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ENVIRONMENT

Richborough Estates
Sandwich Road, Sholden
Kent
Sustainable Drainage Statement

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Sustainable Drainage Statement

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March 2021

DOCUMENT ISSUE RECORD

Document Number:	SRS-BWB-ZZ-XX-RP-CD-0002_SDS
BWB Reference:	BMW-2914-SDS

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01	12/02/21	S2	Catherine Thorpe BSc (Hons) MCInstCES	Rowan Jobling BEng (Hons)	Keith Alger BSc (Hons) MSc
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1. INTRODUCTION

1.1 A Sustainable Drainage Statement (SDS) sets out the principles of drainage design for a development and summarises the reasoning behind the chosen design. This includes consideration of national and local guidance, justification of specific flow rates, volumes of attenuated storage and the appropriate level of treatment to be provided to surface water runoff.

1.2 This SDS has been produced by BWB Consulting on behalf of Richborough Estates in respect of a planning application for a proposed residential development at Sandwich Road, Sholden. It is intended to support an outline planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

1.3 A Flood Risk Assessment (FRA) has been produced for the site (reference SRS-BWB-ZZ-XX-RP-YE-0005_FRA) and this SDS accompanies the overarching document.

1.4 The site is currently a greenfield agricultural field. The existing residential area of Sholden binds the site to the north-east, whilst agricultural greenfield land surrounds the site on all other sides. Contextual information is provided within **Table 1.1** and the site's location is illustrated within **Figure 1.1**.

1.5 The site is proposed for an outline application for the erection of up to 117 dwellings with associated parking and means of access (all matters reserved except for access). The site will be accessed from Sandwich Road in the north-east. An illustrative masterplan is included in **Appendix 1**.

Table 1.1: Site Details

Site Name	Sandwich Road, Sholden
Location	Kent
NGR (approx.)	TR 354 524
Application Site Area (ha)	4.99
Developable Area (ha)	3.0
Development Type	Residential
Lead Local Flood Authority	Kent County Council
Local Planning Authority	Dover District Council
Sewerage Undertaker	Southern Water

Figure 1.1: Site Location

Sustainable Drainage Guidance

1.6 Sustainable Drainage Systems (SuDS) aim to reduce the impact of development by replicating the natural runoff regime in a sustainable, cost-effective manner whilst protecting water quality and reducing pollution. The four key objectives of SuDS design are to achieve improvements in water quantity, water quality, amenity provision and biodiversity.

1.7 In addition to the Lead Local Flood Authority (LLFA) guidance, as summarised below, the Non-Statutory Technical Standards for Sustainable Drainage Systems[1] as published by DEFRA have been utilised to inform the strategy.

[1] 2015, DEFRA. Non-statutory technical standards for sustainable drainage systems

Drainage and Planning Policy

1.8 Local Drainage and Planning Policy[2] has been reviewed in the preparation of this SDS and the following points are considered relevant:

- It is required that the drainage design accommodates the 1 in 100-year storm with a 20% allowance for climate change, with an additional analysis undertaken to understand the flooding implications for a greater climate change allowance of 40%.
- An appropriate allowance for urban creep must be applied, in accordance with the development density, as summarised in **Table 1.2**.
- The first 5mm of any rainfall event should be accommodated and disposed of on-site, rather than being discharged to any receiving watercourse or surface water sewer.

Table 1.2: Urban Creep Allowance

Residential development density (Dwellings per hectare)	Urban creep allowance (%)
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats and apartments	0

Water. People. Places

1.9 Kent's Water. People. Places[3] guidance has been reviewed in the preparation of this SDS. It sets out information on how SuDS can be incorporated into masterplans to deliver multiple benefits as well as providing guidance on the detailed design of features.

1.10 Further information from this document will be referenced within this report where applicable.

[2] Drainage and Planning Policy – a Local Flood Risk Management Strategy Document, Kent County Council, December 2019
[3] Water. People. Places. A guide for master planning sustainable drainage into developments, AECOM, September 2013

2. EXISTING CONDITIONS

2.1 The topographical survey (**Appendix 2**) shows the site to fall to the north-east with levels ranging from approximately 23.0m Above Ordnance Datum (AOD) in the south to 17.4m AOD in the north. There are no existing drainage features recorded at the site.

2.2 There is an ordinary watercourse, known as the South Stream, 400m beyond the south-western boundary of the site.

2.3 British Geological Survey (BGS) mapping shows the site to be underlain by Seaford Chalk Formation. Superficial deposits of Head (Clay and Silt) are shown to be present in the north-east.

2.4 A series of BGS Boreholes (references: TR35SE32, TR35SE30, TR35SE28 and TR35SE31) located to the north-west of the site and underlain by Seaford Chalk Formation with superficial deposits of Head confirm the presence of clay and topsoil underlain by chalk. The depth of the boreholes vary between 2.8m Below Ground Level (BGL) and 5.1m BGL with no groundwater recorded in any of the boreholes.

2.5 The site is not within a Source Protection Zone.

2.6 Given the underlying ground conditions, it is expected that the site currently drains via natural infiltration into the ground.

Existing Runoff Rates

2.7 An assessment of the existing surface water runoff rates has been undertaken, per hectare, and summarised in **Table 2.1**. Calculations are included in **Appendix 3**.

2.8 The runoff rates have been estimated using the IH124 method, with appropriate prorated adjustments for a site of less than 50ha, as recommended in Interim Code of Practice for Sustainable Drainage[4]. This was undertaken within Micro Drainage, which makes the necessary adjustments for small sites automatically.

Table 2.1: Existing Runoff Rate from the Site

Return Period (Yrs.)	Runoff Rate (l/s/ha)
1	0.4
Mean Annual Flow Rate (QBAR)	0.4
30	1.0
100	1.4

2.9 This equates to a greenfield QBAR rate of 2l/s for the 4.99ha site.

[4] The National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage

Existing Runoff Volume

2.10 As the site is underlain by the Seaford Chalk Formation with surface water considered to infiltrate into the ground, no runoff volume will be generated by the site in its current condition.

3. SURFACE WATER DRAINAGE STRATEGY

Drainage Hierarchy

3.1 The Planning Policy Guidance[5] and the SuDS Manual[6] identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

i. into the ground (infiltration);
ii. to a surface water body;
iii. to a surface water sewer, highway drain, or another drainage system;
iv. to a combined sewer.

3.2 The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

3.3 Given the underlying ground conditions and the low runoff rates generated per hectare, infiltration is expected to be viable at this location. Site specific testing, undertaken in accordance with BRE365 methodologies, is required to confirm this assumption.

3.4 A review of the Dover District Council planning portal identifies that intrusive investigations have been undertaken in the vicinity of the proposed development, indicating that soakaway techniques will likely be viable at this location.

3.5 A planning application for a site immediately opposite the proposed development, known as 'Land at Sholden, Deal' (planning application reference: 10/01065) used infiltration rates obtained by site specific intrusive investigations. Rates of 3.4 × 10^{-6}m/s and 6.3 × 10^{-6}m/s were obtained at the site. Full outputs from the testing were not provided, and the testing was quoted to be generally in accordance with BRE365 methodologies, although filled only once and monitored only for a period of up to 8 hours.

3.6 A site immediately adjacent to this proposed development, known as 'Land at Sandwich Road, Sholden, Deal, Kent' (planning application reference: 19/00216) also referenced infiltrates rates obtained at the 'Land at Sholden, Deal' site.

3.7 Given the positive infiltration rates obtained in the vicinity, it is proposed that soakaways are used for the disposal of surface water at this location. To ensure a conservative approach, an assumed infiltration rate of 5 × 10^{-6}m/s has been utilised throughout the surface water drainage strategy at this location.

[5] Planning Practice Guidance. http://planningguidance.planningportal.gov.uk/.
[6] The SuDS Manual (C753). CIRIA 2015.

Attenuated Storage

3.8 It will be necessary to provide attenuated storage to balance the excess volume in a safe manner within the site. In accordance with the drainage hierarchy, this will be achieved via infiltration features.

3.9 The surface water storage should be located within the site in a position where it can receive runoff from the development and discharge from the site by gravity, and in a position where it is hydraulically isolated from any fluvial floodplain or external surface water floodplain/ overland flow route that may be present in the site. The topographical survey shows the lower elevations of the site are on the north-eastern boundary and therefore this is the optimum position for infiltration features. The accompanying FRA does not identify any significant flood extents or overland flow routes across the site from which the infiltration features should be excluded.

3.10 Sufficient storage for events up to the 1 in 100-year storm with a 20% allowance for climate change should be provided and sensitivity tests undertaken for the 40% climate change allowance, in accordance with local guidance.

3.11 Given the outline nature of the development proposals, it is estimated that 65% of the developable area will be impermeable. A further 10% allowance has been applied to allow for urban creep over the lifetime of the development. Note that the urban creep allowance is linked to the proposed development density, hence this allowance should be reviewed as the development aspirations evolve.

3.12 Considering the site constraints and development aspirations it is proposed that the necessary attenuated storage is provided within infiltration basins located on the eastern boundary. The infiltration basins will be enhanced with an infiltration trench to enable engagement with the infiltrating layer and mitigate the risk of chalk dissolution, whilst also preventing over deep basins and their associated safety issues.

3.13 In accordance with guidance and best practice, the half drain down time has been designed to be less than 24hours in the 30-year event as a minimum.

3.14 The site will be divided into sub catchments to treat and dispose of surface water runoff close to source.

3.15 Based upon the parameters outlined above, a simulation has been run using Micro Drainage 'Source Control' to identify the necessary storage provision for each catchment. The results are summarised in **Table 3.1** and calculations are included as **Appendix 4**.

Table 3.1: Outline Attenuated Storage Requirements for 100yr plus 20% climate change

Catchment	Rainfall Method	Critical Storm	Maximum Volume (m^3)
1	FSR	720 min Winter	500
	FEH	2160 min Winter	730
2	FSR	720 min Winter	560
	FEH	2160 min Winter	830
3	FSR	720 min Winter	380
	FEH	2160 min Winter	550

3.16 It is envisaged that the final required attenuated storage volume will be determined during the detailed design stage once the development layout and drainage areas are fixed and site-specific infiltration testing has been undertaken.

Sustainable Drainage Systems

3.17 An Illustrative Drainage Strategy is included in **Appendix 5** and demonstrates how SuDS will be incorporated into the surface water drainage network in line with the four key principles of drainage design: water quality, water quantity, amenity, and biodiversity.

3.18 In all catchments, surface water runoff will be captured via a combination of drains, gullies, and downpipes before being conveyed through the site via a beneath ground pipe system into the storage features.

3.19 Attenuated storage will be provided within infiltration basins enhanced with an infiltration trench. The basins should be appropriately planted to encourage treatment and biodiversity, as well as being landscaped into the public open space to provide an amenity value. The basin banks should not exceed a 1:4 gradient. The infiltration trench will provide a further level of treatment via filtration. It is recommended that forebays are included at the inlets.

3.20 The roof derived runoff is considered clean and therefore requires no additional treatment however it is recommended that trafficked areas are designed with permeable paving and silt traps to prevent solids reaching the infiltration basin.

3.21 The interception value (the first 5mm of runoff in a rainfall event) should be appropriately treated prior to release into the downstream network to prevent contamination from high pollutant concentrations. As the drainage system has been specifically designed for infiltration, the interception value will be delivered, particularly if forebays are provided at the inlets.

3.22 In line with the local guidance, separation distances are required between the infiltrating drainage measure and other drainage measures (including public sewers or permeable paving), building foundations and property boundaries. For shallow infiltration measures, such as those proposed, the minimum separation or setback distance between any two infiltration measures less than 5m deep shall be equal to the maximum depth of the deepest, in this case 2m. This should be confirmed following site-specific ground investigation which will confirm the required depth of the infiltration trench.

3.23 In line with best practice, a 5m access easement should be applied for maintenance purposes. This easement should exclude buildings and boundary fences but can include footways and private drives.

Residual Risk and Designing for Exceedance

3.24 The storage has been designed with 300mm freeboard in the 100-year + 20% event and sensitivity tested to ensure the 40% climate change event can be accommodated within the freeboard.

3.25 To protect against extreme events in exceedance of the drainage infrastructure, the external levels of the development and adoptable highways should be profiled to direct water away from vulnerable infrastructure and towards the nearest drainage point.

3.26 In addition to the volume of storage provided within the main attenuation, there will be capacity within upstream pipes and manholes which has not been accounted for at this stage and a further level of redundancy to the network will therefore be provided.

4. FOUL WATER DRAINAGE

4.1 As the existing site is currently undeveloped, a new foul water outfall will be required. It is proposed to drain used water separately from surface water.

4.2 The foul sewer network in the area is under the jurisdiction of Southern Water. Their sewer records are included as **Appendix 6**.

4.3 The Southern Water Foul Water response received (DS_CC_PDE-116260, Date 19/02/2021), confirms that the network has been assessed to determine the available capacity for the proposed development. Southern Water has determined that there is sufficient capacity in the local network to accommodate some if not all of the additional flows from the proposed development via a connection to the public sewer in Mongeham Road at either manhole references TR35514801 or TR35515901 for foul flows of up to 1.5 l/s and/or to the public sewer network within Sholden Drive manhole reference TR35524601 for flows of up to 0.5 l/s. With consideration to the water usage restrictions imposed by Building Regulations the above available capacity will be more than sufficient to cater for the average daily flow from the development.

4.4 For the purposes of this outline planning application, the Illustrative Drainage Strategy included in **Appendix 5** demonstrates how a gravity connection to foul water manhole 4601 could be achieved.

4.5 If an alternative point of connection to Mongeham Road is required, a pumped solution would be necessary. If this were the case, appropriate space within the masterplan should be provided for a pumping station compound in accordance with Southern Water's requirements (including 15m cordon to habitable dwellings and vehicular access suitable for a tanker).

4.6 Further information on the foul drainage approach can be found in the Utilities Assessment (document reference: SRS-BWB-VUT-ZZ-RP-G-0002_UA).

5. MAINTENANCE

5.1 The drainage network should be constructed in accordance with the Design and Construction Guidance and proposed for adoption by Southern Water. Any elements not adopted by Southern Water should be maintained by a management company or the homeowner (where drainage features lie within private curtilage).

5.2 Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site. Any specialist or proprietary products that are specified at construction design should have a manufacturer specific maintenance regime which should be included within the document.

5.3 It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below.

i. All drainage features should be in open areas which are readily accessible.
ii. Gullies should be inspected and de-silted at least once a year, where necessary.
iii. Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
iv. Where permeable paving is incorporated within the layout, it should be swept a minimum of every 6 months to maintain flow capacity of the joints between blocks.
v. The surface water attenuation areas will be predominantly dry, and the base will be seeded with a wildflower grass seed mix that can tolerate wet ground conditions.
vi. Regular inspections of the infiltration basins and infiltration trenches should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary.
vii. Inlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.
viii. Vegetation/grass with the infiltration basins should be maintained appropriately to allow establishment and promote habitat formation, without impeding the operation of the inlet structures.

6. SUMMARY

6.1 This statement and supporting appendices demonstrate that the drainage design for the development will comply with the relevant local and national standards.

6.2 This SDS is intended to support an outline planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

6.3 A summary of the proposed drainage approach is presented as **Table 6.1**.

Table 6.1: Sustainable Drainage Statement Summary

	Existing Site	Proposed Development
Site Area (ha)	4.99	
Impermeable Area (ha)	0	2.3
Outfall Location	Infiltration	Infiltration
Infiltration Rate	Not quantified	5×10^{-6}m/s (subject to testing)
Proposed Storage Volume (m^3)	-	2,110
SuDS Features	-	Infiltration Basins Infiltration Trench Permeable Paving

6.4 It is envisaged that the final drainage strategy will be determined during the detailed design stage, as the development layout is finalised.

6.5 Site specific ground investigation, including infiltration testing, should be undertaken to confirm the feasibility and design of infiltration solutions for this development.

APPENDICES

Appendix 1: Masterplan

PLANNING

Site Boundary *(4.99ha)*

Land in same ownership

Rev.	Date	Description

Land South West of Sandwich Road, SHOLDEN

Illustrative Masterplan

Job ref:	Drawing number:	Revision:
275	P01	-

Scale:	Date:
1:1,500 @ A3	March 2021

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