



SuDS Strategy Report

Springfield House,

Hatch Gate Lane, Wargrave

Reading

RG10 8QD

Project Reference: SD2502127



SUDS DESIGNS

SUSTAINABLE DRAINAGE DESIGNS

A Division of JMS Group



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Revisions and Additional Material

Document History and Status

Revision	Date	Purpose/Status
-	February 2025	First Issue

Document Details

Project Number	SD2502127
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Preamble

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1.0 Introduction

- 1.0.1 SuDS Designs have been appointed to prepare a surface water drainage strategy to support the discharge of planning application for the site at Springfield Road, Hatch Gate Lane, Wargrave, Reading, RG10 8QD. As part of the proposals, this report will assess the potential impact from alterations to the site's drainage, and the surface water characteristics are considered within the scope of the parameters set out in the Sustainable Drainage Statutory Guidance.
- 1.0.2 This report will also review the requirements set out by the Wokingham Borough Council local planning guidance.

2.0 Location & Existing Conditions

- 2.0.1 The site is specifically located at Springfield Road, Hatch Gate Lane, Wargrave, Reading, RG10 8QD and the total site area is about 0.019ha. The site is currently a detached bungalow associated with access to the parking and landscaping at the front. It is considered a brownfield site.
- 2.0.2 To consider the ground conditions in the application site, the British Geological Society database has been reviewed.

2.0.3 Superficial Deposits:

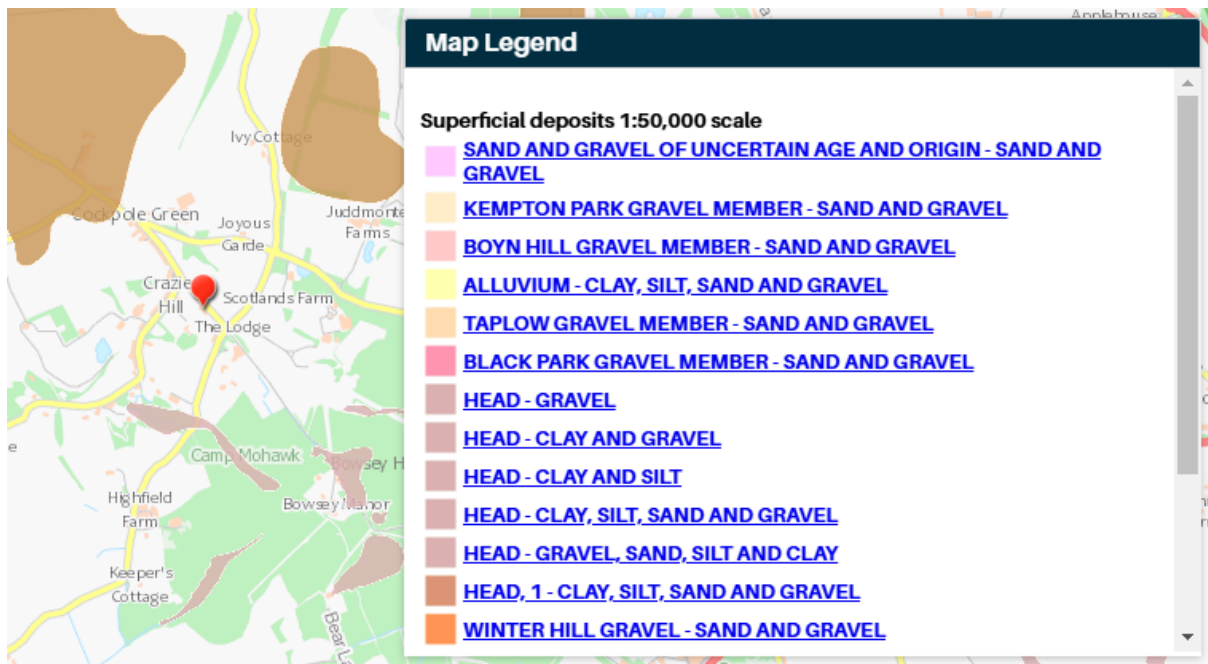


Figure 1: Extent of Superficial Geology

2.0.4 Bedrock Geology:

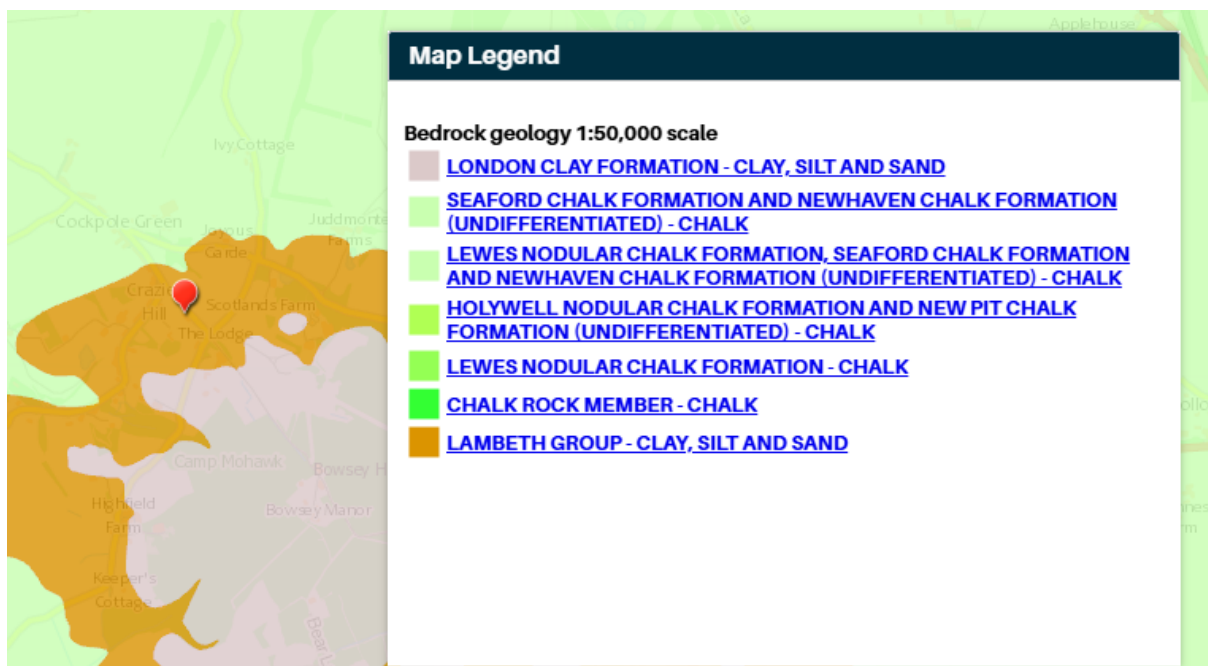


Figure 2: Extent of BGS Bedrock Geology

2.0.5 BGS mapping of bedrock geology as shown in **Figure 2** shows that the site underlain Lambeth Group of Clay, Silt and Sand. Superficial deposits are shown in **Figure 1**. above, shows the site is not on any deposits but Clay-With-Flints Formation - Clay, Silt, Sand and Gravel is present near to the site.

2.0.6 Local borehole:

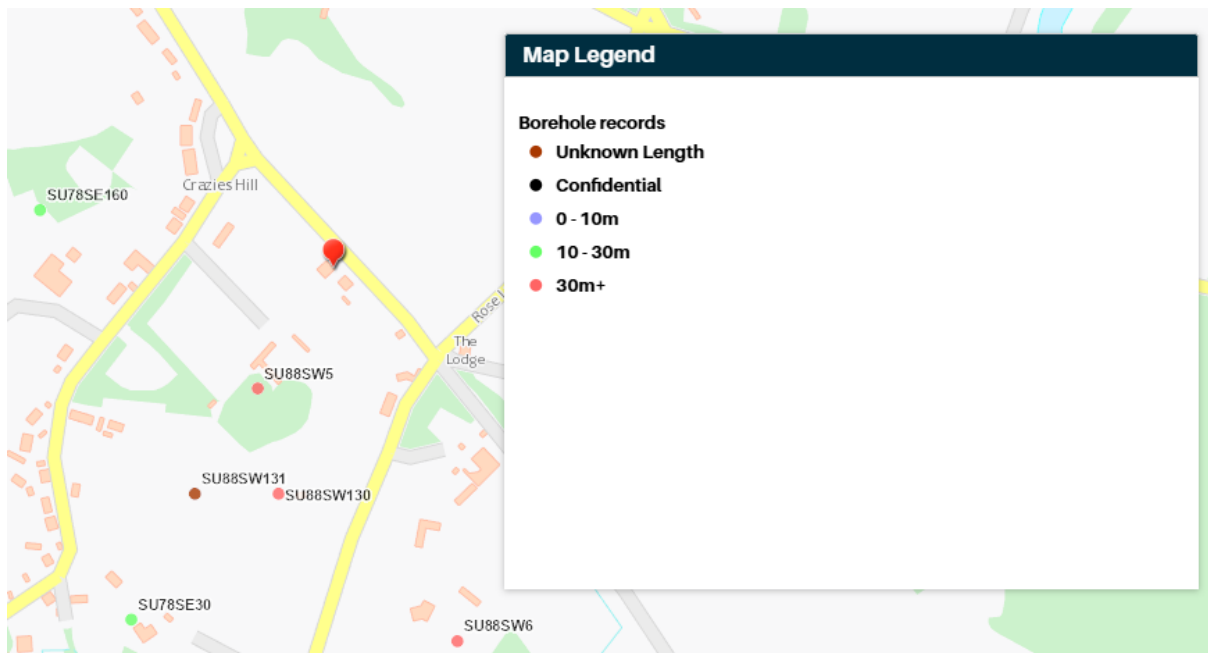


Figure 3: Local borehole records.

2.0.7. Local borehole information has also been reviewed, and the above **Figure 3** shows that the site is in relation to the closest borehole of SU78SE160. The borehole information in **Figure 4** shows that the made ground for about 0.5m and the clay was present for about 3.5m from the ground. A white putty chalk with flint is present for about 11.5m which is 15m from the ground level where the borehole is terminated. Groundwater was not encountered.



British Geological Survey

BGS ID: 20039252 : BGS Reference: SU78SE160
 British National Grid (27700) : 479863, 180930

WR38: Borehole record form

D Strata log

Geological classification (BGS only)	Description of strata	Thickness m	Depth (to base of strata) m
	Top soil	0.5	0.5
	Light blue clay	2	2.5
	Red clay	1	3.5
	White putty chalk with flint	11.5	15

(continuation on separate page if necessary)

Other comments (for example, gas encountered, saline water intercepted)

E Completing this form

How long did it take you to fill in this form? _____

For Official use only			
Date received (DD/MM/YYYY)	File	Consent number	BGS reference number
Accession number	Wellmaster number	SOBI number	NGR
LIC NO	Purpose	EA reference number	
Copy number	Entered by		

WR38 Version 2, February 2011 page 2 of 3

Figure 4: Borehole records of SU78SE160.

2.1 Site Proposals

- 2.1.1 The development proposals include a demolition of existing detached bungalow and the erection of two storey, 3-bedroom house and a basement with landscaping at the front

2.2 Existing Drainage Regime

- 2.2.1 The existing site can be described as a developed brownfield site and the surface water is currently assumed to be discharging into the existing ditch at the front of the property. The sewerage is provided by Thames Water.
- 2.2.2 Given the existing site conditions and drainage regime, a site peak runoff rate for the existing development area can be calculated as shown in the table below. The total existing impermeable area is taken as 0.019ha, being the property. The Modified Rational Method is used to consider the existing runoff rate for the 60 minutes storm duration as set out below:

$$Q(l/s) = C_v \times C_r \times 2.78 \times I \text{ (mm/hr)} \times A \text{ (ha)}$$

Where:

$$A = 0.019\text{ha}$$

$$C_v = 0.75$$

$$C_r = 1.3$$

$$I = 47.619$$

$$Q = 2.4 \text{ l/s}$$

	1:1 Year Storm Event	1:30 Year Storm Event	1:100 Year Storm Event
Greenfield Runoff Rate (l/s)	0	0	0
Existing Peak Runoff Rate (l/s)	2.45	5.91	7.78
I - Peak Rainfall Intensity (mm/hr)	47.619	114.808	150.919

3.0 SuDS Considerations

3.0.1 Consideration of SuDS are a planning requirement for new developments. SuDS are designed to replicate the natural course of drainage as closely as possible with a view to reducing the impact of flooding, removing pollutants at source, and combining water management with green space.

Developments should utilise SuDS where possible and ensure that surface water run-off is managed as close to its source as possible in line with the following hierarchy:

1. Into ground (infiltration).
2. To a surface water body.
3. To a surface water sewer.
4. To a combined sewer.

3.0.2 Sustainable Drainage Systems should be included in the design to manage surface water flood risk. SuDS should be inspired by natural drainage processes and manage water as close to its source as possible whilst offering pollution control and landscape benefits.

3.0.3 Furthermore, the DEFRA guidance states that a surface water drainage assessment should be carried out to demonstrate that the proposed development makes use of SuDS and will not create an increased risk of flooding from surface water to the development site and the surrounding area.

3.0.4 The guidance presents standards which should be adopted where feasible. In particular:

- S2. For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.
- S3. For developments which were previously developed the peak runoff rate from the development to any drain, sewer, or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.
- S4. Where reasonably practicable, for greenfield development, the runoff volume from that development to any drain, sewer or surface water body in the 1 in 100year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.
- S5. Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any drain, sewer or surface water body in the 1 in 100year 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the

greenfield runoff volume for the same event but should never exceed the runoff volume from the development site prior to redevelopment for that event.

- S6. Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface waterbody in accordance with S4 or S5, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

3.1 Local Policy & Planning Condition

- 3.1.1 For this development, Wokingham Borough Council set out the Core Strategy Development Plan of policies of “CP1- Sustainable development” and reference is made to the Sustainable Drainage System Design Guidance. National guidance is also considered. The local design guidance states that a surface water drainage assessment should be carried out to demonstrate that the proposed development makes use of SuDS and will not create an increased risk of flooding from surface water to the development site and the surrounding area.

1. Policy CP1- Sustainable Development

This policy specifically addresses flood risks and layouts requirements to mitigate flooding impacts within the borough.

- This policy in the Wokingham Local Development Plan (LDP) addresses flood risk and requires development proposals to demonstrate that they will not increase flood risk, either on-site or elsewhere. It emphasizes the use of the Sequential and Exception Tests and promotes Sustainable Drainage Systems (SuDS) to manage surface water.

3.2 SuDS Incorporation

- 3.2.1 The below table, taken from the SuDS Manual, C753, CIRIA, 2015 Document lists a variety of SuDS component options which may be applied to development proposals.
- 3.2.2 The underlying bedrock geology data suggest that disposal of surface water via infiltration is unlikely.
- 3.2.3 Therefore, following the hierarchy, the proposals are to discharge to the existing ditch at the front.
- 3.2.4 In accordance with the requirements of the Wokingham Borough Council a Local Planning policies, all developments will be required to submit a SuDS strategy, considering climate change allowances.

Component Type		Description	Design Criteria						
		Collection Mechanism	Water Quantity (Chapter 3)			Water Quality (Chapter 4)	Amenity (Chapter 5)	Biodiversity (Chapter 6)	Further Information (Chapter Ref)
			Peak Runoff Rate	Runoff Volumes					
				Small Events (Interceptions)	Large Events				
Rainwater Harvesting Systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●		11
Green roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●	12
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●	13
Proprietary treatment systems	Subsurface structures design to provide treatment to runoff	P				●			14
Filter strips	Grass strips hat promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○	15
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○	16
Swales	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	L	●	●	●	●	●	●	17
Bioretention systems	Trees with soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	●	●	●	●	●	●	18
Trees	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	P	●	●		●	●	●	19
Pervious pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	●	○	○	20
Attenuation storage tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration-controlled release or use	P	●						21
Detention basins	Vegetated depressions that store and treat runoff	P	●	●		●	●	●	22

Ponds and wetlands	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in an attenuation zone above the pool	P	●			●	●	●	23
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P-Point L-Lateral S-Surface

● – likely valuable contribution to delivery of design criterion

○ - some potential contribution to delivery of design criterion, if specifically included in the design

Figure 5: CIRIA Table 7.1 SuDS Components

3.2.5 The proposed site layout offers the opportunity to apply a range of SuDS measures in accordance with the table above. Proposals are as follows:

- **Attenuation Basin**– located in the front of a site- used to facilitate the treatment of runoff and subsequently be stored the surface water generated by extreme storm events.
- **Rainwater Harvesting (Rainwater Butts):** The table above shows that rainwater harvesting systems offer numerous SuDS benefits at source in terms of water quality, quantity, amenity and biodiversity.
- **Rain Gardens / Bioretention systems** – The table above shows that bioretention systems offer numerous SuDS benefits at source. Contributions are made towards water quantity, quality, amenity and biodiversity.

3.2.6 By use of above, the development proposals aim to drain all developed areas vis SuDS measures and satisfy the four pillars as below:

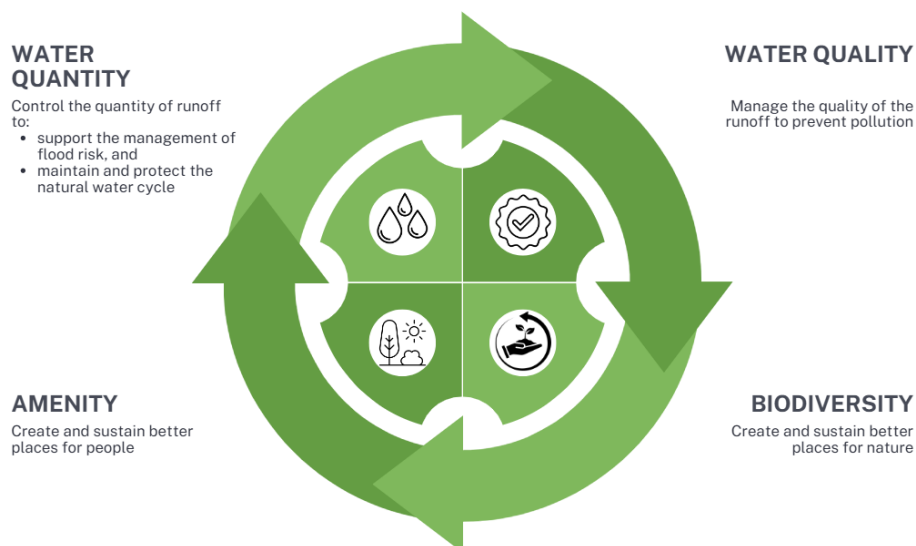


Figure 6: Reference 4 pillars of SuDS Diagram CIRICA C753 p.6

3.2.7 The above proposals ensure that an ‘at source’ SuDS measure is applied, and betterment is provided in terms of surface water runoff velocity and quality. Pollution indices from different land types can be found per as per table 26.15 CIRIA SuDS Manual 2015, below.

Land use surface type (Lust)	Impermeability (IMP _{Ref})	Total suspended solids pollution index (PI _{TSS})	Organic pollution index (PI _{Org})	Hydrocarbon pollution index (PI _{PAH})	Metals Pollution index (PI)
Roofs					
• Industrial / Commercial	1.0	0.3	0.3-0.4	0.2	0.4-0.8
• Residential	0.9	0.4-0.5	0.6-0.7	0.1	0.2-0.5
Highways					
• Motorways	0.8-0.9	0.9	0.7	0.9	0.8
• Major arterial highways	0.7-0.8	0.8	0.7	0.8	0.8
• Urban distributor roads	0.6-0.7	0.7-0.8	0.5	0.8	0.7
• Residential Street	0.4-0.6	0.4	0.6	0.6	0.6
• Pavements	0.5-0.6	0.4	0.6	0.3	0.3
Car Parks / Hardstanding					
• Industrial/Commercial	0.6-0.8	0.6-0.7	0.6-0.7	0.7	0.4-0.5
• Driveways (Residential)	0.5	0.5	0.6	0.4	0.3
Open Areas					
• Gardens (All types)	0.1	0.3	0.2-0.3	0	0.01
• Parks/Golf Courses	0.2	0.2-0.3	0.2	0	0.02
• Grassed Areas (including verges, all types)	0.1	0.2-0.3	0.2-0.3	0.05	0.05
Note					
1	Pollution index values are based on reported land use type EMC distributions and impact potential thresholds from House et al (1991), Luker and Montague (1994), Butler and Clark (1995), D’Arcy et al (2000), Mitchell (2005) and Moy et al (2003)				

Figure 7: Impermeability and pollution indices for different land use types

3.2.8 For this development, the equivalent Greenfield runoff rates have been calculated and is too low to be achieved for the proposed area. The development is designed to achieve minimum or acceptable flow rate by restricting via flow control.

3.2.9 The development proposals result in an increase in impermeable areas and therefore measures must be put in place to ensure the peak runoff rate is achieved to be low as possible.

3.2.10 For this development the equivalent Greenfield runoff rate was found to be very low, QBAR 0 l/s (see **Appendix 8.3**) and would require a small diameter flow control with high blockage potential. Policy 3.4 of the Supplementary Planning Guidance (Sustainable Design and Construction) states that in cases such as this, greenfield runoff may not be appropriate as the system would be prone to blockage. The guidance goes on to state that for previously developed sites, runoff rates should not be more than three times the calculated Greenfield rate. Even when applying this guidance, the outcome still results in a very low rate, requiring an outlet diameter which is at risk of blockage. Therefore, the system has been designed to reduce the flow rate as much as possible whilst ensuring the outlet diameter is not compromised. The existing runoff calculations in 2.2.2 shows that the average peak runoff rate from the site is 1.0l/s.

- 3.2.11 Discharge rates should be managed as close as possible to the required standard by adopting a suitable flow control measure. On the basis that flow control can manage flow rates as low as 1.0l/s without incurring blockages, this has been taken as allowable flow rate for flow control devices and applied to this site.
- 3.2.12 Attenuation Basin is proposed at the front of the site, and it will provide the necessary storage volume for all storm events.
- 3.2.13 The above proposals ensure that SuDS measures are applied throughout the development.

Mitigation Indices			
Type of SuDS component	TSS	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 pavement	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

Figure 8 Extract from Table 26.3 CIRIA SuDS Manual 2015 Indicative SuDS mitigation indices for discharges to surface water

3.3 Climate Change

3.3.1 The appended drainage calculation allows for a 1:100-year storm plus 40% climate change, this has been sourced from the [DEFRA Hydrology Data Explorer for Climate Change Allowances](#), as below.

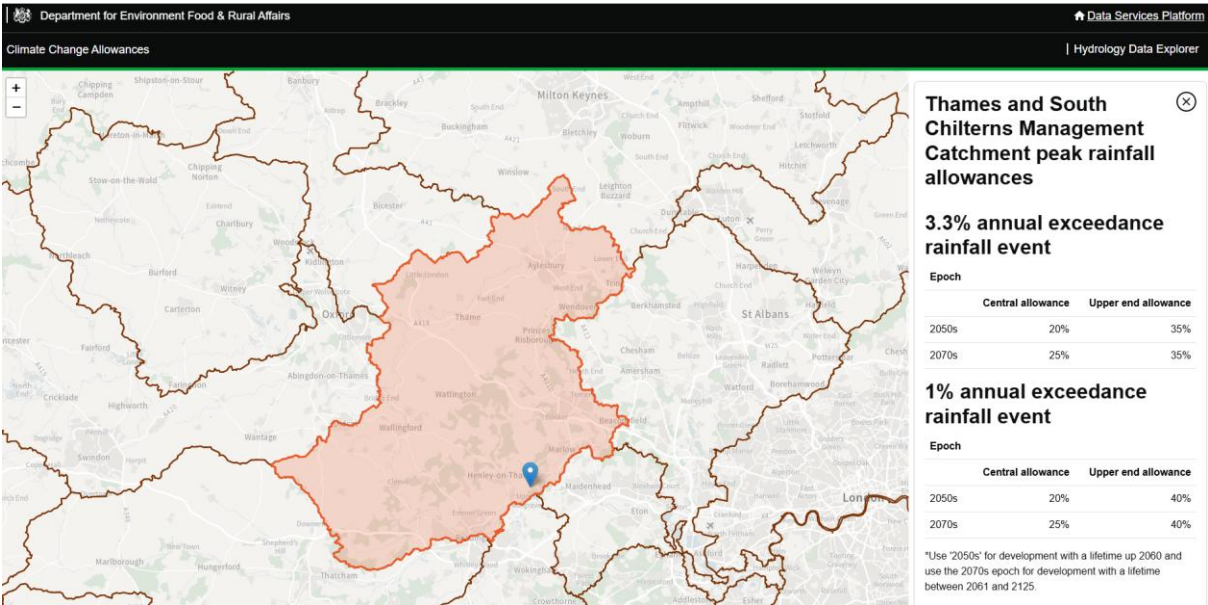


Figure 9: Climate change allowances for peak rainfall

4 Surface Water Strategy

The surface water strategy is based upon the SuDS implementation as outlined above along with the hierarchy for surface water disposal as follows:

A. Store rainwater for later use:

Rainwater harvesting is proposed for garden irrigation purposes.

B. Use infiltration techniques, such as porous surfaces:

The ground conditions at the proposed site are not feasible for infiltration.

C. Attenuate rainwater in ponds or open water features for gradual release:

The site layout does not permit the use of open water features.

D. Attenuate rainwater by storing in tanks or sealed water features for gradual release:

Surface water from the roof and surfaced areas will be directed through the drainage network towards the flow control chamber and the runoff will back up into the attenuation basin where it is temporarily stored that helps to reduce the flow rate and directing it to the existing ditch at the front of a site.

The proposed runoff from the development shall be restricted to the minimum acceptable rate which is 1.0l/s for all the storm events up to the 1:100-year event including climate change.

	1:1 Year Storm Event	1:30 Year Storm Event	1:100 Year Storm Event	1:100 year + 40% climate change
Existing Peak Runoff Rate (l/s)	2.45	5.91	7.78	-
Proposed Site Peak Runoff Rates (l/s)	1.0	1.0	1.0	1.0
Betterment (%)	59.1	83	87.1	-

E. Direct rainwater direct to the watercourse:

The surface water runoff is to discharge to the existing ditch at the front of a site, it is assumed to be flowing through the east with flow controlled to 1.0l/s.

F. Discharge rainwater to a surface water sewer/drain

Not applicable.

G. Discharge rainwater to combined sewer:

Not applicable

H. Discharge rainwater to foul sewer:

Not proposed in line with the hierarchy

4.1 Designing for Exceedance

- 4.1.0 Consideration should be given to external levels to ensure they are set above overland flood risk levels, and low points are created to direct water away from the building footprints during exceedance events.
- 4.1.1 CIRIA document C635 *Designing for exceedance in urban drainage – good practice* states that “at present there are no guidelines on the return period of event (extreme event) that should be used for design exceedance”. However, Section 3.4 also states that “it is suggested that return periods of 1 in 30, to 1 in 100 or 1 in 200-year events would form a suitable framework for most applications”.
- 4.1.2 In accordance with the above, the drainage network has been modelled using a 1 in 100-year event, and the appended calculation proves that the site handles this event without flowing surface water off site.

5 Building and Detailed Design

5.1 Pollution, Water Quality, and Control Measures

- 5.1.0 Consideration for surface water needs to be taken during the construction process, and how it is managed including flood risk and pollution control.
- 5.1.1 On completion of the permanent drainage system the network will be relied upon to control pollution and water quality for the remainder of the construction works.
- 5.1.2 Wheel and plant washing will take place at the temporary entrance to minimise the pollutants being transferred to, or from site, and is also located to minimise the risk of pollutants entering the permeable surfacing and other drainage elements.
- 5.1.3 Pollution incident potential involving plant and machinery can be contained by simple measures:
- Use of drip trays
 - Emergency spill kits
 - Regular maintenance/checks of plant and machinery including checks for wear, oil leaks and immediate decommissioning when faults occur.
 - Procedures for refuelling areas, with spillage kits

6 Surface Water Drainage Maintenance Schedules

- 6.0.1 This section of the report gives guidance on the maintenance of the drainage system and outlines the responsible party as the freeholder.
- 6.0.2 The design life of the development is likely to exceed the design life of each of the SuDS components listed above. During the routine inspections of any drainage components, it may become apparent that they have reached the end of their functional lifetime. In the interest of sustainability, repairs should be the first-choice solution where practicable. If this is not the case, then it will be necessary for the property owners to undertake complete replacement of the component in question.

6.1 Rainwater Pipes, and Chambers

Table 1 - Rainwater Pipes, and Chambers: System storage operation and maintenance requirements

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspection of silt trap chamber and removal of debris when necessary	Quarterly or as required following monitoring
Remedial Actions	Check for blockages in manholes and pipes. Rodding and jetting of pipes to be carried out. CCTV survey can be carried out to inspect condition of pipework	Quarterly or as required following monitoring
Monitoring	Inspect collection apparatus for debris and litter. Remove where necessary to prevent blockages in the system.	Monthly or after periods of heavy rainfall

6.2 Flow Control

Table 2 - System storage operation and maintenance requirements (flow control)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris and grass cuttings from upstream to prevent being washed into the flow control. Inspection of the flow control chamber and the removal of any sediment/debris when required.	Quarterly or as required following monitoring
Remedial Actions	Check flow control is functional	Quarterly or as required following monitoring
Monitoring	Inspect flow control and check flows are not impeded	Monthly or after periods of heavy rainfall

6.3 Attenuation Basin

Table 3 - System storage operation and maintenance requirements (Attenuation Basin)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris.	Monthly
	Cut grass-for spillways and access routes.	Monthly (during growing season), or as required
	Cut grass-meadow grass in and around basin	Half yearly (spring-before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Remedial Actions	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Monitoring	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

6.4 Rainwater Harvesting

Table 4- System Storage operation and maintenance requirements (Rainwater Harvesting)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters, Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and debris.	Annually (and following poor performance)
Occasional Maintenance	Cleaning and/or replacement of filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or tank damage. Pump repairs structural performance.	As required

6.5 Bio-retention Systems

Table 5 System operation and maintenance requirements (Bioretention systems)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain to determine whether maintenance is necessary. Check underdrain operation after rain. Assess plants and replace as necessary. Inspect inlet and outlet for blockage.	Quarterly. Annually. Quarterly. Quarterly.
Regular Maintenance	Remove litter and surface debris and weeds. Replace any plants required to maintain planting density. Remove sediment, litter, and debris build-up from around inlets.	Quarterly. As required. Quarterly to biannually.
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required. Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.	As required. As required.
Remedial actions	Remove and replace filter medium and vegetation above.	As required

7 Conclusions

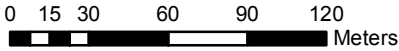
- 7.0.1 Local geology suggests non-compliant material for use of infiltration as a surface water disposal method, therefore proposals are to discharge surface water runoff into the existing ditch at the front of the property.
- 7.0.2 A series of SuDS components are proposed throughout the development including attenuation basin, bio-retention and rainwater harvesting unit. The SuDS measures implemented to ensure that contributions are made towards peak flow, runoff volume & water quality.
- 7.0.3 The drainage strategy is designed to limit the surface water runoff from the proposed development to an appropriate discharge rate. The proposed peak runoff rate offers significant reduction in flows, decreasing potential for surface water flooding downstream.

8 Appendices

8.1 Asset sewer plan

Based on the Ordnance Survey Map with the
sanction of the Controller of H.M Stationary
Office License Number 10019345

ALS/ALS Standard/2025_5114957



The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved

Scale: 1:2865
Width: 800m
Printed By: ASuji
Print Date: 04/02/2025
Map Centre: 480139,180866
Grid Reference: SU8080NW

Comments:

ALS/ALS Standard/2025_5114957

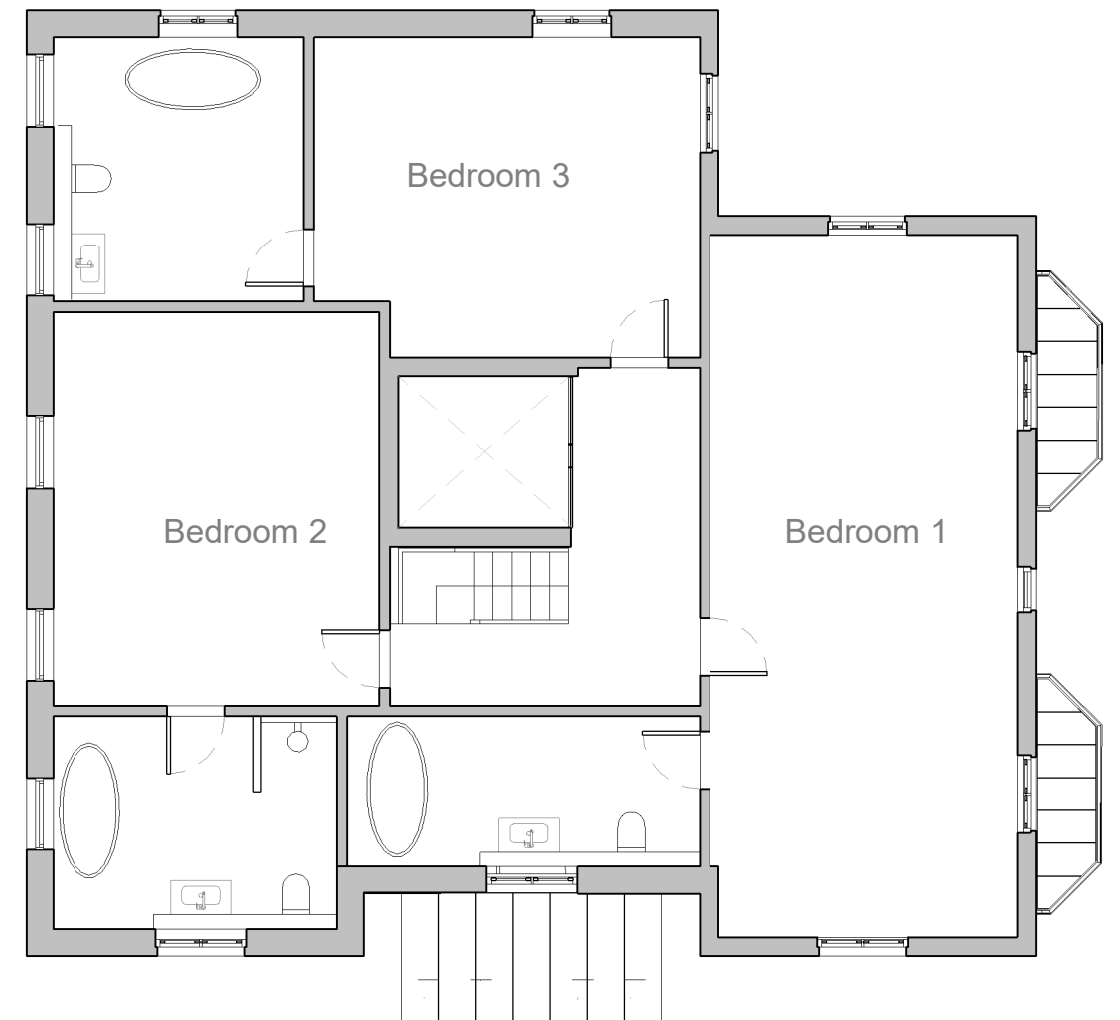
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL	REFERENCE	COVER LEVEL	INVERT LEVEL
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8.2 Architect layout Plan

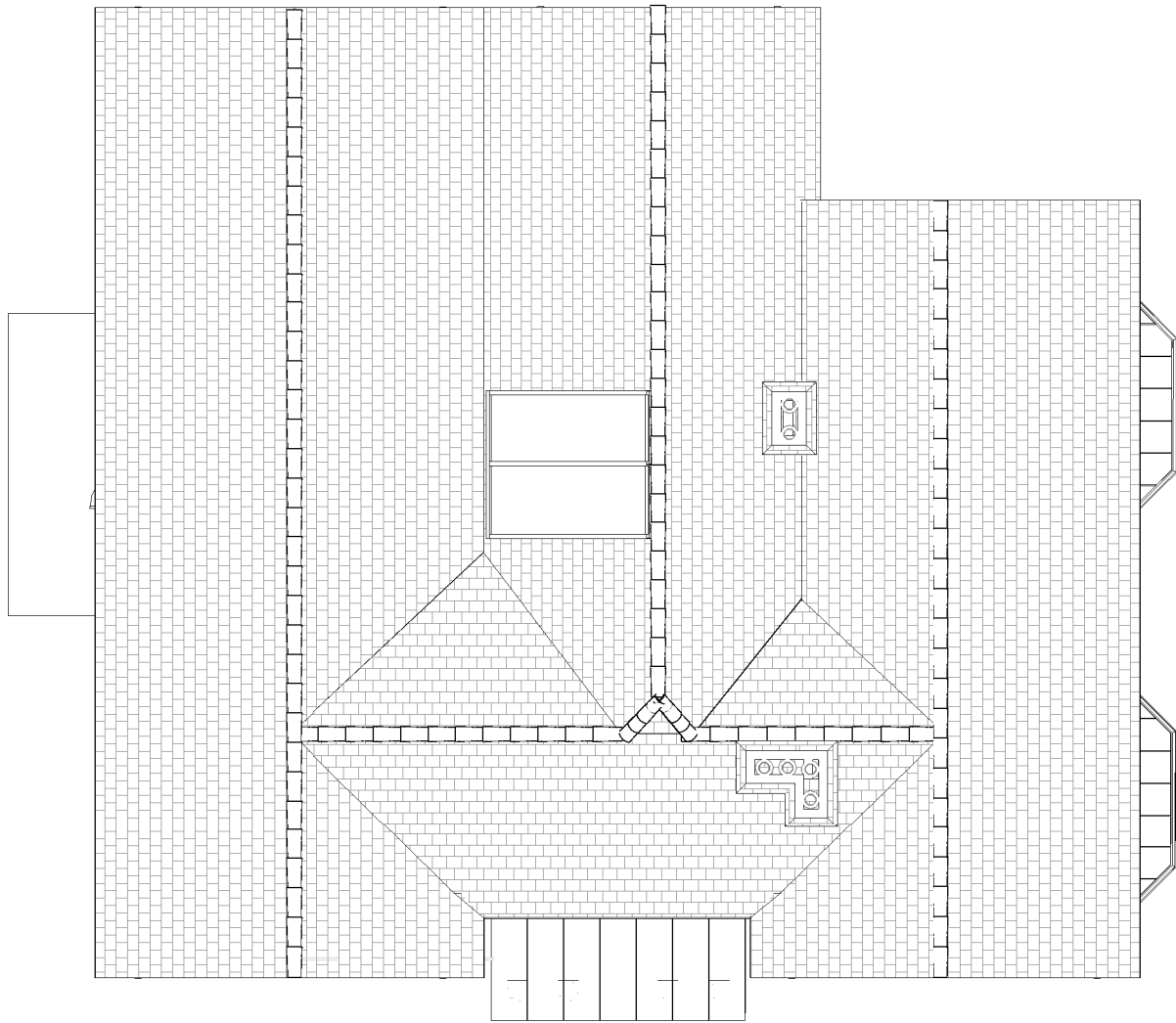


Ground Floor Plan

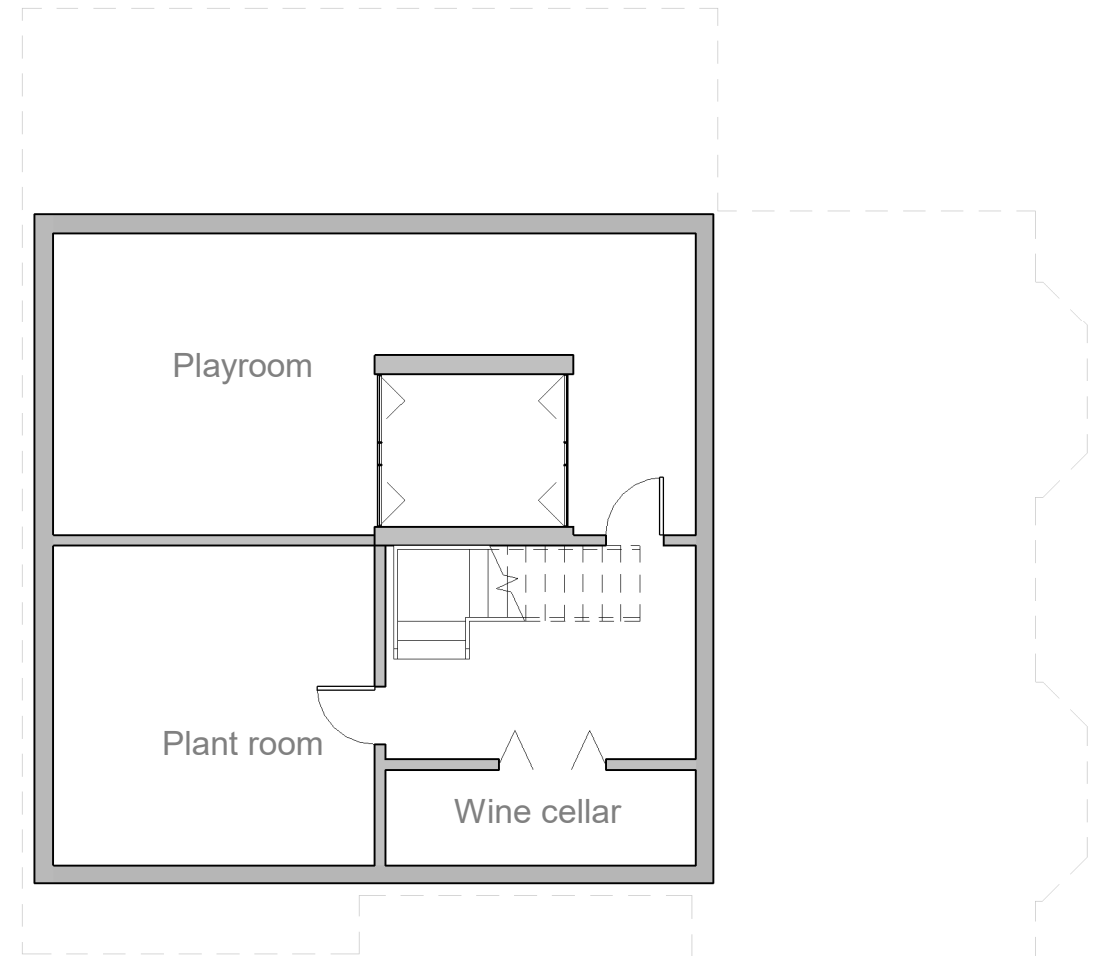


First Floor Plan





Roof Plan



Basement



8.3 Proposed Drainage Calculations

JMS Chelmsford Ltd		Page 1
BIC110 - The MedBIC Alan Cherry Drive Chelmsford CM1 1SQ		
Date 10/02/2025 16:44 File Attenuation pond.SRCX	Designed by MathanKumar Checked by	
XP Solutions Source Control 2018.1		
ICP SUDS Mean Annual Flood Input Return Period (years) 100 Soil 0.150 Area (ha) 0.019 Urban 0.000 SAAR (mm) 700 Region Number Region 6 Results 1/s QBAR Rural 0.0 QBAR Urban 0.0 Q100 years 0.0 Q1 year 0.0 Q30 years 0.0 Q100 years 0.0		
©1982-2018 Innovyze		

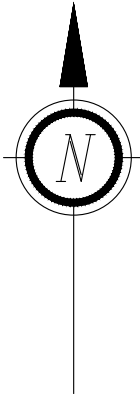
JMS Chelmsford Ltd					Page 1
BIC110 - The MedBIC Alan Cherry Drive Chelmsford CM1 1SQ					
Date 11/02/2025 10:03 File ATTENUATION POND.SRCX		Designed by MathanKumar Checked by			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.804	0.404	1.0	3.9	Flood Risk
30 min Summer	9.833	0.433	1.0	4.7	Flood Risk
60 min Summer	9.839	0.439	1.0	4.9	Flood Risk
120 min Summer	9.828	0.428	1.0	4.6	Flood Risk
180 min Summer	9.812	0.412	1.0	4.2	Flood Risk
240 min Summer	9.794	0.394	1.0	3.7	Flood Risk
360 min Summer	9.757	0.357	1.0	2.9	Flood Risk
480 min Summer	9.719	0.319	0.9	2.2	Flood Risk
600 min Summer	9.682	0.282	0.9	1.6	O K
720 min Summer	9.646	0.246	0.9	1.2	O K
960 min Summer	9.576	0.176	0.8	0.6	O K
1440 min Summer	9.444	0.044	0.7	0.0	O K
2160 min Summer	9.400	0.000	0.5	0.0	O K
2880 min Summer	9.400	0.000	0.4	0.0	O K
4320 min Summer	9.400	0.000	0.3	0.0	O K
5760 min Summer	9.400	0.000	0.2	0.0	O K
7200 min Summer	9.400	0.000	0.2	0.0	O K
8640 min Summer	9.400	0.000	0.2	0.0	O K
10080 min Summer	9.400	0.000	0.2	0.0	O K
15 min Winter	9.826	0.426	1.0	4.5	Flood Risk
30 min Winter	9.859	0.459	1.0	5.5	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	135.884	0.0	4.8	17	
30 min Summer	89.242	0.0	6.4	31	
60 min Summer	55.837	0.0	8.0	50	
120 min Summer	33.756	0.0	9.6	84	
180 min Summer	24.813	0.0	10.6	118	
240 min Summer	19.827	0.0	11.3	152	
360 min Summer	14.397	0.0	12.3	216	
480 min Summer	11.474	0.0	13.1	278	
600 min Summer	9.615	0.0	13.7	338	
720 min Summer	8.318	0.0	14.2	398	
960 min Summer	6.614	0.0	15.1	510	
1440 min Summer	4.780	0.0	16.3	736	
2160 min Summer	3.449	0.0	17.7	0	
2880 min Summer	2.733	0.0	18.7	0	
4320 min Summer	1.966	0.0	20.2	0	
5760 min Summer	1.555	0.0	21.3	0	
7200 min Summer	1.296	0.0	22.2	0	
8640 min Summer	1.116	0.0	22.9	0	
10080 min Summer	0.983	0.0	23.5	0	
15 min Winter	135.884	0.0	5.4	17	
30 min Winter	89.242	0.0	7.1	31	
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JMS Chelmsford Ltd					Page 2
BIC110 - The MedBIC Alan Cherry Drive Chelmsford CM1 1SQ					
Date 11/02/2025 10:03 File ATTENUATION POND.SRCX		Designed by MathanKumar Checked by			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.869	0.469	1.0	5.8	Flood Risk
120 min Winter	9.853	0.453	1.0	5.3	Flood Risk
180 min Winter	9.831	0.431	1.0	4.7	Flood Risk
240 min Winter	9.805	0.405	1.0	4.0	Flood Risk
360 min Winter	9.750	0.350	0.9	2.7	Flood Risk
480 min Winter	9.692	0.292	0.9	1.8	O K
600 min Winter	9.633	0.233	0.9	1.0	O K
720 min Winter	9.572	0.172	0.8	0.5	O K
960 min Winter	9.447	0.047	0.7	0.0	O K
1440 min Winter	9.400	0.000	0.5	0.0	O K
2160 min Winter	9.400	0.000	0.4	0.0	O K
2880 min Winter	9.400	0.000	0.3	0.0	O K
4320 min Winter	9.400	0.000	0.2	0.0	O K
5760 min Winter	9.400	0.000	0.2	0.0	O K
7200 min Winter	9.400	0.000	0.1	0.0	O K
8640 min Winter	9.400	0.000	0.1	0.0	O K
10080 min Winter	9.400	0.000	0.1	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	55.837	0.0	8.9	56	
120 min Winter	33.756	0.0	10.7	90	
180 min Winter	24.813	0.0	11.9	128	
240 min Winter	19.827	0.0	12.6	164	
360 min Winter	14.397	0.0	13.8	230	
480 min Winter	11.474	0.0	14.7	292	
600 min Winter	9.615	0.0	15.3	350	
720 min Winter	8.318	0.0	15.9	400	
960 min Winter	6.614	0.0	16.9	500	
1440 min Winter	4.780	0.0	18.3	0	
2160 min Winter	3.449	0.0	19.8	0	
2880 min Winter	2.733	0.0	20.9	0	
4320 min Winter	1.966	0.0	22.6	0	
5760 min Winter	1.555	0.0	23.8	0	
7200 min Winter	1.296	0.0	24.8	0	
8640 min Winter	1.116	0.0	25.6	0	
10080 min Winter	0.983	0.0	26.4	0	
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JMS Chelmsford Ltd		Page 3																																	
BIC110 - The MedBIC Alan Cherry Drive Chelmsford CM1 1SQ																																			
Date 11/02/2025 10:03 File ATTENUATION POND.SRCX	Designed by MathanKumar Checked by																																		
XP Solutions Source Control 2018.1																																			
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.700</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.400</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.019 <table> <thead> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4</td> <td>0.019</td> </tr> </tbody> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.700	Shortest Storm (mins)	15	Ratio R	0.400	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)		Area	From:	To:	(ha)	0	4	0.019
Rainfall Model	FSR	Winter Storms	Yes																																
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0	4	0.019																																	
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JMS Chelmsford Ltd		Page 4												
BIC110 - The MedBIC Alan Cherry Drive Chelmsford CM1 1SQ														
Date 11/02/2025 10:03 File ATTENUATION POND.SRCX	Designed by MathanKumar Checked by													
XP Solutions Source Control 2018.1														
Model Details Storage is Online Cover Level (m) 10.000 Tank or Pond Structure Invert Level (m) 9.400 <table> <thead> <tr> <th>Depth (m)</th> <th>Area (m²)</th> <th>Depth (m)</th> <th>Area (m²)</th> <th>Depth (m)</th> <th>Area (m²)</th> </tr> </thead> <tbody> <tr> <td>0.000</td> <td>0.6</td> <td>0.600</td> <td>49.3</td> <td>0.601</td> <td>0.0</td> </tr> </tbody> </table> Orifice Outflow Control Diameter (m) 0.023 Discharge Coefficient 0.600 Invert Level (m) 9.000			Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	0.000	0.6	0.600	49.3	0.601	0.0
Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)									
0.000	0.6	0.600	49.3	0.601	0.0									
©1982-2018 Innovyze														

8.4 Proposed Drainage Layout



General Notes:

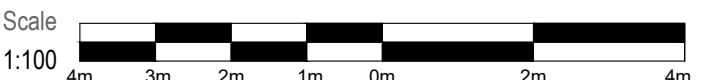
1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
3. All work is to be to the satisfaction of the engineer and local authority building control.
4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
5. All workmanship and materials are to be to current British Standards.
6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
8. All highway works are to be in accordance with the local authorities design guide and specification.
9. Prior to the occupation of the first dwelling, street nameplates shall be erected in accordance with the highway authority and to the wording agreed with the planning authority.
10. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.
11. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.
12. All road markings and signs are to be in accordance with 'The Traffic Signs Regulations and Directions' 2016.
13. All sewer works are to be in accordance with the Sewerage Sector Guidance.
14. All private connections to adoptable sewers should be a minimum of 100mm diameter (foul) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

Drainage Key

Surface Water Manhole Text	CL.00.00 IL.00.00 BD.00.00	Site Boundary	---
Surface Water Pipe Diameter / Gradient	100/80	Channel Drain	---
Inspection chamber 480mm Ø >600mm Depth	○	Oriflow Control Chamber	○
Rodding eye	RE IL.00.00	Rain garden/ Bio-retention	○
Rain Water Pipe	rwp	Rainwater Harvesting / Waterbutt	+
Perforated Pipe	+++++	Headwall	E

Note:
Assumed Rwp locations

Note:
Datum:10.000m AOD



For Planning Only

Preliminary Issue		MKR	DB	10.02.2025
Issue	Notes	Drawn	Approved	Date
 SUDS DESIGNS SUSTAINABLE DRAINAGE DESIGNS				
Issuing Office: JMS East Anglia (Ipswich): Unit 27, Brightwell Barns Brightwell, Suffolk, United Kingdom, IP10 0BJ, Tel: 01473 487047				
Project Springfield House, Hatch Gate Lane Wargrave, Reading, RG10 8QD				
Drawing Title SuDS Drainage Layout				
Project No. SD2502127		Drawing No. 201		Issue P1
PRELIMINARY				

Private Drainage Notes:

1. Inspection chamber covers and frames as follows:-

Brickwork and pre-cast concrete:

- i) Private drives accepting vehicle traffic: BS EN124 class D400, 600mm clear opening, solid top cover and frame.
ii) Footpaths, verges and gardens: BS EN124 class B125, 600mm clear opening, solid top cover and frame.

Polypropylene:

- iii) Areas accepting vehicle traffic: Class B
iv) Soft landscaped areas: Class C

2. Mortar haunching to inspection chamber and frames.

3. i) For use with brick inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 150mm grade C25P in-situ concrete (reinforced with A393 mesh to BS 4483) cover slab. Other locations inaccessible to vehicles; light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 100mm grade C25P in-situ concrete (reinforced with A193 mesh to BS 4483) cover slab.
ii) For use with precast concrete inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections. Other locations inaccessible to vehicles: light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections.

4. With precast or brick inspection chambers, cover slabs with a clear opening of 600x600mm are required. Offset to suit chosen face for step rungs.

5. 215mm thick walls in Class B engineering bricks to BS 3921 layered in English bond with frogs up. Inner faces to be plumb and in true alignment. Brick course to be level. Flush jointing to brickwork inner faces and precast concrete chamber sections to BS 5911.

6. All step rungs to BS 1247

i) General purpose pattern (with 230mm tail) to be built into chamber wall of brick inspection chambers.

ii) Precast concrete manhole pattern "let in" to chamber wall of precast inspection chambers. All step rungs to be horizontally and vertically staggered as shown on section x-x. Step rungs are not required to either type of inspection chamber where depth to soffit is less than 750mm.

7. Mass concrete infill.

8. Benching to rise vertically from edges of channel to a height not less than pipe (full section) soffit level. Steel float smooth hard surface with cement mortar 1:1 mix, 25mm thick.

9. 50mm min. thick mortar bed to half round channels.

10. 150mm min. thick mass concrete base slab (grade C20P) to precast, uPVC and brick types of inspection chamber.

11. 75mm thick lean mix concrete blinding.

12. Minimum of 2, and maximum of 4 courses of 215mm thick engineering bricks (Class B) to underside of cover & frame, built off cover slab, may be required to facilitate road or drive construction.

13. A brick relieving arch shall be turned over all pipes where they pass through the walls of a brick inspection chamber.

14. Pipes entering inspection chambers shall have a flexible joint within 150mm of the outer face of the brickwork or concrete surround.

15. Channel junctions within brick or precast concrete inspection chambers to be half round channel sections.

16. Backfill material to be as detailed above for normal pipe bedding.

17. Following the flexible joint from either a precast or brick inspection chamber (note 14 above) a 'rocker' pipe of 600mm length shall be installed.

18. Precast concrete inspection chambers may (if chosen for use) have a purpose made base units.

19. Where precast concrete inspection chambers are constructed wholly above the water table, joints are to be sealed with mortar. In waterlogged ground or where the water table is above the base slab, joints are to be water tight using a mastic sealant or rubber rings of a type suitable to the chamber units.

Table of Protection Requirements Relative to Cover

Location	Gardens (no traffic loading)		Paved or hard surfaces (light traffic loading)		Roads (carriageways & footways)	
Cover (mm) [from barrel of pipe]	Less than 600	More than 600	Less than 900	More than 900	Less than 900	More than 900
Type of protection required	Reinforced conc. or paving slab bridging	None	Reinforced conc. or paving slab bridging	None	Concrete surround	None

Notwithstanding these requirements the contractor is to give further consideration to the protection of drainage items from construction traffic and building works.

Minimum Dimensions for Access Fittings and Inspection Chambers

Type	Depth to invert from cover level (m)	Internal dimensions		Cover dimensions	
		Length (mm) x width (mm)	Circular dia. (mm)	Length (mm) x width (mm)	Circular dia. (mm)
Rodding eye		As drain but 100 min.			Same size as pipework.1
Access fitting					
Small	150 dia.	0.6 or less, except where situated in a chamber	150x100	150	150x100.1
Large	225x100		225x100	225	225x100.1
Inspection chamber					
shallow	0.6 or less		225x100	190.2	190.1
Deep	1.2 or less >1.2		450x450	450	430
			450x450	450	access restricted to max 350.3

NOTES

1. The clear opening may be reduced by 20mm in order to provide proper support for the cover and frame.
2. Drains up to 150mm.
3. A larger clear opening cover may be used in conjunction with a restricted access. the size is restricted for health and safety reasons to deter entry.

Private Drainage Notes:

1. Formation of trench beds and inspection chambers

i) Excavate immediately before laying beds and pipes or base slabs for inspection chambers.

ii) Remove all mud, rock projections, boulders and hard spots and replace with well compacted selected fill. Localised soft spots are to be hardened by tamping in granular bedding material.

iii) If oil contamination is found adjacent to trench, the trench profile is to be cut back by 150mm from the face of bedding material and replaced with crushed concrete.

2. Concrete and mortar

i) The concrete used to surround pipes and in the construction of gullies and inspection chambers is to be grade C20P (unless noted otherwise) and mixed using SRPC unless directed otherwise by the engineer or local authority. Sulphate resisting cement is to be used for in-situ or precast concrete and mortars to foul drains.

3. Covers and frames

All inspection chamber cover and frames are to be laid to have the top surface in alignment with both the longitudinal and transverse gradients of adjacent roads, drives, footways and verges. They are otherwise to be laid level. All cover levels as shown on the drainage layout/longsection are approximate. Actual cover levels are to be determined on site from the position in the road, drive, footpath or otherwise.

4. Pipes to as follows:

Pipe dia. (mm)	Type	Remark
100 Internal (110 NOM. dia.)	uPVC	BS EN 1401
150 Internal (160 NOM. dia.)	uPVC	BS EN 1401

5. The contractor/developer is to ensure that all of the works comply with the following:

i) BS 8301: 1985 (code of practice for building drainage)

ii) The Building Regulations: Approved Document H 2002

iii) NHBC Technical requirements

iv) BRE Digest No. 363

6. The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions.

7. All uPVC items as specified on this drawing are to comply with BS EN 1401.

8. Mortar

Mortar shall be mixed only as and when required, the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

Alternative Nominal Mixes by Volume		
Cement:Lime:Sand	Cement:Sand	Cement:Sand with plasticiser
1 : 1 1/4 : 3	1 : 3	1 : 2 1/2 to 3

9. Ready-mixed lime: Sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4721 and to be of category 1.12 and designation (i) respectively.

10. All mortar shall be conveyed fresh to the works as required for use. Mortar which has begun to set or which has been site-mixed for a period of more than 1 hour shall not be used. Plasticising and set retarding mortar admixtures shall comply with BS 4887: part 1 and 2, respectively and shall be supplied with instructions for use.

11. Crushed natural stone and shall comply in all respects with BS 1200.

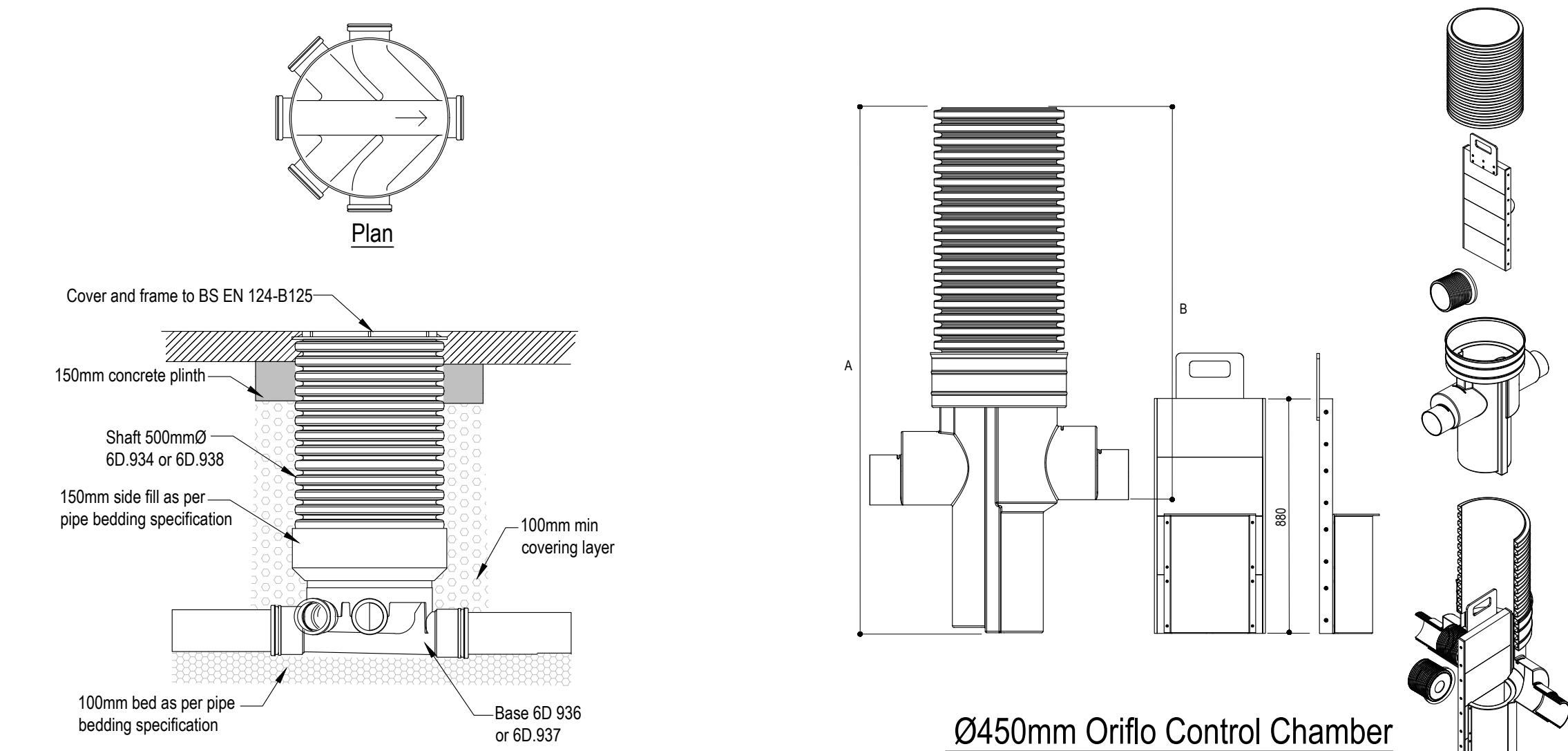
Materials for Below Ground Drainage

Material	British Standard
1. Rigid pipes:	
Vitrified clay	BS 65, BS EN 295
Concrete	BS 5911
Grey iron	BS 437
Ductile iron	BS EN 598
2. Flexible pipes:	
UPVC	BS EN 1401*
PP	BS EN 1852*
Structure wallled	BS EN 13476
Plastic pipes	

*Application area code "UD" should normally be specified
Note
Some of these materials may not be suitable for conveying trade effluent.

Materials for Access Points

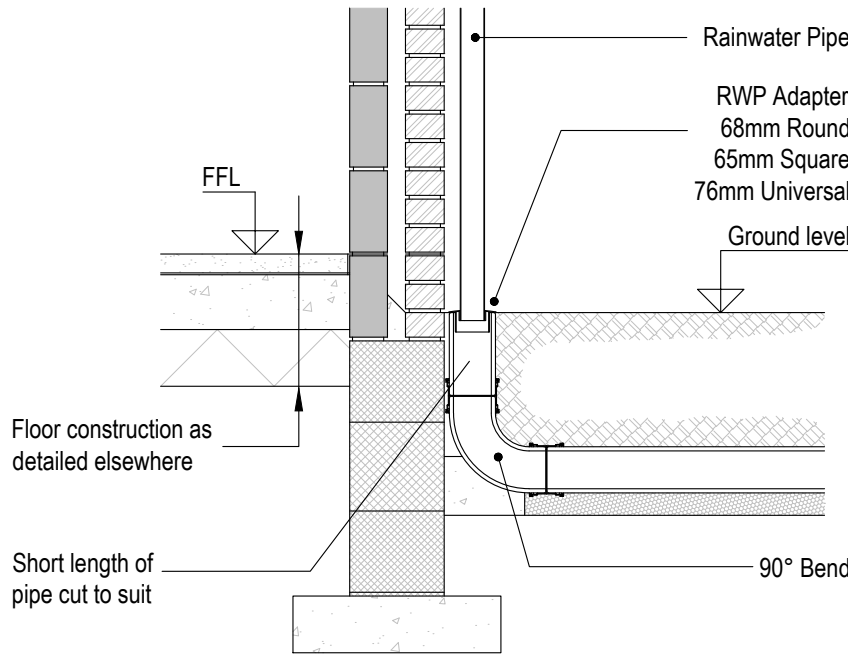
Material	British Standard
1. Inspection chambers and manholes.	
Clay brick & blocks	BS 3921
Vitrified clay	BS EN 295, BS 65
Concrete-precast	BS 5911
Concrete-in situ	BS 8110
Plastics	BS 7158
2. Rodding eyes and access fittings (excludes covers and frames).	As pipes refer to materials for below ground drainage



Polypropylene Shallow Inspection Chamber
Ø450mm (Light Loading B125)

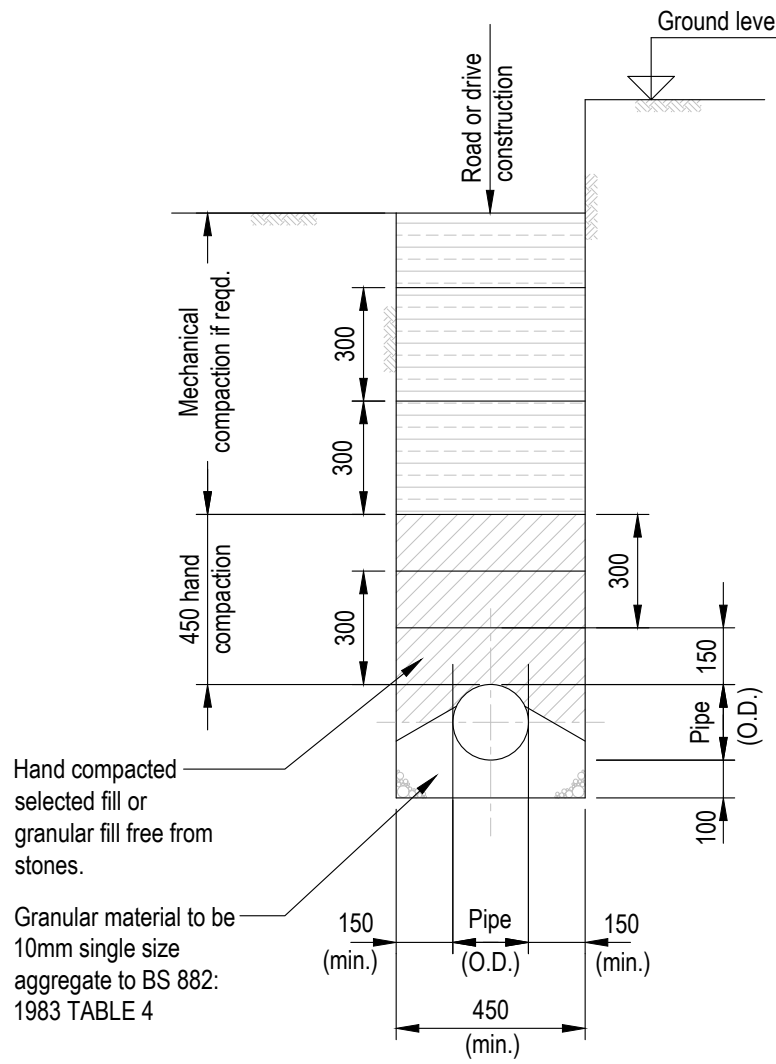
Scale 1:20

Note:
3m maximum depth. Up to Ø150mm pipework for 450mm shaft, or up to 300mm pipework on 500mm shaft. B125 maximum Loading, suitable for car parks and private drives



External RWP Connection

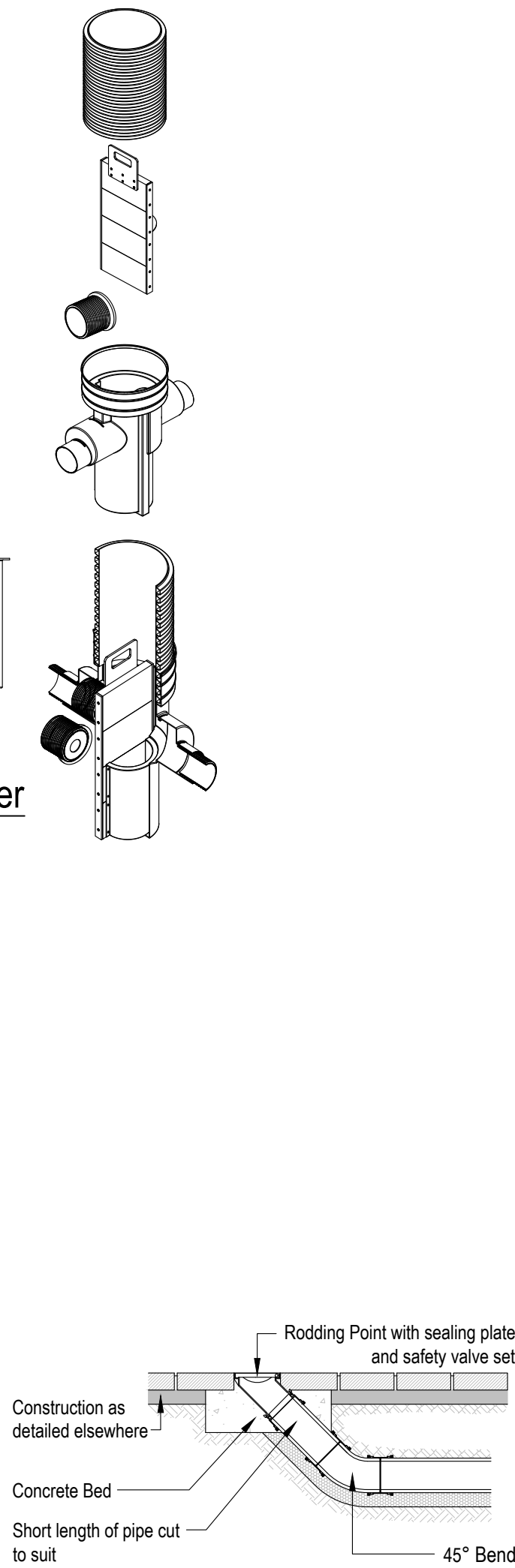
Scale 1:20



Normal Bedding

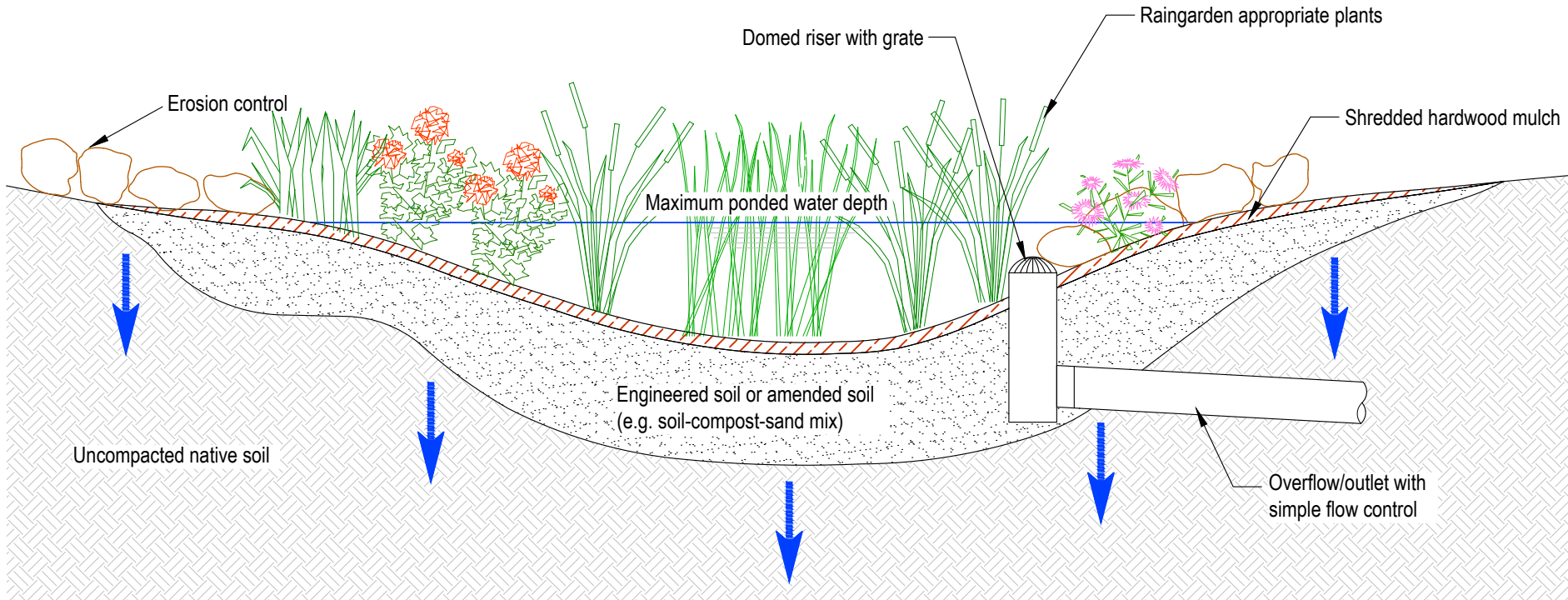
Scale 1:20

Note:
Pipe protection is required by one of the three methods shown where cover is <600mm in un-trafficked areas and <900mm elsewhere.



Rodding Point

Scale 1:20



Typical Attenuation Basin Detail

Not to Scale

Scale
As Shown

P1 Preliminary Issue		MKR	DB	10.02.2025
Issue	Notes	Drawn	Approved	Date
 SUDS DESIGNS SUSTAINABLE DRAINAGE DESIGNS				
Issuing Office: JMS East Anglia (Ipswich): Unit 27, Brightwell Barns Brightwell, Suffolk, United Kingdom, IP10 0BJ, Tel: 01473 487047				
Project Springfield House, Hatchgate Lane Wargrave, Reading, RG10 8QD				
Drawing Title Drainage Construction Details				
Project No. SD2502127		Drawing No. 202		Issue P1
PRELIMINARY				



Questions?

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