

Bellway Homes Ltd (Southern Counties)

Durrington Gasworks (Elizabeth Square Phase 2)

**Martlets Way, Goring-by-Sea, Worthing, West Sussex,
BN12 4UB**

Flood Risk Assessment and Drainage Strategy

**REPORT REF.
2505550_C-ACE-XX-XX-RP-C-0301_B**

April 2026

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REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
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Distribution

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1. Introduction

- 1.1. Ardent Consulting Engineers, hereafter referred to as 'Ardent', has been appointed by Bellway Homes Ltd (Southern Counties) to provide a Flood Risk Assessment (FRA) and Drainage Strategy in support of a full planning application for mixed-use development comprising 123 dwellings and commercial units with associated landscaping, open space and drainage.
- 1.2. This FRA and Drainage Strategy has been prepared with specific reference to the requirements of the National Planning Policy Framework (NPPF – December 2024, amended February 2025) and the Planning Practice Guidance (PPG) (March 2024 – Flood Risk sections updated in August 2022). This report demonstrated that the site can be suitably developed whilst complying with the requirements of the NPPF in terms of flood risk.

2. Site Characteristics

Existing Site

- 2.1. The site is situated within Durrington, Worthing in proximity to Durrington-on-Sea railway station and Goring Business Park. The site's postcode is BN12 4UB and has grid coordinates of 511524mE 103090mN for the approximate centre of the site.
- 2.2. The site is bound by a railway line to the north; a consented residential development owned by the same client (referred to as Phase 1) to the east; residential properties and Barrington Road to the south; and commercial land / the Goring Business Park to the west.
- 2.3. The site is currently brownfield, with the previous use varies across the site; a section was owned by Scotia Gas Network (SGN) where a gasholder tank was housed (blue outline in **Figure 2-1**); a section of the site is currently used as adjacent construction land for the consented residential development to the east (orange outline in **Figure 2-1**); and land east of Martlets Way is mostly covered in vegetation and currently houses various storage containers (black outline in **Figure 2-1**).
- 2.4. The site and the surrounding area are shown in **Figure 2-1** below:



Figure 2-1 : Site Location and Surrounding Area (Source : Google Maps)

- 2.5. The full planning application is to be submitted to Adur and Worthing Councils (AWC), who are operating jointly as the Local Planning Authority (LPA), albeit the site sits

within Worthing Borough Council (WBC). West Sussex County Council (WSCC) is the Lead Local Planning Authority (LLFA).

- 2.6. The topographical survey for the site, undertaken by MK Surveys in December 2021 (ref: 30510), is included in **Appendix A**. The site generally slopes from the south to the north, towards the rail tracks, with levels higher in the west compared to the east. However, the various engineered areas within the site boundary have altered the natural topography. The highest point on-site is found along the centre of the site at 12.00mAOD. The land falls away in various directions, with levels between 10.50mAOD to 11.47mAOD found along the southern boundary and levels between 10.00mAOD and 10.78mAOD found along the northern boundary. To the east/southeast of the site, there are various mounds of rubble ranging from 1.3m to 3.5m high. There is a large area of the site that has been excavated, located to the west of the site, with levels at the bottom of the excavation at approximately 8.00mAOD and ground levels at the top at approximately 10.60mAOD.

Development Proposals

- 2.7. The development proposals consist of mixed-use development comprising 123 dwellings and commercial units with associated landscaping, open space and drainage. **Figure 2-2** shows an extract of the site layout plan, with the full plan included within **Appendix B**.



Figure 2-2 : Site Layout Plan (Source : MDD Architecture)

- 2.8. The total planning application area for the site is approximately 4.18ha.

Hydrology

2.9. There are no main rivers or watercourses located within the site. The closest main river is the Ferring Rife, which is located approximately 1.35km northwest of the site.

2.10. According to the DEFRA MAGIC Maps online tool, the site is not located within a Groundwater Source Protection Zone (SPZ).

Geology

2.11. According to the British Geological Society (BGS) Geology Viewer online tool, the entire site is situated on a bedrock geology of Lewes Nodular Chalk Formation consisting of chalk. This is overlain by superficial deposits of River Terrace Deposits which consists of sand, silt and clay.

2.12. There have been various planning applications for different areas within the current redline boundary, see **Figure 2-3** below. As part of those applications, intrusive site investigations were carried out by Enzygo Ltd.



Figure 2-3 : Intrusive Site Investigations Map

2.13. For the Northeastern parcel, a Geo-Environmental report was produced by Enzygo Ltd (ref: CRM.1154.026.GE.R.001.A), dated December 2021. The report found the ground conditions consisted of Made Ground over soft becoming firm and stiff with depth silty clay varying to loose clayey sand. Made Ground was encountered at depths between 0.2m and 0.7m mostly but found at depths between 2.2m and 2.4m bgl within the area of the former gasholder. Chalk was encountered at depths between 6.0m and 7.2m bgl. The trial pit records are provided in **Appendix C**.

2.14. For the Western parcel, a Geo-Environmental report was produced by Enzygo Ltd (ref: CRM.1154.039.GE.R.001.A) dated June 2025. The report found the ground conditions consisted of Made Ground over firm and stiff with depth silty clay varying to medium dense clayey sand. Made Ground was encountered at depths between 0.3m and 1.5m mostly but found at depths between 2.8m and 3.2m bgl within the central area of the site associated to the sewage treatment works. Chalk was encountered at depths between 4.2m and 7.2m bgl. The trial pit records are provided in **Appendix C**.

Existing Sewer Infrastructure

2.15. Southern Water sewer asset records have been obtained for the area surrounding the site and are included within **Appendix D**.

2.16. An extract of the sewer records is shown below in **Figure 2-4**, which shows that there are existing surface water and foul water sewers surrounding the site. The closest surface water asset is a 300mm sewer located within Martlets Way, west of the site. The closest foul water asset is a 600mm foul water sewer located within the site boundary, towards the western boundary. The exact location and depth of the sewers is to be confirmed by utility/CCTV survey.

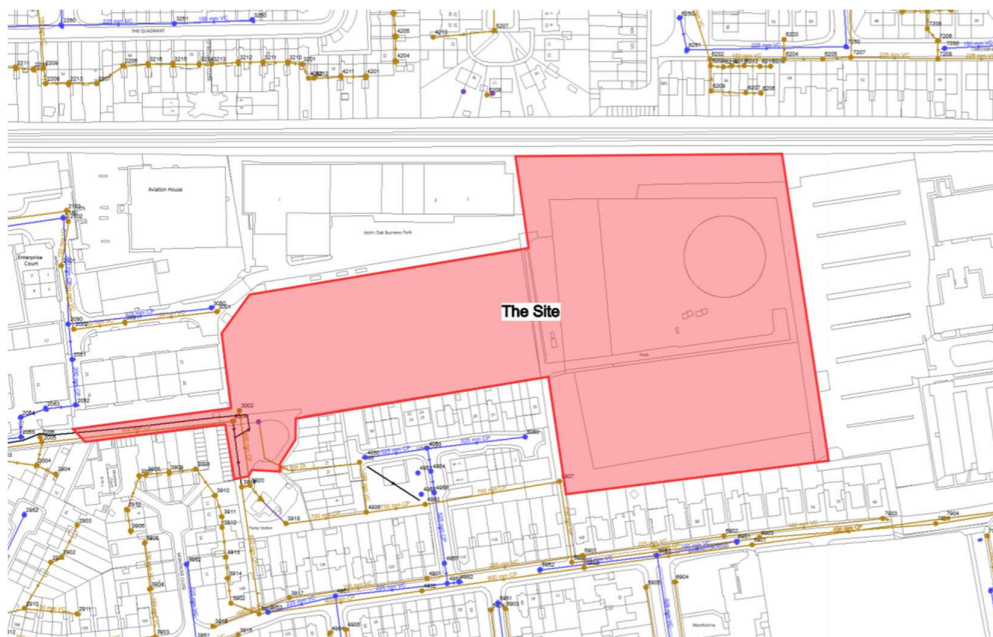


Figure 2-4 : Extract of Southern Water Sewer Assets (Source : Southern Water)

2.17. The topographical survey does not indicate any existing private drainage systems within the site boundary. Utility/CCTV surveys will be required to confirm if any private drainage systems existing within the site.

2.18. Within the adjacent development to the east, lies an existing private drainage network which is owned by the same applicant as this proposed development.

3. Policy Context

National Planning Policy Framework (December 2024)

- 3.1. The NPPF was introduced on 27 March 2012 and revised most recently in December 2024 (and further amended in February 2025); where paragraphs 161 to 182 inclusive establish the planning policy relating to flood risk management and climate change.
- 3.2. It states all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk, and the current and future impacts of climate change to avoid, where possible, flood risk to people and property. Proposals should do this and manage residual risk by:
- applying the sequential test, and if necessary, the exception test;
 - safeguarding land from development that is required for current and future flood management;
 - using opportunities provided by new development and improvements in green, and other, infrastructure to reduce the causes and impacts of flooding (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and
 - where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocated development including housing, to more sustainable locations
- 3.3. The NPPF states at footnote 63 that “*A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in the future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use*”.
- 3.4. The Planning Practice Guidance (PPG) was last updated in February 2024 and provides the methodology required to undertake the sequential and exception tests. The sequential test should be used in areas that are known to be at risk now or in

the future to any form of flooding. As detailed in this report, due to all sources of flood risk being deemed as low or very low risk in the areas of development, it is not anticipated that the sequential test is required.

Flood and Water Management Act (2010)

- 3.5. The Flood and Water Management Act places a duty on all flood risk management authorities to co-operate with each other. The Act also provides LLFAs and the Environment Agency (EA) with a power to request information required in connection with their flood risk management functions.
- 3.6. The LLFAs are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas, and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses. As part of this, LLFAs are responsible for maintaining a register of assets that are a significant impact on flooding within their area.

Sustainable Drainage Systems – National Standards for Sustainable Drainage Systems (SuDS) (June 2025)

- 3.7. An update to the National Standards for Sustainable Drainage Systems (SuDS) were published in June 2025 which supersedes the Non-Statutory Technical Standards for SuDS published in March 2015. This document sets out 7 standards that are complementary, and the delivery of each standard should support the delivery of the other standards.
- 3.8. There may be specific circumstances or constraints, such as type or size of a development, that mean it is not possible to deliver one or more of the standards. In these circumstances, the opportunity to meet the standard shall be maximised and justification be developed in consultation with the approving body, who may agree to a departure.
- 3.9. The standards should be used in conjunction with the PPG.
- 3.10. In addition, SuDS should be designed in accordance with CIRIA C753 SuDS Manual, which represents current best practice.

Planning Practice Guidance (PPG) on Climate Change

3.11. The PPG states that to allow for the predicted impacts of climate change on peak rainfall allowance, consideration should be given to the catchment within which the site is located, which is the Medway Management Catchment.

3.12. The PPG states that to allow for the predicted impact of climate change on surface water runoff within the catchment, the following percentage increases should be applied to the site rainfall intensities, detailed in **Table 3-1** below. For developments up to or beyond 2100, the upper end allowances should be used. However, within the EA's guidance an exception is included that states "*In some locations the allowance for the 2050s epoch is higher than that for the 2070s epoch. If so, and development has a lifetime beyond 2061, use the higher of the two allowances*".

Arun and Western Streams Management Catchment	Central Allowance	Upper End Allowance
3.3% Annual Exceedance Rainfall Event		
Total Potential Change 2050s	20%	35%
Total Potential Change 2070s	25%	<u>40%</u>
1% Annual Exceedance Rainfall Event		
Total Potential Change 2050s	20%	45%
Total Potential Change 2070s	25%	<u>45%</u>

Table 3-1 : Arun and Western Streams Management Catchment Climate Change Allowance Factors

3.13. Therefore, applying an allowance of 40% and 45% for the effects of climate change to the 3.3% and 1% annual exceedance rainfall events would achieve the policy requirements when designing the proposed surface water drainage system.

West Sussex Local Flood Risk Management Strategy

3.14. A Local Flood Risk Management Strategy (LFRMS) was prepared by WSCC in July 2025. The strategy sets out the direction of travel for managing flood risk long term, with objectives, measures and actions for the first five years. The objectives are:

- Use a catchment-based approach to understand and manage flood risk;
- Create a common, informed framework for sustainable development that improves safety and resilience for people, property, infrastructure and the environment through long-term thinking;
- Adopt collaborative approaches to understanding and managing flood risk assets and systems, prioritising the implementation of nature-based solutions
- Empower our communities to increase their resilience and ability to adapt to flood risk now, and in the future

3.15. The LFRMS sets out the understanding of flood risk in the county, what the county is trying to achieve, and how this will be monitored and reviewed. The document also highlights the impact of climate change on flooding and how they have taken consideration of climate change in order to assess the flood risk in the future. Several cases studies have been included to provide an understanding of the issues the county is experiencing and way to address the issues.

Adur and Worthing Level 1 Strategic Flood Risk Assessment

3.16. The Level 1 Strategic Flood Risk Assessment (SFRA) was prepared by JBA Consulting on behalf of Adur and Worthing Councils in July 2024 (ref: KNO-JBAU-XX-XX-RP-Z-0004-S3-P03-Adur_and Worthing_Level1_SFRA). The purpose of the SFRA is to inform selection of options for Local Plan allocations and to support determination of planning applications.

3.17. The key objectives of the SFRA are:

- To provide up to date information and guidance on flood risk in Adur and Worthing, taking into account the latest flood risk information (including the probable impacts of climate change), the current state of national planning policy and legislation and relevant studies;
- To provide the basis for applying the flood risk Sequential Test, and if necessary, the Exception Test. Revised National Planning Policy Framework (updated in 2025) includes a requirement to assess all sources of flooding;

- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as part of the evidence base for the Local Plan Review and to support the preparation of Neighbourhood Plans;
- To inform decisions on the location of future development and the preparation of sustainable policies for the long-term management of flood risk;
- To identify and provide recommendations on opportunities to reduce the causes and impacts of flooding to existing communities and developments.

Worthing Borough Council Local Plan

3.18. The Local Plan sets out the spatial vision strategic objectives and the overarching development strategy for the borough and establishes the planning policy framework necessary to deliver them. The Worthing Local Plan covers the period between 2020-2036.

3.19. The main function of the Local Plan, alongside other key plans, is to provide the legal basis for making decisions on planning applications for development and the use of land. Together, these plans are termed 'Development Management Policies'. Relevant policies are outlined below:

DM9 – Delivering Infrastructure

3.20. Ensure that layout is planned to allow future access to existing water and/or wastewater infrastructure for maintenance and upsizing purposes

3.21. Proposals by service providers for the delivery of utility infrastructure to meet the needs generated by new development and by existing communities will normally be permitted.

DM20 – Flood Risk and Sustainable Drainage

3.22. The Council will work with relevant bodies to ensure that flood risk in Worthing is managed and reduced. Development should be directed away from areas of highest risk of flooding from any source and opportunities should be taken to reduce flooding through sustainable drainage systems and natural flood management to deliver multi-functional benefits for people and wildlife

3.23. The surface water drainage scheme should use Sustainable Drainage Systems, unless there is clear evidence that this would be inappropriate, and be designed to:

- follow natural drainage flow paths and work with existing site topography;
- incorporate green infrastructure and maximise multi-functional benefits ensuring adequate treatment of surface water prior to discharge to ensure that the quality of local water is not adversely affected;
- be sensitively located and designed to promote an enhanced landscape/townscape and good quality spaces that improve public amenity;
- Surface water connections to the public sewerage network should only be made with prior agreement of the relevant sewerage undertaker and where it can be demonstrated that there are no feasible alternatives (this applies to new developments and redevelopments) and where there is no detriment to existing users.

3.24. Clear management arrangements and funding for their ongoing maintenance over the lifetime of the development should be proposed. Planning conditions or obligations will be used to secure these arrangements.

DM21 – Water Quality and Sustainable Water Use

3.25. Development should protect and enhance groundwater, surface water features and control aquatic pollution. Development will be permitted provided that it does not have an unacceptable impact on the quality and potential yield of local water resources, the water environment and its ecology.

3.26. The Council will support proposals to replace existing traditional drainage systems with suitable Sustainable Drainage Systems to further reduce water pollution and improve water quality.

3.27. Potentially polluting development should be steered away from the most sensitive areas. As a minimum a preliminary risk assessment will be required for any development where there is potential risk of contamination of controlled waters. New development within Groundwater Source Protection Zones will only be permitted provided that it has no adverse impact on the quality of the groundwater source or a risk to its ability to maintain a public water supply.

3.28. Development must be phased to take into account the timing of any water and/or wastewater infrastructure required which must be in place prior to the occupation of development.

3.29. All new residential development must achieve as a minimum the optional requirement set through Building Regulations for water efficiency that requires an estimated water use of no more than 110 litres per person per day.

Worthing Borough Council Surface Water Management Plan (SWMP)

3.30. The purpose of a SWMP is to set out how surface water is managed within a defined area to reduce risks and maximise benefits and sets out a long-term action plan for dealing with types of flooding.

3.31. There is no specific SWMP for Worthing Borough Council to refer to in this location. The closest plan is for Lancing located approximately 7km east of Durrington, prepared by CH2M Hill on behalf of West Sussex County Council in October 2015. The output of the Lancing SWMP is available online.

4. Sources of Flooding

4.1. The NPPF requires flood risk from the following sources to be assessed, each of which are assessed separately below:

- Fluvial sources (river flooding);
- Tidal sources (flooding from the sea);
- Pluvial sources (flooding resulting from overland flows);
- Groundwater sources;
- Sewer flooding;
- Historic flooding; and
- Artificial sources, canals, reservoirs etc

Flood Zone Designation

4.2. Flood zones refer to the probability of river and sea flooding, ignoring the presence of defences. The NPPF PPG defines flood zones as follows:

Flood Zone 1: Low Probability. Land having a less than 0.1% annual probability of river or sea flooding

Flood Zone 2: Medium Probability. Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding

Flood Zone 3a: High Probability. Land having a 1% or greater annual probability of river flooding; or land having a 0.5% or greater annual probability of sea flooding

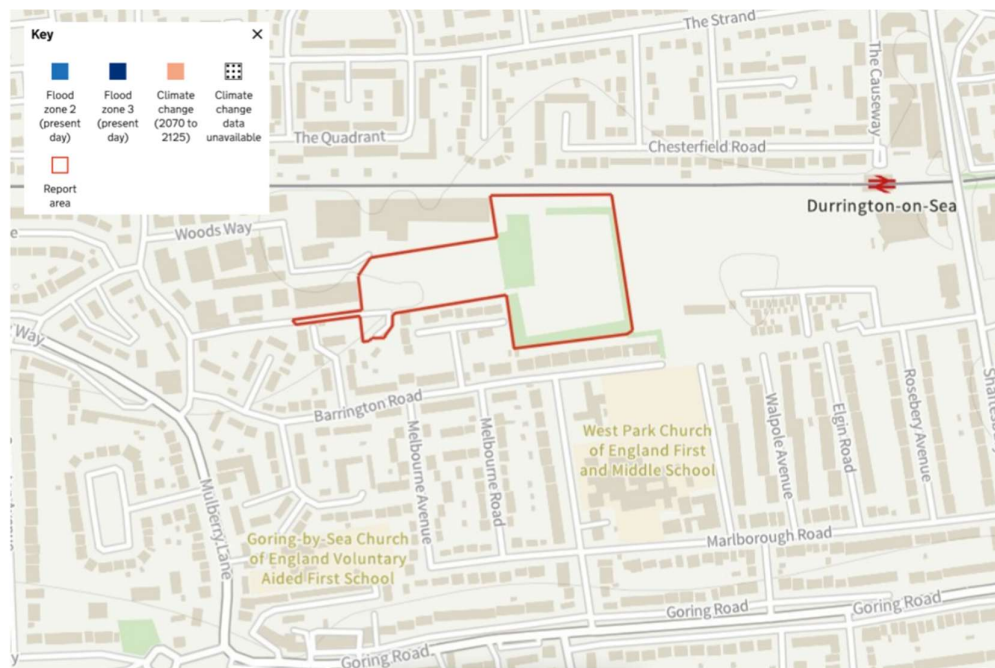
Flood Zone 3b: The Functional Floodplain. This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplains will normally comprise:

- having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or

- land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

Fluvial and Tidal Flooding (River and Sea)

- 4.3. Based on the EA Flood Map for Planning, the entire site is located within Flood Zone 1, which is considered to have less than 0.1% annual probability of river or sea flooding.
- 4.4. In addition to the flood zone mapping, flooding extents for rivers and the sea both with and without defences, are shown in the online EA Flood Map for Planning datasets. The extract in **Figure 4-1** below shows that no area within the site is at risk of flooding from rivers or the sea at present or including an allowance for climate change in the future.



**Figure 4-1 : Flood Zone 2 and 3 Extent with Climate Change (2070 to 2125)
(Source : EA Flood Map for Planning)**

- 4.5. Therefore, the flood risk from rivers and the sea is considered to be low.

4.6. The EA Flood Map for Planning outlines the surface water flood risk for areas in the UK. **Figure 4-2** below shows an extract of the mapping for the pluvial flood risk for the site between 2040 and 2060.



4.8. The Adur and Worthing Councils SFRA states that surface water flooding poses the greatest risk to properties within Worthing and other surrounding areas due to the high level of urbanisation and the prevention of drainage by high tides or groundwater. As a result, surface water flood events are frequent, with recent flooding of roads or properties in Worthing reports in June 2012, July 2014, May 2018 and July 2018.

4.9. Appendix F of the Adur and Worthing Councils SFRA provides mapping to show the risk of flooding from surface water throughout the area covered by the Local Plan, an extract is shown below in **Figure 4-3**:

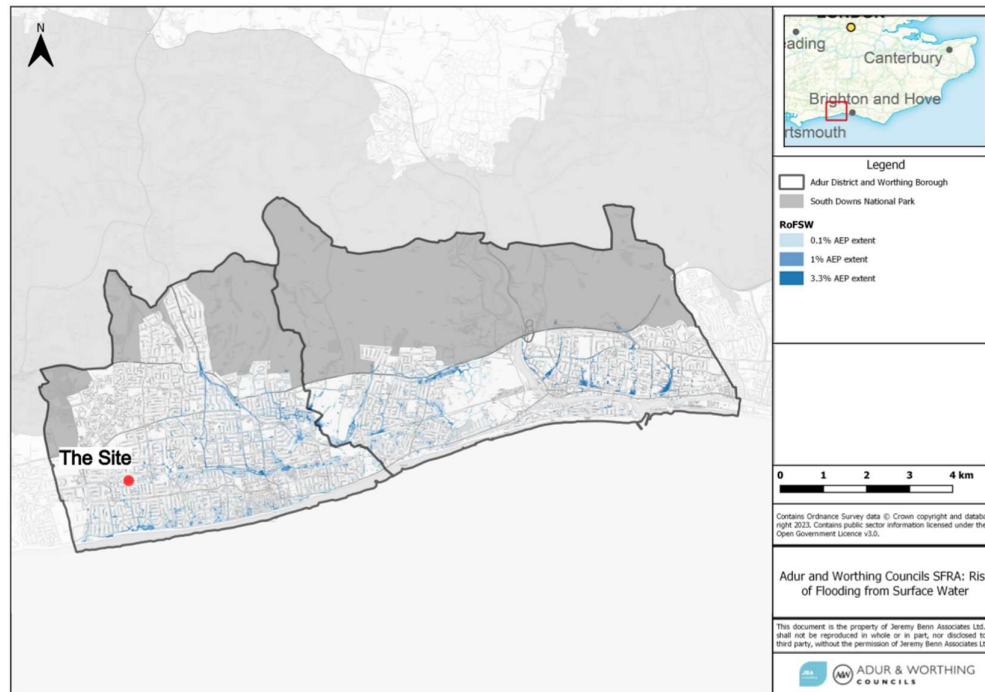


Figure 4-3 : Extract of Risk of Flooding from Surface Water Map (Source: Adur and Worthing Councils Level 1 SFRA)

4.10. **Figure 4-3** shows that the surface water flood risk largely follows roads; that there is a relatively wide surface water flow path through the residential areas in Durrington; and that the site is located in an area of low risk.

4.11. Therefore, the flood risk from surface water is considered to be low.

Groundwater Flooding

4.12. Groundwater flooding occurs as a result of water rising up from an underlying aquifer or water flowing from abnormal springs. It may occur after prolonged periods of heavy rainfall, and the areas at most risk are often low-lying where the water table is likely to be at a shallow depth. Groundwater flooding tends to last longer than fluvial, pluvial, or sewer flooding and may interact with other sources of flooding.

4.13. The DEFRA Magic Map online tool indicated that the site does not lie within a Source Protection Zone (SPZ).

4.14. There is 1 borehole record within the site boundary available on the BGS website, however, as it was recorded in 1917, it is deemed unsuitable.

4.15. Appendix J of the Adur and Worthing Councils SFRA provides mapping to show the assessment of groundwater emergence rather than the actual flood risk from groundwater flooding throughout the area covered by the Local Plan, an extract is shown below in **Figure 4-4**:

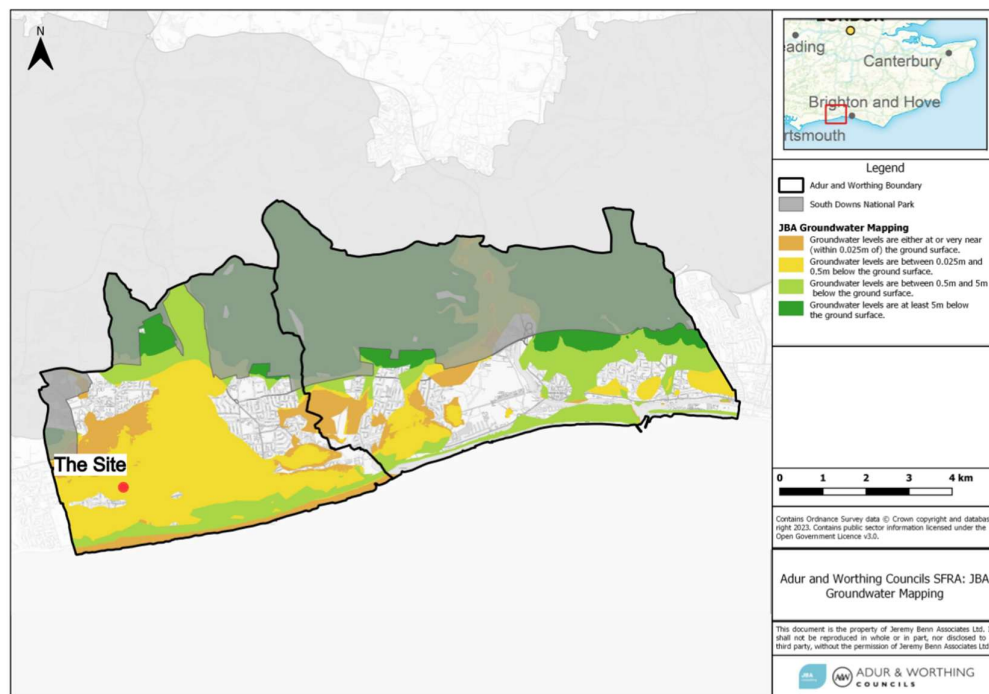


Figure 4-4 : Extract of Groundwater Mapping (Source: Adur and Worthing Councils Level 1 SFRA)

4.16. **Figure 4-4** shows that based on the mapping, the site is located where groundwater levels are between 0.025m and 0.5m below the ground surface.

4.17. As part of the previous planning applications within the current redline boundary, intrusive ground investigations were undertaken by Enzygo Ltd, **Figure 4-5** below shows the exploratory hole locations across the site.

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Figure 4-5 : Site Investigations Exploratory Hole Locations (Source : Enzygo Geo-Environmental Reports)

4.18. Groundwater conditions were assessed as part of the intrusive site investigation works:

- For the northeastern parcel (ref: CRM.1154.026.GE.R.001.A), during drilling of the boreholes BH1-BH3 in December, groundwater was encountered as seepages at depths between 0.3m and 3.5m bgl. On subsequent visits between 1st December to 22nd December, the shallowest standing groundwater level was 6.21m bgl.
- For the western parcel (ref: CRM.1154.039.GE.R.001.A), during the drilling of the boreholes BH2 in June, groundwater was encountered as seepages at depths greater than 6.0m bgl. On subsequent visits between 5th June to 26th June, the shallowest standing groundwater level was 6.79m bgl.

4.19. Therefore, the flood risk from groundwater is considered to be low.

Sewer Flooding

4.20. Sewer flooding is caused by the capacity of existing public sewers within an area being exceeded and overtopping onto the surface.

4.21. Historical incidents of flooding are detailed by Southern Water on a database relating to public foul, combined or surface water sewers and displays by postcode which properties suffered flooding within the Adur District and Worthing Borough area up to May 2023. The database indicated a total of 309 recorded flood events between January 2013 – May 2023 in the Local Plan areas, with all data included within the dataset being limited to events linked to capacity issues. The most frequently flooded postcode within the Worthing Borough is BN13 2 with 45 incidents. For the BN12 4 postcode, 13 incidents were recorded.

4.22. A pre-planning enquiry was submitted to Southern Water to confirm capacity exists within the foul water and surface water networks. Southern Water confirmed on 27th October 2025 that there is adequate capacity in the local network to accommodate the foul water and surface water flows from the proposed development. Correspondence is included within **Appendix E**. On this basis, it is considered that the existing drainage network in vicinity of the site has a low risk of sewer flooding.

4.23. Therefore, the flood risk from sewers is considered to be low.

Historic Flooding

4.24. Information collated from the EA, WSCC and Southern Water were assessed to understand the historic flooding in the Local Plan areas. The data shows that surface water flooding is the most frequent cause of flooding within the Adur District and Worthing Borough. The data shows that Durrington has experienced surface water, fluvial and groundwater flooding historically.

4.25. Key historical incidents of flooding occurring in

- October 1980 – Surface water flooding following intense rainfall led to flooding in Durrington and Worthing
- October 2000 – Surface water flooding of around 20 commercial properties in Worthing Town Centre due to surface water and highway drainage systems being overwhelmed by intense rainfall
- June 2007 – Widespread surface water flooding in Worthing following 4 inches of rain within one hour, impacting properties including Worthing Hospital
- June 2012 – An extreme rainfall event resulted in widespread surface water flooding across West Sussex, with Flood Alerts issued for the River Adur. Worthing was one of the worst affected areas, with two clusters of properties in West Worthing and Central Worthing affected by the flooding
- Winter 2013/14 – Flooding was reported across the Local Plan areas during a particularly wet winter. A small number of properties were impacted in Lancing, as well as the A27 and Shoreham Airport

4.26. Appendix A of the Adur and Worthing Councils SFRA provides mapping to show the recorded historic flood points and flood events, an extract is shown below in **Figure 4-6:**

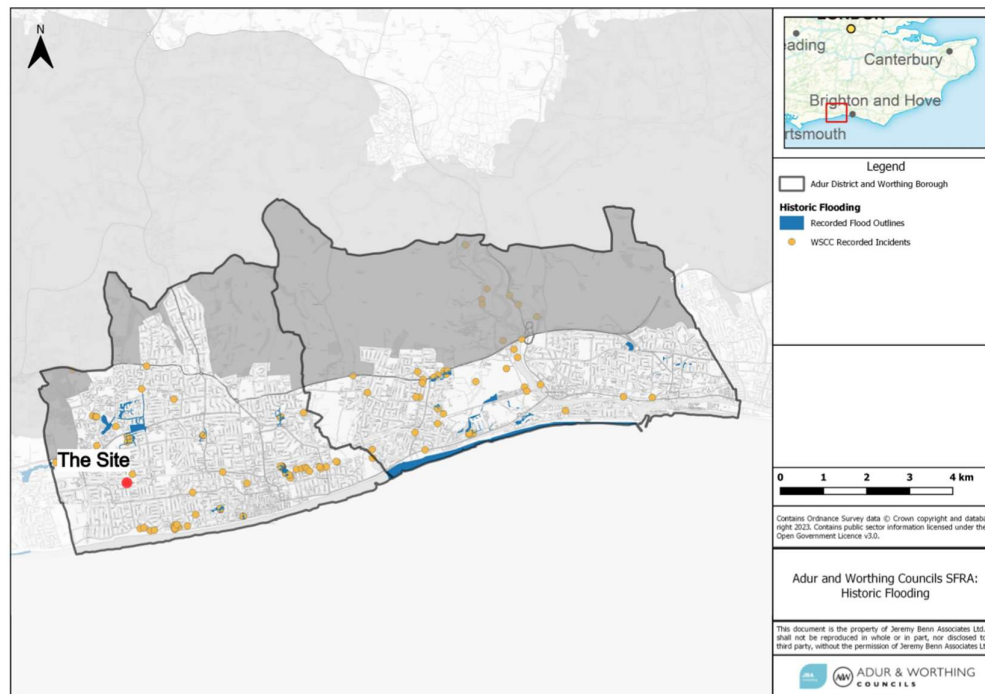


Figure 4-6 : Extract of Historic Flooding Mapping (Source: Adur and Worthing Councils Level 1 SFRA)

4.27. **Figure 4-6** shows that the site lies within an area with minimal history of flooding from the information provided by WSCC and the EA, with 1no. recorded incident within vicinity of the site, north of the railway line.

Artificial Sources

4.28. The EA's Flood Map for Planning shows the site is not located within any flood extents from reservoirs.

4.29. Therefore, the flood risk from artificial sources is considered to be low.

5. Sequential and Exception Test

Sequential Test

- 5.1. The objective of the sequential test is to steer new developments toward the areas with the lowest probability of flooding from any source. Where there are no reasonably available sites in lower flood risk areas, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in higher flood risk areas.
- 5.2. The site is located wholly within Flood Zone 1, indicating a low probability of river or sea flooding. Given that the risk of flooding from all sources is deemed to be very low/low across the site area, a sequential test is not likely to be required; in line with the national policy guidance (last updated September 2025) – subject to agreement of the local planning authority.
- 5.3. The proposed development incorporates suitable flood risk mitigation measures, including finished floor levels, exceedance flow routes and SuDS to further mitigate any flood risk.

Exception Test

- 5.4. The requirement for an exception test is dictated by the proposed development and the associated Flood Risk Vulnerability Classification, which is set out in Annex 3 of the NPPF. Based off the classifications set out in the NPPF, this development comprising residential dwellings and a commercial building, would be classified as 'more vulnerable'.
- 5.5. **Table 5-1** below, taken from the PPG on Flood Risk and Coastal Change, shows the Exception Test requirements for different flood risk vulnerability classification in different flood zones.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Flood Zone 1	✓	✓	✓	✓	✓
	Flood Zone 2	✓	Exception Test Required	✓	✓	✓
	Flood Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
	Flood Zone 3b	Exception Test Required	×	×	×	✓

Table 5-1 : Exception Test Requirements (PPG – Flood Risk and Coastal Change)

5.6. Given that the development is located wholly in Flood Zone 1 and is classed as a 'more vulnerable' development, the Exception Test will not be required.

6. Flood Risk Mitigation Measures

6.1. The site-specific flood risk assessment aims to demonstrate that the development will be safe for its lifetime, taking into account the vulnerability of its users, without increasing flood risk elsewhere. The development should achieve this while, where possible, reducing flood risk overall.

6.2. To achieve the above, the development incorporates the following measures to reduce flood risk and ensure adequate protection in the event of flooding.

Sustainable Drainage Proposals

6.3. The surface water network will be designed to accommodate up to and including the 100-year plus 45% allowance climate change storm events. It is recommended that the spine road levels are designed to create an exceedance flow route through the site towards the basins, as shown in **Figure 6-1**. This will safely manage potential overland flows from off-site and exceedance flows from on-site towards the proposed attenuation basins.



Figure 6-1 : Surface Water Flow Route Through the Development

Proposed Layout and Levels

6.4. The proposed detailed masterplan and levels will be designed to ensure that the flood routing plan simulates the pre-development site as much as possible. With areas of 'low' pluvial flood risk within the site, the site and masterplan levels will be designed

to convey exceedance flows, diverting them towards the proposed landscaping areas from neighbouring properties.

- 6.5. Levels will be designed such that surface water runoff will be directed away from buildings, towards the low points and non-habited areas of the site. Finished Floor Levels (FFLs) will generally be 150mm above surrounding levels for redundancy.

7. Surface Water Drainage Strategy

Sustainable Drainage Systems (SuDS)

7.1. DEFRA's National Standards for Sustainable Drainage Systems (SuDS) published in June 2025, and CIRIA Guidance C753 "The SuDS Manual" have been used to determine the appropriate SuDS Strategy, which considers the spatial and environmental constraints of the site.

7.2. **Table 7-1** below appraises the constraints and opportunities for the use of SuDS techniques within the site and adopts the management train approach outlined in CIRIA C753 'The SUDS Manual'.

Type:	Infiltration Devices (Source Control)
Constraints:	On-site intrusive site investigations found contamination with the upper strata for the site; therefore infiltration is not considered as a feasible means of disposal
Opportunities:	None
Type:	Permeable Paving (Source Control)
Constraints:	The treatment and conveyance benefits of permeable paving is dependent on regular maintenance. Permeable paving can't be proposed on any public roads due to adoption issues, which therefore limits the extent where it can be proposed. Permeable paving also shouldn't be proposed on any roads expecting heavy duty traffic i.e roads within the commercial area.
Opportunities:	Lined permeable paving can be used to provide a stage of treatment in private drives and parking courts around the site, should this be required as part of the treatment. It can also be provided within the parking bays provided within the commercial area of the site. To be considered further at the next design stage.
Type:	Rainwater Harvesting (Source Control)
Constraints:	The benefits of rainwater harvesting on a specific design storm event cannot be quantified due to the seasonal availability of storage within the structure and lack of data on regular daily demand for non-potable water from surface water runoff. Communal systems are not widely accepted due to adoption and maintenance issues and are therefore not relied upon to provide attenuation. When the system is full, it no longer has capacity for subsequent storms, which would introduce risk of flooding downstream.
Opportunities:	Water butts can be used for re-use in irrigation and for grey water. However, it is difficult to quantify contributions from these, therefore no considerations to the benefits offered are made within the attenuation calculations
Type:	Swales etc (Permeable Conveyance)
Constraints:	Swales require a minimum of 1 in 3 side slopes which have a significant land take. In places, there is no space for additional perimeter swales due to root protection areas
Opportunities:	Opportunity to propose roadside conveyance swales with 1 in 1 side slopes to convey and treat surface water runoff before discharging into final storage
Type:	Tree Pits / Rain Gardens (Filtration)

Constraints:	Tree pits and rain gardens have more rigorous up-keep and maintenance and are often poorly maintained. This leads to clogging over time. They are also subject to co-ordination and can be difficult to get adopted within the sewer network, because of this, they are subject to the Landscape Architect's design
Opportunities:	Opportunities to incorporate tree pits in verge and soft landscaped areas
Type:	Green Roofs (Source Control)
Constraints:	Limited feasibility for green roofs for houses and warehousing due to structural constraints and pitched roofs
Opportunities:	None
Type:	Attenuation Basin / Ponds (End of Pipe Treatment)
Constraints:	In order to provide suitable access for maintenance, 1:3 side slopes are needed for ponds/basins which tend to require significant land requirement. Existing constraints such as treelines/hedgelines that are likely to be retained for the development. Any ponds/basins and associated re-profiling of levels will need to be located outside of root protection areas
Opportunities:	There is space within the development to allow for basins to be used to provide storage and treatment.
Type:	Attenuation Tanks (End of Pipe Treatment)
Constraints:	None
Opportunities:	Can be used in parking areas or open spaces to supplement the SuDS with additional storage where feasible

Table 7-1 : C753 SuDS Management Train Approach

7.3. After consideration of the CIRIA C753 SuDS Management Train Approach, the most viable SuDS options for the site would be a combined solution of roadside tree pits, lined permeable paving, attenuation basins and attenuation tanks. This will provide the necessary storage and treatment for up to and including the 100-year plus 45% allowance climate change storm events. Surface water runoff from the site will then discharge into a nearby surface water sewer via a flow control device which will restrict flows.

Updated National Standards for Sustainable Drainage Systems (SuDS)

7.4. The National Standards for SuDS was published on 19th June 2025. The new standards aim to help design, maintain and operate SuDS utilised within new developments/infrastructure. In addition, they also aim to promote consistency and help to ensure the long-term performance and resilience of SuDS, whether on Greenfield or Brownfield sites.

7.5. The national standards have been separated into 2 types of standards:

- The Hierarchy Standard (Standard 1) – gives criteria for prioritising the choice of final runoff destination;
- Fixed Standards (Standards 2-7) – states the minimum design criteria that all surface water drainage systems should satisfy and how they should be built, maintained and operated.

Standard 1: Runoff Destination

- 7.6. This standard determines where the water will go after leaving the site; ensuring it is managed appropriately.
- 7.7. Priority 1 refers to collection for non-potable use. The use of runoff collection devices such as rainwater harvesting systems would be unfeasible for this site due to cost and practicality; having a rainwater harvesting system within communal areas would lead to an unadopted system by the future management company and it is difficult to quantify the storage provisions that a rainwater harvesting system would provide for the storage provisions of the site and the impact of that on other SuDS elements. The most viable option would be including systems such as water butts into residential dwellings to assist with irrigation etc. As the type of industry proposed for the commercial area of the site is unknown, it is not possible to determine the water demand. Therefore, the possibility of implementing a rainwater harvesting system in the commercial unit will need to be determined at the next design stage.
- 7.8. Priority 2 refers to infiltrating to ground, which as discussed earlier in this report, the geo-environmental reports carried out by Enzygo Ltd found that even though the site is underlain by Lewes Nodular Formation consisting of chalk, the Made Ground across the site is likely to be contaminated which is considered unsuitable for infiltrating to ground.
- 7.9. Priority 3 refers to discharging to an above ground surface water body. With no watercourses or ditches located within the site and the closest main river located approximately 1.35km northwest of the site; the site is considered unsuitable for discharging to an above ground surface water body.
- 7.10. Priority 4 refers to discharging to a surface water sewer, or another piped surface water drainage system. According to the Southern Water sewer asset records, existing surface water sewers are located within the site, along Martlets Way. A pre-

planning enquiry was sent to Southern Water to establish capacity within the existing network for the proposed development. Southern Water confirmed that capacity exists within the network for the development. Refer to **Appendix E** for the Southern Water correspondence.

7.11. The development is discharging to a surface water sewer, or another piped surface water drainage system and is considered the highest relevant standard for the site.

7.12. Therefore, the surface water drainage design is considered compliant with Standard 1.

Standard 2: Management of Everyday Rainfall (Interception)

7.13. This standard focuses on capturing and managing rainfall at source, reducing the volume of runoff from the site.

7.14. The overall surface water drainage strategy includes 2no. attenuation basins that provide the necessary storage to achieve the required restricted discharge rate for the site. It is within the attenuation basins that interception will be provided. The basins have been provisionally sized to assume 65% of the developable area is impermeable.

7.15. As the ground beneath is contaminated and remediation measures are needed, the attenuation basins will need to be lined. Lined basins should contain a layer of at least 500mm of suitable base material, which will ensure the basins are suitable for interception for impermeable surface areas up to 5 times the base of the vegetated surface area receiving the runoff.

7.16. The area of the basin that is assumed to contribute to interception of runoff shall be below the outlet level of the basins. Generally, outfall levels from attenuation basins are set 100mm to 150mm above the lowest point.

7.17. **Table 7-2** below sets out the interception requirement for each basin:

Basin	A	B	C	D	Min Level of Outfall Above Base of Basin (mm) (Dx5mm/B)
	Imp Area (ha)	Base Area of Basin (ha)	5 Times Base Area (ha)	Remaining Imp Area to be Intercepted (ha) (A-C)	
East	1.378	0.025	0.125	1.253	251
West	0.827	0.022	0.11	0.717	163

Table 7-2 : Interception Requirements for Site Basins

7.18. The above approach is very conservative and does not allow for SuDS elements used across the development site such as permeable paving, swales, tree pits etc. Conveyance swales/tree pits integrated within the landscaping will be able to capture and treat surface water runoff before it is ultimately discharged into the attenuation basins before outfalling into the existing surface water drainage network.

7.19. Therefore, the surface water drainage design is considered compliant with Standard 2.

Standard 3: Management of Extreme Rainfall and Flooding

7.20. This standard addresses how to handle larger rainfall events, to prevent flooding.

7.21. The surface water drainage rate has been set at a 'relaxation factor' of Greenfield runoff rates as the site is classed as 'previously developed' (Brownfield), which is in line with the National Standards for SuDS. Therefore, a rate of up to 5 times the 50% AEP Greenfield runoff rate (1 in 2-year Greenfield Runoff Rate) has been applied to all return periods which complies with National Standards requirements (in terms of discharge rate and volume respectively) and is in line with what was agreed with West Sussex County Council as Lead Local Flood Authority on 27th November 2025. Refer to **Appendix F** for the LLFA Meeting Minutes.

7.22. The proposed SuDS design has been modelled using Causeway Flow and provides adequate storage, with no significant flooding noted, and all runoff contained on site up to and including the 100-year plus 45% allowance climate change storm events.

Exceedance Routes

7.23. As a result of heavy or extreme storm events, it is sometimes unavoidable for the capacity of sewers and other drainage systems to be exceeded. Drainage exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system; when the receiving water or pipe system becomes overloaded/blocked; or when the outfall is restricted due to flood levels in the receiving water.

7.24. The proposed attenuation features will be located towards the lowest lying areas of the site, to ensure the internal access roads flow away from residential units. The routes will ultimately mimic the current flow routes associated with the existing site as a result of the topography.

7.25. In addition, with development area levels being set some 0.3 to 0.45m above existing ground levels, this ensures offsite exceedance flood route concerns are addressed.

Runoff Volumes

7.26. There will be an increase in impermeable area resulting in an increase in runoff volume for the 1% AEP event. The proposals are to discharge 1% AEP runoff at the 50% AEP Greenfield runoff rates (1 in 2-year) with a 'relaxation factor' of up to 5 times this rate, in accordance with the National Standards for SuDS.

7.27. Therefore, the surface water drainage design is considered compliant with Standard 3.

Standard 4: Water Quality

7.28. This standard ensures that the water discharged from the SuDS system is clean and does not pollute the receiving water bodies.

7.29. The drainage design for the site utilises roadside tree pits, lined permeable paving, attenuation tanks and attenuation basins before discharging into an existing surface water sewer at a restricted rate. All elements provide treatment prior to discharge. In addition, water quality will be significantly improved compared to existing runoff.

7.30. **Table 7-3** below sets out the mitigation indices for each SuDS component:

For Surface Water Discharge from All Roads Except Low Traffic Roads			
	Required Mitigation Indices		
Pollution Hazard Level	TSS	Metals	Hydrocarbons
Medium	0.7	0.6	0.7
Type of SuDS Component Provided			
Swale/Basin	0.5	0.6	0.6
Attenuation Basin	0.25	0.25	0.3
Total	0.75	0.85	0.9
Check	+0.05	+0.25	+0.2

Table 7-3 : SuDS Mitigation Indices

7.31. Therefore, the surface water drainage design is considered compliant with Standard 4.

Standard 5: Amenity

7.32. This standard considers the aesthetic and recreational value of the SuDS features, making them enjoyable and beneficial for the community.

7.33. The proposed SuDS strategy incorporates an above ground attenuation basin within the 2no. areas of open space that is proposed across the development. Both basins have been designed to incorporate them into the proposed landscaping and will be seeded with the same mix as the proposed surrounding landscaping, which will also reflect the local context of the area.

7.34. The landscape strategy for the development consists of open space and a play area which will be connected by pedestrian footways through the site to promote healthy living and community cohesion. Further details can be found within the development's Landscape Strategy, produced by CSA Environmental (ref: CSA/77885/100).

7.35. Therefore, the surface water drainage design is considered compliant with Standard 5.

Standard 6: Biodiversity

7.36. This standard focuses on how SuDS can enhance the natural environment and support local eco-systems.

7.37. The proposed SuDS strategy has been considered as part of the wider landscaping of the proposed development, respecting the Root Protection Areas (RPAs) where possible, and has been developed with biodiversity in mind, in line with CIRIA guidance and LLFA requirements. Refer to the development's Landscape Strategy for further details (ref: CSA/77885/100).

7.38. The main SuDS feature on site will be the attenuation basin, which will utilise a selection of appropriate planting across the scheme.

7.39. Further details, including the biodiversity risk and opportunity assessment and the integration of the design with statutory Biodiversity Net Gain (BNG) requirements, can be found within the site's BNG Assessment.

7.40. Therefore, the surface water drainage design is considered compliant with Standard 6.

Standard 7: Design of Drainage for Construction, Operation, Maintenance, Decommissioning and Structural Integrity

7.41. This standard covers the entire lifecycle of the SuDS, from initial design to eventual decommissioning; ensuring long-term functionality and safety.

7.42. The drainage design has been produced with consideration to longer term construction methods, to ensure that the proposals are deliverable. This includes details on the levels of the associated drainage works, alongside appropriate specification of materials and design to ensure that the proposals remain operational for the lifetime of the development.

7.43. A Management and Maintenance Plan for the proposed drainage network will be included as part of this report, which will set out the mitigation works to ensure the on-going functionality of the design following construction. Refer to **Appendix G**.

Future Maintenance

7.44. It is anticipated that a management company will be appointed to maintain communal areas, landscaping and any shared SuDS throughout the development that are not otherwise adopted by public authorities.

7.45. All maintenance will be in accordance with the best practices, as well as with the CIRIA C753 "The SuDS Manual".

7.46. Therefore, the surface water drainage design is considered compliant with Standard 7.

Surface Water Drainage Network

7.47. Drawing 2505550_C-ACE-XX-XX-DR-C-0601 shows the provision of SuDS across the site, also included within **Appendix H**.

7.48. The overall drainage strategy is to treat and store surface water runoff within roadside tree pits, permeable paving, 2no. attenuation basins and attenuation tanks located across the site before discharging into the existing surface water network at a restricted discharge rate based on a 'relaxation factor' applied to the site's Greenfield runoff rates (up to 5 times the 1 in 2-year Greenfield Rate) in line with National Standards for SuDS.

7.49. To achieve the restricted discharge rate without undue flood risk to the development or surrounding areas, the attenuation basins have been provisionally sized to contain runoff from the impermeable areas on site. The impermeable area for the site is equivalent to 65% of the site's developable area which excludes tree root protection areas and other undevelopable areas within the site boundary but includes a 10% allowance for urban creep.

7.50. Existing Greenfield runoff rates for the site were determined using the FEH Statistical Method based on 1 hectare (per hectare rate) which is presented in **Table 7-4** below. A copy of the Greenfield runoff calculations is provided in **Appendix I**.

Return Period	Greenfield Runoff Rate (l/s/ha)	Greenfield Runoff Rate for Developable Area (l/s)
Q_{bar}	3.6	12.2
Q_1	3.0	10.2
Q_2	3.1	10.5
Q_{30}	8.2	27.8
Q_{100}	11.3	38.3

Table 7-4 : Existing Greenfield Runoff Rates Summary

7.51. Based on the total developable area (3.39ha) and the impermeable area (2.205ha), the overall discharge rate of 52.6 l/s for the site has been used to calculate the storage required for the site, which is 1,568m³.

7.52. The residential development to the East (Phase 1) is owned by the same applicant as this proposed development (Phase 2). As part of the previous drainage design, an allowance of 10l/s was accommodated for within the piped network of Phase 1 for future flows from Phase 2. Drainage calculations were carried out to establish that an area of approximately 210m³ would discharge at 10l/s (100yr+CC) without attenuation. Therefore, to utilise the available capacity, a proposed gully catchment will discharge into the existing drainage network before outfalling downstream into the Phase 1 basin. No changes to the downstream controls are proposed, therefore no additional flows would leave the Phase 1 site.

7.53. If the proposed site layout was adapted to accommodate attenuation near the Phase 1 outfall, a much larger catchment could utilise the 10l/s available, and this may be explored in future iterations of the strategy. The use of the Phase 1 network for a larger catchment is subject to confirming headroom available in the hydraulic model.

7.54. Causeway Flow has been used to size the surface water storage for storm events up to and including the 100-year plus 45% allowance climate change storm events. Refer to **Appendix J** for the modelling results.

7.55. The basins will be located at the low points of the site, with connection to these made through a traditional piped network, roadside tree pits and attenuation tanks.

7.56. The surface water drainage network will be designed to ensure appropriate conveyance and full containment of surface water runoff for storm events up to and including the 100-year plus 45% allowance climate change. Any exceedance flows will be directed away from buildings and towards open spaces and roads to minimise the risk to person and property, on and off site.

7.57. The surface water outfall is to a public Southern Water sewer, passing through an access road which appears to be privately owned 3rd party land. A Section 98 application will need to be made to Southern Water to requisition a new sewer, running parallel to the existing Southern Water foul sewer. An updated capacity check is to be submitted prior to connection.

8. Foul Water Drainage Strategy

- 8.1. The proposed development will consist of 123 dwellings and 1,500m² of commercial space, from which a peak foul demand of 9.55l/s would be allowed for, with 6.15l/s of the demand coming from the residential dwellings.
- 8.2. Southern Water sewer asset maps show that existing foul water sewers are located within the site boundary, to the west of the development within Martlets Way. The existing sewers have a diameter of 600mm and flow from east to west along Martlets Way and then south as they enter the site towards an existing foul water pumping station, located outside the site boundary.
- 8.3. Therefore, the proposed foul water drainage strategy is to discharge proposed flows via gravity into the existing Southern Water network, with a connection proposed into existing foul water manhole 3004, located within the site boundary, to the west of the development.
- 8.4. A Pre-Planning Enquiry has been submitted to Southern Water, who have confirmed that capacity exists within the local network for the proposed flows. Refer to **Appendix E** for the correspondence.
- 8.5. A new drainage connection would require a Section 106 agreement with Southern Water prior to construction.

9. Conclusions

- 9.1. Ardent Consulting Engineers, hereafter referred to as 'Ardent', has been appointed by Bellway Homes Ltd (Southern Counties) to provide a Flood Risk Assessment (FRA) and Drainage Strategy in support of a full planning application for mixed-use development comprising 123 dwellings and commercial units with associated landscaping, open space and drainage.
- 9.2. Based on the EA Flood Map for Planning, the entire site is located within Flood Zone 1, which is considered to have less than 0.1% annual probability of river or sea flooding. No area within the site is at risk of flooding from rivers or the sea at present or including an allowance for climate change in the future.
- 9.3. The site would be subject to predominantly low-medium chance surface water flooding (between 0.1% and 3.3% chance each year) mainly where the previous gasholder tank was located, in the northeast corner for the site. There is some localised high chance surface water flooding (more than 3.3% chance each year) at the centre of the site and adjacent to Martlets Way. These are most likely associated to low points within the current topography and can be resolved by the proposed development and surface water drainage network.
- 9.4. As part of the previous planning applications within the current redline boundary, intrusive ground investigations were undertaken by Enzygo Ltd, **Figure 4-5** shows the exploratory hole locations across the site. Groundwater conditions were assessed as part of the intrusive site investigation works:
- For the northeastern parcel (ref: CRM.1154.026.GE.R.001.A), during drilling of the boreholes BH1-BH3 in December, groundwater was encountered as seepages at depths between 0.3m and 3.5m bgl. On subsequent visits between 1st December to 22nd December, the shallowest standing groundwater level was 6.21m bgl.
 - For the western parcel (ref: CRM.1154.039.GE.R.001.A), during the drilling of the boreholes BH2 in June, groundwater was encountered as seepages at depths greater than 6.0m bgl. On subsequent visits between 5th June to 26th June, the shallowest standing groundwater level was 6.79m bgl.
- 9.5. Flood risk from artificial sources and sewers is considered to be low.

- 9.6. Due to all sources of flood risk deemed to be very low/low, it is anticipated that a sequential test will not be required.
- 9.7. The flood risk mitigation measures will be incorporated within the proposed design to further mitigate the flood risk to the development and offsite.
- 9.8. The most viable SuDS options for the site would be a combined solution of roadside tree pits, attenuation basins and attenuation tanks. This will provide the necessary storage and treatment for up to and including the 100-year plus 45% allowance climate change storm events. Surface water runoff from the site will then discharge into a nearby surface water sewer via a flow control device which will restrict flows. As the site has been previously developed, according to the National Standards for SUDS, a 'relaxation factor' can be applied to the Greenfield Runoff rates, which allows for a discharge rate no greater than up to 5 times the 50% AEP Greenfield Runoff Rate. The use of the relaxation factor was raised with the LLFA who stated it was acceptable for this site, refer to **Appendix F** for the LLFA Meeting Minutes.
- 9.9. The surface water outfall is to a public Southern Water sewer, passing through an access road which appears to be privately owned 3rd party land. A Section 98 application will need to be made to Southern Water to requisition a new sewer, running parallel to the existing Southern Water foul sewer. An updated capacity check is to be submitted prior to connection.
- 9.10. The proposed foul water drainage strategy is to discharge proposed flows via gravity into the existing Southern Water network, with a connection proposed into existing foul water manhole 3004, located within the site boundary, to the west of the development. A new drainage connection would require a Section 106 agreement with Southern Water prior to construction.
- 9.11. This FRA demonstrates that the proposals are consistent with the aims of NPPF, PPG, the latest National Standards for SuDS and Local Plan and the other relevant local guidance. The proposed drainage strategy will not increase flood risk for the development site or the surrounding area.