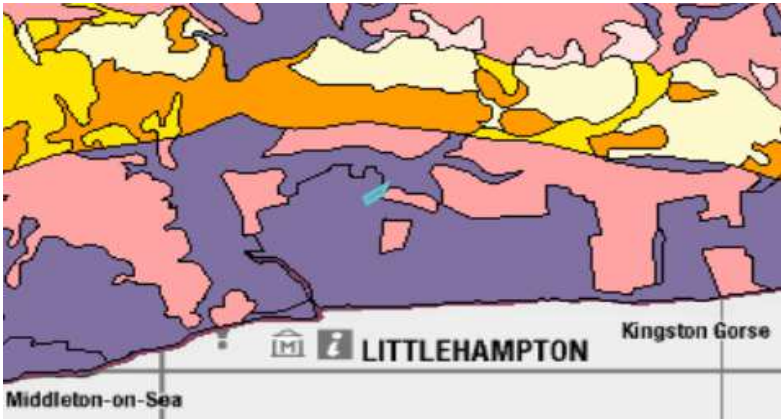


Figure 4.6 – DEFRA Groundwater Vulnerability Map (approximate site location edged cyan)

Based on Figure 4.6 the proposed site lies within a Major Aquifer High vulnerability zone. Flooding from groundwater is unlikely in this area.

4.4 Flooding from reservoirs, canals, and other artificial sources

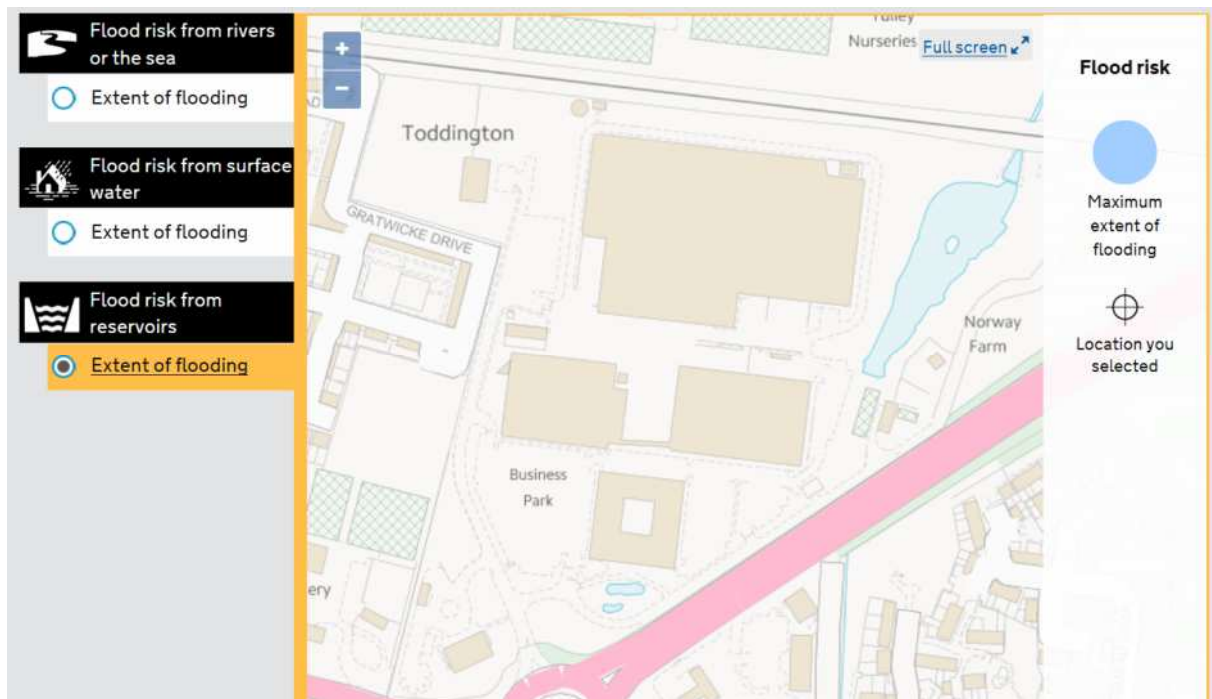


Figure 4.7 – Environment Agency’s Online Flood Map for Planning for Reservoirs Flooding extract

Flooding from reservoirs or canals is unlikely in this area. Based on Figure 4.7 above, the proposed site lies within a no risk zone of flooding from reservoirs/ canals.

5 POLICY STATUS FOR PROPOSED DEVELOPMENT

5.1 Vulnerability classification

The proposed development complies with the following principles:

- The proposed development lies within Flood Zone 1;
- The proposed development is classified as ‘less vulnerable’ in accordance with Table 2 of the Flood Risk and Coastal Change, Planning Practice Guidance (reproduced as Table 5.1 below).

Essential Infrastructure	<p>Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk</p> <p>Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood</p> <p>Wind Turbines</p>
Highly Vulnerable	<p>Police stations, Ambulance stations, Fire stations, Command Centres and telecommunications installations required to be operational during flooding</p> <p>Emergency dispersal points</p> <p>Basement dwellings</p> <p>Caravans, mobile homes and park homes intended for permanent residential use</p> <p>Installations requiring hazardous substances consent</p>
More Vulnerable	<p>Hospitals</p> <p>Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels</p> <p>Buildings used for dwelling houses; student halls of residence, drinking establishments, nightclubs and hotels.</p> <p>Non-residential uses for health services, nurseries and educational establishments</p> <p>Landfill and sites used for waste management facilities for hazardous waste.</p> <p>Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.</p>
Less Vulnerable	<p>Police, ambulance and fire stations which are not required to be operational during flooding.</p> <p>Buildings used for shops; financial, professional and other services, restaurants and cafes, not food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure.</p> <p>Land and buildings used for agriculture and forestry.</p> <p>Waste treatment (except landfill and hazardous waste facilities).</p> <p>Minerals working and processing (except for sand and gravel working).</p> <p>Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place).</p> <p>Sewage treatment works (if adequate measures to control pollution and manage sewage during flood events are in place).</p>
Water-compatible Development	<p>Flood control infrastructure.</p> <p>Water transmission infrastructure, pumping stations.</p> <p>Sewage transmission infrastructure and pumping stations.</p> <p>Sand and gravel workings.</p> <p>Docks, marinas, wharves</p> <p>Navigation facilities.</p>

	<p>MOD defence installations.</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.</p> <p>Water-based recreation (excluding sleeping accommodation).</p> <p>Lifeguard and coastguard stations.</p> <p>Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.</p>
<p>Notes</p> <p>1 - This classification is based partly on Defra/Environment Agency research on Flood Risks to People (FD2321/TR2)21 and also on the need of some uses to keep functioning during flooding.</p> <p>2 - Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.</p> <p>3 - The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.</p>	

Table 5.1 – Flood Risk Vulnerability Classification

Vulnerability Classification		Essential Infrastructure	Water-compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test	✓	✓
	Zone 3a	Exception Test	✓	✗	Exception Test	✓
	Zone 3b	Exception Test	✓	✗	✗	✗
<p>Key</p> <p>✓ Development is appropriate</p> <p>✗ Development should not be permitted</p>						

Table 5.2 – Flood Risk Vulnerability and Flood Zone ‘Compatibility’

The proposed development is appropriate in accordance with Table 3 of the Flood Risk and Coastal Change, Planning Practice Guidance, reproduced in Table 5.2 above.

5.2 Sequential Test & Exception Test

The NPPF requires that all development is sequential tested to steer new development to areas at the lowest probability of flooding (Flood 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. However, where this process has not yet been completed the onus for the provision of evidence demonstrating successful application of the Sequential Test falls to the developer, or

promoter of the site. The NPPF also requires the layout of a site to be sequentially tested to locate the most vulnerable land uses in the areas at lowest risk of flooding.

The NPPF Planning Practice Guidance acknowledges that in some circumstances it may not be possible to locate development in areas of low or appropriate (considering development vulnerability) flood risk or that there may be other valid reasons for a development to take place within the floodplain. In these circumstances, it is necessary to apply the Exception Test to clearly demonstrate that the benefits for development of a site outweigh the flood risks to the development and its occupants. Table 3 of the Flood Risk and Coastal Change, Planning Practice Guidance (reproduced in Table 5.2 above) indicates when the Exception Test is required.

The proposed development site falls entirely into Flood Zone 1, however, during the Planning Pre-Application consultation stage, the LPA requested for a Sequential Test to be carried out, due to the site's surface water flooding risk, amongst other reasons as stated on the Pre-Application Advice. The Sequential Test has been completed by Freeths LLP including the Retail Impact Assessment. This has been reflected under Section 5 of the Planning Statement. On this basis, the Sequential Test is deemed to be passed, and the Exception Test is not required.

5.3 Ground Finish Floor Level (FFL) Design

The Environment Agency advises that the minimum floor level for buildings at risk of flooding should be set at least 300mm above the design flood level, defined as the 1-in-100-year extreme water level, including the appropriate climate change allowance.

The above EA policy is not applicable to this proposal as the buildings are existing (and to be retained except for Building 7 which is subject to demolition) on this brownfield site, thus, the FFL were pre-established. The existing Building FFL can be found on Drawing Ref. C240660684-PIN-XX-XX-DR-C-02100 which is appended on Appendix K. The assumed building FFL for the proposed Units A1 and A2 is 5.19m AoD, Unit A3 at 4.90m AoD, Unit A4 at 4.75m AoD, and Units A5 to A9 will have a FFL of 4.55m AoD. The building FFL generally does not affect the existing site drainage of the site. The existing external ground FFL on the north side of the site will be kept the same, however, the proposed design ground levels on the new carpark area on the south side of the site is shown on Appendix K.

5.4 Flood Risk On-Site and Off-Site

Flood water will thus be allowed to propagate across the proposed external hardstanding and new car park set at ground level (GFFL). Therefore, loss of flood attenuation or obstruction to flood flow resulting from the proposed development is unlikely, thereby averting any increased flooding elsewhere.

All external areas that may experience flooding will be designed to be flood resistant and/or flood resilient however, as the external areas are predominantly car parking, service yard, footway hardstanding, and landscaping, it is unlikely any significant measures would be required.

The predicted overland Flood Exceedance Flow Path is appended on *Appendix L*.

5.5 Flood Resilience Measures (up to minimum 1m above ground level)

Where flood resistance measures are not feasible for the proposed development, the following flood resilience measures shall be adopted, where practicable, to minimise the damage and to enable quick recovery and clean up after the flooding event:

- Building materials that are effective for a 'water exclusion strategy' will be used, where applicable, which include: engineering bricks, cement-based materials including water retaining concrete and dense stone.




- Wiring for telecoms, internet and other services will be protected by suitable insulation to avoid or minimise damage.
- Water, electricity and gas meters will be located above predicted flood level.
- Non-return valves will be used in the drainage system to prevent back-flow of diluted sewage in situations where there is an identified risk of the foul sewer surcharging.
- All service entries will be sealed (e.g. with expanding foam or similar closed cell material).
- Closed cell insulation will be used for pipes which are below the predicted flood level.
- Boiler units and ancillary devices will be installed above predicted flood level and preferably on the first floor of two-storey properties.
- Non-return valves will be used in the drainage system to prevent back-flow of diluted sewage in situations where there is an identified risk of the foul sewer surcharging.
- All service entries will be sealed (e.g. with expanding foam or similar closed cell material).
- Closed cell insulation will be used for pipes which are below the predicted flood level.

5.6 Flood Warning and Evacuation

It is anticipated that the existing Watersmead Business Park site premises already has an available flood warning and evacuation plan.

5.7 Flood Warning Service

The Flood Warning Service is provided by the Environment Agency (EA) across England and Wales in areas at risk of flooding from rivers or the sea. This service is provided using up to date rainfall, river

Flood Warning Code	Meaning	Actions to be taken
 FLOOD ALERT	Flooding is possible. Be prepared.	<ul style="list-style-type: none"> • Be prepared to act on your flood plan. • Prepare a flood kit of essential items. • Monitor local water levels and the flood forecast on our website.
 FLOOD WARNING	Flooding is expected. Immediate action required.	<ul style="list-style-type: none"> • Move family, pets and valuables to a safe place. • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place.
 SEVERE FLOOD WARNING	Severe flooding. Danger to life.	<ul style="list-style-type: none"> • Stay in a safe place with a means of escape. • Be ready should you need to evacuate from your home. • Co-operate with the emergency services. • Call 999 if you are in immediate danger.
Warnings no longer in force	No further flooding is currently expected in your area.	<ul style="list-style-type: none"> • Be careful. Flood water may still be around for several days. • If you've been flooded, ring your insurance company as soon as possible.

level and sea condition monitoring 24 hours a day to forecast the possibility of flooding. If flooding is forecast, the Environment Agency will issue warnings using a set of three different warning types as shown below. The EA's Flood Warning target lead time; the time between a flood warning being issued and the onset of flooding is approximately two hours.:

6 FLOOD RISK MANAGEMENT STRATEGY

The demolition of Building 7 forms part of an earlier Prior Notification of demolition application (ref. LU/27/25/DEM), and is therefore not part of this proposed development. As a consequence, the old building roof impermeable area was replaced with the proposed new carpark hardstanding. It is anticipated that the associated minor decrease in runoff rate as a result of the smaller runoff coefficient (C value) for the hardstanding area as compared to the roof runoff coefficient, it would subsequently reduce the net runoff rate and volume that will discharge to the existing site surface water drainage infrastructure, and further downstream at its outfall to the existing lake on the eastern side of the wider site.

Given that the proposal is to marginally increase the amount of impermeable area by 836m² (refer to Appendix E), it is anticipated any overland flow routes will be left unaffected. All surface water storage requirements up to the 1 in 100 year event plus a suitable allowance for climate change are to be stored within the site.

Sections 5.3 to 5.7 of this report also discuss the measures for dealing with flood risk.

Current drainage CCTV survey records identify that the site has two fully operational primary positive draining surface water networks, with separate discharge locations serving the existing site. should infiltration be ruled out as a viable mode of water management, any additional impermeable area created by the proposed development can be effectively managed within the existing drainage infrastructure. Following a assessment of the existing site drainage networks, it is assumed that surface water runoff discharges into the lake (retention pond) to the east of the site at an unrestricted rate. The existing lake is proposed to provide the runoff volume attenuation feature for the proposed site development.

Results of an infiltration test conducted in May 2019 have confirmed that infiltration would be a viable method of surface water management. It is therefore required under Building Regulation (H3) that drainage via infiltration be seen as the primary objective for surface water management.

Th site has been divided into two sub-catchments (Catchment 1 and 2). The impermeable areas within Catchment 1 is not changing. Therefore, although the south side of the site (Catchment 2) will have a net 3,071m² additional carpark hardstanding area, however, this will be easily offset by the net sum of the roof impermeable area of 2,235 m² (because of the net reduction in the runoff coefficient C from roof to hardstanding areas) at post-demolition stage. Please refer to Appendix G for the results of the site specific Infiltration test.

The Arun and Western Streams Management Catchment makes use of the Peak Rainfall Allowances to derive the applicable allowances for climate change (CCA) for the 1 in 100-year (1% AEP) and 1 in 30-year (3.33% AEP) storm events based on the Environment Agency data (Gov. UK website) and reproduced as Figure 6.1 below. Due to the lifetime of the proposed project, the CCA of 45% for the Upper End allowance and 2070s epoch was used for the 1% AEP. Likewise, the CCA of 40% for the Upper End allowance and 2070s epoch was used for the 3.33% AEP, respectively:

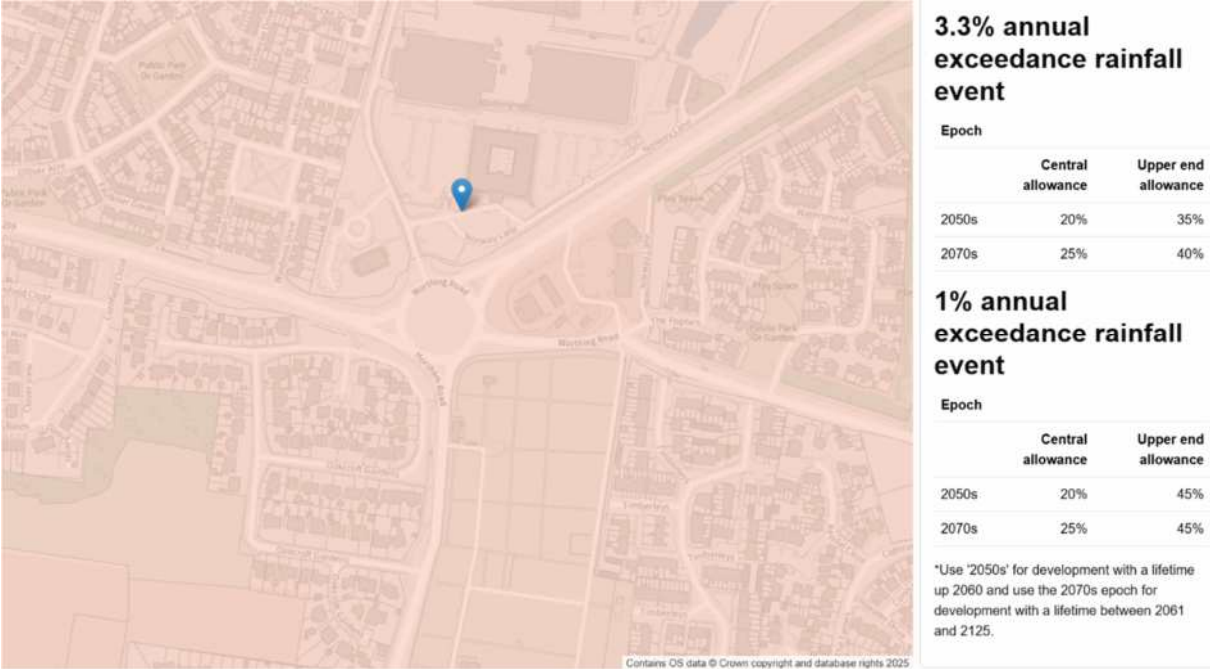


Figure 6.1 - Climate Change Allowances

Please refer Appendix I of this report for the proposed drainage strategy plan.

7 PROPOSED DRAINAGE STRATEGY

7.1 Surface Water Discharge Strategy

Traditional approaches to urban drainage have comprised of underground tanks and pipe networks. More recently, the benefits and opportunities to use Sustainable Drainage Systems (SuDS) have been realised and encouragement to use such systems is promoted throughout Flood Risk Management policy at all levels. SuDS is a term which encompasses a variety of approaches to managing surface water in a way which is more sympathetic to the natural and human environment than conventional piped drainage systems. Management of surface water is an essential element for reducing flood risk and SuDS techniques are often designed to achieve this in a way that mimics the natural environment.

The Building Regulations (H3) states the priority for discharging surface water runoff from a development is as follows:

1. Infiltration into the ground;
2. Discharge into a watercourse;
3. Discharge into the public sewer.

In conjunction with the aforementioned discharge methods hierarchy and reference to the C753 SUDS Manual, the preferred solution for the proposed site would be to integrate the new surface water runoff drainage at the reconfigured carpark areas into the existing positive drainage on site and connect to its outfall downstream via the existing lake (Priority Method 2 above). It was also explored to replicate the existing natural drainage regime for the landscaped areas through surface water runoff infiltration into the ground (Priority Method 1 above). The proposed raingardens and tree pits are proposed to directly drain via ground infiltration. Following the results of a site-specific infiltration test to BRE Digest 365, conducted in May 2019 by Delta-Simons, it can be confirmed that discharge through ground infiltration of the raingardens and tree pits are perceived to be viable discharge method to surface water runoff management on site. The recorded infiltration rates were 6.0×10^{-5} m/s (S101) and 1.7×10^{-5} m/s (S102) provide evidence that ground infiltration can be adopted as a feasible discharge method. However, due to the vulnerability of the groundwater zone, the use of infiltration methods sitewide is considered a very low viability option for the discharge of surface water runoff from across the whole site. Therefore, the discharge of the positive site drainage system via its existing outfall into the existing lake is generally perceived to be the most technically/ economically viable and pragmatic approach and is proposed to be in combination with the Source Control ground infiltration method (for the tree pits and raingardens, where applicable). The latter method will ensure that first 5mm of runoff will not develop or do not go to the proposed and existing positive site drainage system but will be drained instead through ground infiltration and/or evapotranspiration. This is a well-recognised SUDS source control method under the C753 SUDS Manual. Please refer to *Appendix G* for the results of the infiltration test. *Appendix I* also shows the proposed Site Drainage Layout Plan.

7.2 Proposed Development Surface Water Drainage Strategy

The proposed site has been subdivided into two sub-catchment areas, i.e. Catchment 1 (north of site) and Catchment 2 (south of site). The division or demarcation boundaries for Catchments 1 and 2, including the calculations for the pre-development and post-development runoff rate and volume, are shown on Appendix H (Drainage Calculations). Catchment 1 consist of the existing Buildings 5 and 6 footprints and associated external areas (service yard and access circulation road). It is anticipated that the impermeable areas around Catchment 1 during the pre-development and post-development stages will not change, therefore, the runoff rate and volume around Catchment 1 during the post-development stage is also anticipated not to change.

It can be seen from the enclosed drawings in Appendix E that the existing impermeable areas for the site and therefore the existing drained area is approximately 33,687m² (this excludes the landscaped areas of 6,682m²). The proposed net impermeable area is 34,523m², results in a net increase of 836m² of impermeable areas. However, *due to the decrease in the roof areas (from 13,564 m² at pre-development stage to 11,329.5 m² at post-development stage), the net runoff rate and volume at the proposed site is anticipated to have a minimal net increase [due to the net reduction to the runoff coefficient ($C = C_v C_r$) resulting from the change to the impermeable areas at Building 7 footprints from roof to hardstanding areas] by 2 l/s and 7m³, respectively. Therefore, it can be inferred that the total runoff discharge rate and volume at the lake (that currently serves as an attenuation pond) at post-development stage will not have a significant change. This indicates that the proposed hybrid solution (Method 2, and Method 1 where applicable, discharge methods discussed on Section 7.1 above) will be able to deal with the additional runoff volume attenuation/ storage that will ensure to preserve the capacity (not overwhelm) of the existing lake.*

As part of the proposed drainage strategy the majority of the existing site drainage infrastructure will remain un-altered (particularly around Catchment 1). The proposed repairs/ rehabilitation, reinstatement or improvement measures for the existing sitewide drainage network are fully outlined on Appendix C. It is noted that part of the existing site drainage around the footprints of Building 7 (within Catchment 2) that is subject to demolition will need to be abandoned/ grubbed out or capped. It is also important to note that the existing warehouse buildings around Catchment 1 have fully operational, positive drainage systems that discharges into the existing site drainage, and further downstream at its outfall into the aforementioned existing lake (attenuation pond), as described earlier under Section 2.1 of this report. Any proposed alterations to the existing surface water management infrastructure within Catchment 1 will be limited to minor alterations to the existing site drainage connections for the proposed rainwater roof down pipes that will serve the proposed canopy in between buildings 5 and 6.

The net increase in the impermeable area of 836m² (roofs and hardstanding) is offset by the reduction of the roof areas within Catchment 2 as a result of the proposed demolition of Building 7. When compared to the pre-development runoff rate and volume, this will result to a minimal net increase in the post-development runoff rate and volume of 2 l/s and 7m³, respectively. The relevant calculations are shown on *Appendix H*.

A hydraulic model was also developed in order to analyse/ assess the capacity of the proposed site drainage network (mainly aimed to assess the impact to the existing site drainage network by the demolition of the existing 4-storey building and subsequent replacement with the proposed new carpark) and the integration of the new external carpark drainage into the existing overall site drainage network. The hydraulic assessment of the combined piped external drainage network has demonstrated that the existing site drainage network has sufficient capacity to accommodate a design storm of 1 in 1-year up to the 1 in 30-year storm events + 40% CCA. However, the existing site drainage network, when subjected to a simulation and loaded with a storm event of 100-year + 45% climate change allowance (CCA) revealed that it does not possess adequate capacity to deal with a storm event of this scale. Therefore, it is hereby *proposed to upgrade/ upsize some sections of the existing site drainage in order to be able to cope with the storm event of 100-year + 45% CCA* and thus attempt to eliminate any risk of site flooding from the 100-year + 45% CCA extreme storm event. The hydraulic calculations is appended on *Appendix H*.

7.3 Surface Water Infiltration Rate and SUDS design (Raingardens/ Tree Pits)

The proposed impermeable area compared to the existing condition at pre-development will have a net increase of approximately 836m². However, it is to be noted that this is broken down to a net decrease in the roof areas (due to the demolition of Building 7) of 2,235 m², although there is a net increase on the external hardstanding areas of 3,070.5m². As noted in the report, the infiltration tests were attempted at 3no. locations across the site in the winter period; two of the recorded infiltration rates were 6.0x10⁻⁵ m/s (S101) and 1.7 x10⁻⁵ m/s (S102) and the third could not be accurately recorded as the water drained

too quickly to be measured. For the purposes of devising adequate storage capacity for the proposed third cellular soakaway unit S103, the infiltration rate of 6.0×10^{-5} m/s was used in our calculations. The storage estimate calculations account for all storms up to a 1 in 100 year rainfall event plus a 45% allowance to accommodate climate change and an additional safety factor of 4.0 (as required by the LLFA Engineer).

In accordance with calculation results and measured dimensions of individual building units and external areas, the required net storage volume for the additional impermeable areas (approx. 836 m²) to the southern part (Catchment 2) of the site is a very minimal increase of 7m³. The pre-development impermeable areas within Catchment 1 will remain the same at post-development stage. These catchment areas had been assessed using the Wallingford Procedure (Modified Rational Method) whilst the hydraulic model was developed using the MicroDrainage software in order to analyse the combined site drainage network (consists of the existing site drainage and the reconfigured carpark drainage within Catchment 2). The results of the calculations are attached as part of *Appendix H*.

Winter ground water table monitoring has been carried out during the winter period and the infiltration system has been revised based on the winter BRE 365 infiltration test results. Refer to Appendices D and G for the associated ground Infiltration Testing Report prepared by Delta-Simons.

Additional surface water runoff around Catchment 1 will be collected from the proposed canopy, between Buildings 5 and 6, into rainwater downpipes and discharged into the existing surface water network. Runoff from the additional impervious areas around Catchment 2 (south of the site) will be collected by drainage gullies with locations spread across the proposed carpark area at suitable intervals (spacing). These are proposed to connect or outfall into existing manholes on the existing positive site drainage network on site. The proposed site drainage layout plan is included as Appendix I.

7.4 SuDS Features

The proposed tree pits/ raingardens are SUDS Source Control solutions providing infiltration and pollution treatment of surface water flows. They also prevent the development of the first 5mm runoff depth to go into the existing positive drainage network on site. This in conjunction with the existing lake that acts a SUDS attenuation feature are considered appropriate for the scale and nature of the development. The existing lake also provides a natural way treating any surface water pollution or contamination issues.

Refer to Appendix I for proposed the proposed site drainage layout plan.

7.5 Maintenance Requirements

It is anticipated that a private management company will be employed to maintain the completed drainage network for the development incorporating the following activities and frequency for each SUDS component.

7.5.1 Gullies//Channels and Pipes/Manholes

All components are to be periodically cleaned of foreign particles and silt accumulation, on a quarterly basis. Components located in unadopted areas will be maintained by the landowner. Those located in adopted areas will be maintained by the adopting authority.

7.5.2 Proprietary Systems (if applicable)

Proprietary systems will require routine maintenance by the owner to ensure continuing operation to design performance standards. A typical maintenance schedule is detailed below in table 14.2 from the CIRIA SuDS manual.

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

7.6 Foul Drainage Strategy

The foul flows (wastewater) generated from the proposed site will be discharged into the public foul water sewers via an existing Southern Water adopted foul pumping station that is located to the southeast side of the site. Due to the demolition/ removal of the 4-storey Bodyshop Building (Building 7) it is anticipated that there will be a general net reduction in the foul discharges into the existing foul pumping station. The existing sewer connections from Buildings 5 and 6 into the existing adopted foul pumping station will be utilised. This means that a S106 sewer connection is not anticipated for this development proposal.

The pre-development and post-development foul discharges are estimated to be 4.938 l/s and 3.485 l/s, respectively. However, with the demolition of Unit 7 (estimated foul flows is 3.75 l/s), the resultant net foul flows is reduced by 1.453 l/s.

The foul discharges calculations are appended on *Appendix H*.

8 CONCLUSIONS

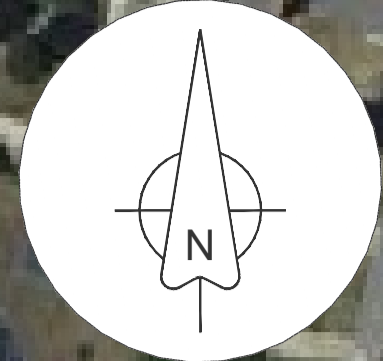
- The proposed development is centred at National Grid Reference (NGR) 503839, 103654 off Norway Lane, Watersmead Business Park, Littlehampton in Toddington, BN17 6LS. The existing site consists of three large warehouse buildings, associated service yards, carpark areas, landscaped areas, circulation routes and HGV parking areas. One building (4-storey Bodyshop) is proposed to be demolished.
- The development site is relatively flat with ground levels falling in a southerly direction from approximately 5.20m to 4.28m Above Ordnance Datum (AOD).
- With reference to the indicative flood map published by the Environment Agency (Gov.UK), the development site is located within Flood Zone 1- 'Low probability'. This has been confirmed by the site-specific flood risk assessment (FRA). The proposed site is classified as 'Less Vulnerable' (Flood Risk Vulnerability Classification) and therefore, is classified as 'appropriate' development.
- Due to vulnerability groundwater zone, the use of ground infiltration methods on site is considered a very low viability option for the discharge of surface water runoff. It is assumed that the existing surface water drainage infrastructure and outfall (lake) has adequate capacity to accommodate the minor increase in runoff rate and volume associated with the proposed development. The additional or net increase of 836m² in the impermeable areas and consequent net increase on the runoff rate and volume of 2 l/s and 5m³, respectively, can be accommodated by the existing attenuation/ storage capacity of the lake.
- The hydraulic assessment of the combined piped external site drainage network developed for this site development has demonstrated that the existing site drainage network has sufficient capacity to accommodate a design storm of 1 in 1-year up to the 1 in 30-year storm events + 40% CCA. However, the existing network when subjected to a simulation and loaded with a storm event of 100-year + 45% climate change allowance (CCA) revealed that it does not possess adequate capacity to deal with a storm event of this scale. Therefore, it has been proposed to upgrade/ upsize some sections of the existing site drainage in order to be able to cope with the storm event of 100-year + 45% CCA and therefore attempt to eliminate any risk of site flooding from the 100-year + 45% CCA extreme storm event. Refer to Appendix H for the relevant hydraulic model/ calculations.
- The site has two existing fully operational, primary, positive surface water networks, with separate discharge locations at the existing lake. The entire site drainage discharge into its outfall into the existing lake (retention pond) situated ca. 20m-50m to the northeast of the site. The proposed net increase in impermeable areas is 836m². Based on calculations for all storms up to a 1 in 100-year storm event with a 45% climate change allowance, a total of ca. 30m³ or 30,000 litre (minimum) of site attenuation/ storage tank (or the alternative use of rainwater harvesting system/ greywater recycling) can be provided as a mitigating solution.
- The foul flows (wastewater) generated from the proposed site development will be discharged into the public foul water sewers via an existing Southern Water adopted foul pumping station that is located to the southeast side of the site. Due to the demolition/ removal of the 4-storey Bodyshop Building (Building 7) it is anticipated that there will be a general net reduction in the foul discharges into the existing foul pumping station. The estimated foul flows for Units A1 to A9 is 3.485 l/s whilst the net reduction is estimated to be ca. -1.453 l/s (Refer to Appendix H for the relevant calculations in accordance with the standard BS EN 12056). The existing sewer connections from Buildings 5 and 6 into the existing adopted foul pumping station will be utilised. This means that a S106 sewer connection is not anticipated for this development proposal.
- The Environment Agency advises that the minimum floor level for buildings at risk of flooding should be set at least 300mm above the design flood level, defined as the 1-in-100-year extreme water level, including the appropriate climate change allowance.

The above EA policy is not applicable to this proposal as the buildings are existing (and to be retained except for Building 7 which had been demolished) on this brownfield site, thus, the FFL

were pre-established. The existing Building FFL can be found on Drawing Ref. C240660684-PIN-XX-XX-DR-C-02100 which is appended on Appendix K. The assumed building FFL for the proposed Units A1 and A2 is 5.19m AoD, Unit A3 at 4.90m AoD, Unit A4 at 4.75m AoD, and Units A5 to A9 will have a FFL of 4.55m AoD. The building FFL generally does not affect the existing site drainage of the site. The existing external ground FFL on the north side of the site will be kept the same, however, the proposed design ground levels on the new carpark area on the south side of the site is shown on Appendix K.

- The proposed development is deemed suitable for development from a flood risk perspective and in accordance with the NPPF and associated PPG guidance, and issues relating to flood risk and drainage do not represent an impediment to the development of the site, and therefore should not be constrained from granting of the planning permission.

Appendix A – Site Location Plan

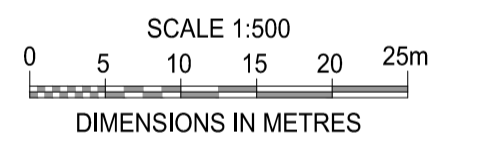


GENERAL NOTES

- DO NOT SCALE THIS DRAWING. WORK ONLY TO FIGURED DIMENSIONS.
- FOR ALL RELEVANT NOTES, REFER TO STRUCTURAL AND CIVIL ENGINEERING PERFORMANCE SPECIFICATION.
- ANY DISCREPANCIES ARE TO BE REPORTED TO PINNACLE CONSULTING ENGINEERS IMMEDIATELY.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SUB-CONTRACTORS DRAWINGS AND DETAILS.
- THIS DRAWING IS TO BE PRINTED IN COLOUR.
- THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS EXPRESSLY STATED
- THIS DRAWING USES THE GREAT BRITAIN COORDINATE SYSTEM "OSGB1936.NationalGrid".
- THIS DRAWING HAS BEEN PREPARED USING THE PROPOSED SITE BOUNDARY FROM RGP ARCHITECTS, DRAWING NO. 11631-PL108_REV E, DATED 16.04.2025.

LEGEND

— SITE BOUNDARY



P02 UPDATED FOR NEW SITE PLAN DAL AC 25.04.25
 P01 ISSUED FOR INFORMATION DAL AC 07.04.25

REV	DESCRIPTION	BY	CHK / APP	DATE

CLIENT
HALLWAY PROPERTIES LIMITED

PROJECT
**LAND AT NORWAY LANE
 LITTLEHAMPTON**

DRAWING TITLE
SITE LOCATION PLAN

PINNACLE
 CONSULTING ENGINEERS

PINNACLE HOUSE,
 MAPLE WAY,
 BROADLAND GATE,
 NORWICH,
 NR13 5HB. TELEPHONE: 01603 327 170
 WELWYN GARDEN CITY ■ LONDON ■ DUBLIN ■ THE HAGUE ■ FRANKFURT

DRAWING STATUS					
INFORMATION					
SCALE @ A1	DATE	DRAWN BY	CHECKED	APPROVED	
1:500	APR'25	DAL	AC	AC	
DRC NO. C240600684-PIN-XX-XX-DR-C-02000					REV. P02

Appendix B – Topographical Surveys/ GPR Utilities Survey

