



Surface Water Drainage Strategy

Southleigh

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Bloor Homes

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Surface Water Drainage Strategy

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Contents

Executive Summary	1
Summary of Key Data	2
Abbreviations	3
1 Introduction	4
1.1 Scope of Report	4
1.2 Existing Site and Proposed Development	4
1.3 Sources of Information	4
1.4 Stakeholder Consultation	5
1.5 Report Structure	5
1.6 Caveats and Exclusions	5
2 Planning Policy Context	6
2.1 National Policy and Guidance	6
2.2 Local Policy and Guidance	7
3 Site Setting	8
3.1 Site Description	8
3.2 Topography	8
3.3 Hydrological Setting	9
3.4 Existing Drainage Arrangements	10
3.5 Geology and Hydrogeology	11
3.6 Description of Proposed Development	11
4 Climate Change Impacts	12
4.1 General	12
4.2 Peak Rainfall	12
5 Surface Water Drainage	13
5.1 Statutory Consultation	13
5.2 Overview	13
5.3 Summary of Proposed SWDS	14
5.4 Standard 1: Runoff Destination	16
5.5 Standard 2: Management of Everyday Rainfall (Interception)	19
5.6 Standard 3: Management of Extreme Rainfall and Flooding	20
5.7 Standard 4: Water Quality	21
5.8 Standard 5: Amenity	25
5.9 Standard 6: Biodiversity	25
5.10 Standard 7: Design of Drainage for Construction, Operation, Maintenance, Decommissioning and Structural Integrity	25
5.11 Other Considerations	29
6 Conclusions	31
6.1 General	31
6.2 Surface Water Drainage Strategy	31



6.3	Mitigation Strategy	31
6.4	Summary	31

Figures

Figure 3-1 Site Location Plan.....	8
Figure 3-2 Site Elevation	9
Figure 3-3 Hydrological Setting	10
Figure 5-1 Trial Pit and Borehole Coverage (Endeavor Drilling, 2023)	18

Tables

Table 4-1 Climate Change – Peak Rainfall Intensity Allowances.....	12
Table 5-1 Proposed Discharge Rates	21
Table 5-2 Summary of Pollution Indices for Proposed Development.....	23
Table 5-3 SuDS Mitigation Indices for Discharge to Surface Waters	23
Table 5-4 Land Use Water Quality Evaluation	24
Table 5-5 Maintenance Activities for Detention Basins (CIRIA, C753).....	27
Table 5-6 Maintenance Activities for Swales	28

Appendices

Appendix A	Surveys
Appendix B	Development Proposals
Appendix C	Stakeholder Correspondence
Appendix D	Surface Water Drainage Strategy



Executive Summary

This Surface Water Drainage Strategy (SWDS) has been prepared by Stantec UK Ltd to accompany an Outline planning application for a proposed residential-led development at Southleigh, Havant. In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), the SWDS demonstrates that:

- i. The development is safe.
- ii. The development does not increase flood risk; and,
- iii. The development does not detrimentally affect third parties.

The potential climate change impacts over the lifetime of the development have been fully assessed. The design of the proposed SWDS accounts for a predicted 45% increase in peak rainfall intensity ('Upper End' allowance, 2070s epoch).

Runoff generated by the proposed development will be managed through intercepting flows via sumped road gullies and rainwater down pipes. Flows will then be conveyed via a conveyance network (principally through surface water drains and sewers) prior to discharging into one of many Sustainable Drainage System management trains, consisting of geocellular storage, swales and detention basins.

The proposed SWDS will discharge surface water at greenfield runoff rate (3l/s/ha) to the onsite watercourses, thus restricting the rate and volume of runoff to existing conditions.

Runoff interception is provided through the vegetated base of all proposed swales and detention basins.

Proposed management trains will provide total removal of metal, hydrocarbon and suspended solid pollutants contained in urban runoff.

Proposed Sustainable Drainage Systems (SuDS) will enhance characteristic landscape features and contribute to the delivery of visually aesthetic public open space.

SuDS will be planted with native grasses, providing habitats that can tolerate dry and wet conditions.

During the construction phase, the principal contractor will be responsible for the maintenance of onsite Surface Water Drainage Infrastructure as detailed in a Construction Environmental Management Plan (CEMP) to be prepared at detailed design. Following construction, the maintenance of all proposed SuDS will be carried out in accordance with manufacturer guidance and CIRIA 'The SuDS Manual (C753)'.

In summary, the SWDS demonstrates that the proposed development is safe and in accordance with the requirements of national and local planning policy. The future occupants and users of the proposed development will be at a low risk of flooding and the development will not increase flood risk elsewhere.



Summary of Key Data

Aspect of Surface Water Drainage	Applicable Guidance/ Source of Data	Summary	Section of Report
Site			
Site Location	n/a	National Grid Reference SU 73740 07070.	3
Proposed Development	Proposals by Stantec Ltd	Outline planning application for up to 1,800 new homes, mixed-use Local Centre, primary school, public open space, landscaping and associated infrastructure.	3
Climate Change			
Peak Rainfall Intensity Allowance	Environment Agency 'Flood Risk Assessment: Climate Change Allowances'	+45% - Arun and Western Streams Management Catchment, 'Upper End' allowance, 2070s epoch.	4
Surface Water Drainage Strategy			
Runoff Destination	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 1	Discharge to watercourse.	5.4
Management of Everyday Rainfall (Interception)	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 2	Interception provided by the planted base area of proposed swales and detention basins. Additional interception storage required as detailed design progresses.	5.5
Management of Extreme Rainfall and Flooding	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 3	Discharge restricted to 3l/s/ha (QBAR).	5.6
Water Quality	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 4	Swale and detention basin management trains to provide sufficient hydrocarbon, metal and total suspended solids pollutant removal, for all proposed land uses except for the Mobility Hub. This will need additional water quality treatment provision which should be confirmed as the detailed design progresses.	5.7
Amenity	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 5	Proposed swales and detention basins will enhance characteristic landscape features and contribute to the delivery of visually aesthetic public open space.	5.8
Biodiversity	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 6	Swales and detention basins will be planted with native grasses, providing habitats that can tolerate dry and wet conditions.	5.9
Construction, Operation, Maintenance, Decommissioning and Structural Integrity	DEFRA 'National standards for sustainable drainage systems (SuDS)' Standard 7	During the construction phase, the Principal Contractor will be responsible for the maintenance of onsite SuDS features as detailed in a CEMP to prepared at detailed design. Following construction, the maintenance of all proposed Sustainable Drainage features will be carried out in accordance with manufacturer guidance and CIRIA (C753).	5.10



Abbreviations

ABI	-	Association of British Insurers
AEP	-	Annual Exceedance Probability
BGS	-	British Geological Survey
CDM	-	Construction (Design and Management)
CEMP	-	Construction and Environmental Management Plan
CIRIA	-	Construction Industry Research and Information Association
DEFRA	-	Department for Environment, Food and Rural Affairs
FAS	-	Flood Alleviation Scheme
FRAP	-	Flood Risk Activity Permit
LLFA	-	Lead Local Flood Authority
mAOD	-	Metres Above Ordnance Datum (Newlyn)
NPPF	-	National Planning Policy Framework
PPG	-	Planning Practice Guidance
SPZ	-	Source Protection Zones
SuDS	-	Sustainable Drainage Systems



1 Introduction

1.1 Scope of Report

- 1.1.1 This Surface Water Drainage Strategy (SWDS) has been prepared by Stantec UK Ltd ('Stantec') on behalf of our client, Bloor Homes, to support an Outline Planning Application for residential-led development at Southleigh, Havant.
- 1.1.2 The report is based on the available information for the site as detailed in **Section 1.3** and prepared in accordance with the planning policy requirements set out in **Section 2**.

1.2 Existing Site and Proposed Development

- 1.2.1 The proposed development site comprises approximately 105 hectares (ha) of land between the existing urban area of Havant to the west, Westbourne to the east and Emsworth to the south, and is centred around National Grid Reference SU 73740 07070. The site is located to the north of the A27 and is divided into three parcels by Southleigh Road and Eastleigh Road.
- 1.2.2 The site lies within the administrative boundary of Havant Borough Council Local Planning Authority. Hampshire County Council are defined as the Lead Local Flood Authority (LLFA) under the Flood and Water Management Act (2010).
- 1.2.3 The proposal is for Outline planning permission for up to 1,800 new homes, mixed-use Local Centre, primary school, public open space, landscaping and associated infrastructure (see **Section 3.6**).

1.3 Sources of Information

- 1.3.1 The SWDS has been prepared based on the following sources of information:
- Topographic survey of the site (drawing reference: 01SQ01) undertaken by SiteLine in June 2023 (see **Appendix A**).
 - Endeavour Drilling, Ground Investigation Report (ref:332310755-SP-3501-V02, 26/09/2023) (see **Appendix A**).
 - Development proposals by Stantec (see **Appendix B**).
 - Ministry of Housing, Communities & Local Government, National Planning Policy Framework (February 2025).
 - Ministry of Housing, Communities & Local Government, Planning Practice Guidance – Flood Risk and Coastal Change (September 2025).
 - Department for Environment, Food & Rural Affairs, National Standards for Sustainable Drainage Systems (July 2025).
 - Havant Borough Council, Core Strategy (adopted March 2011).
 - Havant Borough Council, Draft Building a Better Future Plan (available for consultation between May 2025 and July 2025).
 - Hampshire County Council, Surface Water Checklist and associated Guidance Document (see **Appendix D**).



- 1.3.2 This report sets out the proposed outline SWDS only. For information regarding flood risk on site, please refer to the Flood Risk Assessment produced by Stantec (Stantec, *Southleigh, Havant, Flood Risk Assessment*, ref: 332310755/316)

1.4 Stakeholder Consultation

- 1.4.1 Hampshire County Council LLFA, Pre-application Consultation Response (ref: SWM-PRE/2022/0676), dated 17/01/2023 (see **Appendix C**).
- 1.4.2 Environment Agency, Solent & South Downs Area Pre-application Advice Note, dated September 2019 (see **Appendix C**).

1.5 Report Structure

- **Section 2: Policy Context** – This section sets out the various national and local policies and guidance that relate to this site regarding surface water drainage.
- **Section 3: Site Setting and Proposed Development** – This section provides an overview of the site location, the hydrological context and the development proposals.
- **Section 4: Climate Change Impacts** – This section summarises the EA climate change allowances guidance relevant to the SWDS.
- **Section 5: Surface Water Drainage** – This section sets out the surface water management for the proposed development.

1.6 Caveats and Exclusions

- 1.6.1 This SWDS has been prepared in accordance with the NPPF, the associated PPG and local planning policy. The approach for the SWDS is based on the requirements of the DEFRA, the EA and Hampshire County Council in its role as Lead Local Flood Authority (LLFA). The conclusions are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined in **Section 1.2**.
- 1.6.2 Activities during the construction phase may have an impact on the existing and future flood risk. Thus, an assessment of the risks and appropriate mitigation measures should be identified and managed by the contractor.
- 1.6.3 The Construction (Design and Management) Regulations (CDM Regulations) will apply to any future development of this site which involves “construction” work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.
- 1.6.4 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development. Stantec does not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.



2 Planning Policy Context

2.1 National Policy and Guidance

National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

- 2.1.1 National policy in relation to surface water drainage is contained within the National Planning Policy Framework (NPPF), updated February 2025, issued by the Department for Levelling Up, Housing and Communities, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change'.
- 2.1.2 The latest version of the associated Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' section was updated in September 2025. The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the 'Flood risk assessments: climate change allowances' ¹ planning guidance.
- 2.1.3 This guidance provides contingency allowances for potential increases in peak rainfall intensity as a result of climate change. These allowances are key for designing appropriate management of surface water over the site. The relevant allowances for consideration and the impacts to the development are discussed further in **Section 4**.
- 2.1.4 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development. The NPPF sets out the requirements for surface water management in paragraph 182, see below.

'182. Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

a) take account of advice from the Lead Local Flood Authority;

b) have appropriate proposed minimum operational standards; and

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.'

National Standards for Sustainable Drainage Systems (SuDS) (July 2025)

- 2.1.5 The "National Standards for Sustainable Drainage Systems (SuDS)" (DEFRA, July 2025) sets out the guiding Principles and technical Standards for the design of SuDS for new development. The proposed SWDS has been designed in line with these standards, as far as practicable at this stage, and is discussed in **Section 5**.

¹ [Flood risk assessments: climate change allowances - GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/101444/flood-risk-assessments-climate-change-allowances.pdf)



2.2 Local Policy and Guidance

Havant Borough Core Strategy

- 2.2.1 Local planning policy is contained within the Havant Borough Core Strategy, adopted on the 1st March 2011, with particular reference to 'Policy CS15 Flood and Coastal Risk', which states:

Core Strategy Policy 15 Flood and Coastal Erosion Risk

'All development will be required to ensure that there is no net increase in surface water runoff. Priority should be given to incorporating Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it is proven that SuDS are not appropriate. Where SuDS are provided arrangements must be put in place for their whole life management and maintenance.'

Havant Borough Building a Better Future

- 2.2.2 Further guidance is contained in the Havant Borough Council emerging Local Plan 'Draft Building a Better Future Plan'. The guidance provides policies to which Havant Borough Council expects new development to adhere to, with particular reference to 'Policy 27: Drainage':

Policy 27: Drainage

'Surface Water Management in all new Development

Planning permission will be granted where current and future drainage needs, including for the expected climate change scenario, have been fully considered and:

- a) The drainage needs of the site are met in full over the lifetime of the development and flood risk is not increased elsewhere;*
- b) The drainage strategy incorporates SuDS, unless there is clear evidence that this would be inappropriate, and is in line with the hierarchy of drainage options; and*
- c) Adequate arrangements are in place for the lifetime maintenance of the surface water management systems.*

Major Development

In addition to criteria (a).- (c) above, on major development, planning permission will be granted only where

- d) The surface water management system ensures that the post development rate of flow is:*
 - i. on greenfield sites: restricted to the greenfield run-off rate;*
 - ii. on brownfield sites outside of identified Priority Areas: restricted to below the pre-development rate of flow; and*
 - iii. on brownfield sites in identified Priority Areas: produce a 50% betterment on the pre-development rate of flow.'*

- 2.2.3 The site is put forward for residential allocation (site reference: BL05 Southleigh) under the emerging Local Plan. The emerging Local Plan advises development at this site will be permitted where proposals 'Shows areas at risk of flooding are avoided for development, and all floor levels, access routes, drainage systems and flood mitigation measures are designed with an allowance for climate change.'

3 Site Setting

3.1 Site Description

- 3.1.1 The site comprises approximately 105 hectares (ha) of greenfield land between Havant to the west, Westbourne to the east and Emsworth to the south, and is centred around approximate Ordnance Survey (OS) National Grid Reference (NGR) SU 73740 07070 (see **Figure 3-1**).
- 3.1.2 The site is located to the north of the A27 and is divided into three parcels by Southleigh Road and Eastleigh Road.



Figure 3-1 Site Location Plan

3.2 Topography

- 3.2.1 A topographical survey of the site, completed by SiteLine in June 2023, is provided in **Appendix A**. Open-source LiDAR data is included in **Figure 3-2** below.
- 3.2.2 The site generally falls from north to south. The highest elevation in the site is recorded at approximately 39mAOD along the northern site boundary. The lowest elevations in the site are recorded at approximately 9mAOD in the southeast site corner associated with an EA Flood Alleviation Scheme (FAS), discussed further in **Section 3.3**. A length of the A27, adjacent to the southern Site Boundary, is elevated upon an embankment.

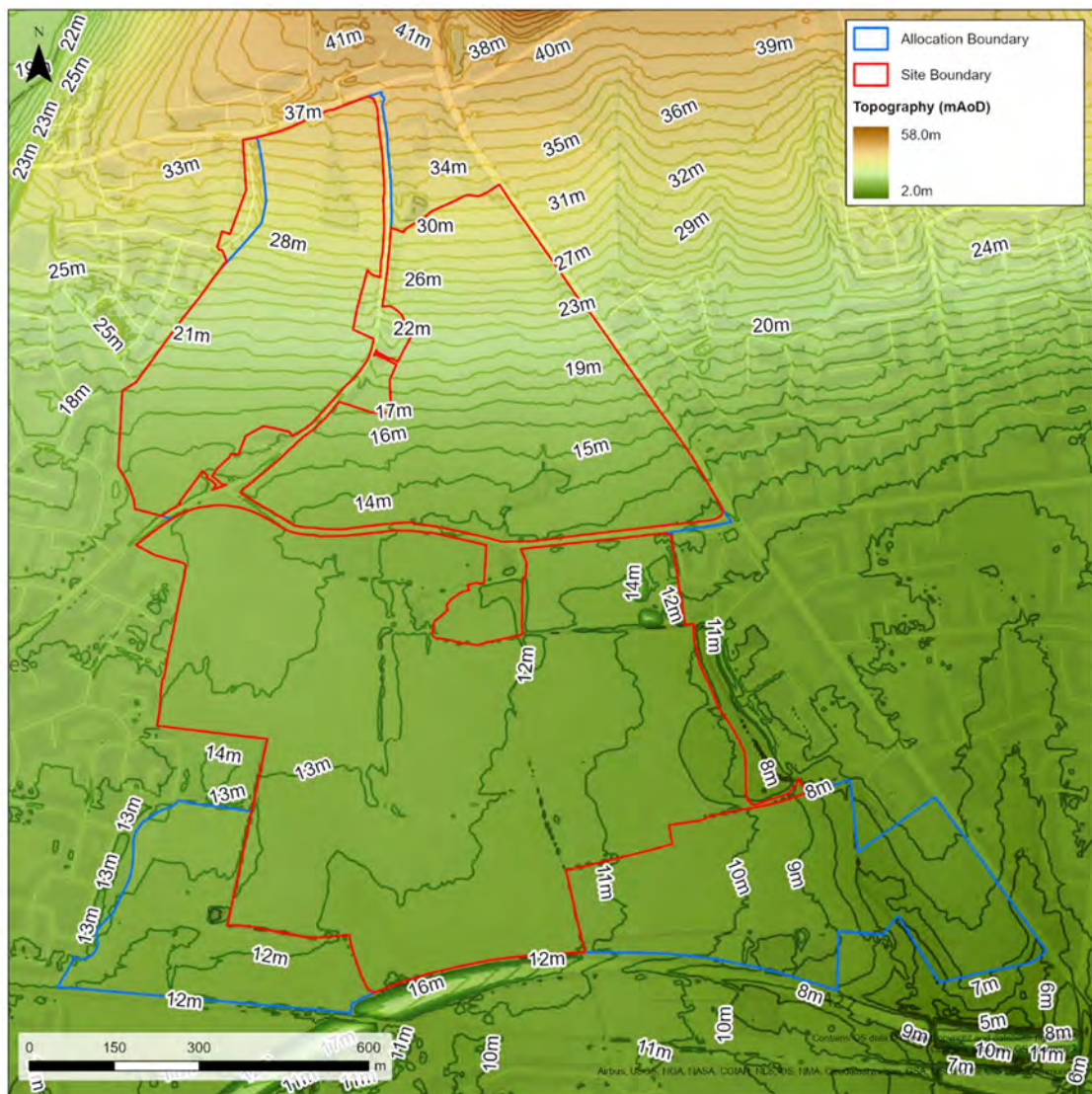


Figure 3-2 Site Elevation

3.3 Hydrological Setting

- 3.3.1 There are several watercourses located within the site (see **Figure 3-3**).
- 3.3.2 The West Brook, an EA Statutory Main River, runs along the eastern site boundary, flowing through the Emsworth FAS wetland and adjacent to, the area of floodplain compensation. Both were excavated in support of development proposals at Land West of Horndean Road (application reference APP/17/00358).
- 3.3.3 After outfall from the Site and wider allocation boundary, the West Brook passes under the A27 and railway and is largely conveyed within a culvert and open concrete channel through Emsworth. The West Brook eventually discharges to Emsworth Channel/Harbour.
- 3.3.4 The Nore Farm Stream, an ordinary watercourse, rises in the site along the western boundary, adjacent to Daffodil Way and the Stride Centre. The Nore Farm Stream passes under the A27 and railway. The Nore Farm Stream passes along the western boundary of Emsworth, where it is classified as an Environment Agency Statutory Main River and is partially culverted. The Nore Farm Stream eventually discharges into the Emsworth Channel/Harbour.

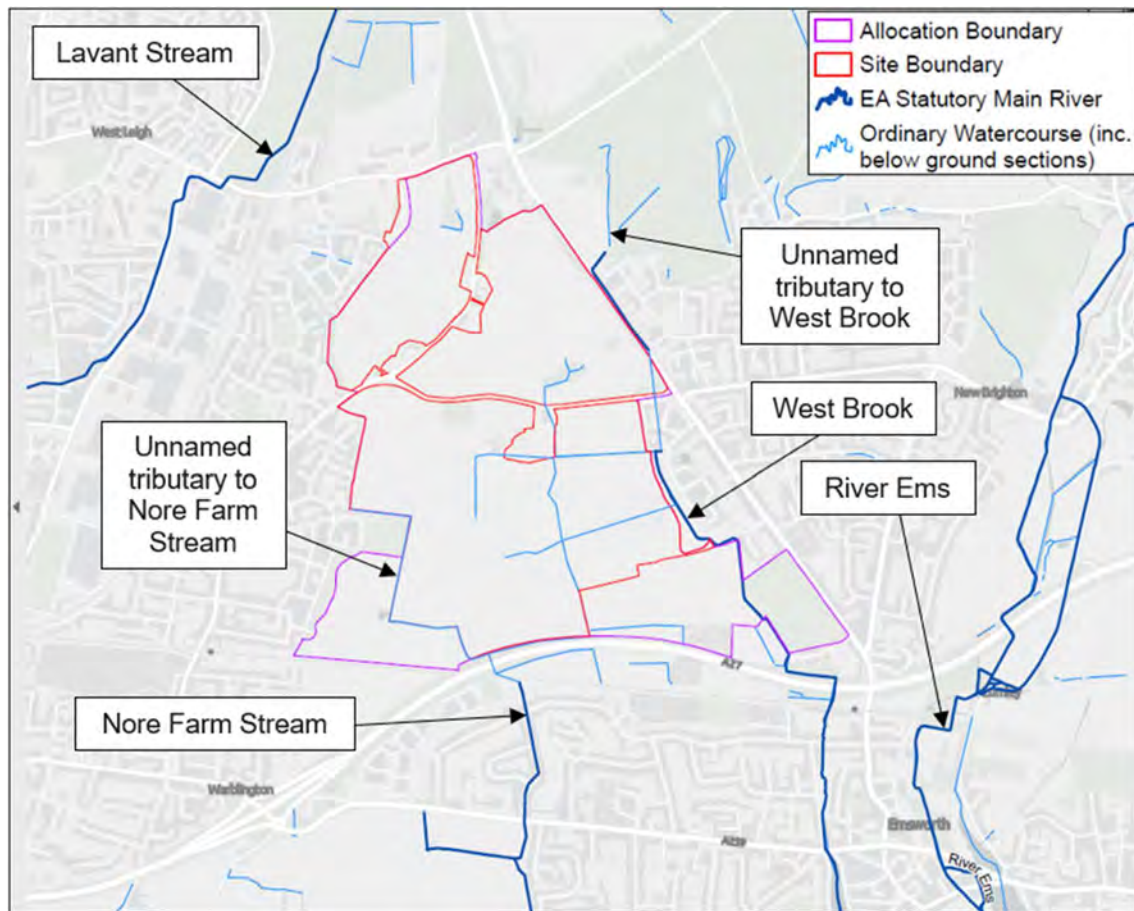


Figure 3-3 Hydrological Setting

- 3.3.5 The topographical survey of the site (see **Appendix A**) confirms the presence of additional field boundary surface water drainage ditches within the site. These can be found on the Proposed Surface Water Drainage Plan in **Appendix D**. An easement between proposed built development and on-site ordinary watercourses is provided, for both access for maintenance and ecological enhancement. Additional easements between built development and the West Brook are provided (see **Appendix D**).

3.4 Existing Drainage Arrangements

- 3.4.1 The existing site is predominantly greenfield, comprising agricultural land use. As such, it can be assumed that a limited amount of rainfall will drain via infiltration. In more extreme rainfall events, runoff will be generated, flowing overland following the natural fall of the site to the south, prior to interception and conveyance within field boundary ditches, located within the site boundary. Surface water conveyed within existing onsite ditches will eventually discharge from the site via the West Brook and Nore Farm Stream.
- 3.4.2 A minimal extent of the site is brownfield. Existing structures located in the site boundary, in proximity to Southleigh Farm, are set to be retained. Runoff generated by these existing impermeable structures may be intercepted, conveyed and discharged from the site via an existing private drainage network. At this stage, to ensure a conservative approach is adopted, it is assumed no existing private drainage network serves the site. Therefore, the SWDS has been designed to account for runoff generated by these retained impermeable surfaces (Catchment 2C) (see **Appendix D**).

3.5 Geology and Hydrogeology

- 3.5.1 The UK Soil Observatory online 'Soilscapes for England and Wales' viewer indicates soils on site comprise the following:
- In the north of the site: "*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*" (Soilscapes 18);
 - In the northwest of the site: "*Freely draining slightly acid loamy soils*" (Soilscapes 6);
 - In the centre and south of the site: "*Loamy soils with naturally high groundwater*" (Soilscapes 22).
- 3.5.2 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the site lies on a bedrock of London Clay Formation, comprising clay, silt and sand, designated by the Environment Agency as an 'Unproductive' aquifer.
- 3.5.3 The BGS record superficial deposits across most of the site, comprising either River Terrace deposits (in southern and central parts of the site) or Head deposits (located along the corridor of the West Brook and in northern parts of the site). The River Terrace Deposits are designated by the Environment Agency as a 'Secondary A' aquifer, whilst Head deposits are designated as a 'Secondary (undifferentiated)' aquifer.
- 3.5.4 The findings of the ground investigation undertaken by Endeavour Drilling on behalf of Stantec are included in **Appendix A**. The windowless sampler borehole logs confirm a shallow topsoil (0.15-0.40mbgl) underlain by clay rich strata.
- 3.5.5 DEFRA publish indicative Groundwater Source Protection Zones (SPZs) for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. The zones define areas where a range of human activities may damage/pollute groundwater. Examination of the mapping indicates that the northwest of the site is located within a 'Zone I – Subsurface Activity' SPZ.

3.6 Description of Proposed Development

- 3.6.1 This SWDS supports an Outline Planning Application for up to 1,800 new homes, mixed-use Local Centre, primary school, public open space, landscaping and associated infrastructure. A copy of the Illustrative Concept Masterplan, prepared by Stantec is appended (see **Appendix B**).
- 3.6.2 The application boundary falls within a wider allocation boundary, as taken from the Havant Borough Council emerging Local Plan '*Draft Building a Better Future Plan*' (site reference: BL05 Southleigh) (see **Appendix B**).
- 3.6.3 The SWDS, proposed in support of this planning application, does not negatively impact the delivery of future development in remaining areas of the wider allocation.
- 3.6.4 The proposed SWDS is based on a design life for the development of 100 years, and the climate change allowances described in **Section 4** are also based on this assumption.

4 Climate Change Impacts

4.1 General

- 4.1.1 It is necessary to fully consider the potential impacts of climate change over the lifetime of new development. The applicable allowances to take into consideration are detailed in the 'Flood risk assessments: climate change allowances' planning guidance (see **Section 2.1**) and discussed in turn below.

4.2 Peak Rainfall

- 4.2.1 The potential increase in peak rainfall intensity needs to be considered in the design of the SWDS for the proposed development.
- 4.2.1 The EA climate change allowances guidance was updated in May 2022 to include a GIS based 'peak rainfall allowances' map showing the anticipated changes in rainfall intensity based on river management catchment. The anticipated change in peak rainfall intensity at this site is summarised in **Table 4-1**.

Table 4-1 Climate Change – Peak Rainfall Intensity Allowances

<i>Arun and Western Streams Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)
	<i>Upper End</i>
<i>3.3% (1 in 30-year) rainfall</i>	<i>+40%</i>
<i>1% (1 in 100-year) rainfall</i>	<i>+45%</i>

- 4.2.2 As the development proposals are considered as having a design life of 100 years, the SWDS accounts for a 45% increase in peak rainfall intensity (see **Section 5**).

5 Surface Water Drainage

5.1 Statutory Consultation

- 5.1.1 The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. As the LLFA, Hampshire County Council is therefore responsible for the approval of surface water drainage systems within new major development.
- 5.1.2 The following section provides an overview of the existing surface water drainage arrangements and the proposed strategy for the management of surface water from the new major development. Further details are provided **Appendix D**.

5.2 Overview

- 5.2.1 A key requirement for the proposed development is to seek that flood risk downstream is not increased. The potential is associated with additional runoff generated by the introduction of roofs and hard-paved surfaces as part of the development. These surfaces replace natural ground where water can percolate into soil pores and to a greater or lesser extent infiltrate into the underlying rock. Additionally, natural ground is more uneven, promoting localised ponding while vegetation intercepts rainfall by collecting water. Lastly, natural ground is generally more resistant to flow, reducing the velocity of overland flow and the time that it takes to leave the site.
- 5.2.2 The replacement of natural surfaces has two principal effects on the land's response to rainfall:
- An increase in the rate of runoff.
 - An increase in the volume of runoff.
- 5.2.3 Both of these impacts have the potential to increase the flood risk downstream. The rate of runoff is normally of principal concern as it can impact on the peak flow rate in the receiving watercourse or drainage network. Increasing the volume of runoff can also increase flood risk in particular situations.
- 5.2.4 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface water runoff from development sites and recommended that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development. Adding to this, the 11 Principles set out in the DEFRA "*National standards for sustainable drainage systems (SuDS)*" describe the underpinning philosophy of SuDS design within a surface water drainage strategy, namely: a natural approach to managing water, early and integrated design and link with development planning.
- 5.2.5 The strategy should replicate, as closely as possible, the natural drainage process of a site prior to development to mitigate the adverse effects of urban storm water runoff on the environment. SuDS provide the ability to manage surface water discharge rates and volumes but also improve water quality, ecology and amenity within the development.
- 5.2.6 These aims are achieved by utilising a "management train", which simply consists of three elements:
- i. Source control.
 - ii. Conveyance.
 - iii. Site Control.



- 5.2.7 Source control is an overarching term for SuDS techniques that manage rainfall at source e.g. green roofs or permeable paving. It is the most effective method of improving surface water quality and intercepting rainfall within the development, which can help to reduce attenuation storage volumes (subject to more detailed design). Improving surface water quality within the drainage system can also help to provide better amenity value and biodiversity enhancement further downstream and help to realise the multiple benefits SuDS can provide.
- 5.2.8 Conveyance is the means by which surface water is transported from source control features to site control features. Traditionally, this is done by pipes underneath highways, however SuDS measures offer alternative options which can contribute to managing runoff on site, providing water quality and treatment and contribute to the landscape and biodiversity objectives within the development. In addition, conveyance features are surface features and therefore are shallower than piped systems resulting in less earthworks required.
- 5.2.9 Site control provides the strategic means of managing the discharge rates and volumes within the development, although this function is augmented by the presence of upstream source control and conveyance SuDS features. By providing source control upstream, the water quality reaching a site control feature is far improved, with most pollutants removed. Clean water is an essential input to wet ecosystems, and this therefore facilitates utilising the site control for biodiversity enhancement on site. An attractive and functional habitat can also provide amenity for future occupants of the site.

5.3 Summary of Proposed SWDS

- 5.3.1 Runoff generated by the development will be managed through intercepting flows via rainwater downpipes and sumped road gullies. At a future stage of planning, additional interception SuDS features (e.g. permeable paving) may be proposed as a detailed development layout emerges. Flows will then be conveyed via a conveyance network (principally through pipes) prior to discharging into a SuDS management train, see below.
- 5.3.2 Based upon the topographical survey of the site (see **Appendix A**) and Illustrative Concept Masterplan (see **Appendix B**), runoff generated by the proposed development can be divided into eleven sub-catchments (see **Appendix D**).

Catchment 1A

- Surface water conveys via a cascading detention basin system (DB-1A.1 to DB-1A.4) and directly (via surface water sewers) to a detention basin (DB-1A.5).
- Surface water attenuated within this detention basin (DB-1A.5) discharges at a controlled rate to a detention basin (DB-2A.2) in Catchment 2A.
- The Catchment 2A detention basin (DB-2A.2) discharges at a controlled greenfield QBAR runoff rate into the proposed surface water drainage system south of Southleigh Road.

Catchment 1B

- Surface water conveys via a detention basin (DB-1B) and directly (via surface water sewers) to a swale (SW-1B).
- The swale (SW-1B) discharges at a controlled greenfield QBAR runoff rate to an onsite ordinary watercourse.

Catchment 2A

- Surface water is attenuated within a detention basin (DB-2A.1) discharging at a controlled rate to another detention basin (DB-2A.2).



- Alongside attenuating flows received from Catchment 1A, this detention basin (DB-2A.2) discharges at a controlled greenfield QBAR runoff rate into the proposed surface water drainage system south of Southleigh Road.

Catchment 2B (Local Centre)

- Surface water attenuation volume is demonstrated within the model as managed within a geocellular storage system (GC-2B), before discharging at a controlled rate to a swale (SW-2C). This is for the purpose of demonstrating the viability of the overall SWDS.
- This swale (SW-2C) discharges at a controlled greenfield QBAR runoff rate to an onsite ordinary watercourse.
- However, the scale and location of attenuation within 2B will be subject to detailed design of the Local Centre, which may permit discretising attenuation within this sub-catchment at multiple locations. Furthermore, it may be possible to provide this attenuation in open-SuDS features rather than below-ground geocellular crates.

Catchment 2C

- Alongside receiving controlled flow from Catchment 2B, surface water runoff generated by Catchment 2C cascades within a swale (SW-2C), discharging at a controlled greenfield QBAR runoff rate to an onsite ordinary watercourse.

Catchment 3

- Surface water is attenuated within a detention basin (DB-3) discharging at a controlled greenfield QBAR runoff rate to the West Brook.

Catchment 4A

- Surface water is attenuated within a detention basin (DB-4A) discharging at a controlled greenfield QBAR runoff rate to the Nore Farm Stream

Catchment 4B, C and D

- Surface water is attenuated within a detention basin (DB-4B/C/D) discharging at a controlled greenfield QBAR runoff rate to the Nore Farm Stream

Catchment 5A (School)

- Surface water is attenuated within a system to be determined by the eventual developer of the school, discharging at a controlled rate to either the nearest watercourse or the surface water drainage network provided by the wider development.

Catchment 5B

- Surface water is attenuated within a detention basin (DB-5B) discharging at a controlled greenfield QBAR runoff rate to the West Brook.

Catchment 5C

- Surface water cascades via a series of swales (SW-5C.1, 5C.2 and 5C.3) discharging at a controlled rate to a detention basin (DB-5C).
- This detention basin (DB-5C) discharges at a controlled greenfield QBAR runoff rate to the West Brook.

- 5.3.3 An indicative SWDS, including drawings, calculations and technical design checklists, is included in **Appendix D**.
- 5.3.4 The following sub-sections set out how the proposed SWDS meets the requirements of the DEFRA “*National standards for sustainable drainage systems (SuDS)*”, providing relevant technical information suitable for supporting an Outline planning application.

5.4 Standard 1: Runoff Destination

- 5.4.1 The DEFRA “*National standards for sustainable drainage systems (SuDS)*” Standard 1 for runoff destination is as follows:

1.1 A ‘SuDS approach’ shall be adopted to address the management of surface water by the development and where it should be discharged. Runoff shall be treated as a resource and managed in a way that avoids negative impacts of the development on flood risk, the morphology and water quality of receiving waters and the associated ecology.

1.2 Runoff from the development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:

- *priority 1: collected for non-potable use*
- *priority 2: infiltrated to ground*
- *priority 3: discharged to an above ground surface water body*
- *priority 4: discharged to a surface water sewer, or another piped surface water drainage system*
- *priority 5: discharged to a combined sewer*

Note 1: priority 1 is the highest priority and priority 5 is the lowest.

Note 2: for the purposes of this standard, a combined sewer is a sewer intended to receive both foul sewage and surface runoff and does not include a sewer intended to receive only foul sewage, even if it has the capacity to accommodate additional flows or has an element of surface water in it already.

1.3 To utilise a lesser priority final destination, appropriate evidence shall be provided that demonstrates all higher priority final destinations have been utilised to the maximum extent practicable. Higher cost alone shall not be a reason to utilise lower priority final destinations.

1.4 Where more than one final destination is utilised, each final destination’s ability to accept runoff shall be maximised in order of priority.

Collection for Non-potable Use

- 5.4.2 Based on the aforementioned hierarchy, the preferred destination for discharging runoff is to re-use water for non-potable uses on site as far as practicable where any of the following apply:
- There is a demand for non-potable water and available contributing catchment area that will deliver safe and efficient water savings.



- There is a need for landscape irrigation.
- The development is in an area identified as seriously water stressed

5.4.3 At a future stage of planning, where detailed plot layouts will be known, rainwater reuse measures such as water butts may therefore be proposed to deliver landscape irrigation. The viability of non-potable reuse is likely to be limited by the available demand. Water regulations in the UK often prevent use of non-potable water to a limited number of functions within residential properties, generating insufficient demand and therefore limiting justification for their inclusion.

5.4.4 As such, at this stage, a conservative approach has been adopted. It is assumed that any future rainwater re-use would be full upon onset of the 'design rainfall event' i.e. the 1 in 100-year rainfall event with an allowance for climate change, and thus delivers no attenuation.

Infiltration to Ground

5.4.5 If collection for non-potable use is not practicable or it cannot manage all runoff up to the required 'design rainfall event', the next preferred destination is infiltration to ground.

5.4.6 Through pre-application correspondence (see **Appendix C**), Hampshire County Council LLFA comment *'The ground is predominantly clay which is likely to indicate low permeability at the application site, and infiltration testing should be undertaken to determine whether an infiltration drainage strategy is viable. Groundwater monitoring should be undertaken in the winter months to show that any proposed infiltration features will be at least one metre above the highest groundwater levels.'*

5.4.7 Ground investigation undertaken by Endeavour Drilling on behalf of Stantec, comprised nine windowless sampler boreholes with associated sampling and in-situ testing, eighteen machine dug trial pits, with three infiltration tests within selected trial pit locations (see **Figure 5-1**). Semi-permanent groundwater standpipes (to facilitate groundwater monitoring) were installed within all boreholes with the exception of WS102 (see **Figure 5-1**). The findings of Ground Investigation can be found in the report contained in **Appendix A**



Figure 5-1 Trial Pit and Borehole Coverage (Endeavor Drilling, 2023)

- 5.4.8 As explained in **Section 3.5**, widespread windowless sampler borehole logs confirm a shallow topsoil underlain by clay rich strata.
- 5.4.9 Infiltration testing was undertaken in accordance with BRE Digest 365 in Trial Pit 103, 104 and 106a. The results of infiltration testing were mixed, with some results positive and others negative.
- 5.4.10 Groundwater monitoring in all boreholes except WS102, was undertaken between August 2023 and January 2024 to determine seasonal high groundwater level. In August 2023, groundwater level varied between 1.05m and 4.00m below ground level (bgl) across the site. By the November 2023 groundwater level peak, groundwater level ranged between 0.16m and 1.33m bgl across the site.
- 5.4.11 Groundwater monitoring confirms widespread shallow groundwater across the site. It would not be feasible to provide a 1m unsaturated depth between the base of an infiltrating SuDS feature and maximum recorded groundwater level. Therefore, discharge via infiltration has been discounted.

Discharge to an Above Ground Surface Water Body

- 5.4.12 Where infiltration to ground is not possible, the next preferred destination is discharge to an above ground surface water body.
- 5.4.13 Through pre-application correspondence (see **Appendix C**), Hampshire County Council LLFA comment 'Should infiltration be unviable as a strategy, attenuation of runoff with a

restricted discharge to a watercourse or surface water sewer may be acceptable. An assessment of greenfield runoff rates should be made for the existing site, and any proposed discharges off site should be restricted to Qbar or should not exceed the equivalent greenfield rates for storms up to the 1 in 100 year event plus a climate change allowance for peak rainfall.'

- 5.4.14 As confirmed in **Section 3.3**, the West Brook, an EA Statutory Main River, runs along the eastern site boundary and the Nore Farm Stream, an ordinary watercourse, rises in the site along the western boundary. OS mapping and the topographical survey of the site indicate the presence of various other field boundary ordinary watercourses within the site.
- 5.4.15 As existing (see **Section 3.4**), runoff generated by the site can therefore feasibly discharge to onsite watercourses within the site boundary, without the requirement for 3rd party consent.
- 5.4.16 The proposed SWDS will discharge at a controlled greenfield QBAR rate via three outfalls to the West Brook, via two outfalls to the Nore Farm Stream and via three other outfalls to unnamed ordinary watercourses within the site boundary.
- 5.4.17 Proposed works in, over, under or near a main river or a flood defence require a 'Flood Risk Activity Permit' (FRAP) application to be made to the EA (this replaced the previous 'Flood Defence Consent' (FDC) procedure). This is required to demonstrate any new development does not have a detrimental impact on flood risk, either through impacting the integrity of the existing defence or through preventing maintenance access to the defence. Prior to commencement of works onsite, a FRAP application will be made to consent to works in proximity to the West Brook, including the construction of the proposed surface water sewer outfalls and associated headwalls.
- 5.4.18 Proposed works in, over, under or near to an ordinary watercourse require an Ordinary Watercourse Consent (OWC) application to be made to the LLFA, which at this site is Hampshire County Council. Prior to commencement of works onsite, an Ordinary Watercourse Consent application will be made to consent to works in proximity to the Nore Farm Stream and all other applicable ordinary watercourses, including the construction of the proposed surface water sewer outfalls and associated headwalls.

5.5 Standard 2: Management of Everyday Rainfall (Interception)

- 5.5.1 The DEFRA "National standards for sustainable drainage systems (SuDS)" Standard 2 for interception is as follows:

2.1 Apply a 'SuDS approach' so that at least the first 5mm of rainfall for the majority of rainfall events does not result in runoff from the site to surface waters or piped drainage systems.

2.2 Evidence shall be provided that the approach to managing runoff from 'everyday' rainfall has been developed alongside and in support of the management of runoff quality (standard 4) and the delivery of amenity and biodiversity benefits (standards 5 and 6).

- 5.5.2 The quantity of interception provided by a swale is dependent upon its' base area, longitudinal gradient and infiltration rate. The 'National Standards for SuDS' dictates 'As a minimum, where the longitudinal gradient of a swale is less than 1:100 and has at least 500mm of suitable base material, swales are suitable for interception for impermeable surface areas up to 5 times the base of the vegetated surface area receiving the runoff, whether lined or unlined.'
- 5.5.3 The 'National Standards for SuDS' further explains 'Areas of the development drained to detention basins with a flat unlined base, for example, can infiltrate to ground (without specific provision for routing low flows directly to the outlet), shall be assumed to comply where the



drained impermeable surface area is up to 5 times the vegetated detention basin surface area receiving the runoff for any soil type.'

- 5.5.4 Assuming all proposed strategic swales and basins (as shown in set out in **Section 5.3**) are left unlined, based on this criteria they can provide interception of the first 5mm of rainfall for 57% of the proposed development area, even allowing for urban creep (see **Appendix D**).
- 5.5.5 However, the degree to which each sub-catchment provides interception of the first 5mm of rainfall varies. Therefore, at detailed design additional source control SuDS features could be provided for additional interception. Alternatively, additional retained volume below the outlet level of swale and basin features could be provided to meet interception of the first 5mm for 100% of proposed development, however this approach is less desirable than inclusion of upstream SuDS, which would provide additional benefits.

5.6 Standard 3: Management of Extreme Rainfall and Flooding

- 5.6.1 The DEFRA "National standards for sustainable drainage systems (SuDS)" Standard 3 for peak discharge rates and volumes is as follows:

3.1 A 'SuDS approach' shall be adopted to address the management of development runoff during extreme rainfall, including allowances for climate change and urban creep to:

- *protect people and property on the development from flooding of the surface water drainage system*
- *mitigate any increased flood risk to people and property adjacent to or downstream of the development*
- *protect the receiving water body from morphological damage or minimise the impact on sewer capacity*

3.2 When discharging to an infiltration feature, the system shall be appropriately sized to accommodate the design event based on ground conditions and contributing areas.

3.3 When discharging to an above ground surface water body, sewer or other piped drainage system, the surface water runoff (rate and volume) for the 1% annual exceedance probability (AEP) event shall be controlled to ensure the runoff from the development does not increase flood risk elsewhere.

3.4 When discharging to an above ground surface water body, sewer or other piped drainage system, the surface water runoff rate for the 50% AEP event shall be controlled to ensure development runoff from an event of this magnitude has no negative impact.

3.5 Any flooding from the surface water drainage system for events up to the 1% AEP event shall be managed within the development.

3.6 Any flooding from off-site sources for the 1% AEP event should be managed on site or safely routed through the site, ensuring any downstream risks are not increased compared to the pre-development scenario.

3.7 The risks (both on and off the development) associated with flooding from the surface water drainage system for exceedance events greater than the 1% AEP event shall be appropriately managed.

- 5.6.2 The 'National Standards for SuDS' states 'The 50% AEP greenfield runoff rate can be considered equivalent to the calculated Q_{BAR} (mean annual flood) or Q_{MED} (median annual flood) for the site' and 'Where the volume of runoff discharged from the development to

surface waters or sewers for the 1% AEP, 6-hour rainfall event is greater than the volume of greenfield runoff for the same rainfall event, the peak allowable discharge rate from the development for the 1% AEP event shall be limited to the 50% AEP greenfield runoff rate or 3l/s/ha, whichever is the greater.'

- 5.6.3 In accordance with the Flood Estimation Handbook (FEH) post-2008 Statistical Method QMED Equation, greenfield QBAR runoff rate at this site has been calculated as 3.0l/s per developable area (see **Appendix D**), based on 2022 rainfall data.
- 5.6.4 The below table (see **Table 5-1**) provides a summary of greenfield QBAR discharge rate restriction by sub-catchment.

Table 5-1 Proposed Discharge Rates

Catchment	End of Management Train SuDS Outfall Feature	Development Catchment Area (ha)	Greenfield QBAR Runoff Rate (l/s/ha)
1A and 2A	Detention Basin (DB-2A.2)	9.8	3.0
1B	Swale (SW-1B)	2.1	
2B (Local Centre) and 2C	Swale (SW-2C)	3.1	
3	Detention Basin (DB-3)	2.8	
4A	Detention Basin (DB-4A)	5.9	
4B, 4C and 4D	Detention Basin (DB-4B/C/D)	15.9	
5A (School)	TBC by future school application/proposals	2.3	
5B	Detention Basin (DB-5B)	3.8	
5C	Detention Basin (DB-5C)	5.8	
Total		51.7	

5.7 Standard 4: Water Quality

- 5.7.1 The DEFRA “National standards for sustainable drainage systems (SuDS)” Standard 4 for water quality is as follows:

4.1 Apply a ‘SuDS approach’ that protects surface waters, groundwater and coastal waters by managing the quality of the surface water runoff to adequately address water quality risks from the development.

4.2 The proposed SuDS management train(s) shall be based on a robust water quality risk assessment, appropriate to the pollution hazard and sensitivity of receiving waters, reflecting industry recognised guidance or other quantitative assessment as agreed with the approving body and permitting requirements.

- 5.7.2 As indicated above, the site proposes to discharge via watercourse. As explained in **Section 3.3**, the West Brook and Nore Farm Stream eventually discharge to the Emsworth Harbour.



- ³ CHICHESTER HARBOUR | Catchment Data Explorer | Catchment Data Explorer

Table 5-2 Summary of Pollution Indices for Proposed Development

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial)	Low	0.3	0.4	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail) all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7

5.7.12 **Table 5-3** presents the mitigation indices provided by each SuDS method proposed as part of the drainage strategy.

Table 5-3 SuDS Mitigation Indices for Discharge to Surface Waters

SuDS Measure	TSS	Metals	Hydrocarbons
Swale	0.5	0.6	0.6
Detention Basin	0.5	0.5	0.6

5.7.13 Through applying the equation set out in section 26.7.1 of CIRIA C753, each proposed land use is assessed against the potential receiving SuDS management train scenarios as this varies across the site. This is summarised in Error! Not a valid bookmark self-reference.

Table 5-4 Land Use Water Quality Evaluation

Land Use	SuDS Management Train Scenario	Resultant Total Mitigation Indices		
		TSS	Metals	Hydrocarbons
Residential roofs	Detention Basin	0.5	0.5	0.6
	Swale	0.5	0.6	0.6
	Detention Basin to Swale	0.75	0.8	0.9
	Swale to Detention Basin	0.75	0.85	0.9
Other Roof (typically commercial/industrial)	Detention Basin	0.5	0.5	0.6
	Swale	0.5	0.6	0.6
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change	Detention Basin	0.5	0.5	0.6
	Swale	0.5	0.6	0.6
	Detention Basin to Swale	0.75	0.8	0.9
	Swale to Detention Basin	0.75	0.85	0.9
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail) all roads except low traffic roads and trunk roads/motorways	Swale	0.5	0.6	0.6
<p>Green cells represent management train scenarios where total pollutant removal is achieved.</p> <p>Orange cells represent management train scenarios where partial pollutant removal is achieved, and additional pollutant removal will be need to be confirmed at a future stage of planning as the detailed design progress in order to achieve total pollutant removal.</p>				

5.7.15 As shown in the above tables, the combined SuDS mitigation indices are higher than the pollution indices from the residential development, therefore the water quality shall be adequately managed.

5.7.16 In the case of this project, and specifically as proposals emerge for a mobility hub, local centre and school, a variety of additional SuDS measures at source, for example permeable paving in courtyard parking areas, filter strips serving some highways and bioretention where possible could be proposed. Therefore, the quality of surface water runoff on site will be adequately managed.

5.8 Standard 5: Amenity

- 5.8.1 The DEFRA “National standards for sustainable drainage systems (SuDS)” Standard 5 for amenity is as follows:

5.1 A ‘SuDS approach’ shall be adopted that maximises benefits for amenity through the creation of multi-functional places and landscapes.

- 5.8.2 Proposed grass swales and detention basins will provide multiple benefits, including visual amenity. Swale routes will follow the natural topography of the land and thus enhance characteristic landscape features.
- 5.8.3 Due to the inherent requirement of SuDS features to retain water, during normal operation, open SuDS features pose a potential risk to the general public. As part of the detailed design process, Health and Safety considerations need to inform the proposals and implement adequate protection for the public and enable safe means of egress from open features, while not compromising the proposed amenity uses.
- 5.8.4 SuDS features are proposed with 1:3 side-slopes and a maximum depth of 1.5m to facilitate egress. Thus, SuDS features are considered safe for public access and thus contribute to the provision of public open space.

5.9 Standard 6: Biodiversity

- 5.9.1 The DEFRA “National standards for sustainable drainage systems (SuDS)” Standard 6 for biodiversity is as follows:

6.1 A ‘SuDS approach’ shall be adopted to ensure the surface water drainage system maximises biodiversity benefits throughout the development lifecycle.

6.2 The surface water drainage system shall add biodiversity value by:

- *creating diverse, self-sustaining, resilient local ecosystems*
- *which contribute to net gains in biodiversity*
- *supporting and promoting natural local habitat and species, for example, through local nature recovery strategies (LNRS)*
- *contributing to the delivery of local biodiversity strategies contributing to habitat connectivity*

- 5.9.2 Proposed swales and detention basins will be planted with native grasses, providing habitats that can tolerate dry and wet conditions. These habitats will benefit birds, insects (including pollinators), invertebrates and small mammals. Swales and basins will be typically constructed with 1 in 3 side slopes resulting in shallow water gradients, benefitting habitat creation. Proposed maintenance will ensure continued silt removal, grass cutting and invasive vegetation removal, which will ensure protection for new habitats.

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

- 5.10.1 The DEFRA “National standards for sustainable drainage systems (SuDS)” Standard 7 for design for construction, operation, maintenance, decommissioning and structural integrity is as follows:



7.1 A 'SuDS approach' shall be adopted to ensure that surface water drainage systems are designed so they can be easily and safely constructed, operated and maintained taking account of the need to minimise negative impacts on natural resources and the environment.

7.2 The designer shall provide a management and maintenance plan that supports the design objectives detailed in standards 1 to 6 and ensures the performance of the surface water drainage system with regards to runoff destinations, everyday and extreme rainfall, water quality, amenity and biodiversity is maintained throughout the lifetime of the development.

7.3 Surface water drainage design shall examine for the likelihood and consequences of potential failure scenarios that may occur during the operation phase and safely manage the associated risks.

7.4 The surface water drainage system shall be designed to ensure structural integrity of all components under anticipated loading conditions for the design life of the development so that it does not affect the structural integrity of any existing or proposed components within, or adjacent to, the development.

Construction

- 5.10.2 Swale and basin excavations should ideally be undertaken in dry weather, to prevent mobilisation of sediments from exposed surfaces. Native grass planting should be undertaken soon after excavation, to promote base and side-slope stabilisation. Signage should be erected to mark the position of swales and basins, to prevent accidental damage during construction. Swales and basins should be protected by silt fencing during the construction phase.
- 5.10.3 For the construction phase, a Construction Environmental Management Plan (CEMP) will be produced so that the potential impacts of construction are managed efficiently, including measures to mitigate the adverse impacts of construction and ensure that there is no detrimental impact on flood risk and surface water. The CEMP will be a live document that will be reviewed and updated at regular intervals throughout the construction phase.
- 5.10.4 Measures will be adopted to mitigate against the risk to local watercourses from contaminated surface water runoff arising from general construction activities and the operation of construction vehicles present on the site during the construction phase. These procedures may include:
- Building, bunding and raising the ground where pollutant material is stored;
 - Creating a temporary surface water drainage network to the West Brook, Nore Farm Stream and other onsite unnamed ordinary watercourses, to manage surface water runoff during the construction phase; and
 - Pollution clean-up measures in the event of accidental spillages.

Operation & Maintenance

- 5.10.5 During the construction phase, the Principal Contractor is responsible for ensuring the SuDS maintenance activities as specified in this document are carried out. The Principal Contractor should adhere to strict preventative measures to ensure pollution of SuDS and onsite watercourses is avoided.
- 5.10.6 Following construction, it may be possible for some SuDS features to be adopted by the LLFA, Highways Authority or local sewerage company, subject to further consultation and design



development. The ongoing management and maintenance of the proposed surface water management systems will otherwise be expected to fall under the responsibility of the relevant site management company.

- 5.10.7 Long term management of surface water drainage assets, including any SuDS components, is essential to ensure they continue to function to their design standard. As such, a management and maintenance plan will need to be developed in order to ensure the systems continue to work effectively.
- 5.10.8 The final strategy for adoption of SuDS and the SuDS maintenance plan, including a maintenance schedule and details of easements and outfalls for the drainage system, will be produced at the detailed design phase, once details of any SuDS features to be incorporated into the site have been finalised. The maintenance plan will be prepared in line with national policy and industry guidance. Continued SuDS maintenance will ensure the effective operation of the SWDS, including the continued SuDS performance for water quantity, water quality, amenity, and biodiversity.
- 5.10.9 SuDS features are proposed with shallow side-slopes (i.e., 1:3 or flatter) ensuring safe access for maintenance. All SuDS features are proposed with a maintenance buffer provided between the edge of the SuDS features and built development.
- 5.10.10 The following tables outline key operation and maintenance requirements for swales and detention basins, as set out in CIRIA C753. Following further detailed design of the proposed surface water drainage system, these requirements should be refined for individual, named SuDS components, taking account of site-specific factors.

Table 5-5 Maintenance Activities for Detention Basins (CIRIA, C753)

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring - before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
	Reseed areas of poor vegetation growth	As required

Occasional Maintenance	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment or rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Table 5-6 Maintenance Activities for Swales

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specific design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Structural Integrity

- 5.10.11 Necessary cover depths will be provided for all proposed surface water sewers and for geo-cellular storage in accordance with manufacturer guidance to ensure continued structural integrity.
- 5.10.12 Easements are provided between proposed SuDS features and development to mitigate the risk of damage in the unlikely event of side-slope instability.

5.11 Other Considerations

Designing for Exceedance

- 5.11.1 The risk associated with a potential blockage for the main drainage system onsite is considered to be small. Routine inspection and maintenance procedures as described in **Section 5.10** of this report will minimise the risk of the accumulation of detritus and debris as well as ensuring that the drainage systems continue to operate efficiently. However, the residual risk of these events needs to be managed. The principles of dealing with these is set out below.
- 5.11.2 In the event of a rare storm (beyond the design condition), the capacity of the drainage network could be temporarily exceeded, and drainage inlets could be bypassed creating overland flow. To minimise and manage the impact of these events at source, the SuDS features for the scheme will be designed with controlled overflows such as spillways and weirs.
- 5.11.3 The piped system will be designed to accommodate runoff during storm events up to the 1 in 30-year event. In excess of this it is possible that the design standard for the system will be exceeded.
- 5.11.4 To ensure that in an exceedance event any flooding does not affect properties or discharge from the development, flows up to the 1 in 100 year plus 45% climate change event should be managed on site.
- 5.11.5 The detailed masterplan will need to consider the overland flow paths required to manage these events and the flows from the overflow of SuDS features. Where possible, the masterplan should be designed to utilise natural and naturalised blue/green corridors to divert the flows from critical infrastructure and the development to further mitigate the impact.
- 5.11.6 In certain circumstances it may be necessary to utilise road corridors to deliver this function. This, however, should not be considered the preferred option and should still facilitate safe access and egress as well as taking reasonable steps to protect property.
- 5.11.7 All buildings should be provided with internal threshold levels raised above surrounding ground levels and designated flow paths created around the buildings to the lower lying levels. Localised grading may be required to achieve level access criteria. Exceedance flows would then naturally be directed around the buildings to lower ground.
- 5.11.8 An overland flow assessment should be carried out at detailed design stage once all construction information e.g. street layout and levels, is available so that any hotspots can be identified and managed.
- 5.11.9 Notwithstanding fluvial flood level freeboard requirements (addressed in the separate FRA), ground floor levels are to be set a suitable freeboard above proposed surrounding ground (minimum 150mm apart from where accessibility requires no step access) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from dwellings in such a scenario.



Surcharge

- 5.11.10 In accordance with paragraph 3.24 of the National Standards for Sustainable Drainage Systems all strategic features which outfall into the watercourses on site (i.e. SW-2C, DB-3, DB-4A, DB-4B/C/D, DB-5B, DB-5C and SW-1B) have been performance tested in the event there outfall is surcharged.
- 5.11.11 To test this scenario, it has been assumed that water levels within the discharge destination watercourse are at the top of bank i.e. bank full. To obtain this surcharge level, the top of bank levels are utilised, as indicated within the topographical survey.
- 5.11.12 In this scenario, all SuDS features do not flood. The outflow restriction imposed by the surcharged outfall does result in higher water levels when compared with the free-discharge scenario, however these water levels are managed within the freeboard provided for each of these features.
- 5.11.13 Therefore, based on this assessment and in the unlikely event an extreme rainfall event coincides with high water levels within the on-site watercourses, the proposed SWDS serving the site will not flood.



6 Conclusions

6.1 General

- 6.1.1 This Surface Water Drainage Strategy (SWDS) has been prepared by Stantec to accompany an Outline Planning Application for a proposed residential-led development at Southleigh, Havant.

6.2 Surface Water Drainage Strategy

- 6.2.1 The proposed SWDS will discharge surface water at the greenfield QBAR runoff rate (3l/s/ha) to the onsite watercourses, thus ensuring no increase in the rate, nor volume, of runoff discharging from the site.
- 6.2.2 Interception is provided through the vegetated base of all proposed swales and detention basins.
- 6.2.3 Proposed swale and detention basin management trains provide the required level of pollutant removal. The final strategy for pollution control will be confirmed as part of the detailed design.
- 6.2.4 Proposed Sustainable Drainage Systems (SuDS) will enhance characteristic landscape features and contribute to the delivery of visually aesthetic public open space.
- 6.2.5 SuDS will be planted with native grasses, providing habitats that can tolerate dry and wet conditions.
- 6.2.6 During the construction phase, the principal contractor will be responsible for the maintenance of onsite SuDS features as detailed in a Construction Environmental Management Plan (CEMP) to be prepared at detailed design. Following construction, the maintenance of all proposed SuDS features will be carried out in accordance with manufacturer guidance and the CIRIA C753 SuDS Manual.

6.3 Mitigation Strategy

- 6.3.1 To mitigate against this residual risk of surface water flooding in the unlikely event of exceedance, onsite exceedance flow routes will direct surface water flows away from proposed dwellings and it is recommended that the minimum residential floor level be set a suitable freeboard above surrounding ground level.

6.4 Summary

- 6.4.1 In conclusion, the future occupants and users of the proposed development will be at a low risk of flooding and the development will not increase flood risk elsewhere. It is demonstrated that the proposal complies with the NPPF, Planning Practice Guidance (PPG) and the local planning policy with respect to surface water drainage.

