

Project Title: South Wokingham Strategic Development
Location Phase 2B

Project No/ Document Reference: A398-TN004C

Date: 18 July 2024

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Condition 29 – Surface Water Drainage and Sustainable Drainage Systems (SuDS)

1. Introduction

- 1.1. Abley Letchford Partnership (ALP) has been requested by Miller Homes and Kier Venture Ltd to provide this Technical Note in support of development within Phase 2B of the South Wokingham Strategic Development Location (SDL).
- 1.2. The Site lies to the south east of Wokingham. Montague Park lies to the north east, with the railway line running across the northern boundary. Easthampstead Road bisects the middle of the Site with Holme Green to the south. The Site forms Phase 2B of the SDL.
- 1.3. This Technical Note is presented in order to support the discharge of Condition 29 under planning application reference 191068.

2. Surface Water Drainage

- 2.1. Condition 29 requires that:

“Before or concurrent with submission of the first application pursuant to reserved matters or commencement of development within the SANG (whichever is earlier), a Strategy demonstrating coordination with the wider Strategic Development Location (the SuDS Strategy), based on Phase 2 of the South Wokingham SDL Flood Risk Assessment, Ref No: 70001684-FRA-SDL-001 (August 2020) (Environmental Statement Phase 2 Addendum Volume 2) and including drainage calculations, details of the layout, position and size of attenuation basins, and principles for locally based treatments such as rain gardens, filter strips and swales shall be submitted to and approved in writing by the Local Planning Authority.”

- 2.2. This Technical Note outlines the general Surface Water Drainage Strategy within the development pursuant to that set out within the Approved Phase 2 Flood Risk Assessment (WSP Ref 70001684-FRA-SDL-001 dated August 2020) which supported the Outline Application, such that Condition 29 can be discharged. Additional parcel specific information will be produced in the form of Drainage Statements to support individual Reserved Matters Applications as they come forward, as allowed by the wording of Condition 30.



- 2.3. Such Drainage Statements will be consulted on as part of any Reserved Matters submission, therefore the Council has the confidence that appropriate consideration is being given to surface water matters as the scheme progresses.
- 2.4. Reference should also be made to the Illustrative Masterplan, Design Code and Landscaping Design Statement which supports the development.

3. General Principles and Guidance

- 3.1. The proposed Drainage Strategy has been designed to meet the requirements of paragraphs 173(c) and 175 of the National Planning Policy Framework (NPPF) by providing a comprehensive drainage system which embraces the SuDS philosophy and key principles. The utilisation of Sustainable Drainage Systems (SuDS) not only provides the benefit of controlling waters at source and online treatment of collected surface water, but also allows enhanced aesthetics through improved landscaping, biodiversity, and ecological opportunities.
- 3.2. Sustainable drainage systems (SuDS) should be introduced to control the surface water runoff from the proposed development site therefore, managing the flood risk to the Site and surrounding areas from the surface water runoff.
- 3.3. The Construction Industry Research and Information Association (CIRIA), CIRIA's C690 states the following:
 - **Prevention** – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing surfaces)
 - **Source Control** – control of runoff at or very near its source (such as the use of rainwater harvesting)
 - **Site Control** – management of water from several sub-catchments (including routing water from roofs and car parks to one or several soakaways for the entire site)
 - **Regional Control** – management of runoff from several sites, typically in a detention basin or wetland.
- 3.4. The SuDS Manual 2015 (C753) provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS. This document provides guidance to ensure that SuDS are planned and designed to maximise the opportunities and benefits of surface water management.



- 3.5. The four main categories of benefits that can be achieved by SuDS, referred to as the four pillars of SuDS design, are:
- **Water quantity** – control the quantity of runoff to support the management of flood risk, and maintain and protect the natural water cycle;
 - **Water quality** – manage the quality of the runoff to prevent pollution
 - **Amenity** – create and sustain better places for people
 - **Biodiversity** – create and sustain better places for nature.
- 3.6. Supplemental to CIRIA guidance, Document H of the Building Regulations 2015 sets out three possible options to discharge surface water runoff. Rainwater shall discharge to one of the following, listed in order of priority:
- An adequate soakaway or some other adequate infiltration system; or where that is not reasonably practicable,
 - A watercourse; or where that is not reasonably practicable
 - A sewer.

4. Outline Surface Water Strategy

- 4.1. The WSP Drainage Strategy, approved at the Outline Application stage, included strategic attenuation basins placed throughout the development which were designed to cater for all storms up to and including the 1:100 return period plus 40% climate change allowance. These primary basin locations have been respected and refined in order to sit within the development proposals.
- 4.2. In addition, section 6.3 of the WSP Drainage Strategy provided a commentary on exceedance routes considered during the presentation of the Outline Application, in so far as:
- Any flows exceeding the capacity of the surface water network (generally in excess of 1 in 100 year event with a 40% climate change allowance) will be directed either through the open space and/or the road network. The open space provision on this Project development is predominately located at the low points, and adjacent to the Emm Brook tributary, and hence will allow a pathway for flows to re-enter the watercourse.*
- 4.3. The current Surface Water Strategy conveys runoff from the development parcels via SuDS features and traditional sewers and manholes to their respective attenuation basin prior to discharge to nearby watercourses. And in doing so, the sub surface drainage network meets the pre-requisite hydraulic criteria for adoption.



- 4.4. As with WSP's scheme presented in support of the Outline application, excess surface water will exit the network during severe storm events beyond the design storms.
- 4.5. Infiltration testing in accordance with BRE365 was undertaken by Geo-Environmental Ltd in January 2022 and the Site Investigation Report confirms that infiltration is unlikely to be a viable method of disposal due to wholesale poor permeability. Therefore, the surface water drainage proposals will be designed to attenuate runoff and dispose of it to existing and proposed watercourses in line with the WSP Flood Risk Assessment and supporting Drainage Strategy.
- 4.6. Implementation of SuDS will ensure that flood risk downstream is not increased due to the proposed development. These features will also provide positive improvements to the quality of surface water runoff.
- 4.7. The following SuDS components are deemed applicable to the Site:
 - Pervious surfacing systems – structural surfaces that allow water to penetrate into a granular layer thus providing storage and treatment, e.g. pervious paving.
 - Storage systems – components that control flow, and possibly volumes, by storing water and releasing it slowly, e.g. geocellular units, attenuation basins and wetlands.
 - Treatment systems – components that remove or facilitate the degradation of contaminants present in runoff, e.g. rain gardens, swales, silt traps and proprietary treatment systems.

5. Development Parcel Areas/Rates

- 5.1. To quantify any potential increase in surface water runoff, the existing Greenfield/Pre-Development runoff rate from the Site must be determined. The rates of runoff have been determined using the current 'industry best practice' guidelines as outlined in the Interim Code of Practice for SuDS. The recommended methodology for sites up to 50 hectares in area is the ICP SuDS method.
- 5.2. The WSP FRA supporting the Outline Application, establishes an average QBAR rate of 4.4 l/s/Ha.
- 5.3. Based on the Site-Wide Masterplan, it has been conservatively estimated that the impermeable surfaces are approximately 65% of the developable area. Refer to drawing A389-001 Site Overview Surface Water Strategy in **Appendix 1**.
- 5.4. The post development impermeable area has been calculated to be 24.03ha based on 65% of the development parcels being hard paved or dwelling. Based on previous sites of this nature this provides an allowance for urban creep of a maximum of 10%.
- 5.5. The anticipated impermeable area of each catchment and subsequent discharge rate is presented in **Figure 1** and can also be seen in drawing A389-001 Site Overview Surface Water Strategy in **Appendix 1**.

Figure 1 – Anticipated Impermeable Area of Catchments and Discharge Rate

Parcel	Impermeable Area (ha)	Discharge Rate (l/s)
R4a-R5a	2.81	13.1
R4b	1.18	5.3
R5b-R5c-R4c	2.44	11.1
R8a	2.08	9.4
R8b-R9	2.11	9.6
R10 North	1.20	8.2
R10 South	2.35	11.0
R11a	2.94	13.8
R11b	1.88	5.0
R11c-d	1.95	13.1
R13	3.09	14.0
Total:	24.03	100.50

- 5.6. Parcels R7 and the Local Centre/School site have unrestricted flows into the new watercourse system as per the original WSP outline strategy which indicated no parcel specific attenuation on the surface water strategy drawings.

Site Wide Surface Water Strategy

- 5.7. The principles of the Site Wide SuDS Strategy are indicated on drawing A389-023 (included within **Appendix 1**) and follows that set down within WSP's Phase 2 FRA alongside their Surface Water Drainage Strategy drawings.
- 5.8. The Site Wide SuDS Strategy drawing identifies the proposed Source, Site and Regional Control SuDS features as set out below, in order to provide a comprehensive sustainable drainage solution for the development as a whole.
- Detention Basins,
 - Permeable Paving
 - Swales,
 - Rain Gardens/Tree Pits



- 5.9. Given the time elapsed since the production of the WSP FRA and Drainage Strategy, fundamental changes have occurred to drainage design criteria. This has resulted in the original WSP features (shown in red on drawing A389-001 within **Appendix 1**), being unable to attenuate the necessary surface water within the confines of the site constraints and developable area.
- 5.10. In order to comply with NPPF Requirements, discharge rates should be restricted for all storms up to and including the 1 in a 100 year storm event (1% AEP) plus a 40% allowance for climate change. In complying with Figure 1 above, this is achieved.
- 5.11. Surface water models should assess the worse of either Flood Estimation Handbook (FEH) or Flood Studies Report (FSR) rainfall profiles. The Outline Application only assessed FSR, which is no longer a recommended method within the CIRIA SuDS Manual.
- 5.12. It is also now common practise to increase the coefficient of runoff value (CV) to 0.95 for all storms to replicate the fact that most rainfall will enter the positive drainage network. This requirement has been met within the presented Strategy. The Outline Application assessed only 0.75 and 0.84 for Summer and Winter storms respectively.
- 5.13. Finally, minimum freeboard limits within any attenuation basin should ideally increase from 300mm to 400mm.
- 5.14. All of the above result in more rainfall entering the network simulation, requiring additional attenuation storage prior to discharge.
- 5.15. To cater for the increased attenuation required, attenuation basins have been utilised wherever possible in combination with source control features. However, due to existing topography and root protection area constraints, the odd instance is supplemented by localised installations of sub-surface cellular storage crates located within adjacent public open space.
- 5.16. The basins have been sympathetically designed with varying depths (maximum of 2.0m) with 1:3 to 1:5 side slopes, in addition a freeboard of 400mm has been provided with a minimum of 600mm freeboard to the nearest dwelling FFL.
- 5.17. Cellular storage will have a minimum cover of 1.0m and will be designed to cater for the maximum loading expected in each situation, inspection chambers for access will be provided to assist in maintenance activities.
- 5.18. Swales, where provided will have side slopes of 1:3, a minimum longfall of 1:500, and depths vary.

6. Water Quality Improvements

- 6.1. CIRIA report C753 The SuDS Manual outlines the methodology for assessing water quality risks associated with new development. This is a simple index approach which provides a high level scoping analysis of the land usage and gives guidelines for appropriate treatment stages.



- 6.2. This process identifies features necessary to provide adequate substance removal in line with Environment Agency requirements. This is a three step process of Allocation, Mitigation and Review.
- 6.3. Surfaces generating runoff are ‘graded’ on their potential to contribute to various harmful pollutants and gives each surface a risk of pollution from each element. An extract of Table 26.2 within the SuDS Manual is set out below in **Figure 2**.

Figure 2 – Extract from Table 26.2 SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Other Roofs	Low	0.3	0.2-0.8	0.05
Low traffic residential roads and non-residential parking with infrequent change.	Low	0.5	0.4	0.4
Commercial yard, parking with frequent change, other roads,	Medium	0.7	0.6	0.7
Sites with heavy pollution	High	0.8	0.8	0.9

- 6.4. Historically, PPG3 documentation would recommend that pollutants were removed utilising oil separators, but since its superseding, more recent guidance has shifted to the use of SuDS features to remove pollutants; thereby providing significant improvements in treatment.
- 6.5. The use of non-mechanical features decreases the requirements for maintenance and increase natural biodiversity. That said, the SuDS Manual does not remove the possibility of utilising separators, so long as they are considered in partnership with a comprehensive overall SuDS regime.
- 6.6. Without adequate treatment, the pollutants would cause damage if they were to enter the watercourse or water table in large volumes. The use of SuDS features to slow down and degrade these pollutants is critical to the provision of an acceptable discharge.
- 6.7. The Residential Roofs of the proposed development are classified as ‘Very Low’ in accordance with the Pollution Hazard Level, which equals to Total Suspended Solids: 0.2, Metals: 0.2 and Hydrocarbons: 0.05.
- 6.8. In addition, the low traffic residential roads of the proposed development are classified as ‘Low’ in accordance with the Pollution Hazard Level, which equals to Total Suspended Solids: 0.5, Metals: 0.4 and Hydrocarbons: 0.4.
- 6.9. The indicative SuDS mitigation indices for discharge to watercourses are given by corresponding mitigation indices within the SuDS Manual. An extract of Table 26.2 is set out in **Figure 3** below.



Figure 3 – Extract from Table 26.2 SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Other Roofs	Low	0.3	0.2-0.8	0.05
Low traffic residential roads and non-residential parking with infrequent change.	Low	0.5	0.4	0.4
Commercial yard, parking with frequent change, other roads,	Medium	0.7	0.6	0.7
Sites with heavy pollution	High	0.8	0.8	0.9

- 6.10. The proposed attenuation basins provide treatment based on the mitigation indices for the Total Suspended Solids of 0.5, the Metals of 0.5 and Hydrocarbons of 0.6. As a result, the attenuation basins will provide adequate pollution mitigation for the pollutants that derive from the roofs of the residential development and partly for the residential roads. Forebays can also be provided to further enhance the treatment of the surface water.
- 6.11. The proposed permeable pavement will also provide water quality treatment. Therefore, the mitigation indices for the Total Suspended Solids will be 0.7, the Metals will be 0.6 and for the Hydrocarbons will be 0.7. As a result, the permeable pavement will provide more than adequate pollution mitigation for the pollutants that derive from for the residential roads and parking areas of the proposed development.
- 6.12. In line with Environment Agency guidance, as part of any future Reserved Matters Application, the proposals are reviewed and analysed in order to identify potential shortcomings and to ensure that an adequate quantum of SuDS features are provided to mitigate the risk of pollution from each source.

7. SuDS Maintenance Strategy

- 7.1. For the water treatment effects of SuDS features to remain effective, a comprehensive maintenance strategy should be implemented.
- 7.2. During construction, maintenance of SuDS features should be undertaken by the Contractor. Upon completion, the assets should be passed over to the Management Company, Local Authority, or community group commissioned to maintain the features in perpetuity.



- 7.3. As part of the strategy, a regular maintenance regime will be created, which consists of several primary measures required to ensure the longevity of the system. These should be undertaken on a regular basis to ensure consistent performance. Typical maintenance activities consist of:
- Inspecting and reporting; relatively regular review of the condition identifying issues and providing resolutions. Periodic review from the maintenance contractor;
 - Litter and debris removal;
 - Grass trimming, overall cutting and localised strimming preventing blockages;
 - Weed and evasive plant control;
 - Shrub management;
 - Aquatic and shoreline vegetation management;
 - Sweeping pervious surfaces; and
 - Oil removal from proprietary systems.
- 7.4. A remedial maintenance schedule would be recommended as part of the handover of the SuDS features, remedial maintenance is required to provide repairs to the system and monitor long term damage ensuring the system remains consistently productive. The schedule could consist of;
- Structure rehabilitation and repair;
 - Infiltration surface rehabilitation;
 - Scarifying to remove 'Thatch';
 - Spiking or Tining the soil;
 - Air pressure treatment.
- 7.5. The maintenance schedule contents and timing will depend upon multiple factors including usage, contents of water utilising the system, location and biology. The schedule will be finalised as part of subsequent Reserved Matters Applications; ensuring the most comprehensive maintenance schedule is incorporated for the phase in hand.
- 7.6. Community outreach can be undertaken as part of the development, which will raise awareness on the importance of SuDS to both flood risk and water quality in the local area. Imparting the new residents with knowledge on the risks associated with pollution to the surface water drainage system is key, as is the direct effect their actions may have on water quality and biodiversity in the area.



8. Ownership

- 8.1. The drainage system is designed to the appropriate standards including Design and Construction Guidance (DCG), the Building Regulations and the requirement of the NPPF.

Sewers

- 8.2. New pipes and manholes could ultimately remain in private ownership as there is no obligation on any Developer to progress to adoption, but typically such assets would be transferred to Thames Water Utilities Limited (TWUL) or NAV through a Section 104 Agreement (Water Act 2014). Once vested, these assets would be classed as public sewers.
- 8.3. However, under such a Section 104 Agreement, TWUL would limit adoption of assets to any headwall forming an inlet into a swale or attenuation basin for example. TWUL are not able to adopt such SuDS features, nor any downstream outlet headwalls, pipes or manholes. Such features would therefore reside within Management Company or Local Authority control.
- 8.4. Alternatively, pipes and manholes could be transferred to a New Appointment and Variation company (NAV), which is a process managed by Ofwat. NAVs are limited companies which provide a sewerage service to customers in an area which was previously provided by the incumbent monopoly provider such as TWUL.
- 8.5. Such NAVs are more flexible and forward thinking in their approach to adoption extents, and do not limit themselves to inlet headwalls like TWUL. Therefore, opportunities exist for wholesale adoption of all pipes/manholes and SuDS features.

SuDS Features

- 8.6. SuDS features such as swales, permeable paving, filter drains, attenuation basins are precluded from adoption by Thames Water Utilities Limited (TWUL) under a Section 104 Agreement. Irrespective of these features being on-line or off-line to the mainline sewer system, TWUL are unable to take ownership.
- 8.7. As a result, such features typically remain in private ownership and are transferred to a Management Company (ManCo) to ensure they are properly maintained and function correctly. Or if agreeable, they can be transferred to the Local Authority.
- 8.8. However, with the creation of NAVs, alternatives are now available, wherein they take ownership of SuDS features and ongoing maintenance as part of the wholesale adoption of the surface water network of sewers and manholes.



Adoption

- 8.9. The anticipated intention for adoption and ownership of drainage and SuDS is as follows:
- Surface water sewers within development parcels are likely to be offered for adoption to a NAV.
 - The shared permeable driveways are likely to remain within the control of a private Management Company.
 - Above ground attenuation (i.e. basins) are expected to be offered to the Local Authority as part of the overall public open space provision.
 - SuDS features serving single properties, for example, permeable paved driveways to single dwellings, will be owned and maintained by the owner of that property.
- 8.10. Suitable adoption and maintenance regimes for SuDS would be submitted in support of the Reserved Matters application.



Appendix 1 - Supporting Plans

A389-001 Site Overview Surface Water Strategy

A389-023 Site Wide SUDS Strategy



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NOTES:
1. Do not scale from this drawing.
2. Refer to all other project drawings and supporting notes.

KEY:

Proposed attenuation feature

Proposed Catchment

Proposed flow direction

Original Strategy attenuation feature

Proposed Thames Water Culvert

Proposed Residential Areas

Proposed SUDS Feature - Tree Pit within Rain Garden

Proposed SUDS Feature - Rain Garden

P11	05.24	R11 BASINS AMENDED	CS	LPA
P10	05.24	R13 BASIN AMENDED	CS	LPA
P9	05.24	R14 RIVER CROSSING FEATURES ADDED, R15 BASIN AMENDED	CS	LPA
P8	02.24	INTERNAL ISSUE		
P7	07.23	R13 BASIN UPDATED TO CATER FOR ADDITIONAL FURNISHING DISTON	KLW	LPA
P6	09.23	UPDATED IN LINE WITH SURFACE WATER TECHNICAL NOTE	KLW	LPA
P5	11.22	PANEL R4 ATTENUATION UPDATED IN LINE WITH CURRENT MASTERPLAN	KLW	LPA
P4	04.22	PANEL R4 ATTENUATION UPDATED TO AVOID FOOT DEVELOPMENT FLOOD EXTENTS	KLW	LPA
P3	04.22	UPDATED FOLLOWING DESIGN TEAM WORKSHOP AND REPORT OF SCB 26 INFORMATION	JA	KLW
P2	03.22	THAMES WATER CULVERT ADDED	JA	KLW
P1	10.20	FIRST ISSUE	JA	KLW
Rev		Description	Drawn	Checked

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Client

MILLER HOMES
KIER VENTURES

Project

SOUTH WOKINGHAM SDL

Title

SITE OVERVIEW
SURFACE WATER STRATEGY

Status

FOR INFORMATION

Scale

1:2000 @ A0

Date

MAR 2022

Drawn

KLW

Checked

LPA

Drawing No

A389-001

Revision

P11



FEATURE	BENEFIT			
	LOCAL FLOOD RISK	WATER QUALITY	BIODIVERSITY	AMENITY
ATTENUATION BASIN	✓	✓	✓	✓
CELLULAR STORAGE	✓	✗	✗	✗
SWALES	✗	✓	✓	✓
PERMEABLE PAVING	✓	✓	✓	✗
FILTER STRIP	✗	✓	✗	✓
RAIN GARDEN	✓	✓	✓	✓

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NOTES:
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KEY:

REGIONAL SUDS:
SWOR PROVIDED DETENTION FEATURE
SWOR PROVIDED WATERCOURSE

SITE LEVEL SUDS:
DETENTION BASIN WITH FOREBAY
LANDSCAPING TO IMPROVE WATER QUALITY.
OPPORTUNITIES FOR PERMANENT BODIES OF
WATER TO INCREASE BIO DIVERSITY AND
AMENITY BENEFIT.

SUB-SURFACE CELLULAR STORAGE

SOURCE CONTROL SUDS:
SHARED DRIVES/PARKING AREA WITH
PERMEABLE PAVING AND GRANULAR STORAGE
LAYER
LOCALISED FEATURES SUCH AS SWALES, FILTER
STRIPS AND RAIN GARDENS.
SWOR PROVIDED DETENTION BASINS AND
BIO-RETENTION / RAIN GARDENS AS PER SWDR
DESIGN DRAWINGS

EXISTING FEATURES:
MAIN RIVER - ENNIS BROOK

P3	07.24	BASINS UPDATED	R.W.	SM
P2	06.22	R10 PROVISION CLARIFIED	LPA	LPA
P1	06.22	FIRST ISSUE	R.W.	LPA

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Project
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Title
**SITE OVERVIEW
SUDS STRATEGY**

Status
FOR INFORMATION

Scale 1:2000 @ A0	Date JUN 2022	Author KLW	Checker LPA
Drawing No A389-023	Revision P3		

Transport
Development Planning
Sustainable
Deliver
Trusted
Enable
Site Appraisal
Hydrology
Highways
Civil Engineering
Successful
Travel Planning
Support
Drainage
Dynamic
Masterplanning
Flood Risk Assessment
Infrastructure Design

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