

Drainage Strategy and Sustainable Drainage Systems (SuDS) Report



Site:

Groby Lodge Farm, Slate Pit Lane, Groby LE6 0GN

Revision CO2

Schedule

Re: Groby Lodge Farm, Slate Pit Lane, Groby LE6 0GN

Revision	Status	Au- thor	Checked	Reason for Issue	Date of Issue
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Document Status

This document has been prepared in support of the discharge of Planning Condition 9 under Planning permission reference 18/00329/FUL and should be read in conjunction with all supporting drawings, calculations and appendices.

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Table of Contents

Schedule.....	2
Document Status	2
Document Control Statement	2
Caveat	2
Further Reading and Reference Documents	6
Abbreviations	7
1.0 Executive Summary	8
2.0 Introduction	10
2.12 Site Location	10
2.13 Existing Site Characteristics	11
2.14 Proposed Development Layout	11
2.15 Existing Drainage Infrastructure	11
2.16 Watercourse and Outfall Considerations	12
2.17 Summary of Key Constraints	12
2.18 Proposed Development	12
3.0 Document Examined	13
4.0 Sustainable Drainage Systems (SuDS) Hierarchy	13
5.0 Sustainable Drainage Systems (SuDS).....	14
5.1 SuDS Hierarchy and Approach.....	14
5.2 SuDS Strategy.....	14
5.3 Source Control Measures.....	15
5.4 Water Quality	15
5.5 Finished Floor Levels and Site Levels	15
5.6 Maintenance and Management	15
6.0 Surface Area Summary	16
6.1 Existing Area	16
6.2 Development Description	16
6.3 Greenfield Runoff Rate & Discharge Rates	16
6.4 Surface Water Attenuation	17
6.5 Climate Change Allowance.....	17
6.6 Flow Control and Outfall.....	19
6.7 Summary	19
7.0 Exceedance & Overland Flow	19
7.1 Exceedance Flow Routing	20

7.2	Protection of Buildings	21
7.3	External Flood Risk	21
7.4	Interaction with Attenuation System.....	22
7.5	Summary.....	22
8.0	Surface Water Drainage.....	22
8.3	Drainage Hierarchy	22
8.10	Surface Water Drainage Calculations	23
8.11	Hydraulic Modelling Results	24
8.12	Modelling Approach	25
8.13	Network Performance	25
8.14	Attenuation Performance	26
8.15	Exceedance Flow Management.....	26
8.16	Design Assumptions.....	26
8.17	Summary	26
9.0	Water Quality Treatment	27
10.0	Maintenance and Management.....	27
10.1	Surface Water Drainage Maintenance	28
10.2	Foul Water Drainage Maintenance	28
10.3	Maintenance	28
10.4	Conclusion	29
11.0	Sewerage Infrastructure and Connection Strategy.....	29
11.1	General Approach	29
11.2	Surface Water Drainage Strategy	29
11.3	Existing Sewer Infrastructure	29
11.4	Foul Drainage Strategy	30
11.4.a	Connection to Public Sewer.....	30
11.4.b	Foul Drainage Connection	30
11.2.c	Final Confirmation	30
11.5	Summary	30
12.0	Summary	30
13.0	Conclusion.....	31
14.0	Recommendations	32
15.0	Further Information	33
16.0	Acknowledgements.....	33
17.0	Disclaimer	33

List of Appendices

Appendix A - Site Location Plan	36
Appendix B - Proposed Site Layout Plan	37
Appendix C - Existing Area	38
Appendix D - Proposed Surface Area	39
Appendix E - Existing Drainage	40
Appendix F - Proposed Surface Water Drainage	41
Appendix G - Drainage Strategy Plan	42
Appendix H - STW Sewer Record	43

List of Calculations

Calculation 1 - Greenfield runoff rate by HR Wallingford	48
Calculation 2 - SW Network1 Hydraulic calculation by Site 3D	50
Calculation 3 - SW Network2 Hydraulic calculation by Site 3D	50

List of Tables

Table 1 - Greenfield Runoff Rate & Discharge Rates	17
Table 2 - Attenuation Volume Summary	18
Table 3 - Rural run-off Calculator Parameters	24
Table 4 - Existing Greenfield Run-off Rates	25
Table 5 - SuDS Hierarchy	36
Table 6 - Soil Classification Guide	38
Table 7 - National Planning Policy Guidance defining Flood Zone 1	39
Table 8 - Extract from National Planning Policy Guidance: Flood Risk	39
Table 9 - Surface Water Drainage Strategy Summary (Hierarchy & Attenuation)	40
Table 10 - Permeable Paving Maintenance Schedule	41
Table 11- Manhole/Inspection Chamber Maintenance Schedule	42

Further Reading and Reference Documents

The preparation of this Drainage Strategy and Sustainable Drainage Systems report has been informed by the following guidance documents, technical standards and supporting reports:

- Surface Water Management Plan – Technical Guidance
- National Planning Practice Guidance (NPPG): Flood Risk and Drainage
- CIRIA C753 – The SuDS Manual
- Site-Specific Flood Risk Assessment Report (July 2025)
- Leicestershire LLFA Local Guidance and Standing Advice
- Lead Local Flood Authority Planning Consultation Response
- UK Government Planning and Flood Risk Guidance: www.gov.uk
- Water Industry and Sewerage Guidance: www.water.org.uk

These documents have been used to inform the design, assessment, and justification of the proposed surface water and foul drainage strategy and to ensure compliance with national and local policy requirements.

Abbreviations

CDA....Critical Drainage Area

EA....Environment Agency

DEFRA.... Department for Environment, Food and Rural Affairs

DS Drainage Strategy

EA....Environment Agency

FFL....Finished Floor Level

FRA....Flood Risk Assessment

HBC....Hinckley & Bosworth Council

LHA.... Local Highway Authority

LLFA....Lead Local Flood Authority

LPA.... Local Planning Authority

m AOD....Metres Above Ordnance Datum

NPPF....National Planning Policy Framework

NPPG.... National Planning Practice Guidance

RSC.... Road & Sewer Consulting

SFRA.... Strategic Flood Risk Assessment

STW....Severn Trent Water

SuDS....Sustainable Drainage Systems

1.0 Executive Summary

This Drainage Strategy (DS) and Sustainable Drainage Systems (SuDS) report has been prepared to support the discharge of Planning permission reference 18/00329/FUL relating to Condition 9 for the development at Groby Lodge Farm, Slate Pit Lane, Groby.

The proposed development comprises the conversion of existing agricultural barns to form 10 dwellings, including alterations and small extensions, hard and soft landscaping, formation of parking spaces, ancillary works, and alterations to the site access at Ratby Lane.

Surface Water Drainage

The surface water runoff is managed on-site, and the drainage layout also accounts for various storm events, particularly the 1 in 100-year event with a 40% climate change allowance. It will be controlled by the Hydro-Brake device at a greenfield runoff rate of 5 l/s, ensuring compliance with SuDS guidelines by controlling the discharge rate to Slate Brook.

In accordance with the SuDS hierarchy, the site's surface water runoff will be attenuated on-site and discharged at a controlled rate to Slate Brook via an attenuation pond.

The strategy incorporates the following elements:

- **Source control** using permeable paving where feasible;
- **Surface water conveyance** through pipework and flow control devices, such as Hydro-Brake;
- **Storage** in the attenuation pond to manage peak flows.

Given the site's clay nature and the unknown makeup of alluvial deposits, infiltration components of SuDS, such as permeable pavements, are not feasible for large-scale infiltration. Permeable paving is still considered suitable for use in specific areas, such as public realm and access spaces, but only where it can be safely installed with proper drainage measures and without reliance on infiltration.

The surface water strategy incorporates on-site attenuation within a proposed pond located on the opposite side of Slate Brook, with discharge to the watercourse restricted to greenfield runoff rates by means of a Hydro-Brake flow control device, in accordance with SuDS requirements.

Hydraulic modelling confirms:

- No flooding for events up to the 1 in 30-year return period;
- During the 1 in 100-year plus 40% climate change event, exceedance flows will be safely managed within the site, with no flooding of buildings;
- No increase in flood risk on or off-site.

The site lies predominantly within Flood Zone 1, with only a small section of the access road located within Flood Zones 2 & 3 adjacent to Slate Brook. All proposed built development is located within Flood Zone 1.

Hydraulic Modelling and Flood Zone Consideration:

The proposed development site is predominantly located within Flood Zone 1, with a small portion of the access road falling within Flood Zones 2 and 3 adjacent to Slate Brook. The development area itself lies entirely within Flood Zone 1, with appropriate measures in place to manage the risk associated with the areas within Flood Zones 2 and 3.

Hydraulic modelling for the site has been carried out using industry-standard methods and software, such as Site3D or EPA SWMM, to ensure that flood risks are effectively managed and that the proposed drainage strategy complies with flood risk management requirements.

Foul Water Drainage

Foul water will be conveyed to the existing public sewer system, subject to approval from Severn Trent Water under Section 106 of the Water Industry Act 1991. This ensures that the foul drainage system is properly connected to the public sewer network. The drainage system for foul water will be designed to remain separate from surface water systems.

The foul system will remain separate and private, designed to meet the Part H Building Control requirements at the detailed design stage.

The foul water system will be constructed to accommodate the expected flows generated by the development, with final connection details confirmed during the detailed design phase, in coordination with Severn Trent Water.

Summary of Key Outcomes

The drainage strategy ensures that:

- There is no increase in flood risk on or off-site;
- Surface water runoff is restricted to greenfield equivalent rates;
- Adequate attenuation is provided for the 1 in 100 year + 40% climate change event;
- Exceedance flows are safely managed within the site;
- The system complies with LLFA requirements, national planning policy, and SuDS guidance.

Conclusion:

This report produced to support the discharge of Planning permission reference 18/00329/FUL and should be read in conjunction with the accompanying drainage layout drawings, hydraulic calculations, and supporting technical documentation.

For Planning Condition 10, relating to the Construction Surface Water Management Plan (CSWMP), please refer to a separate document prepared by Road & Sewer Consulting (RSC).

2.0 Introduction

- 2.1 RSC Ltd has been commissioned by the client to undertake the SuDS/Drainage Strategy report at Groby Lodge Farm, Slate Pit Lane, Groby LE6 0GN.
- 2.2 This report supports planning application for the Conversion of existing agricultural barns to form 10 dwellings.
- 2.3 This statement has been prepared in support of the discharge of planning permission reference 18/00329/FUL and sets out the proposed foul and surface water drainage arrangements in accordance with the requirements of Leicestershire County Council, in its role as Lead Local Flood Authority (LLFA). The drainage strategy has been developed in accordance with:
- Non-Statutory Technical Standards for SuDS (DEFRA)
 - CIRIA C753 SuDS Manual
 - National Planning Policy Framework (NPPF)
 - Leicestershire LLFA Local Guidance and Standing Advice
- 2.4 The local Planning authority (LPA) is Hinckley & Bosworth District Council.
- 2.5 The local lead flood authority (LLFA) is Leicestershire County Council.
- 2.6 The local flood authority (EA) is Environment Agency.
- 2.7 Severn Trent Water (STW) is responsible for the maintenance and management of the public sewer.
- 2.8 The proposed development comprises the conversion of existing agricultural barns to residential dwellings, together with associated new-build elements, access arrangements, parking areas, and external works as part of the wider site layout.
- 2.9 The Planning application no. 18/00329/FUL.
- 2.10 The site is located north west of Slate Pit Lane. The Ordnance survey area SK504077.
The national grid reference:
X (Easting) 450460
Y (Northing) 307780
- 2.11 The proposed development is accessed via a single point of entry from Markfield Road, as illustrated on the approved site layout plan in [Appendix A](#).
- 2.12 The development site is designated as brownfield land.
- 2.13 The development site is considered to be brownfield site with an approximate area of 15,900 m² (1.59ha).
- 2.14 Site Location

The application site is located at Groby Lodge Farm, Slate Pit Lane, Groby, Leicestershire. The site comprises an existing agricultural holding situated within a predominantly rural setting, with the proposed access taken off Ratby Lane.

The surrounding area is characterised by a mix of open land, mature vegetation, and sporadic built development. A watercourse, identified as Slate Brook, runs in close proximity to the site and forms a key consideration in the proposed drainage strategy.

2.15 [Existing Site Characteristics](#)

The site currently accommodates a number of existing agricultural buildings (barns) together with areas of hardstanding and access tracks. The approved development includes the conversion of these barns into residential dwellings, alongside associated external works.

Ground levels across the site generally fall towards the adjacent watercourse, providing an opportunity for gravity drainage towards the proposed outfall location.

Surface water runoff from the existing site is currently unmanaged and predominantly drains overland or via informal routes towards lower ground and the adjacent watercourse.

2.16 [Proposed Development Layout](#)

The proposed development comprises a mix of converted residential units, associated new-build elements, internal access roads, parking areas, and private driveways. These are shown on the approved site layout plan, drawing no. 2015-427-22 Rev K, as detailed in [Appendix B](#).

The layout has been designed to:

- Retain and convert the existing barn structures;
- Provide vehicular access and circulation routes;
- Accommodate surface water drainage infrastructure, including attenuation features.

As part of the design development, the drainage layout has been coordinated with the site layout to ensure that all infrastructure is positioned outside of building footprints and remains accessible for maintenance.

2.17 [Existing Drainage Infrastructure](#)

A key constraint within the vicinity of the site is the presence of an existing 375mm diameter public foul sewer, the responsibility of STW, which runs parallel to Slate Pit Lane, as identified from statutory sewer records.

It should be noted that the exact position of the sewer must be confirmed on site prior to construction, as statutory records are indicative only. The sewer record asset plan is provided in [Appendix H](#). No diversion of the existing public foul sewer is proposed as part of this development.

The sewer is located outside the developable area and does not present a constraint to the proposed layout. The drainage strategy has been developed to ensure that there is no

build-over or conflict with the existing sewer, and that access for maintenance is retained at all times.

The proposed development will maintain appropriate stand-off distances from the sewer in accordance with statutory requirements, and no structures are proposed within the sewer easement.

The sewer is anticipated to provide a suitable point of connection for the proposed foul drainage, subject to agreement with STW at detailed design stage.

2.18 [Watercourse and Outfall Considerations](#)

The site is located in close proximity to Slate Brook, which provides a suitable receiving watercourse for surface water discharge in accordance with the drainage hierarchy.

The proposed surface water strategy includes attenuation and controlled discharge to this watercourse, with the attenuation feature (pond) located on the opposite side of Slate Brook within the client's land.

The relationship between the site levels, drainage network, and watercourse has been carefully considered to enable a gravity-led drainage solution.

2.19 [Summary of Key Constraints](#)

The principal constraints influencing the drainage design are summarised as follows:

- Presence of an existing 375mm diameter public foul sewer.
- No development is proposed within the sewer easement area.
- Clear access for maintenance will be retained at all times.
- No building is to be constructed over the sewer, and appropriate clearances will be maintained to ensure access for maintenance and protection of the existing sewer.
- No diversion of the existing sewer is required.
- Proximity of Slate Brook as the receiving watercourse for surface water.
- The site levels and topography influencing the direction of surface water runoff and the layout of the drainage system.
- Integration of drainage infrastructure within a mixed conversion and new-build layout.

These constraints have been fully considered in the development of the proposed drainage strategy.

The proposed drainage layout has been developed to address these constraints while ensuring full compliance with relevant planning policy and best practice guidance, including CIRIA C753.

2.20 [Proposed Development](#)

The proposed site layout plan, prepared by the project architect, Urban Designs is provided in [Appendix B](#). The drawing illustrates the overall development arrangement, including the conversion of existing agricultural barns, internal access roads, parking areas, and associated landscaping proposals.

The approved layout also identifies key site features, including the existing farmhouse, retained vegetation, proposed tree planting, and areas of hard and soft landscaping, together with the location of the proposed balancing pond / sustainable drainage feature positioned to the north-east of the site.

Vehicular access is taken from Ratby Lane, with internal circulation routes serving the individual plots and associated garages. The layout has been designed to reflect the constraints and opportunities of the site, including existing buildings, site topography, and the proximity of the adjacent watercourse.

These drawings have been used to inform the Drainage Strategy (DS) and associated surface water management proposals set out within this report, ensuring that drainage infrastructure is fully coordinated with the proposed development layout.

The layout has been developed in coordination with the drainage design to ensure that all drainage features are deliverable, accessible for maintenance, and integrated within the site.

3.0 Document Examined

- 3.1 Proposed Site Layout Plan prepared by Urban Design.
- 3.2 LLFA Planning Conditions 9 & 10.
- 3.3 Sewer Record Asset Plan provided by STW.
- 3.4 Greenfield Runoff Rate Estimation using HR Wallingford Methodology.
- 3.5 Hydraulic Modelling and Drainage Calculations undertaken using Site3D Software.

4.0 Sustainable Drainage Systems (SuDS) Hierarchy

- 4.1 The surface water drainage strategy for the proposed development has been developed in accordance with the principles of sustainable drainage, with the aim of managing surface water runoff as close to its source as reasonably practicable.
- 4.2 In accordance with the Department for Environment, Food and Rural Affairs (DEFRA) guidance and the National Planning Practice Guidance (NPPG), the following SuDS hierarchy has been applied when considering the disposal of surface water runoff, listed in order of preference:
 - Discharge to ground (infiltration)
 - Discharge to a surface water body (watercourse)
 - Discharge to a surface water sewer

- Discharge to a combined sewer

4.3 Infiltration has been assessed and is considered not feasible at this site due to the underlying ground conditions (including clay subsoil and alluvial deposits). In accordance with the hierarchy, discharge to a nearby watercourse (Slate Brook) has therefore been selected as the most appropriate and sustainable solution.

The proposed drainage strategy incorporates a range of SuDS components to manage run-off in accordance with best practice. Details of the selected SuDS features is provided in [Appendix G](#).

4.4 A SuDS maintenance plan has been prepared in accordance with CIRIA C753, outlining the required inspection and maintenance activities (including routine and reactive works), together with details of the responsible party to ensure the long-term performance of the drainage system.

The proposed approach represents the highest feasible option within the SuDS hierarchy for this site.

5.0 Sustainable Drainage Systems (SuDS)

Sustainable Drainage Systems (SuDS) have been incorporated into the proposed development to manage surface water runoff in a sustainable manner, in accordance with the NPPG, NPPF, and CIRIA C753 (The SuDS Manual).

The drainage strategy has been developed to control surface water runoff as close to its source as practicable, reduce runoff rates and volumes, and ensure that post-development conditions mimic greenfield runoff behaviour.

5.1 SuDS Hierarchy and Approach

The proposed SuDS strategy has been developed in accordance with the recognized drainage hierarchy.

Infiltration was assessed and found to be unfeasible due to the site's underlying ground conditions (including clay subsoil and alluvial deposits). Therefore, the surface water runoff will be managed on-site and discharged at a controlled rate to Slate Brook, a nearby water-course. This approach represents the next most sustainable option within the hierarchy.

5.2 SuDS Strategy

The proposed drainage system incorporates a SuDS management train comprising the following key elements:

- **Source control:** permeable paving and soft landscaped areas to reduce runoff volumes and provide initial treatment.
- **Conveyance:** gullies and surface water pipe network to convey flows across the site.
- **Storage:** an attenuation pond (balancing pond) to store runoff during storm events.
- **Flow control:** regulated discharge to Slate Brook at greenfield runoff rates.

5.3 Source Control Measures

Source control measures have been incorporated into the site layout to manage runoff at or close to its point of origin.

These include:

- **Permeable paving:** used within hardstanding areas to provide storage and water quality treatment.
- **Soft landscaped areas:** including grassed and planted zones, to intercept and reduce runoff.
- **Limited impermeable surfacing:** minimising runoff generation.

These measures reduce peak flow rates and improve water quality prior to conveyance to downstream SuDS features.

5.4 Water Quality

The proposed SuDS strategy provides adequate water quality treatment in accordance with CIRIA C753:

- [Permeable paving](#) provides primary treatment through filtration.
- [Additional treatment](#) is provided through the drainage network and attenuation pond.
- [Sediment control measures](#) are incorporated to prevent debris entering the system.

The development is classified as a low pollution hazard (residential), and the proposed treatment train is considered appropriate.

5.5 Finished Floor Levels and Site Levels

Finished floor levels (FFLs) will be set at a minimum of 300mm above surrounding external ground levels.

External ground levels will be carefully designed to fall away from the buildings, directing surface water runoff towards the site drainage system and designated attenuation features, ensuring no ponding occurs adjacent to the structures.

5.6 Maintenance and Management

A SuDS maintenance plan has been prepared in accordance with CIRIA C753, outlining routine and reactive maintenance requirements for all drainage components. Further details are provided within the SuDS Maintenance Schedule ([Table 10](#)).

6.0 Surface Area Summary

6.1 Existing Area

The existing site area is considered to be brownfield site with an area of 15,900 m² (1.590 ha). Further details are included in [Appendix C](#).

6.2 Development Description

The site currently comprises a number of existing agricultural buildings (barns), together with areas of hardstanding and access tracks. The approved development includes the conversion of these barns to residential dwellings, along with associated external works, parking areas, access arrangements, and related infrastructure within the wider site boundary.

Ground levels across the site generally fall towards the adjacent watercourse, providing a natural drainage route and enabling a gravity-led surface water discharge strategy towards the proposed outfall location.

Surface water runoff from the existing site is currently unmanaged and predominantly drains overland, or via informal pathways, towards lower ground and the adjacent watercourse.

6.3 Greenfield Runoff Rate & Discharge Rates

In accordance with the CIRIA C753 SuDS Manual (2015) and relevant industry guidance, the greenfield runoff rate for the site has been calculated using the IH124 methodology.

Surface water runoff from the development will be restricted to greenfield runoff rates for all return periods up to and including the 1 in 100 year event plus climate change.

The greenfield runoff rates and proposed discharge rates are summarised in [Table 1](#). The hydraulic model separately assesses the 1 in 100 year event plus 40% climate change allowance.

Greenfield Runoff and Proposed Discharge Rates

Parameter	QBAR 1 year	30 year	100 year
Greenfield Runoff Rate (l/s)	6.47 l/s	15.55 l/s	20.30 l/s
Discharge Rate to Stream (l/s)	6.47 l/s	15.55 l/s	20.30 l/s

The hydraulic model separately assesses the 1 in 100 year return period event including a 40% climate change allowance to confirm system performance and storage requirements.

The proposed discharge rate represents a significant reduction compared to the existing brownfield runoff and provides betterment in accordance with LLFA policy.

6.4 Surface Water Attenuation

The drainage strategy confirms that a minimum attenuation volume of approximately 675 m³ is required to accommodate runoff from the 1 in 100 year event, including the 40% climate change allowance. This storage will be provided within the proposed attenuation pond, which forms the primary surface water storage feature for the site.

Hydraulic modelling has been undertaken using industry-standard software to assess the performance of the drainage network and attenuation features under a range of storm events. The modelling confirms that the attenuation pond provides sufficient storage to manage runoff from the developed site while restricting discharge to Slate Brook at a controlled rate of 5.0 l/s via a Hydro-Brake flow control device.

The required attenuation volume is summarised in [Table 2](#).

Table 2 - Attenuation Volume Summary

Parameter	2 Year	30 Year	100 Year	Storage Volume Required
Runoff Rate (l/s)	6.4 l/s	14.6 l/s	18.6 l/s	675 m ³
Discharge Rate to Stream (l/s)	5.0 l/s	5.00 l/s	5.00 l/s	
Proposed Pond Storage (m ³)				675 m ³

The hydraulic modelling confirms that a minimum attenuation storage volume of approximately 675 m³ is required to accommodate runoff from the developed site. The proposed attenuation pond has been sized accordingly and will discharge to Slate Brook at a controlled rate of 5.0 l/s via a Hydro-Brake flow control device.

Surface water will discharge to Slate Brook at a controlled rate of 5.0 l/s via a Hydro-Brake Optimum flow control device (Model Ref. SHE-0110-5000-0700-5000) located within man-hole S23. The device is designed to operate at a control head of approximately 0.70 m and provides a dynamic head–flow response to regulate discharge in accordance with green-field runoff requirements. Detailed specifications are provided in [Appendix J](#).

The balancing pond shown on the layout plan is indicatively shaped to follow the available site area and has approximate maximum dimensions of 30 m x 15 m x 1.5 m, providing an estimated storage capacity of approximately 675 m³. This provides sufficient capacity for the proposed surface water drainage strategy. Final pond dimensions, site levels, and storage characteristics will be confirmed at detailed design stage.

6.5 [Climate Change Allowance](#)

A 40% climate change allowance has been applied to rainfall intensities in accordance with current national guidance and Environment Agency recommendations.

The hydraulic model confirms that the proposed surface water drainage system can accommodate the 1 in 100 year return period storm event plus 40% climate change allowance, with exceedance flows safely managed within the site.

The modelling demonstrates that:

- no flooding of buildings occurs during the design event;
- exceedance flows are directed to safe areas within the site; and
- there is no increase in off-site surface water flood risk.

The proposed drainage strategy therefore provides a robust and resilient solution capable of accommodating future climatic conditions over the lifetime of the development.

6.6 [Flow Control and Outfall](#)

Surface water discharge from the attenuation pond will be controlled using a Hydro-Brake flow control device, set to limit discharge to the agreed greenfield runoff rate.

The controlled discharge will outfall to Slate Brook, which represents the most appropriate receiving watercourse in accordance with the drainage hierarchy.

The outfall arrangement will be designed to ensure:

- Stable discharge conditions;
- No erosion of the receiving channel;
- Compliance with any requirements of the LLFA or relevant consenting authority.

6.7 Summary

The proposed surface water drainage strategy has been developed to ensure compliance with LLFA requirements, as summarised below:

- Post-development discharge is restricted to greenfield runoff rates;
- Adequate attenuation is provided for the 1 in 100 year return period storm event plus 40% climate change allowance;
- The system ensures no increase in flood risk on or off site;
- Discharge to the watercourse is in accordance with the SuDS hierarchy;
- The drainage system has been designed using recognised industry-standard methods and software.

7.0 Exceedance & Overland Flow

The drainage design has been developed to ensure the safe management of exceedance flows across the site:

- **Overland flow routes** are strategically directed away from buildings, guiding water to designated low-risk areas.
- **Finished floor levels** are elevated above surrounding ground levels to enhance flood resilience.
- Surface water is ultimately directed towards Slate Brook, following the site's natural topography.

This strategy aligns with the expectations of the Lead Local Flood Authority (LLFA) for the safe routing of exceedance flows.

In accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) and the CIRIA SuDS Manual (C753), the design effectively manages exceedance flows (those exceeding the capacity of the drainage system) during extreme rainfall events.

The site's layout has been carefully planned to direct exceedance flows away from critical infrastructure, ensuring that flood risk is minimised. The finished floor levels are raised to provide added resilience, while surface water is routed towards lower-lying areas, ultimately flowing into the adjacent watercourse, Slate Brook.

This natural topography (falling from west to east and north to south) integrates with the drainage design, facilitating controlled and safe routing of exceedance flows. All flow paths are contained

within the site, preventing any flooding of buildings and avoiding increased flood risk to adjacent properties or land.

Detailed information on exceedance flow routing is provided in the Exceedance Flow Route Plan in [Appendix G](#).

According to CIRIA guidance, exceedance flows occur when the drainage system's capacity is exceeded during extreme rainfall events, including the 1 in 100-year return period plus a 40% climate change allowance.

Importantly, no exceedance flows will be directed off-site. The overland flow routes will remain contained within the site, ensuring there is no flooding on adjacent properties.

The exceedance flow routing strategy has been developed in conjunction with the proposed drainage layout and site levels, ensuring a fully integrated solution that meets both LLFA and Local Planning Authority (LPA) requirements.

7.1 [Exceedance Flow Routing](#)

Exceedance flows have been considered for storm events exceeding the capacity of the surface water drainage system, including events greater than the 1 in 100-year return period storm, plus a 40% climate change allowance.

The site benefits from a natural fall towards the lower areas of the site and the adjacent Slate Brook, which allows for the effective routing of exceedance flows along defined and controlled overland flow paths.

Key features of the exceedance flow strategy include:

- [Surface water](#) that exceeds the capacity of the pipe network will surcharge from man-holes and flow overland along defined routes within roads, driveways, and landscaped areas.
- [Overland flow paths](#) have been strategically designed to direct flows away from residential properties and towards low-risk areas, including the proposed attenuation pond.
- [Exceedance flows](#) will ultimately be conveyed towards the attenuation pond and discharged to Slate Brook in compliance with the overall drainage strategy.
- [Finished floor levels](#) will be set above surrounding ground levels to provide additional resilience against exceedance events.

This approach ensures that exceedance flows are safely managed within the site, with no flooding of buildings and no increase in flood risk to adjacent land or third-party property.

The strategy has been integrated with the proposed drainage layout and site levels to provide a robust and safe surface water management solution, as shown on the Exceedance Flow Plan in [Appendix G](#).

7.2 [Protection of Buildings](#)

The drainage design ensures that all proposed buildings are protected from surface water exceedance flows through a combination of layout design and finished floor level (FFL) strategy.

Specific design features include:

- **Finished floor levels** will be set above surrounding ground levels to prevent the ingress of surface water into buildings.
- **Overland flow routes** have been directed away from building entrances and thresholds to prevent surface water entering buildings.
- **External levels and landscaping** have been designed to ensure positive drainage away from structures, ensuring that water flows are directed away from foundations and building perimeters.

7.3 External Flood Risk

The proposed exceedance strategy ensures that:

- Surface water is retained and managed within the site boundary or directed to the designated outfall location (Slate Brook);
- There is no increase in flood risk to adjacent land or third-party property;
- The discharge of exceedance flows aligns with the natural drainage direction of the site, avoiding any off-site flooding.

7.4 Interaction with Attenuation System

The attenuation pond plays a pivotal role in the exceedance strategy, offering additional storage capacity during extreme rainfall events.

In the event of system exceedance:

- Surface water will be directed towards the attenuation pond via both the formal drainage network and designated overland flow routes.
- The pond provides a controlled storage area, reducing the potential for uncontrolled surface water flow across the site.
- Discharge from the pond remains controlled to the agreed greenfield equivalent rate, ensuring compliance with drainage requirements.

7.5 Summary

The exceedance and overland flow strategy has been developed to ensure the following:

- Exceedance flows are safely routed away from buildings to minimise flood risk;
- Surface water is directed towards designated low-risk areas and attenuation features (such as the attenuation pond) for effective management;
- There is no internal flooding of buildings during extreme rainfall events;
- There is no increased risk of flooding to third-party land or properties as a result of the development;

- The strategy complies with LLFA requirements, national planning policy, and SuDS guidance to ensure sustainable drainage solutions.

8.0 Surface Water Drainage

8.1 Strategy Overview

The proposed surface water drainage strategy provides a coordinated and sustainable approach to runoff management, ensuring that the development does not increase flood risk on-site or elsewhere.

8.2 Policy / Guidance

The proposed surface water drainage strategy has been developed in accordance with the principles of sustainable drainage and relevant national and local guidance, including the NPPF, NPPG, CIRIA C753 (The SuDS Manual), and Environment Agency climate change guidance.

8.3 Drainage Hierarchy

In accordance with the National Planning Policy Guidance (NPPG) on reducing the causes and impacts of flooding, the surface water drainage hierarchy has been applied to determine the most appropriate method of discharge from the site. The preferred methods of surface water disposal, in order of priority, are as follows:

- a. Discharge to ground via infiltration measures, such as soakaways, rainwater harvesting, or other infiltration systems, is not suitable due to the ground conditions at the site.
- b. Discharge to a surface water body, where infiltration is demonstrated to be impracticable;
- c. Discharge to a surface water sewer, highway drain, or other suitable drainage system; and
- d. Discharge to a combined sewer, where no other reasonable options are available.

The proposed surface water drainage strategy has been developed in accordance with the drainage hierarchy. Infiltration has been discounted due to unsuitable ground conditions (clay subgrade and alluvial deposits), and this is considered appropriate for the site.

Surface water will therefore discharge to a nearby watercourse, Slate Brook, representing the next most sustainable option in the hierarchy.

8.4 Proposed SuDS Components

In accordance with the drainage hierarchy, infiltration has been assessed and deemed unsuitable due to underlying ground conditions. Surface water runoff will therefore be attenuated on-site and discharged at a controlled rate to the adjacent watercourse, Slate Brook.

The proposed drainage system incorporates a SuDS management train comprising the following components:

- Source Control: Permeable paving and soft landscaped areas to reduce runoff volumes and provide water quality treatment;
- Conveyance: Surface water pipe network directing flows through the site;
- Storage: Attenuation pond providing temporary runoff storage;
- Flow Control: Discharge restricted to greenfield runoff rates via Hydro-Brake.

8.5 The system has been designed to accommodate all storm events up to and including the 1 in 100 year return period plus 40% climate change allowance, without flooding of buildings during the design event.

8.6 [Discharge & Attenuation Pond](#)

The proposed attenuation pond is located on the opposite side of Slate Brook. Surface water runoff will discharge to Slate Brook at a controlled rate of 5.0 l/s by means of a Hydro-Brake Optimum flow control device installed within manhole S23.

The flow control device (Model Ref. SHE-0110-5000-0700-5000) has been designed to operate at a control head of approximately 0.70 m, delivering a restricted discharge rate in accordance with the greenfield runoff requirement. The Hydro-Brake provides a dynamic head-flow relationship, ensuring stable and efficient flow control across a range of operating conditions.

Detailed Hydro-Brake technical information and performance data are provided in [Appendix J](#). This approach ensures that runoff is attenuated and discharged in accordance with LLFA requirements and sustainable drainage principles.

8.7 The development seeks to manage and treat the first 5 mm (and up to 10 mm where practicable) of rainfall within the site in accordance with CIRIA C753 principles.

8.8 Surface water drainage infrastructure has been fully coordinated with the site layout to ensure runoff is directed away from buildings and neighbouring land.

8.9 **No** surface water runoff will be discharged to the public foul sewerage system.

8.10 [Hydraulic Modelling Summary](#)

Surface water drainage calculations have been undertaken to assess system performance and demonstrate compliance with LLFA requirements and relevant national guidance.

Greenfield runoff rates have been calculated using the IH124 method (HR Wallingford), based on site-specific parameters obtained from the Rural Runoff Calculator, including catchment area, soil type, and rainfall characteristics, as summarised in [Table 3](#).

[Table 3 - Rural run-off calculator parameters](#)

Parameter	Value
Area (ha)	1.590
SAAR (mm)	673

Soil Type	4
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The calculated greenfield runoff rates, based on the IH124 methodology, are summarised in [Table 2](#) and have been used to inform the proposed discharge rate from the site.

[Table 2 - Existing Greenfield Runoff Rates](#)

Parameter	Value for site (l/s)
QBAR	6.47
1 in 10 year	10.49
1 in 30 year	15.55
1 in 100 year	20.30

Greenfield runoff rates for the site have been calculated using the IH124 methodology and are used to inform the proposed controlled discharge rates for the development.

The proposed surface water discharge will be restricted to the equivalent greenfield runoff rate, in accordance with LLFA requirements.

Hydraulic modelling has been undertaken using industry-standard software (Site3D, utilising the EPA SWMM engine) to assess surface water runoff and system performance across a range of storm events.

The modelling has been carried out in accordance with LLFA guidance and has been used to evaluate system performance for a range of storm durations and return periods, ensuring the proposed drainage system operates effectively under both design and extreme conditions.

The following design storm events have been modelled:

- 1 in 1 year (0% climate change)
- 1 in 30 year (0% climate change)
- 1 in 100 year (0% climate change)
- 1 in 100 year (40% climate change allowance)

The modelling results demonstrate that:

- The drainage system operates effectively without surface flooding for events up to and including the 1 in 30 year return period;
- During the 1 in 100 year plus 40% climate change event, any exceedance flows are safely managed within the site, with no flooding of buildings;

- The proposed attenuation system provides sufficient storage capacity to accommodate all design storm events;
- Discharge from the site is restricted to greenfield runoff rates, in accordance with LLFA requirements.

The modelling confirms that surface water runoff is effectively managed on site and that there is no increase in flood risk on site or to surrounding land, with all flows discharged in accordance with the approved drainage strategy and relevant LLFA requirements.

8.11 [Hydraulic Modelling Results](#)

The hydraulic modelling demonstrates that the proposed surface water drainage system performs effectively for all simulated storm events.

For events up to and including the 1 in 30 year return period, the drainage system operates effectively without surface flooding.

During the 1 in 100 year event plus 40% climate change allowance, exceedance flows are safely managed within the site through the designed exceedance routing with no flooding of buildings.

The modelling confirms that there is no increase in flood risk on-site or to adjacent land, and that the drainage system performs in accordance with LLFA requirements and national guidance.

8.12 [Modelling Approach](#)

The proposed surface water drainage system has been assessed using industry-standard hydraulic modelling software (Site3D, utilising the EPA SWMM engine) to verify the performance of the drainage network and attenuation features across a range of design storm events.

The model has been developed based on:

- Site-specific impermeable areas derived from the proposed layout;
- Pipe network geometry (pipe sizes, gradients, and manhole locations);
- Attenuation storage within the proposed pond;
- Controlled discharge restricted to greenfield runoff rates.

Rainfall data has been applied in accordance with current guidance, including:

- 1 in 1 year
- 1 in 30 year
- 1 in 100 year
- 1 in 100 year + 40% climate change

8.13 [Network Performance](#)

The hydraulic modelling confirms that:

- The system conveys runoff without surcharge during the 1 in 30 year event;

- During the 1 in 100 year + 40% climate change event, flows are safely managed within the drainage system and attenuation features;
- There is no flooding of buildings or critical infrastructure;
- Discharge is restricted to greenfield equivalent runoff rates.

8.14 [Attenuation Performance](#)

The proposed attenuation pond has been sized based on modelling outputs to accommodate runoff from all design storm events.

The modelling confirms that:

- The pond provides sufficient storage for the 1 in 100 year + 40% climate change event;
- Water levels remain within design limits, maintaining appropriate freeboard;
- The flow control device regulates discharge to the allowable rate.

8.15 [Exceedance Management](#)

Exceedance flows have been explicitly considered within the design and modelling.

The site layout ensures that:

- Exceedance flows are directed away from buildings;
- Overland flow routes follow site topography towards the attenuation pond and Slate Brook;
- There is no increase in flood risk to third-party land.

8.16 [Design Assumptions](#)

The modelling is based on the following:

- Impermeable areas derived from the proposed layout;
- Greenfield runoff rates calculated using the IH124 method;
- Discharge restricted via a flow control device;
- 40% climate change allowance applied;
- Gravity drainage discharging to Slate Brook.

Any future layout or level changes may require the modelling to be updated.

8.17 [Summary](#)

The hydraulic modelling demonstrates that the proposed surface water drainage system operates effectively for all relevant design storm events up to and including the 1 in 100 year return period plus 40% climate change allowance. The scheme provides adequate attenuation storage, restricts discharge to greenfield equivalent runoff rates, prevents flooding of buildings, and does not increase flood risk on-site or elsewhere. The proposed surface water drainage strategy is considered compliant with LLFA guidance and the non-statutory Technical Standards for SuDS.