LODDON GARDEN VILLAGE
DRAINAGE STRATEGY

UNIVERSITY OF READING

12 SEPTEMBER 2025

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1.0 Introduction

Context

1.1. This Drainage Strategy has been prepared by Abley Letchford, on behalf of the University of Reading to support their Outline Planning Application for a mixed use development on land known as Loddon Garden Village (LGV).

1.2. The development consists of the following elements;

- up to 2,800 residential units to include up to 100 custom and self-build plots;
- 2 primary schools (up to 3 forms of entry) to include early years provision and 1 secondary school (up to 12 forms of entry);
- one District Centre, to incorporate up to 11,000m2 of Class E (Commercial, Business and Service, to include a food store of around 2,500m2), and Class F (Local Community and Learning);
- one Local Centre; to incorporate up to 2,400m2 of Class E;
- a Sports Hub to include sports pitches and pavilion space;
- up to 4,250m2 of further Class E, Class F, and sui generis development to include commercial, health care and public house;
- comprehensive green infrastructure including a Country Park, landscaping and public open space, and ecological enhancement measures;
- 20 gypsy and traveller pitches;
- comprehensive drainage and flood alleviation measures to include Sustainable Urban Drainage Systems (SUDS) and engineering measures within Loddon Valley for the River Loddon;
- internal road network including spine road with pedestrian and cycle connections and associated supporting infrastructure;
- new and modified public rights of way;
- associated utilities, infrastructure, and engineering works, including the undergrounding of overhead lines;
- Ground reprofiling to accommodate infrastructure, flood alleviation and development parcels;
- Up to 0.5ha of land adjoining St Bartholomew's church for use as cemetery;
- Electricity substation (up to 1.5ha)

1.3. LGV is identified as a development location within Wokingham Borough Council's Local Plan Update 2023 – 2040 via Policy SS13: Loddon Valley Garden Village. The approach to flood risk and drainage is covered through clause 7 which states:

> Development proposals should devise and implement a comprehensive drainage and flood alleviation strategy that:
>
> a) Provides high quality sustainable drainage systems (SuDS) that are integrated into the wider landscape and green and blue infrastructure strategy, including mitigation at source and makes a positive contribution to attractive open spaces, and improvement to biodiversity and water quality;
>
> b) Considers and takes opportunity as appropriate to improve the management of flood risk and reduce the risk of flooding to areas beyond the garden village; and
>
> c) Establishes clear and robust arrangements for future maintenance.

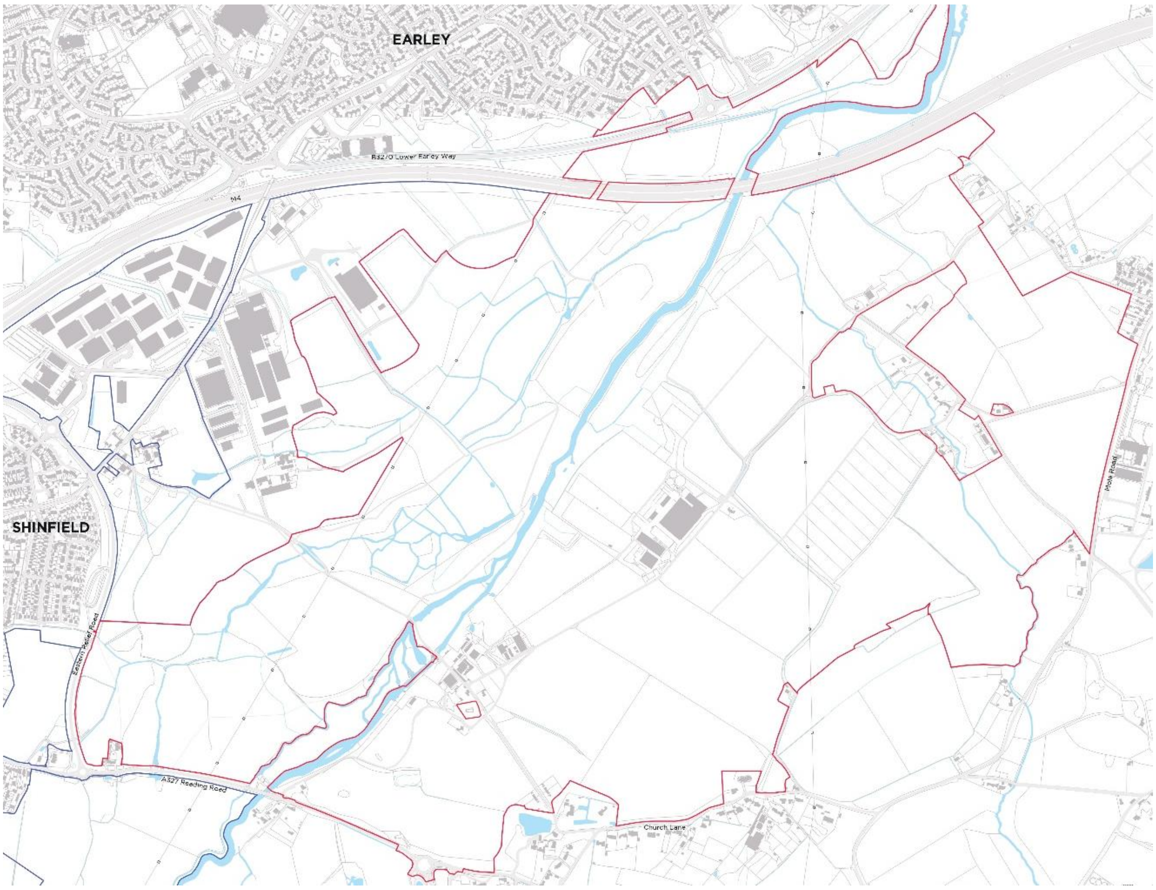
1.4. This report outlines the context of the existing site and introduces the principle of the strategies for managing surface water on the site, and for disposing of wastewater from the site.

1.5. This report and associated documentation / drawings will assist in demonstrating a sympathetic and collaborative approach to the implementation of green and blue infrastructure.

Site Location and Development Proposals

1.6. The site is located approximately 2.3km east of Shinfield, Reading and is approximately centred on OS grid reference 475575E, 168280N. The site location is shown in **Figure 1.1**.

Figure 1.1 - Site location plan



1.7. The site is bounded to the north by Reading, to the west by Shinfield, to the south by Arborfield and agricultural fields and to the east by Winnersh and Sindlesham.

1.8. The site consists predominantly of large agricultural fields, enclosed by mature hedgerow and tree boundaries. There are some farm buildings within the site boundary including the University of Reading's Centre for Dairy Research (CEDAR) and International Cocoa Quarantine Centre.

1.9. The site covers an area of approximately 397.4 hectares.

Structure of the Report

1.10. The structure of this Report utilises the following section headings:

- Section 2: Policy Background
- Section 3: Existing Drainage Conditions
- Section 4: Sustainable Drainage Systems (SuDS)
- Section 5: Proposed Surface Water Drainage Strategy
- Section 6: Proposed Foul Water Drainage Strategy
- Section 7: Water Quality
- Section 8: Conclusion

2.0 Policy Background

Introduction

2.1. This chapter provides a review of policy relevant to the drainage strategy and sources of information.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework (NPPF) provides vital guidance on managing surface water drainage in the UK to ensure that new developments are resilient to flood risks and contribute to sustainable urban planning. The NPPF, along with its supporting Planning Practice Guidance (PPG), emphasizes the importance of mitigating surface water flooding, particularly in areas with increased impermeable surfaces, which can lead to higher runoff rates.

2.3. National Planning Policy Framework (NPPF) calls for surface water disposal to follow a hierarchical approach as does Part H3 of the Building Regulations 2015. The three possible options listed in order of priority are:

- discharge into the ground (infiltration); or, where that is not reasonably practicable,
- discharge to a surface water body (river, watercourse); or where that is not reasonably practicable,
- discharge to a sewer, highway drain, or another drainage system.

Key NPPF Policies on Surface Water Management

2.4. The NPPF, supported by the Planning Practice Guidance (PPG), emphasises the importance of managing surface water runoff effectively to reduce flood risks. The key principles of the NPPF regarding surface water drainage strategies include:

- **Minimising Flood Risk Through Planning**

2.5. The NPPF requires local planning authorities to steer development away from areas at high risk of flooding through the application of the Sequential Test. This test ensures that new developments are located in areas with the lowest possible flood risk. However, when development must occur in areas at risk of flooding, the NPPF mandates the application of surface water management strategies to mitigate flood risk both at the development site and downstream.

2.6. Under paragraph 162 of the NPPF, local authorities must ensure that developments in flood-prone areas are resilient to current and future flood risks. Developers are expected to incorporate effective surface water management strategies into their proposals, especially in areas with a significant risk of surface water flooding.

- **Encouraging the Use of Sustainable Drainage Systems (SuDS)**

2.7. The NPPF promotes the use of Sustainable Drainage Systems (SuDS) as a preferred method of managing surface water in new developments. SuDS are designed to manage surface water as close to the source as possible, mimicking natural drainage processes by allowing water to infiltrate the ground, reducing runoff rates, and providing water quality benefits.

2.8. The Flood and Water Management Act 2010 and subsequent guidance reinforce the expectation that SuDS should be implemented in most major developments, particularly those with a significant amount of hard, impermeable surfaces. The NPPF's guidance encourages local authorities and developers to prioritise the use of SuDS over conventional drainage systems. These systems not only reduce the risk of surface water flooding but also provide environmental benefits such as improved water quality, biodiversity enhancement, and the creation of public amenities.

2.9. The NPPF paragraph 182 specifically states that major developments should incorporate SuDS unless there is clear evidence that it would be inappropriate. The expectation is that surface water runoff rates should be reduced to the pre-development greenfield rate or as close as possible to it, ensuring that developments do not exacerbate flood risks downstream.

- **Site-Specific Flood Risk Assessments**

2.10. The NPPF requires that site-specific flood risk assessments (FRA) be carried out for all developments in areas at risk of flooding, or for developments over 1 hectare in size in areas not considered to be at flood risk. The FRA must include detailed information on surface water management, demonstrating how runoff will be managed on-site and that the proposed development will not increase flood risks elsewhere.

2.11. The FRA should also take into account the potential impacts of climate change, with increased rainfall and more intense storm events being anticipated. In line with the NPPF, surface water management strategies must therefore ensure that development is resilient to both current and future risks, considering increases in peak rainfall intensity over the lifetime of the development.

Specific Requirements for Surface Water Drainage Strategies

2.12. Surface water drainage strategies, as set out in the NPPF, must be designed to manage runoff in a way that prevents increased flood risk both on-site and off-site. Key considerations outlined by the NPPF and PPG include:

- **Runoff Rates and Volumes**

2.13. The primary objective of a surface water drainage strategy is to manage runoff rates and volumes. The NPPF advises that the post-development runoff should not exceed pre-development rates. This is particularly important in urban areas where impermeable surfaces, such as roads and rooftops, can dramatically increase runoff. Developers are expected to demonstrate that their proposals include adequate storage for excess runoff during heavy rainfall events, typically through features like attenuation basins, ponds, and storage tanks.

- **Infiltration and Natural Drainage**

2.14. Wherever possible, the NPPF encourages the use of natural drainage techniques, such as infiltration, to manage surface water. In areas with suitable soil conditions, infiltration systems such as soakaways or permeable pavements should be prioritised. These systems allow water to infiltrate the ground, replenishing groundwater supplies and reducing the amount of runoff that enters drainage networks.

- **Surface Water Treatment**

2.15. The NPPF also requires that surface water management strategies address water quality. This involves treating runoff to remove pollutants before the water is discharged into rivers, streams, or groundwater. SuDS components, such as swales, wetlands, and retention ponds, can provide both water treatment and storage, helping to improve the quality of water being released from the site.

- **Long-Term Management and Maintenance**

2.16. Another key aspect of surface water management under the NPPF is ensuring that systems are maintained over the long term. SuDS and other drainage systems must have clear maintenance plans to ensure they remain effective throughout the life of the development. Local planning authorities are encouraged to seek assurances from developers regarding the long-term management of these systems, including funding and maintenance responsibilities.

Role and Responsibilities of WBC as Lead Local Flood Authority (LLFA)

2.17. As the LLFA, Wokingham Borough Council holds statutory responsibilities under the Flood and Water Management Act 2010, which requires local authorities to manage local flood risk from sources such as surface water, groundwater, and ordinary watercourses (i.e., rivers and streams that are not classified as "main rivers" by the Environment Agency). The LLFA is responsible for creating and implementing strategies that reduce flood risk, improve water management practices, and ensure public safety.

2.18. Wokingham Borough Council provides guidance on surface water drainage for major developments, aiming to reduce flood risk, protect the environment, and ensure sustainable drainage. The key principles of these guidelines typically align with national policies such as those outlined in the National Planning Policy Framework (NPPF) and Sustainable Drainage Systems (SuDS) principles.

2.19. The key responsibilities of WBC as the LLFA include:

- Flood Risk Management Strategy: WBC must develop a Local Flood Risk Management Strategy (LFRMS) that outlines how flood risk will be managed in the borough, particularly focusing on surface water, groundwater and ordinary watercourses. The strategy provides a framework for coordinated flood risk management and is supported by data gathered through assessments like the SFRA.

- Surface Water Management: Managing surface water flood risks is a priority in urban areas. This involves assessing potential flood risks from heavy rainfall events and designing appropriate mitigation measures, which are integral to the SFRA's findings
- Ordinary Watercourses: WBC manages flood risks from smaller rivers and streams, ensuring they are maintained and free from obstructions that could lead to local flooding.
- Flood Incident Investigation: When significant flood events occur, WBC is responsible for investigating the causes and impacts, identifying possible improvements to flood defences, and making recommendations to reduce future risks.
- Planning Consultations: WBC, as an LLFA, is a statutory consultee for all planning applications that may have flood risk implications. This involves assessing flood risk from development proposals and ensuring that adequate mitigation is in place.

The Strategic Flood Risk Assessment (SFRA)

2.20. The SFRA is a key tool used by WBC to assess flood risks and inform decision-making. The WBC Level 1 and Level 2 SFRA is a comprehensive document that assesses flood risks from a variety of sources, including rivers, surface water, groundwater, and sewers. The SFRA is developed in line with national planning policies, including the NPPF and Planning Practice Guidance (PPG). Its purpose is to provide robust evidence that supports flood risk management and informs the local planning process.

2.21. The SFRA is divided into two levels:

- Level 1 SFRA: This provides a general assessment of flood risk across the borough, identifying areas at risk from different sources of flooding. It is used to inform the Sequential Test, which ensures that development is steered away from areas with high flood risk wherever possible.
- Level 2 SFRA: This offers a more detailed assessment for specific sites that are being considered for development. It includes detailed hydraulic modelling and analysis, providing information that can be used for the Exception Test, which may be required if development is proposed in higher flood risk areas.

2.22. The SFRA supports WBC's planning and development control functions by providing an evidence base for making informed decisions about flood risk in relation to proposed development sites. It helps identify areas where flood mitigation measures are necessary and ensures that development is appropriate to the level of flood risk.

2.23. WBC's SFRA process involves a comprehensive assessment of various sources of flood risk. These assessments are critical to ensuring that both new and existing developments are resilient to flooding. The SFRA identifies areas that are vulnerable to flooding and recommends policies for flood risk mitigation. The key components of the SFRA flood risk assessment process include:

Fluvial Flooding (Rivers and Streams)

2.24. Fluvial flooding occurs when rivers or streams overflow their banks due to heavy rainfall or snowmelt. The SFRA assesses flood risk zones based on Flood Zones 1, 2, and 3, which are defined by the Environment Agency:

- **Flood Zone 1**: Low probability of flooding, affecting areas with less than 1 in 1,000 annual probability of river or sea flooding.
- **Flood Zone** 2: Medium probability, affecting areas with a 1 in 1,000 to 1 in 100 annual probability of flooding.
- **Flood Zone 3**: High probability, affecting areas with a 1 in 100 or greater annual probability of flooding from rivers or seas.

2.25. The SFRA incorporates flood data and models from the Environment Agency, including the latest updates to hydraulic models for rivers like the River Loddon, which is a key watercourse in the borough.

Surface Water Flooding

2.26. Surface water flooding, often caused by intense rainfall that cannot be absorbed by the ground or drained quickly enough, is a major concern for urban areas in Wokingham. The SFRA uses the Environment Agency's Risk of Flooding from Surface Water (RoFSW) maps to identify areas prone to surface water flooding. It assesses the severity of flood risk based on different rainfall event probabilities, including the 1 in 30 year, 1 in 100 year, and 1 in 1,000 year storm events.

2.27. The SFRA highlights areas where surface water flooding is a significant risk and recommends that developers incorporate Sustainable Drainage Systems (SuDS) to manage surface runoff effectively.

Groundwater Flooding

2.28. The SFRA assesses groundwater flooding risks by analysing geological data and groundwater flood susceptibility maps. Areas with high groundwater levels or permeable soils may be more prone to flooding, especially after prolonged periods of rainfall. Groundwater flooding can be less predictable but has long-lasting effects compared to other types of flooding. The SFRA highlights areas where surface water flooding is a significant risk and recommends that developers incorporate Sustainable Drainage Systems (SuDS) to manage surface runoff effectively.

Sewer Flooding

2.29. Flooding from sewers occurs when the capacity of the sewer system is overwhelmed by stormwater, leading to water backing up and flooding streets or properties. The SFRA incorporates data from Thames Water, the water utility company responsible for managing the sewer network in Wokingham, to identify areas at risk of sewer flooding.

SFRA and Planning Applications

2.30. One of the most important roles of the SFRA is to guide planning decisions in areas at risk of flooding. As the LLFA, Wokingham Borough Council uses the SFRA to ensure that the Sequential Test and, where necessary, the Exception Test are applied to proposed developments. These tests help ensure that development is directed away from high-risk areas, or if necessary, that developments in higher-risk areas are made safe and sustainable.

- **Sequential Test**: The Sequential Test ensures that development is steered toward areas with the lowest flood risk. If a proposed development is located in a higher-risk flood zone, the council will assess whether there are other suitable sites available in areas with lower flood risk (e.g., Flood Zone 1). If no alternative sites are available, the development can proceed to the Exception Test.
- **Exception Test**: The Exception Test is applied when development is proposed in higher-risk areas (Flood Zones 2 or 3). The test requires developers to demonstrate that the development will provide wider sustainability benefits that outweigh the flood risk, and that the development can be made safe for its lifetime without increasing flood risk elsewhere.

2.31. WBC's SFRA provides detailed guidance on how to apply these tests in planning decisions, ensuring that flood risk is considered at every stage of the development process. It also outlines flood risk mitigation measures.

2.32. The WBC SFRA and other associated planning documents provide detailed evaluations concerning developments like Loddon Valley Garden Village. This proposed development, outlined in the council's Local Plan Update, envisions around 3,930 homes, along with essential infrastructure such as schools, open spaces, and community facilities between Shinfield and Arborfield.

2.33. Flood risk is a key consideration in the planning process, and the SFRA is crucial in determining areas prone to flooding. The council uses these assessments to ensure that future developments, such as Loddon Valley Garden Village, are designed with flood mitigation measures and climate resilience in mind. The Level 1 and Level 2 SFRA documents provide insight into how flood risks will be managed, ensuring that development does not exacerbate flooding concerns in the region. For any development like Loddon Valley Garden Village, proper drainage and flood prevention measures would be crucial to mitigate flood risks, especially given the flood history in the surrounding area.

Wokingham Borough Council Planning Policy

2.34. The following policies in the emerging Wokingham Borough Local Plan Update 2023 – 2040 are relevant to the evolution of the project.

Policy SS13: Loddon Valley Garden Village

2.35. Loddon Valley Garden Village is designated as a strategic development location (SDL) with the goal of creating a thoughtfully designed community. The development will include around 3,930 homes, with 2,700 homes expected by 2040. At least 40% of these homes will be affordable, and provisions are included for custom-built plots, Gypsy and Traveller pitches, and specialist housing.

2.36. The village will also feature about 100,000 square metres of research and development space through the extension of the Thames Valley Science and Innovation Park. It will have vital infrastructure such as schools, a district centre with various services, local centres, a multifunctional country park, and measures to mitigate impacts on the Thames Basin Heaths Special Protection Area.

2.37. Provision will be made for two 3-form entry primary schools and an 8-form entry secondary school.

Policy C4: Green and Blue Infrastructure and Public Rights of Way

2.38. Policy C4 aims to ensure that new development supports and enhances green and blue infrastructure, including natural resources like rivers, streams, woodlands, and public rights of way.

2.39. Developments must contribute to improving biodiversity, flood risk mitigation, and creating recreational spaces. Public rights of way should be preserved and enhanced to improve accessibility for walking, cycling, and other sustainable transport options. Developers are encouraged to integrate green spaces and blue water elements into the design to contribute to ecological networks.

Policy FD2: Sustainable Drainage

2.40. Sustainable drainage systems (SuDS) are essential to managing surface water, especially considering climate change. All developments should incorporate SuDS to mimic natural water flow, returning run-off rates to pre-development levels. For greenfield sites, runoff should match original levels, while brownfield sites should achieve a reduction.

2.41. SuDS should provide ecological, social, and environmental benefits while being designed for long-term functionality. The policy also emphasizes the need for a clear maintenance strategy and a preference for natural drainage solutions over underground tanks.

Policy FD3: River Corridors and Watercourses

2.42. This policy focuses on conserving and enhancing the natural, ecological, and cultural value of river corridors and watercourses. Development proposals near rivers must respect the setting, improve public access, and protect the biodiversity associated with these environments.

2.43. Key principles include maintaining natural banks, preventing negative impacts on water quality, and ensuring that any river or watercourse culverting is avoided when possible. The policy also supports de-culverting where appropriate.

2.44. A minimum undeveloped buffer zone of 8m for rivers must be retained.

Wokingham Borough Council Water Cycle

2.45. A Phase 2 Water Cycle study for Wokingham Borough Council was published in July 2024. The aim of the study is to ensure sufficient water is available in the region to serve the proposed level of growth without impact to the environment.

2.46. The study identifies infrastructure upgrades will be required to serve the development with potable water and waste water collection infrastructure, but significant constraints to the provision of the infrastructure have not been identified. Arborfield sewage treatment works has been identified as requiring a growth upgrade in AMP8.

Wokingham SuDS Strategy – Guidance on the use of SuDS

2.47. Wokingham Borough Council's guidance on Sustainable Drainage Systems (SuDS) is focused on reducing flood risk, improving water quality, and enhancing biodiversity within the borough. The SuDS Strategy forms a key part of the council's commitment to managing surface water in an environmentally sustainable way, ensuring that new developments are designed to manage rainfall effectively.

2.48. For major planning applications (developments of 10 or more dwellings or equivalent non-residential developments), SuDS are required unless demonstrated to be unsuitable. These systems aim to mimic natural drainage processes, reducing surface water runoff and its associated risks. The strategy provides guidance for developers, ensuring that drainage designs comply with national standards and local requirements, integrating SuDS into the planning process.

2.49. Developers are expected to submit detailed drainage strategies and surface water management plans, which are subject to approval. Wokingham Borough Council also emphasizes early consultation with local authorities, the use of SuDS in line with flood risk policies, and requires robust maintenance plans to ensure the long-term effectiveness of these systems.

2.50. For further details, Wokingham Borough Council provides a SuDS Strategy Guide and other planning resources available on their official website.

Design and Construction Guidance (DCG)

2.51. The Code for Adoption of Foul and Surface Water Sewers offers comprehensive guidance for developers when planning and constructing drainage systems that will be adopted by sewerage companies under Section 104 of the Water Industry Act 1991. This document is pivotal in ensuring proper management of water resources, flood risks, and environmental impact in new developments.

Key Benefits:

2.52. Environmental Protection: The code ensures that drainage systems are designed to manage both foul and surface water effectively, reducing pollution risks to nearby water bodies. Sustainable Urban Drainage Systems (SuDS) are encouraged to manage surface water runoff in an environmentally friendly way.

2.53. Flood Risk Management: Developers are required to explore the surface water hierarchy and implement strategies that reduce the risk of flooding. This includes the use of infiltration systems, watercourse discharge, or, as a last resort, the public sewer system. Proper design considerations ensure that exceedance flows during extreme weather events are managed safely.

2.54. Compliance with Legislation: The document ensures compliance with national standards such as the Water Industry Act 1991, Defra's non-statutory technical standards, and other regulatory frameworks. Following this guidance helps developers align with legal obligations, ensuring their drainage systems meet necessary regulatory approvals.

2.55. Asset Adoption and Maintenance: By adhering to the design principles and providing the necessary documentation, developers can transfer long-term responsibility for drainage systems to sewerage companies, ensuring professional maintenance and reducing the burden on the developer.

Core Principles:

2.56. Holistic Design: Drainage design should be integrated with the overall development's layout, considering topography, street layouts, and ecological factors. For larger developments, this holistic approach is incorporated during the master planning phase to ensure the drainage infrastructure complements the site's design.

2.57. Surface Water Hierarchy: Developers must explore alternatives to sewer discharge, such as infiltration or discharge to watercourses, before considering sewer connections. Only when these alternatives are proven impractical can developers propose connection to a public sewer system.

2.58. Health and Safety: Drainage designs should consider the safety of future maintenance and operation. This includes the submission of health and safety files and a maintenance plan, ensuring the ongoing safety and sustainability of the drainage infrastructure.

Guidance for Planning Applications:

2.59. Engagement and Consultation: Early engagement with local authorities, including the local planning authority (LPA), lead local flood authority (LLFA), and sewerage companies, is critical. This helps align drainage strategies with national and local flood risk management plans and ensures proper statutory consents are obtained.

2.60. **Documentation:** Developers are expected to submit comprehensive documentation that demonstrates how surface water will be managed in accordance with the surface water hierarchy. This includes drainage strategies, maintenance plans, and safety assessments.

2.61. **Adoptable Systems:** The systems designed for adoption should be accessible and maintainable. The layout should ensure easy access for maintenance, and components not adoptable by the sewerage company must be maintained by other responsible bodies. Proper planning ensures the continued functionality and safety of drainage systems.

2.62. **Sustainable Drainage Solutions:** The adoption of SuDS is encouraged, promoting systems that reduce surface runoff, improve water quality, and enhance biodiversity. Developers must include evidence that sustainable solutions have been prioritized.

Summary

2.63. The Code serves as a framework for ensuring that new developments are equipped with effective, legally compliant drainage solutions that mitigate flood risks and protect the environment while providing a clear path for adoption and maintenance by sewerage companies.

3.0 Existing Drainage Conditions

3.1. The Site is primarily a greenfield site with some farm and research buildings. The site's surface water drainage is heavily influenced by natural watercourses, most notably the River Loddon and Barkham Brook, which both bisect the site. The River Loddon flows from the southwest to the northeast, while Barkham Brook runs from southeast to northwest, eventually discharging into the River Loddon. These watercourses play a significant role in the site's drainage, with much of the water flowing through these channels.

3.2. In addition to these major water bodies, the site also has a complex network of field drainage features and unnamed watercourses. These smaller watercourses drain into both the River Loddon and Barkham Brook, particularly in the north and northwest parts of the site. The drainage in the southeast flows towards Barkham Brook, while the northern and far southern areas drain towards the River Loddon.

3.3. The topography of the site, which generally slopes towards the River Loddon and Barkham Brook, further enhances the drainage patterns, with water moving naturally towards these lower-lying areas. However, this also creates areas of flood risk, particularly around the watercourses. The site's natural drainage is affected by both fluvial flooding from the rivers and surface water accumulation during heavy rainfall. There is also a raised motorway (M4) running through the northern part of the site, which can act as a barrier and cause localised ponding of surface water runoff.

3.4. The soils are a mixture of loamy and clayey types, with naturally high groundwater levels, which can influence drainage efficiency. Sustainable Drainage Systems (SuDS) have been proposed as mitigation, but site-specific investigations are necessary due to the risk of groundwater ingress affecting the hydraulic capacity of any below-ground structures. The use of infiltration methods may also be limited due to poor soil permeability and the presence of groundwater source protection zones.

3.5. In summary, the existing drainage condition of site relies heavily on its natural watercourses and drainage networks, which direct water towards the River Loddon and Barkham Brook. However, it is noted that parts of the site are prone to both fluvial and surface water flooding due to the local topography and the presence of impermeable infrastructure like the M4. As detailed further in the FRA, the areas of potential flood risk are primarily associated with the land west of the River Loddon, with some flooding within the watercourse corridors on the eastern side of the Loddon. It is noted that these areas are located outside of the proposed residential areas of the site.

3.6. In areas prone to surface water flow and flooding, retention of natural drainage flow paths and integration with blue-green infrastructure is critical. Development will aim to maintain pre-development surface water runoff rates, ensuring no increased flood risk either on or off-site.

3.7. The site's drainage strategy will account for future climate change impacts, as increased rainfall intensity could exacerbate flood risks. A robust system of attenuation, infiltration where appropriate, and surface water management is necessary.

3.8. There are no public foul water sewers within the site. Localised systems serve the farms and research buildings.

4.0 Sustainable Drainage Systems (SuDS)

4.1. Sustainable Drainage Systems (SuDS) have become a cornerstone of modern flood risk management and water quality protection. Developed in response to the growing need for more sustainable ways to manage stormwater, SuDS aim to mimic natural hydrological processes in urban environments. The SuDS Manual (C753), produced by CIRIA (the Construction Industry Research and Information Association), is a comprehensive guide that sets out best practices for the design, construction, and maintenance of SuDS. It provides detailed guidance on how SuDS can be integrated into new developments and retrofitted into existing infrastructure to manage runoff, reduce flooding, improve water quality, and create amenity and biodiversity benefits.

4.2. This overview will explore the key principles of SuDS, types of SuDS components, their design and performance criteria, as well as the benefits and challenges of implementing SuDS, as laid out in the SuDS Manual C753.

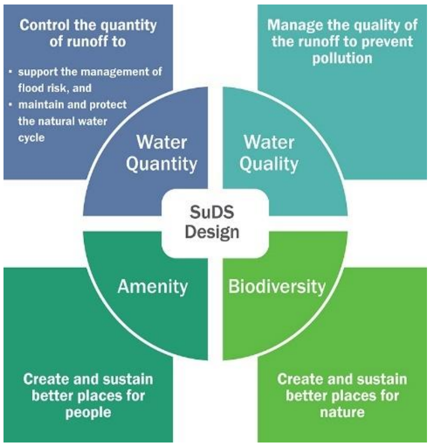
Principles of SuDS

4.3. SuDS are designed to address the challenges of managing surface water in developed areas. Conventional drainage systems often lead to rapid runoff, contributing to flooding, pollution, and habitat degradation. SuDS, on the other hand, offer a more sustainable approach by slowing down water flow, encouraging infiltration, and treating runoff at its source.

4.4. According to the SuDS Manual (C753), there are four key principles of SuDS:

- **Water Quantity Management**: SuDS manage the volume and flow of surface water to reduce the risk of flooding. This is achieved by slowing runoff, providing temporary storage, and promoting natural infiltration where possible.

Figure 4.1: Key SuDS Principles



*HR Wallingford, 2024

- **Water Quality Improvement**: SuDS help improve the quality of surface water by filtering out pollutants. This includes capturing suspended solids, heavy metals, oils, and other contaminants that are commonly found in urban runoff.
- **Amenity:** SuDS can be designed to enhance the local environment, providing recreational and aesthetic benefits. For example, features like ponds, wetlands, and swales can create attractive landscapes that offer spaces for leisure and relaxation.
- **Biodiversity:** SuDS can support and enhance local ecosystems. Wetlands, ponds, and vegetated areas can provide habitats for a wide range of species, promoting biodiversity in urban areas.

4.5. These principles emphasise the multi-functional nature of SuDS, which go beyond traditional drainage systems by delivering social, environmental, and economic benefits.

Types of SuDS Components

4.6. The SuDS Manual C753 categorises SuDS into several types of components, each with different characteristics and functions. These components are often used in combination to create a "treatment train," where water is managed progressively as it moves through the system.

Source Control

4.7. Source control SuDS manage surface water runoff as close to the source as possible. These systems reduce the volume and speed of runoff entering the drainage network. Key examples include:

- **Green roofs:** Vegetated roofs that absorb rainfall, reduce runoff, and provide insulation. Green roofs can significantly reduce the peak flow and total volume of runoff.
- **Permeable Paving:** Paving that allows water to infiltrate through surfaces rather than running off. This can be achieved through permeable concrete, asphalt, or block paving systems.
- **Rainwater harvesting systems:** These systems collect rainwater for reuse, reducing the amount of runoff and demand on mains water. The collected water can be used for non-potable purposes such as irrigation or toilet flushing.

Figure 4.2: Indicative Green Roof

Figure 4.3: Permeable Pavement

**The SuDS Manual (C753), CIRIA, 2015*

Conveyance

4.8. Conveyance SuDS are used to transport water across a site while slowing down its flow and promoting infiltration. These systems also provide opportunities to treat water and improve its quality. Examples include:

- **Swales**: Shallow, vegetated channels that convey runoff. Swales are effective at slowing down water flow, promoting infiltration, and trapping sediments and pollutants.

- **Filter strips:** Vegetated areas that treat runoff from impervious surfaces before it enters a conveyance or storage system. Filter strips can be integrated alongside roads, car parks, or footpaths.

Figure 4.4: Indicative Swale

**The SuDS Manual (C753), CIRIA, 2015*

Figure 4.5: Filter Strips

Storage

4.9. Storage components temporarily hold runoff, allowing water to infiltrate the ground or be released gradually to avoid overwhelming drainage systems. These components are crucial for managing peak flows during heavy rainfall. Examples include:

- **Detention basins**: Depressions in the ground that store water temporarily before it is discharged. Detention basins typically remain dry between storm events.
- **Ponds and wetlands**: Permanent water features that store runoff and treat it through sedimentation and biological processes. These features provide significant water quality improvements and create habitats for wildlife.

Figure 4.6: Indicative Detention Basin

**Essex County Council, 2024*

Figure 4.7: Indicative Pond/Wetland

**Sudsdrain, CIRIA, 2024*

Infiltration

4.10. Infiltration SuDS allow water to percolate into the ground, replenishing groundwater and reducing the amount of runoff entering the drainage system. Examples include:

- **Infiltration trenches**: Gravel-filled ditches that store and infiltrate water. They are typically used alongside roads or other paved areas.
- **Soakaways:** Underground chambers that collect water and allow it to infiltrate into the surrounding soil.

4.11. Each of these components can be adapted and combined depending on the site conditions, space availability, and specific flood risk management needs.

Blue-Green Corridors

4.12. Blue-green corridors are integrated urban spaces that combine natural water management features (blue) with vegetated areas (green), providing multifunctional benefits for both people and the environment. When paired with Sustainable Drainage Systems (SuDS), these corridors create resilient landscapes that not only manage water effectively but also offer a host of social, ecological, and economic advantages.

Figure 4.8: Indicative Green-Blue corridor

* *Civil & Structural Engineer Media, 2021*

Enhanced Flood Management

4.13. One of the most significant benefits of blue-green corridors is their ability to reduce flood risk. SuDS components such as swales, retention ponds, wetlands, and permeable surfaces slow down and store excess rainwater, reducing the pressure on conventional drainage networks. These systems can help manage peak flows during storm events, lowering the likelihood of flash floods in urban areas. The natural processes within the corridor allow rainwater to be absorbed, filtered, and released slowly, mimicking natural water cycles and providing long-term flood resilience.

Figure 4.9: Indicative cross section of a Green-Blue corridor

* *Civil & Structural Engineer Media, 2021*

Improved Water Quality

4.14. Blue-green corridors, through the use of SuDS, also help to improve water quality. As surface water passes through vegetated systems like bioswales, rain gardens, and wetland areas, contaminants such as oils, heavy metals, and sediment are naturally filtered out. This biological filtration reduces pollution in downstream rivers and water bodies, benefiting ecosystems and improving the quality of urban waterways. The gradual infiltration of water also helps to recharge groundwater supplies, supporting water resource sustainability.

Biodiversity and Ecological Value

4.15. SuDS-integrated blue-green corridors support biodiversity by providing diverse habitats for plants, animals, and aquatic species. The combination of water features and green spaces creates ecosystems where flora and fauna can thrive. Wetland areas can support amphibians, insects, and birdlife, while green spaces encourage pollinators, small mammals, and other wildlife. This biodiversity enriches the urban environment, helping to maintain ecological balance and contributing to the conservation of local species.

Urban Cooling and Climate Resilience

4.16. The vegetation and water bodies in blue-green corridors help to mitigate the urban heat island effect, where development tends to be warmer than surrounding rural areas due to the concentration of buildings and impermeable surfaces. The presence of water cools the air through evaporation, while trees and other vegetation provide shade and reduce heat absorption. This cooling effect is particularly important in the face of climate change.

Recreational and Social Spaces

4.17. Blue-green corridors create attractive, multi-functional public spaces that enhance the quality of urban life. These corridors often include footpaths, cycle routes, and seating areas, allowing communities to engage with nature in their daily lives. Accessible green spaces promote physical activity, mental well-being, and social interaction. The aesthetic appeal of blue-green corridors also increases the desirability of urban areas, contributing to a higher quality of life for residents and a sense of place.

Sustainability and Long-Term Environmental Health

4.18. SuDS within blue-green corridors contribute to the overall sustainability of urban areas. These systems are designed to work with natural processes, using the land's natural capacity to manage water, rather than relying on intensive, energy-consuming infrastructure. This supports the long-term environmental health of cities by promoting natural water cycles, reducing dependence on artificial drainage systems, and enhancing the resilience of urban environments to future climate impacts.

Overall

4.19. Blue-green corridors, when implemented with Sustainable Drainage Systems, provide a holistic approach to urban water management. By integrating water management, biodiversity enhancement, and recreational spaces, they offer a wide range of benefits—from flood risk reduction and water quality improvement to urban cooling and social well-being. As the United Kingdom faces growing environmental pressures, blue-green corridors represent an essential tool for creating resilient, liveable, and sustainable urban environments.

Design and Performance Criteria (CIRIA C753)

4.20. The design of SuDS is governed by a number of key performance criteria, which are detailed in the SuDS Manual. These criteria ensure that SuDS are effective in managing water quantity, improving water quality, and delivering additional environmental benefits. The main performance criteria include:

Hydraulic Design

4.21. Hydraulic design is focused on controlling the flow of water through a SuDS system. This includes determining the appropriate size of storage features, flow rates, and discharge rates to prevent flooding. The SuDS Manual recommends designing systems to manage a range of rainfall events, including:

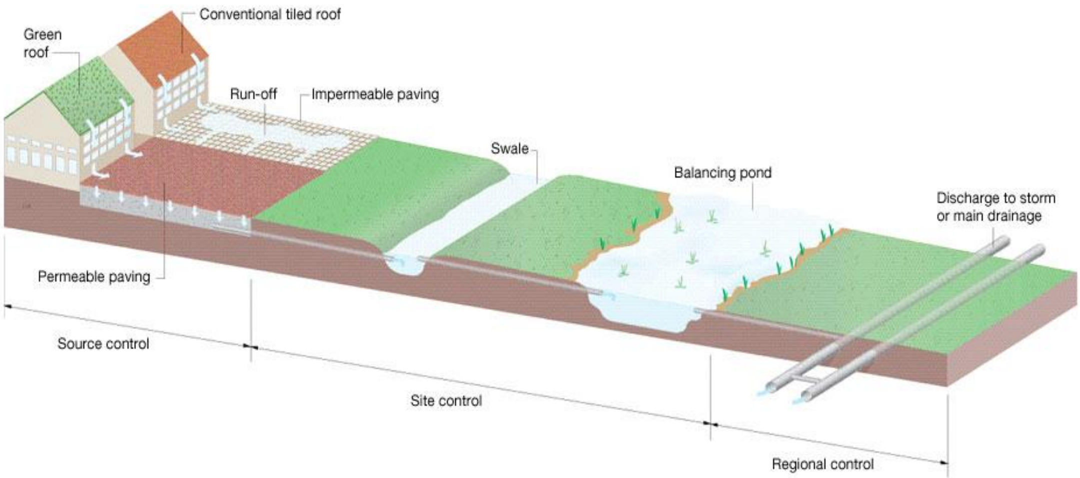
- **1 in 1 year storm event**: To control frequent, minor storms.
- **1 in 30 year storm event**: To manage more intense storms and reduce local flooding.
- **1 in 100 year storm event**: To protect against major storm events that could cause significant flooding.

4.22. Designers must also consider the impacts of climate change, with the expectation that storm intensity and frequency will increase over time. Systems should be resilient to these changes, ensuring long-term effectiveness.

Water Quality

4.23. The SuDS Manual emphasises the importance of treating runoff to improve water quality. The treatment performance of SuDS is based on the removal of pollutants such as suspended solids, nutrients, metals, and hydrocarbons. SuDS should provide multiple stages of treatment, often referred to as the "SuDS management train," to maximize pollutant removal. For example, a treatment train may include permeable paving to capture sediments, a swale to slow flow and allow for further sedimentation, and a pond to provide final treatment before discharge.

Figure 4.10: Indicative SuDS Management Train



**Brettpaving, 2024*

Amenity and Biodiversity

4.24. In addition to managing water, SuDS can create valuable public spaces and enhance biodiversity. The SuDS Manual highlights the importance of integrating SuDS into the urban landscape to provide recreational opportunities and visual appeal. Features like ponds, wetlands, and green roofs can be designed to offer aesthetic benefits, while also providing habitats for plants, birds, and aquatic species.

4.25. When designing for biodiversity, SuDS components should be carefully selected to provide varied habitats. Wetlands, for example, support a wide range of wildlife, including amphibians, invertebrates, and birds. Native planting schemes and varying water depths can enhance these habitats.

Benefits of SuDS

4.26. The benefits of SuDS go far beyond traditional flood control methods. SuDS provide a holistic solution to managing water in the built environment, delivering a range of social, environmental, and economic benefits. Some of the key benefits outlined in the SuDS Manual include:

Flood Risk Reduction

4.27. One of the primary benefits of SuDS is reducing the risk of flooding. By managing water at its source, slowing its flow, and providing temporary storage, SuDS help prevent surface water from overwhelming drainage systems. This is particularly important in urban areas, where impermeable surfaces can lead to rapid runoff during storms.

Water Quality Improvement

4.28. SuDS provide significant improvements to water quality by filtering pollutants from runoff before it reaches watercourses. This protects rivers, lakes, and coastal waters from contamination and helps meet the requirements of environmental legislation such as the Water Framework Directive.

Enhanced Amenity and Aesthetics

4.29. By incorporating water management features into the landscape, SuDS can create attractive and functional public spaces. Features such as ponds, swales, and green roofs can enhance the visual appeal of a development while also providing spaces for recreation and relaxation.

Biodiversity and Habitat Creation

4.30. SuDS can play a vital role in enhancing biodiversity by creating new habitats for wildlife. Wetlands, ponds, and green spaces can support a wide variety of plant and animal species, contributing to the overall ecological value of urban area.

Economic Benefits

4.31. In addition to the environmental and social benefits, SuDS can also offer economic advantages. By reducing the risk of flooding, SuDS can prevent costly damage to property and infrastructure. They can also increase property values by improving the aesthetics and environmental quality of developments.

Overall

4.32. Sustainable Drainage Systems (SuDS) are an essential tool for managing surface water in a sustainable and resilient manner. The SuDS Manual C753 provides comprehensive guidance on how to design, implement, and maintain SuDS to achieve the best possible outcomes for flood risk management, water quality improvement, amenity, and biodiversity. By integrating SuDS into urban developments and retrofitting them into existing infrastructure, communities can reap the many environmental, social, and economic benefits of sustainable water management.

4.33. The successful implementation of SuDS requires careful planning, stakeholder collaboration, and long-term commitment to maintenance. Overcoming challenges such as space constraints, maintenance, and regulatory issues will be key to achieving the full potential of SuDS in managing water sustainably for future generations.

5.0 Proposed Surface Water Drainage Strategy

Introduction

5.1. This chapter provides an overview of the proposed surface water drainage strategy for the site and measures to drain the proposed Development that has been informed by discussions and workshops with WBC.

Overall Strategy

5.2. The Proposed Drainage Strategy has been developed to achieve the requirements of NPPF and local plan policies and foresees the provision of a comprehensive Sustainable Drainage System (SuDS). 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.

5.3. Sustainable Drainage Systems (SuDS) are proposed as mitigation and have been sized to attenuate surface water flow. Further investigation will be required as designs progress to determine whether measures to limit groundwater ingress into SuDS features are required.

5.4. These features offer a holistic treatment train and management system to the benefit of new residents, members of the wider community, downstream receptors, and the environment.

5.5. The selection of the most appropriate SuDS needs to consider existing constraints, ownership and maintenance issues. To that end, the most suitable SuDS features that could be incorporated into this Site are:

- Attenuation Basins
- Permeable paving
- Swales
- Filter Drains
- Bioretention Systems
- Sub surface storage in the form of attenuation crates or tanks; and
- Use of existing natural ditches and watercourses

5.6. The use of infiltration methods requires careful consideration due to poor soil permeability and the presence of groundwater source protection zones.

5.7. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. Changes of land uses can have significant downstream impacts where existing drainage systems may not have sufficient capacity for any additional surface water flow.

5.8. A surface water management strategy is therefore required to manage and reduce the flood risk posed by the surface water runoff from the site. The proposed surface water drainage strategy for the site has been developed such that the volumes and peak flow rates of surface water leaving the developed site are no greater than the rates of the pre-development scenario.

5.9. The site's drainage strategy accounts for future climate change impacts, as increased rainfall intensity could exacerbate flood risks.

5.10. All designs will be in accordance with best practice as stipulated in EA Report SC030219 'Rainfall Runoff Management for Developments'. FEH Rainfall data 2022 (FEH22) will be utilised in line with the requirements of CIRIA 753 guidance.

5.11. All conveyance systems will be designed to cater for the 1 in 30 year storm event (3.3% AEP), in accordance with industry standard, with all attenuation features designed to allow for the 1 in 100 year storm event (1% AEP) plus 40% climate change allowance.

5.12. In line with the "Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for Adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code")" guidance, all adoptable sewers will have a minimum diameter of 150mm.

5.13. The following SuDS components are deemed applicable to the site:

- Pervious surfacing systems – structural surfaces that allow water to penetrate into a granular sub base layer that is either unlined so water infiltrates to ground, or lined so water is conveyed through the system thus providing storage and treatment, e.g., permeable paving.
- Conveyance systems – components that convey flows to downstream storage systems, e.g. swales and filter drains.
- 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., filter strips and proprietary treatment systems.

Pre and Post Development Areas/Rates

5.14. 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.

5.15. An assessment of the existing greenfield surface water runoff has been undertaken, using the online HR Wallingford tool, greenfield run off rates are shown below in Table 5.1 for the various rainfall events.

Table 5.1 Pre-Development Runoff Rates/Volumes per Hectare

Annual Probability	Greenfield/Pre-Development Runoff Rate per hectare (l/s)
1 in 2 year event	3.9
QBar	4.4
1 in 30 year event	10.1
1 in 100 year event	14.0

5.16. Based on the Illustrative Masterplan, it has been conservatively estimated that the impermeable surfaces will be approximately 65% of the developable area. Depending upon how future Reserved Matters Site Layouts evolve, this percentage typically reduces slightly to around 55-60%.

5.17. The use of 65% therefore provides for a robust assessment which allows for fluctuations in residential density, and future urban creep of up to 10% on private curtilage areas, which typically results in approximately 5% of the total area, in accordance with The SuDS Manual (CIRIA 753).

5.18. In order to comply with best practice as stipulated in EA Report SC030219 'Rainfall Runoff Management for Developments', proposed discharge rates should be restricted to one of two methods for all storms up to and including the 1 in a 100 year storm event plus a 40% allowance for climate change.

Variable Greenfield discharge rates

5.19. This would require traditional onsite attenuation to hold back flows controlled by a complex control device, such as multiple vortex control devices. Discharge rates would be set so as not to exceed the pre-development 1in1, 1in30 and 1in100 year runoff rates set out in Table 5.1 based upon the appropriate catchment area.

5.20. In addition to this onsite attenuation, consideration of Long Term Storage would also be necessary given the increase in discharge volume generated by the proposed development, over and above that pre-development. This storage would need to be released into the surrounding watercourses at a low rate of 2.0 l/s/ha. This would normally be controlled by a secondary attenuation area and supplemental control device.

QBAR Greenfield discharge rate

5.21. Alternatively, all discharge flows could be restricted to Qbar. This would negate the requirement for Long Term Storage and again flows would be attenuated on site and discharged utilising an onsite control device, such as a vortex control device. This normally requires a greater volume of attenuation.

5.22. For the purposes of this report and to provide a robust analysis, all attenuation requirements have been calculated utilising all discharge flows restricted to Qbar, as this is normally the worst case scenario. As shown in Table 5.1, Qbar is taken as 4.4l/s/ha for this site.

5.23. The use of Qbar gives a value for the average annual peak runoff rate, this provides a comprehensive SuDS scheme with the volume runoff being reduced for intense storms. However, either method described above is viable and will be investigated further during detailed design.

5.24. With the above in mind, and having assessed limiting the offsite discharge rate to Qbar, the anticipated attenuation volumes for a 100 year storm with a 40% allowance for climate change have been calculated for each catchment and are shown on Surface Water Strategy Drawing, A392-024 found in **Appendix A**.

5.25. It likely that at Reserved Matters stage, a mixture of both strategies may be beneficial as complexities can lie within the use of the variable discharge rates especially when used at source but the reduction of the required storage volumes can have other benefits for the use of the development such as dedicated green space areas and play areas.

Surface Water Proposals

5.26. It is proposed to provide a network of roadside swales, bioretention features such as pits and filter strips, and traditional pipes to collect the surface water runoff from impermeable areas such as roads, roofs and driveways.

5.27. This system will work in combination with source control drainage techniques within development parcels, with attenuation basins and sub-surface storage features providing attenuation storage, and high water quality benefits, with flow restricted by a proprietary device (e.g. flow control chamber and orifices) to hold back water throughout the SuDS train and ensure flows are released at the greenfield rate for the specific phase. Refer to **Appendix A** for the proposed drainage strategy for the development.

5.28. The proposed development will mimic and it will not alter the existing topography in accordance with The SuDS Manual (C753). Therefore, the entire site will be split in several catchments.

5.29. Due to the size and topography of the site, a number of catchments have been established. Each catchment will benefit from its own principal attenuation basin and outfall point into nearby ditches and watercourses. At this stage, basins have been sized to provide the full attenuation from the catchment, assuming 65% of the catchment is impermeable and discharge rates are limited to Qbar. This ensures sufficient space is provided within the masterplan to incorporate sensitively designed attenuation basins. However, as design develops and additional SuDS features can be detailed within the catchment, the required basin volumes may be reduced.

5.30. Basins will form an integral part of the landscape and will be designed to reflect the landscape typologies within which they are located. For example, within amenity green space, the basins will be designed with side slopes with a maximum gradient of 1 in 5 to provide access for amenity use. Informal seating and steps may be included as well as features to promote play. The design of basins and those shown indicatively have been derived from discussions between both drainage and landscaping consultants and WBC. These basins will be predominantly dry until rainfall events.

5.31. Within the natural green space typology, the basins will be designed to look more natural, with permanent water bodies and shallow side slopes to provide wildlife habitat.

5.32. Planting within the basins will be selected to tolerate variations in water levels, and will enhance the water quality of run off leaving the basin.

5.33. Between development areas, SuDS features will be designed with more formal edges such as rain gardens within areas of hard landscaping. These can also incorporate play features and seating in keeping with the surrounding landscape.

5.34. Open SuDS features will be designed so as not to compromise the safety of residents, visitors and their property. Generally open boundaries are provided, and perimeter planting could be utilised to define the extents of the features.

5.35. For the purposes of the Outline Application and robustness, proposed discharge rates have been restricted to Qbar for all storm events up to and including the 1 in 100 year storm event plus 40% allowance for climate change and this will be achieved by utilising on-site flow control devices such as a vortex flow devices (hydrobrakes).

5.36. All conveyance systems will be designed to cater for the 1:30 year storm event, in accordance with industry standard, with all attenuation features designed to allow for the 1 in 100 year storm event plus 40% climate change allowance.

5.37. The proposals draw reference to the DEFRA document Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems March 2015, as well as CIRIA C753 The SuDS Manual.

5.38. Any current uncontrolled pluvial runoff exhibited onsite during high rainfall events will be mitigated as a result of the Development. This will occur by virtue of the change in surface from greenfield to positively drained impermeable areas, which will serve to capture, attenuate and delay surface water runoff to the nearby watercourses. This will be a benefit to downstream receptors.

5.39. The use of source control techniques (such as swales, granular strips and permeable paving) within development parcels will assist with the reduction of larger attenuation storage features. This will be embraced and investigated as the project progresses.

5.40. Subject to the provision of additional geotechnical information, the attenuation basins may require partial lining to protect against the ingress of natural groundwater. Such lining provides the ability to create localised, small permanent bodies of water which adds landscaping and biodiversity opportunities to the scheme.

5.41. The design of the conveyance features such as swales and filter drains will be in accordance with CIRIA C753 The SuDS Manual and will form part of the proposed blue-green corridors.

5.42. Safe access and egress will be always provided.

Exceedance Flood Routing

5.43. Exceedance flood routes are an essential aspect of flood risk management in the UK, where increasing urbanization and changing weather patterns have heightened the risk of surface water flooding. These routes serve as overflow pathways for water when drainage systems exceed their design capacity, often due to heavy rainfall or storms. By strategically directing floodwaters away from vulnerable areas like homes and infrastructure, exceedance flood routes help mitigate damage and reduce the risk to human life.

5.44. In the UK, the increasing frequency and intensity of heavy rainfall events are being driven by climate change, which poses significant challenges to drainage systems, especially in urban areas. Many UK drainage networks were designed decades ago to handle less severe weather conditions, typically managing rain events with a return period of 1 in 30 years. However, with rainfall patterns now exceeding these thresholds, there is a growing need for effective exceedance flood routing as part of flood resilience planning.

5.45. The Environment Agency and local authorities across the UK have integrated exceedance routes into urban planning policies to manage surface water flooding more effectively. These routes are critical in urban areas, where impermeable surfaces like roads and pavements prevent natural infiltration, leading to higher volumes of runoff.

5.46. Exceedance routes are often designed in conjunction with other flood mitigation strategies, such as Sustainable Urban Drainage Systems (SuDS), to create a holistic approach to flood risk management. Key elements of exceedance flood routes include:

- **Natural Topography Utilisation:** In the UK, local topography often provides natural pathways for water flow. These natural channels, such as valleys, streams, or slopes, are incorporated into flood risk management strategies to direct water away from built-up areas.
- **Urban Design Features:** Streets, pavements, and car parks are designed to act as temporary flood routes in the event of drainage system exceedance. Roads can channel water to lower-risk areas, such as parks or retention basins, away from homes and critical infrastructure.
- **Flow Barriers and Raised Structures:** In areas prone to flooding, the UK's Building Regulations and flood risk guidelines often require the Finished Floor Levels (FFLs) of buildings to be set higher than the surrounding ground level. Setting FFLs well above anticipated flood levels—typically 150mm or more above the surrounding ground or the predicted flood level—is a key strategy in reducing the risk of water ingress into buildings. This measure ensures that even during exceedance events, where surface water accumulates, buildings remain protected.
- **SuDS Integration:** SuDS such as permeable paving, detention ponds, swales, and green roofs are implemented across new developments in the UK to manage surface water runoff at the source. These systems slow down the flow of water, allowing it to infiltrate the ground

gradually, or temporarily store it in designated areas, thus reducing the pressure on conventional drainage systems during heavy rain events.

5.47. As part of this Drainage Strategy, flows in excess of the 1 in 100-year storm plus 40% climate change, will be kept within the internal road network, until such time as they can be directed into adjacent landscaping areas or existing vegetation/woodland. This ensures that on site and offsite residential units are afforded an increased level of protection from flood waters.

5.48. Finished Floor Levels (FFLs) play a critical role in managing flood risks, especially in areas where exceedance flood routes are necessary. By setting FFLs high—often above predicted flood levels—the risk of water entering buildings during a flood event is minimized. The Environment Agency typically recommends that FFLs for residential properties be set at least 300mm above the known flood level, though this can vary based on local conditions. This precaution ensures that, even during exceedance flood events, where water may flow down streets or around buildings, it does not enter homes or businesses.

5.49. The proposed attenuation basins of the Development are designed to provide a minimum of 300mm freeboard and therefore can accept additional flood water from manholes upstream.

SuDS Maintenance

5.50. For the water treatment effects of SuDS features to remain effective, a comprehensive maintenance strategy should be implemented.

5.51. During construction, maintenance of SuDS features should be undertaken by the Contractor. Upon completion, the assets should be passed over to the Management Company, statutory authority, or community group commissioned to maintain the features in perpetuity.

5.52. 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.

5.53. 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 Tinning the soil;
- Air pressure treatment.

5.54. The maintenance schedule contents, and timing will depend upon multiple factors including usage, contents of water utilising the system, location and biology. To this end, it is suggested that the schedule be finalised as part of future applications; ensuring the most comprehensive maintenance schedule is incorporated for the phase in hand.

5.55. 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.

Adoption and Ownership

5.56. Whilst a drainage system can be designed to the appropriate standards including Design and Construction Guidance (DCG), the Building Regulations and the requirement of the National Planning Policy Framework, ongoing maintenance will be required to all drainage elements.

5.57. Until such time as assets are passed through for adoption, the Developer has an obligation to maintain the SuDS features and associated drainage network in accordance with the approved scheme.

5.58. The intention of adoption and ownership of drainage and SuDS is as follows:

- Surface water sewers within development parcels to be offered for adoption to Thames Water or NAV under the Section 104 process of the Water Industry Act.
- Surface water highway drains, gullies and leads within adopted roads to be maintained by the Highway Authority.
- Above ground attenuation (i.e. swales and basins) to maintained by a NAV or a private maintenance company funded by residential properties or subject to agreement passed to the Local Authority.
- SuDS features serving single properties, for example, permeable paved driveways to single dwellings, will be owned and maintained by the owner of that property.

6.0 Foul Water Drainage Strategy

Introduction

6.1. This chapter provides information on the proposed foul water drainage strategy and measures to convey effluent.

Overall Strategy

6.2. There are no existing foul sewers within the site and therefore new points of connection will need to be established. Thames Water sewers are located in Reading Road to the south of the site. This includes a gravity network discharging to a local pump station with flows ultimately being pumped to the Arborfield Sewage Treatment Works which is located approximately 2km from the site.

6.3. Due to the topography of the site and location of the public foul sewer network, wastewater from the site cannot flow entirely by gravity to the receiving public sewer and a number of pump stations will be required.

6.4. The proposed strategy is shown on drawing A392-123 A in **Appendix A**. The site has been split up into 4 catchments based on topography with a gravity network conveying flows to a pump station in each catchment.

6.5. A terminal pump station will be established within Phase 1, with satellite pump stations located in Phases 2, 3 and 4.

Design Flows

6.6. Foul flows have been calculated for the proposed development and is summarised below.

Table 6.1 Foul Peak Flow Rates

Pump Station	Land Use	Peak Flow (l/s)
1	430 Dwellings Primary School Secondary School	36.59
	Pumped flows from PS2, 3, 4, 5*	Total 173.91
2	1412 Dwellings District Centre	69.16
3	550 Dwellings Primary School	29.31
4	409 dwellings Primary School	18.94

** PS 5 is located outside red line boundary but provision is made within PS1 for flows from PS5 in case a point of connection cannot be found for PS5 separately.*

6.7. Within Phase 1, a network of sewers will convey foul flows by gravity to the pump station. A rising main from the Phase 1 pump station will discharge foul flows into the Thames Water sewer with an assumed point of connection in Reading Road to the south of the site.

6.8. As subsequent development phases come forward, additional pump stations will be established with flows discharging via rising mains from the satellite pump stations into the Phase 1 gravity network and then on to the Phase 1 pump station.

6.9. Discussions between Abley Letchford and Thames Water have been taking place since early 2022 to develop the foul water drainage strategy for this site in an appropriate and timely manner.

6.10. Thames Water determines capacity and a suitable point of practical connection to the public sewerage through their Pre-Planning Enquiry process. This includes a high-level internal hydraulic analysis to establish if the development can be accommodated within its sewer network and sewage treatment works, whilst still within their allowable discharge and treatment rates.

6.11. This initial Pre-Planning Enquiry to Thames Water has established inadequate sewer capacity within the immediate vicinity and known performance issues at the Arborfield Sewage Treatment Works.

6.12. Discussions are ongoing with Thames Water regarding the extent of additional off-site sewers or improvements to existing sewers that will be required to provide sufficient capacity to service the development.

6.13. Since April 2018, upgrades are funded by Thames Water through their New Infrastructure Charging mechanism or, in the case of large development projects such as this, through Business Plan/Asset Management Plan (AMP) funding where strategic infrastructure is required. Should network capacity improvements be required, certainty of delivery is therefore guaranteed as the reliance on the Developer to facilitate upgrades is removed.

6.14. The proposed foul water sewers and pump stations will be designed in collaboration with Thames Water as approving body in accordance with the new Sewerage Sector Guidance (SSG) and will be offered to Thames Water or NAV for adoption under S104 Agreements of the Water Industry Act.

Adoption and Ownership

6.15. The drainage system will be designed to the appropriate standards including the new Sewerage Sector Guidance (SSG), the Building Regulations and British Standards.

6.16. Foul water sewers within infrastructure roads, development parcels and offsite to the point of connections are to be offered for adoption to Thames Water or NAV under the Section 104 process of the Water Industry Act.

7.0 Water Quality

Introduction

7.1. Water quality is an essential component of environmental management, especially in urban and developed areas where human activities contribute to pollution. Untreated runoff from impermeable surfaces, such as roads, rooftops, and industrial sites, can carry various contaminants, including heavy metals, oils, nutrients, and sediments, into natural water bodies, affecting ecosystems and human health. The concern over deteriorating water quality has grown in parallel with the rise in urbanisation and industrial activities. Thus, the integration of effective drainage systems plays a crucial role in mitigating water pollution. Sustainable Drainage Systems (SuDS), outlined comprehensively in the SuDS Manual C753, offer an approach that not only manages flood risks but also improves water quality through natural processes.

SuDS Components and Their Role in Water Quality

7.2. SuDS utilise a variety of components that mimic natural hydrological processes to manage surface water. Each component plays a role in improving water quality through various mechanisms, such as sediment capture, filtration, biological uptake, and infiltration.

- **Permeable Pavements:** Permeable surfaces, such as permeable asphalt, concrete, or block paving, allow water to infiltrate through the surface into the underlying materials where it is stored and slowly released. These systems not only reduce runoff but also improve water quality by trapping sediment and pollutants in the surface or sub-base layers, where biological processes can break down contaminants.
- **Swales**: Swales are shallow, vegetated channels that convey surface water runoff. Their vegetated surfaces help slow the flow of water, promoting sedimentation and infiltration. Swales can remove pollutants such as suspended solids, metals, and hydrocarbons through filtration, adsorption, and plant uptake. In addition, they can be designed to allow for infiltration where appropriate, further improving water quality.
- **Filter Strips:** Filter strips are vegetated areas, often grass or other low-maintenance vegetation, positioned to treat runoff from impermeable surfaces before it reaches downstream water bodies. Water passes through the vegetation, where larger sediment particles settle, and finer pollutants are filtered or absorbed by the soil and vegetation. Filter strips are often used in conjunction with other SuDS components to provide pretreatment for more intensive systems like wetlands or ponds.
- **Infiltration Basins and Trenches:** Infiltration systems, such as basins or trenches, allow water to soak into the ground. These systems reduce the volume of runoff and help recharge groundwater, while filtering out pollutants through the soil matrix. The biological activity within the soil can break down organic pollutants, making infiltration systems an effective means for improving water quality.

Ponds and Wetlands: Ponds and constructed wetlands are key components of SuDS that provide multiple stages of water treatment. Ponds allow suspended solids to settle, while wetlands further treat water through complex biological processes. The dense vegetation in wetlands provides a surface for pollutants to adhere to, while plants take up nutrients, and microbial processes break down organic matter and contaminants. Wetlands are particularly effective at reducing nitrogen and phosphorus concentrations, which are common pollutants in urban runoff.

Water Quality Management in SuDS: Mechanisms and Processes

7.3. The SuDS Manual C753 emphasizes the importance of water quality management and outlines specific processes by which SuDS components achieve pollutant removal. These processes include:

- **Sedimentation:** The removal of suspended solids from runoff as water slows down, allowing particles to settle. This process occurs in features such as swales, ponds, and sedimentation basins. By capturing sediments, these systems prevent the transport of heavy metals and other attached pollutants to watercourses.
- **Filtration:** Physical filtering of runoff through soil or a permeable medium. Permeable pavements, filter strips, and vegetated systems like swales and wetlands provide filtration, removing fine particles and associated contaminants.
- **Adsorption:** Pollutants adhere to surfaces of soil particles, vegetation, or other materials. This process is particularly effective for removing metals and hydrocarbons. Vegetated SuDS components, such as swales and wetlands, play a significant role in pollutant adsorption.
- **Biodegradation:** Microbial processes break down organic pollutants, such as oils and hydrocarbons, in the soil or on plant surfaces. Biodegradation occurs in systems with high biological activity, including wetlands and infiltration systems. It is a critical process for treating pollutants that cannot be removed through physical means.
- **Uptake by Vegetation:** Plants in SuDS systems can take up nutrients, such as nitrogen and phosphorus, from runoff. This process is important for reducing nutrient loading, which can lead to eutrophication in receiving water bodies. Wetlands and vegetated swales are particularly effective at nutrient uptake.

Best Practices from The SuDS Manual (C753)

7.4. The SuDS Manual C753 provides detailed guidance on designing, implementing, and maintaining SuDS to maximize their benefits for water quality. Some of the key recommendations include:

- **Treatment Train Approach:** The SuDS Manual advocates for a "treatment train" approach, where multiple SuDS components are used in sequence to progressively improve water quality. For example, runoff from a road might first pass through a filter strip to remove coarse sediment, then a swale for additional filtration and infiltration, and finally a pond or wetland for biological treatment and attenuation.
- **Designing for Pollutant Removal**: SuDS should be designed to target specific pollutants based on the characteristics of the site and the type of runoff. For instance, areas with

significant vehicular traffic may require systems that effectively remove hydrocarbons and heavy metals, while areas with high nutrient loads may benefit from wetlands or bio-retention systems that target phosphorus and nitrogen removal.

- **Maintenance and Monitoring:** Effective water quality management through SuDS requires ongoing maintenance to ensure that systems function as designed. Sediment build-up, clogging of infiltration surfaces, and degradation of vegetation can reduce the efficiency of SuDS over time. Regular monitoring is essential to assess performance and guide maintenance activities.
- **Community and Ecological Benefits**: SuDS should not be viewed solely as engineering solutions. Their integration into landscapes can provide broader ecological and social benefits. For example, ponds and wetlands can support biodiversity, while green spaces enhance the aesthetic and recreational value of urban developments.

7.5. The SuDS Manual C753 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.

7.6. 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.

7.7. 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 in Figure 7.1.

Figure 7.1 – 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

7.8. 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.

7.9. 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.

7.10. Without adequate treatment, the pollutants would cause damage if they were to enter groundwater in large volumes. The use of SuDS features to slow down and degrade these pollutants is critical to the provision of an acceptable discharge to ground.

7.11. The pollution hazard levels in **Figure 7.1** above, show that while the residential roofs and roads pose minimal environmental risk, the primary road network requires closer attention due to its moderate pollution levels.

7.12. The respective cleansing abilities of common SuDS features are given by corresponding mitigation indices within the SuDS Manual. An extract of Table 26.3 is set out below in **Figure 7.2**.

Figure 7.2 – Extract from Table 26.3 SuDS Manual

Type of SuDS component	Total Suspended Solids	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable Paving	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

7.13. The individual pollution indices are totalled, with the first SuDS component utilising its full value and subsequent downstream SuDS features acting with 50% efficiency. This provides a realistic strategy which mimics the reduced cleansing effectiveness as the concentration of a pollutant decreases along the SuDS train.

7.14. The Sustainable Drainage Systems (SuDS) features and mechanical devices incorporated in this Drainage Strategy will provide significant pollution mitigation. Furthermore, the integration of blue-green corridors and treatment trains will effectively reduce further or eliminate the pollution levels specified in the SuDS Manual (C753), enhancing overall water quality and promoting environmental sustainability.

7.15. The surface water treatment train will not only capable of catering for 'typical' pollution occurrences emanating from the development such as sediment or dissolved metals, but also provides mitigation for 'untypical' pollution such as fire water or hydrocarbon spills.

7.16. Carriageways and parking areas are at highest risk of pollutants entering the drainage network through incidental fuel/oil spills from vehicles or indeed general jet washing activities by residents.

7.17. The provision of permeable block paving and or roadside swales/filter drains to estate roads and shared driveways will facilitate the biodegradation of organic pollutants, such as petrol and diesel, and the absorption of pollutants and settlement and retention of solids.

7.18. Catchpits across the scheme will be provided upstream of storage structures (permeable paving, storage features and basins) to further facilitate the removal of silts and other suspended solids.

7.19. The presence of blue – green corridors and treatment trains provide opportunities for comprehensive interventions to reduce pollution to insignificant levels. In line with Environment Agency guidance, further detailed design will confirm the exact specification of the SuDS features and the materials required to provide the necessary mitigation.

Summary

7.20. Sustainable Drainage Systems, provide an effective framework for managing surface water runoff and improving water quality. Through a combination of physical, chemical, and biological processes, SuDS components remove pollutants from runoff, reduce the volume of water entering natural watercourses, and enhance the resilience of urban environments to flooding and pollution. As urban areas continue to grow, the importance of integrating SuDS into new developments and retrofitting them into existing infrastructure becomes increasingly clear. By following the best practices outlined in the SuDS Manual, planners and engineers can create drainage systems that not only manage flood risk but also protect and enhance water quality, contributing to healthier and more sustainable urban environments.

8.0 Conclusion

8.1. The existing drainage condition of site relies heavily on its natural watercourses and drainage networks, which direct water towards the River Loddon and Barkham Brook. However, it is noted that parts of the site are prone to both fluvial and surface water flooding due to the local topography and the presence of impermeable infrastructure like the M4. As detailed further in the FRA, the areas of potential flood risk are primarily associated with the land west of the River Loddon, with some flooding within the watercourse corridors on the eastern side of the Loddon. It is noted that these areas are located outside of the proposed residential areas of the site. In areas prone to surface water flow and flooding, retention of natural drainage flow paths and integration with blue-green infrastructure is critical. Development will maintain pre-development surface water runoff rates, ensuring no increased flood risk either on or off-site.

8.2. Sustainable Drainage Systems (SuDS) are an essential tool for managing surface water in a sustainable and resilient manner. The SuDS Manual C753 provides comprehensive guidance on how to design, implement, and maintain SuDS to achieve the best possible outcomes for flood risk management, water quality improvement, amenity, and biodiversity. By integrating SuDS into urban developments and retrofitting them into existing infrastructure, communities can reap the many environmental, social, and economic benefits of sustainable water management.

8.3. SuDS solutions could include but are not limited to;

- Source Control
  - Green Roofs
  - Permeable Paving
  - Rainwater Harvesting Systems
- Conveyance
  - Swales
  - Filter Strips
- Storage
  - Detention Basins
  - Ponds and Wetlands

8.4. For robustness, attenuation features have been sized for the proposed development with discharges to local water courses restricted to greenfield runoff rates (Qbar), which is 4.4l/s/ha. Attenuation volumes have been calculated for all events up to and including the 1 in 100 year event including an allowance for a 40% increase in rainfall intensities as a result of climate change and urban creep.

8.5. The proposed Drainage Strategy will manage the flood risk posed by uncontrolled surface water runoff from the site. Any increase in surface water run-off can be managed using SuDS source control techniques as well as attenuation features to provide storage in extreme storm events.

8.6. All conveyance systems will be designed to cater for the 1 in 30 year storm event (3.3% AEP), in accordance with industry standard, with all attenuation features designed to allow for the 1 in 100 year storm event (1% AEP) plus 40% climate change allowance.

8.7. The design of the conveyance features such as swales and filter drains will be in accordance with CIRIA C753 The SuDS Manual and will form part of the proposed blue-green corridors.

8.8. Flows in excess of the above design storms, which may flood from the network for storms in excess of the 1 in 100-year storm plus 40% climate change, will be kept within the internal road network, until such time as they can be directed into adjacent landscaping areas or existing vegetation/woodland. This ensures that no onsite or offsite residential units are afforded an increased level of protection from flood waters until such time as the rain events become significant.

8.9. Sustainable Drainage Systems, as outlined in the SuDS Manual C753, provide an effective framework for managing surface water runoff and improving water quality. By following the best practices outlined in the SuDS Manual, planners and engineers can create drainage systems that not only manage flood risk but also protect and enhance water quality, contributing to healthier and more sustainable urban environments.

8.10. Onsite foul pumping stations, and sewers will be designed in collaboration with Thames Water/NAV as approving body in accordance with the new Sewerage Sector Guidance (SSG) and will be offered for adoption under S104 Agreements of the Water Industry Act.

8.11. Safe access and egress will be provided at all times.

8.12. Lastly, this drainage strategy and associated drawings / documentation evidences that the scheme has be duly considered against the requirements set out in WBC Local Plan Policy SS13 clause 7. The collaborative approach to the design of blue / green infrastructure has resulted in a strategy that not only serves the fundamental purpose of capturing, conveying and controlled discharge of surface water but has also been sympathetically integrated within the wider schemes aesthetics to provide positive contributions to both open space and infrastructure corridors.

Appendices

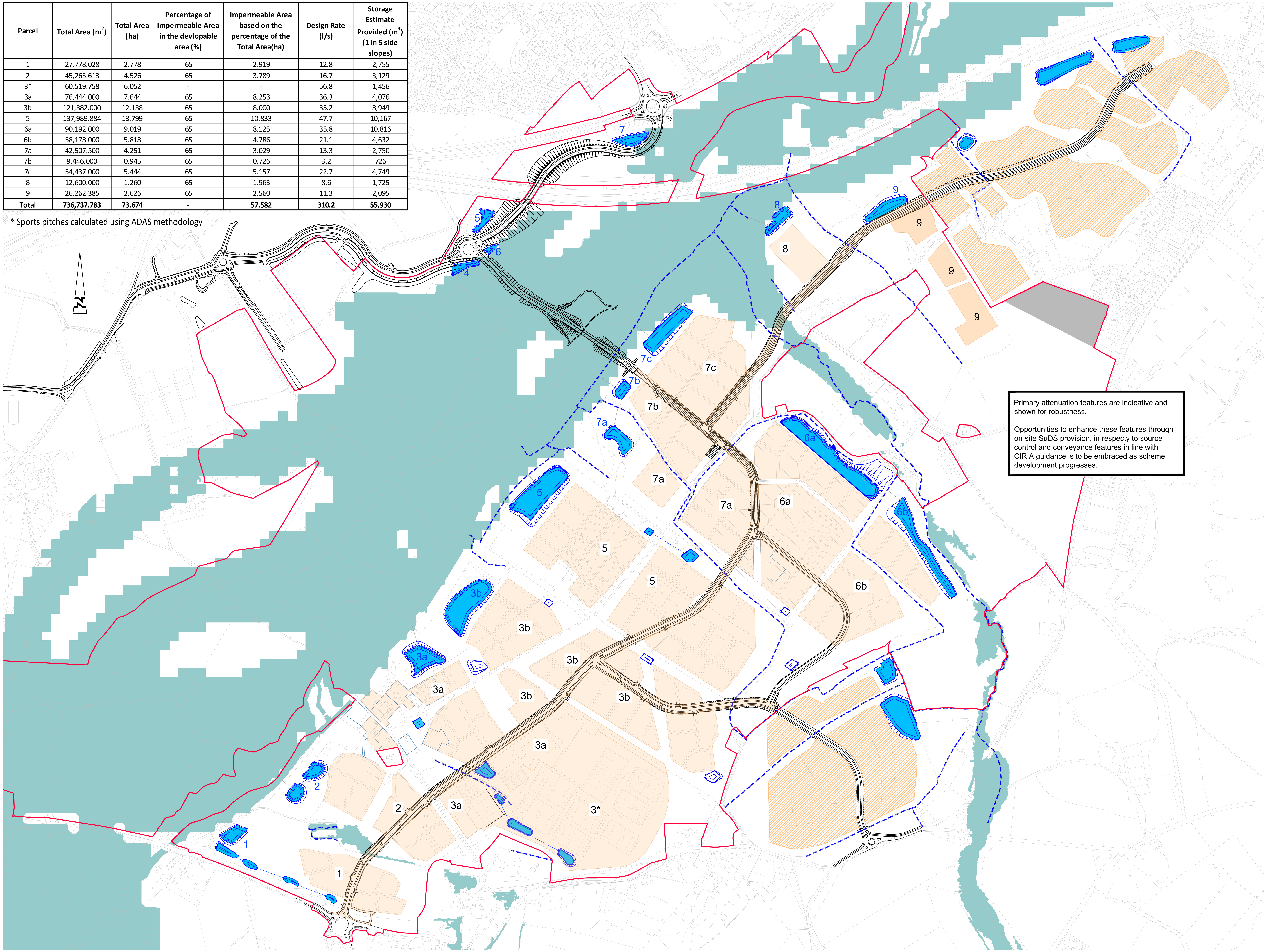
Appendix A - Plans

Preliminary Surface Water Drainage Strategy

Preliminary Foul Water Drainage Strategy

Parcel	Total Area (m^2)	Total Area (ha)	Percentage of Impermeable Area in the devlopable area (%)	Impermeable Area based on the percentage of the Total Area(ha)	Design Rate (l/s)	Storage Estimate Provided (m^3) (1 in 5 side slopes)
1	27,778.028	2.778	65	2.919	12.8	2,755
2	45,263.613	4.526	65	3.789	16.7	3,129
3*	60,519.758	6.052	-	-	56.8	1,456
3a	76,444.000	7.644	65	8.253	36.3	4,076
3b	121,382.000	12.138	65	8.000	35.2	8,949
5	137,989.884	13.799	65	10.833	47.7	10,167
6a	90,192.000	9.019	65	8.125	35.8	10,816
6b	58,178.000	5.818	65	4.786	21.1	4,632
7a	42,507.500	4.251	65	3.029	13.3	2,750
7b	9,446.000	0.945	65	0.726	3.2	726
7c	54,437.000	5.444	65	5.157	22.7	4,749
8	12,600.000	1.260	65	1.963	8.6	1,725
9	26,262.385	2.626	65	2.560	11.3	2,095
Total	**736,737.783**	**73.674**	**-**	**57.582**	**310.2**	**55,930**

* Sports pitches calculated using ADAS methodology



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2. All dimensions are in millimetres unless stated otherwise. It is recommended that information is not scaled off this drawing.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

KEY:

- Existing Pluvial Flood extent
- Proposed Development Parcel
- Proposed Development Parcel (Outside of Redline)
- Proposed Attenuation Basin
- Existing Key Watercourses (Minimised culverting where required to facilitate access)

Rev	Date	Description	Drawn	Checked
P14	09/25	FINAL LAYOUT DESIGN XREF INSERTED	LPA	LPA
P13	07/25	WATERCOURSE NOTE ADDED	CS	LPA
P12	06/25	SELF BUILD PARCELS ADDED	RF	LPA
P11	06/25	UPDATED FOR DRAINAGE STRATEGY REPORT	RF	LPA
P10	03/25	UPDATED TO SUIT LATEST DEVELOPMENT PARCELS	CS	LPA
P9	02/25	PARCEL 6 INFORMATION UPDATED	RF	LPA
P8	02/25	INTERNAL ALIGNMENTS UPDATED TO SUIT SAVILLS MASTERPLAN SFP001 RECEIVED 05/02/25	CS	LPA
P7	01/25	UPDATED TO REFLECT PARCEL 12	GR	LPA
P6	10/24	UPDATED TO REFLECT PARCEL 12	GR	LPA
P5	09/24	UPDATED TO ADDRESS PARCEL 11	GR	LPA
P4	05/24	UPDATED TO REFLECT REDUCED BASIN SIZES	GR	LPA
P3	04/24	UPDATED IN LINE WITH SAVILLS MASTERPLAN	GR	LPA
P2	11/23	UPDATED IN LINE WITH GLEESON MASTERPLAN	KLW	LPA
P1	06/22	FIRST ISSUE	KLW	LPA

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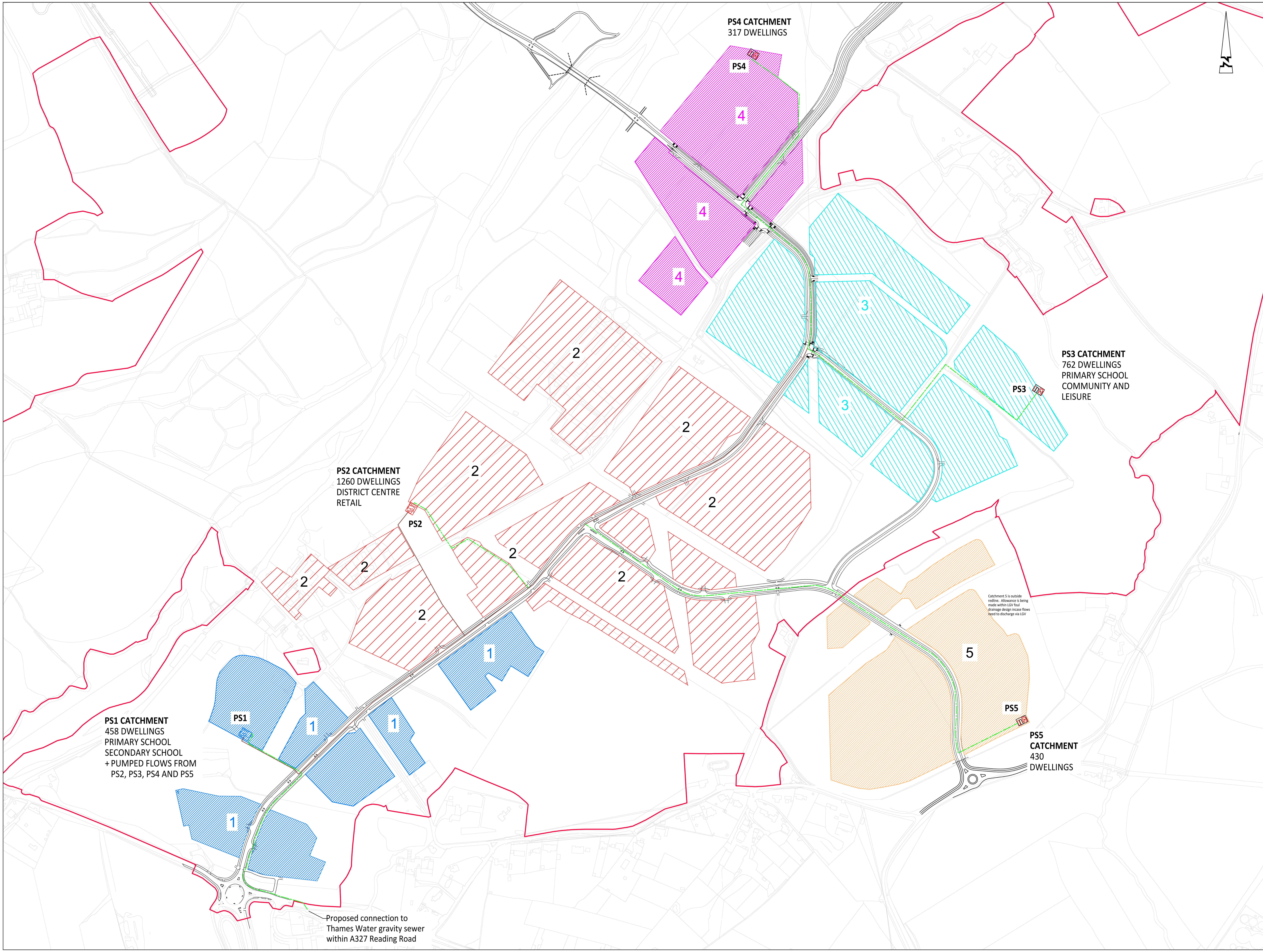
LODDON GARDEN VILLAGE

Title
SURFACE WATER DRAINAGE STRATEGY

Status

Scale	Date	Drawn	Checked
NTS @ A1	JUNE 2025	RF	CS

Drawing No	Revision
A392-024	P14



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3. This drawing should be read in conjunction with all other relevant drawings and specifications.

KEY:

- Proposed Pump station
- Proposed Rising Main
- Proposed gravity sewer
- Pump Station 1 Catchment
- Pump Station 2 Catchment
- Pump Station 3 Catchment
- Pump Station 4 Catchment
- Pump Station 5 Catchment
- Outline Planning Application Boundary

Rev	Date	Description	Drawn	Checked
P3	09/25	FINAL DESIGN XREF INSERTED	LPA	LPA
P2	06/25	OUTLINE PLANNING APPLICATION BOUNDARY UPDATED	CS	LPA
P1	06/25	FIRST ISSUE	RF	LPA

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Project

LODDON GARDEN VILLAGE

Title

FOUL WATER DRAINAGE STRATEGY

Status

Scale	Date	Drawn	Checked
NTS @ A1	JUNE 2025	RF	LPA

Drawing No	Revision
A392-123	P3

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