

LEONARDSLEE LAKES & GARDENS
HORSHAM, WEST SUSSEX

**FLOOD RISK ASSESSMENT &
DRAINAGE STRATEGY**

PURCELL UK

DOCUMENT REFERENCE:

25087-FRA-RP-01 | C01



Water Environment Limited
6 Coppergate Mews
103 Brighton Road
Surbiton
London
KT6 5NE

Tel: 020 8545 9720

www.WaterEnvironment.co.uk

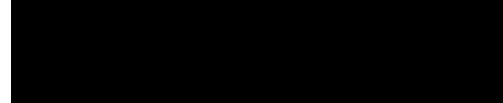
Authorisation and Version Control

Water Environment was commissioned by Purcell UK to investigate the risks and assess the consequences of flooding on the site at Leonardslee Lakes & Gardens as well as to develop a Sustainable Drainage Strategy for the proposed development.

Author:

Jonathan Adams

MEng



Checker:

Guy Laister

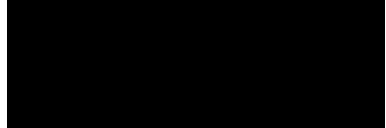
MSc Eng BSc Eng (Civil)
CEng CEnv C.WEM MCIWEM



Approver:

Guy Laister

Director



for and on behalf of Water Environment Limited

Document Version History

Rev	Date	Comments	Auth	Chck	Appr
P01	12/12/2025	Draft issue for comment	JA	GL	GL
C01	17/12/2025	Final issue for planning submission	JA	GL	GL

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ABBREVIATIONS

Acronym	Definition
AOD	Above Ordnance Datum
BGL	Below Ground Level
BGS	British Geological Survey
DEFRA	Department for Environment Food and Rural Affairs
DTM	Digital Terrain Model
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
HDC	Horsham District Council
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WSCC	West Sussex County Council

1 INTRODUCTION

Brief

- 1.1 Water Environment has been commissioned by Purcell UK to prepare a Flood Risk Assessment (FRA) and Drainage Strategy in accordance with the National Planning Policy Framework (NPPF), to inform the proposed development at Leonardslee Lakes & Gardens, West Sussex, RH13 6PP, herein referred to as 'the Site'.
- 1.2 This FRA and drainage strategy has been prepared in support of the detailed planning application already submitted for the proposed development under reference DC/25/1146. This report seeks to address comments raised by the Lead Local Flood Authority (LLFA) on the submitted application.

Project Overview

- 1.3 The proposed development comprises a number of separate areas of development across the Leonardslee Lakes & Gardens estate. For the purposes of this report, the proposed development is divided across seven areas:
 1. Extension to the visitor entrance building to house a new ticket sales area and café;
 2. Landscaping changes to the forecourt of Leonardslee House.
 3. Single storey winter garden conservatory to the Stable Block with terrace extension to the east and internal/ external reconfigurations and change of use from redundant staff offices and staff accommodation within the stable block to guest accommodation including extension to Honey Cottage;
 4. Infilling roof to the former generator block courtyard, re-roofing of the Alpine House and internal/external reconfigurations and link extension;
 5. Change of use to the partial first floor of the Red House to staff accommodation;
 6. Small WC extension, reinstated chimney stack, and roof alterations to the Engine House; and,
 7. Lightweight wedding pavilion to the lawn, south of Leonardslee House.

Scope of Study

- 1.4 The main objectives of this study are to:
 - Assess the risk and implications of flooding on the Site including flooding from tidal, fluvial, groundwater, surface water and artificial sources;
 - Prepare a flood risk assessment of the Site that is in accordance with the guidelines set out in the National Planning Policy Framework and associated Planning Practice Guidance;
 - Consider potential future climate change over the lifetime of the proposed development in accordance with the latest guidance; and
 - Prepare a SuDS strategy that shows how surface water runoff will be managed from the Site in accordance with the latest guidance.

2 SITE DESCRIPTION

Location

2.1 The Site is located to the east of the A281, south east of Horsham, West Sussex, as illustrated in Figure 2.1 below. The nearest postcode for the Site is RH13 6PP and the National Grid Reference for the approximate centre of the Site is 522125E, 125952N. The Site covers a total area of approximately 1.08 ha.

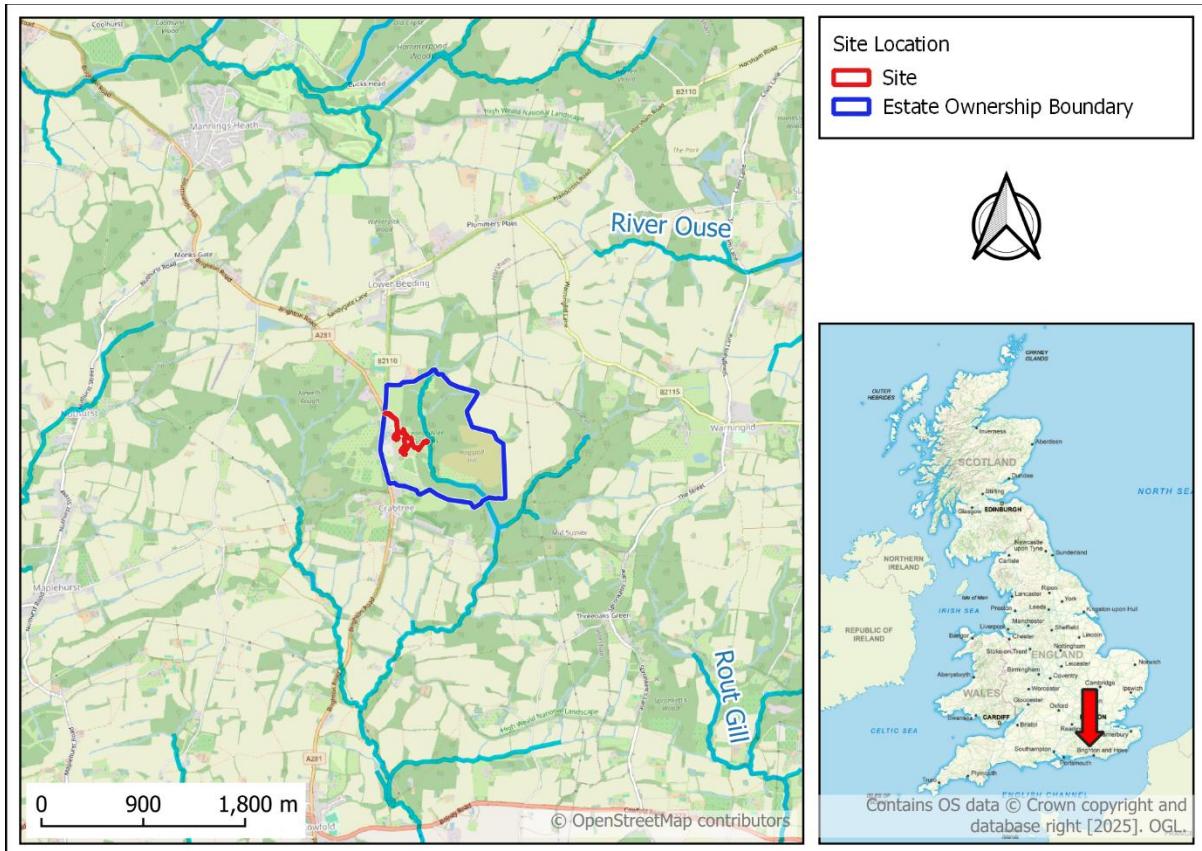


Figure 2.1: Site location and local watercourses

2.2 Horsham Borough Council (HBC) is the Local Planning Authority (LPA) for the Site and West Sussex County Council (WSCC) acts as the Lead Local Flood Authority (LLFA).

Existing Development

2.3 The existing site is currently occupied by a number of historic buildings, visitor amenities and historic gardens, and sits within the wider Leonardslee Lakes & Gardens estate. Within the estate, all gardens are Grade I listed and buildings are a mixture of Grade II listed, curtilage listed, and unlisted 20th Century buildings.. A plan of the existing site is included in Appendix A.

2.4 The Site is bound to the north, east, and south by the Leonardslee Lakes & Gardens estate. At the Site's western boundary is the A281.

2.5 Historic mapping shows that the site has been occupied by the present house and estate buildings since 1852 as a private residence. In recent years, the estate has operated as a public attraction, and was most recently re-opened to the public in 2019, for which the estate was developed to accommodate visitors through the construction of additional car parking and re-development of existing buildings.

Topography

2.6 A topographic survey of the site was undertaken by MK Surveys in March 2023 (ref: 32290), and is enclosed in Appendix A.

2.7 The topographic survey shows the Site to have a general fall from northwest to southeast in the area of the existing entrance building and forecourt. This area of the Site has a high point of approximately 100.2 mAOD at the site access road in the north, and a low point of approximately 90.0 mAOD at the south east corner of the forecourt to the front of the main house. The site falls more steeply east of the main house towards the lakes and engine house, which is the lowest part of the site at approximately 49.2 mAOD.

Geology

2.8 The British Geological Survey (BGS) Online Viewer notes the underlying bedrock of the Site as Upper Tunbridge Wells Sand, in a combination of Sandstone and Mudstone, as can be seen in Figure 2.2. No superficial deposits are noted on or within the near vicinity of the Site.

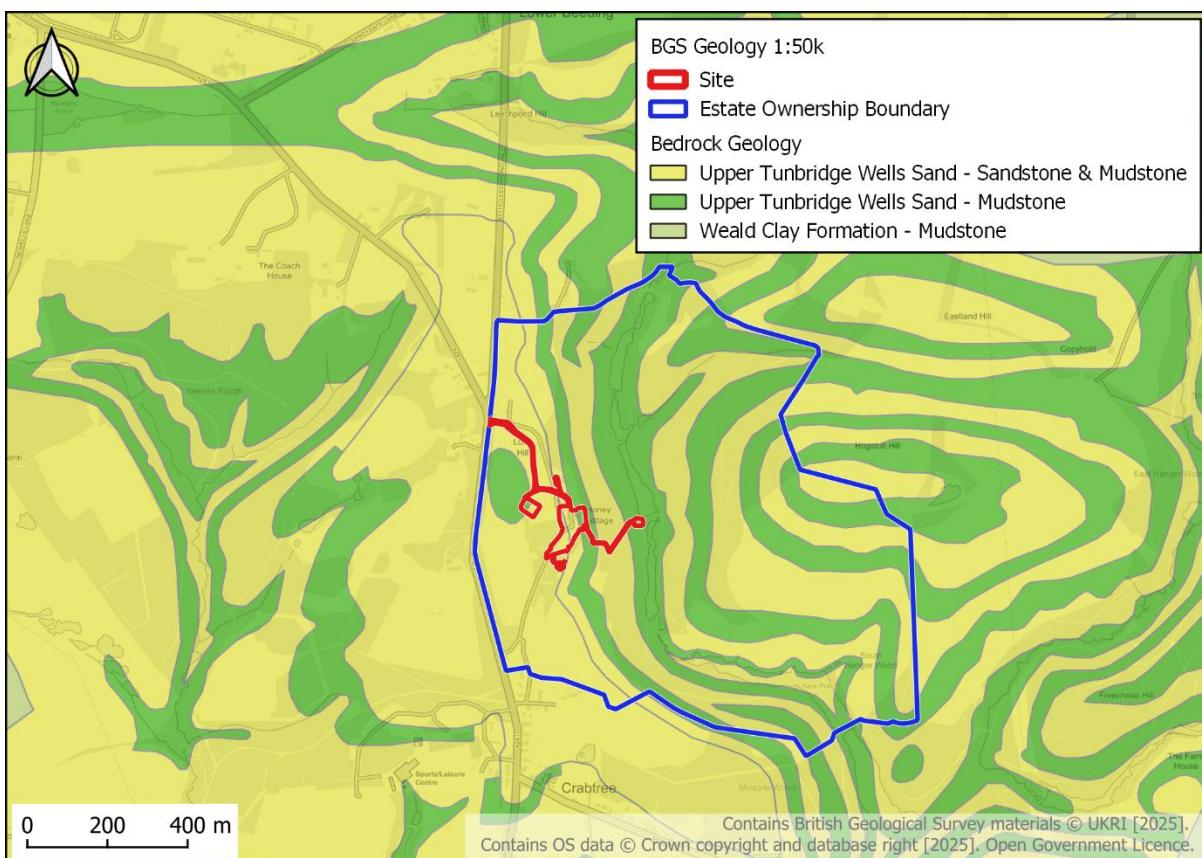


Figure 2.2: Extract of BGS Online Geology Viewer Map

2.9 One historical borehole record is located in the near vicinity of the Site on the BGS GeoIndex resource, approximately 350m to the west. This shows the area to be underlain by Tunbridge Wells Sandstone, described as sandy clay with occasional hard bands of sandstone, up to a depth of 65m. Water was struck at 43m below ground level (bgl). This record can be found in Appendix B.

2.10 No site-specific ground investigation has been undertaken at this time.

Hydrogeology

- 2.11 The Site is not located on a Source Protection Zone (SPZ).
- 2.12 The site is located on the boundary between Secondary A and unproductive aquifers. The groundwater vulnerability for the Site is noted as high in some areas, and unproductive in others. These areas likely correspond with the regions of sandstone and mudstone mapped by the BGS Online Viewer.
- 2.13 The groundwater levels beneath the Site are currently unknown, although the historical borehole record approximately 350m east of the Site notes groundwater levels to be approximately 43m bgl. The approximate ground level of the area of this borehole is 94 mAOD, meaning groundwater levels are believed to be at approximately 50 mAOD in the wider area.

Hydrology

- 2.14 A desk-study review of Ordnance Survey mapping shows no surface water bodies within the Site itself. This was confirmed by site walkover by Water Environment in November 2025.
- 2.15 Environment Agency mapping identifies the nearest Main Rivers to the Site as the Cowfold Stream and the River Ouse, 4.3km south and 4.4km north east of the Site respectively.
- 2.16 Immediately adjacent to the Engine House at the easternmost point of the site are a number of man-made lakes within the Leonardslee Lakes & Gardens estate. These lakes cascade from north to south, and ultimately discharge to the Cowfold Stream.

Existing Site Drainage

- 2.17 Southern Water are the statutory undertakers for wastewater in the area. However, a review of the Southern Water asset records confirms that there are no public sewers within the Site or in the immediate vicinity.
- 2.18 An underground utilities survey of the wider Leonardslee Lakes & Gardens estate was undertaken by MK Surveys in October 2017, and is contained in Appendix A. This survey showed the site to be served by a private combined network, taking both foul and surface water flows from the buildings and areas of hardstanding across the Site. These flows are conveyed through the subsurface pipe network to a settlement tank and reed beds to the southeast of the Site. Here the combined flows are treated and discharged overland to ultimately outfall to the man-made lakes at the base of the valley to the southeast of the site. An EA permit is in place for this discharge to surface water.
- 2.19 With regard to drainage, the Engine House is separate to all other buildings within the Site due to prevailing levels. The Engine House discharges only surface water, which is collected by rainwater pipes and channel drains, and outfalls overland into the man-made lakes immediately to the east.

Proposed Development

- 2.20 The proposed development comprises a number of separate areas of development across the Leonardslee Lakes & Gardens estate. For the purposes of this report, the proposed development is divided across seven areas, as set out in Figure 2.3. A plan of the proposed development is contained in Appendix C.
 1. New Ticket Entrance Extension – an extension is proposed to the south elevation of this building creating a new area to house a ticket desk and a welcome café;

2. Leonardslee House Forecourt – it is proposed that the existing hard landscaping will be altered to a softer configuration with new interpretation boards to reduce parking to the front of the House, creating a soft division from garden visitors to the car park as per historic precedent;
3. Stable Block – a new winter garden extension is proposed to the Stable Block along with a lightweight terrace to the east. The Clocktower Café will be refurbished and back of house spaces consolidated with new WCs introduced. The existing staff accommodation will be refurbished into additional guest accommodation;
4. Former Generator Block – it is proposed that the existing open courtyard will be covered to create a new events space. The Alpine House will be refurbished and the Dolls House Museum will be moved to the Red House to create a limited number of WCs;
5. Red House – it is proposed that the current staff welfare to the ground floor side wing that has been moved to the Compound will house the Dolls House Exhibition to be closer to the play area. The offices at first floor level will be renovated into purpose built staff accommodation with individual living space and kitchens;
6. Engine House – a small extension is proposed to house an accessible WC. An extension to the existing terrace is also proposed for further seating capacity; and
7. Lightweight Wedding Pavilion – a new lightweight wedding pavilion is proposed on the lawn to the south of Leonardslee House to hold wedding ceremonies.

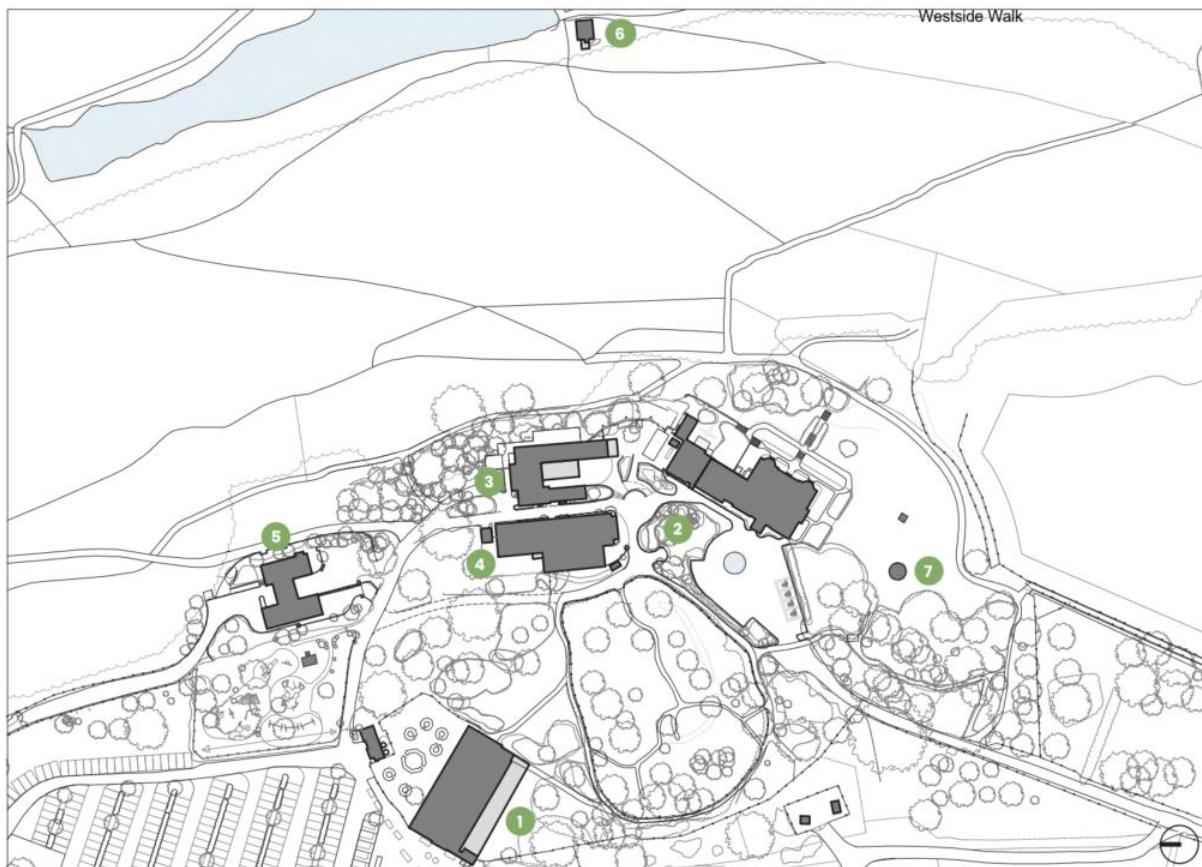


Figure 2.3: Proposed site plan (ref: Purcell UK Design and Access Statement, July 2025)

3 PLANNING POLICY

National Planning Policy Framework

3.1 The National Planning Policy Framework (NPPF) was revised in December 2024 and sets out the Governments' planning policies for England and how these are expected to be applied. In terms of flood risk, the updated NPPF states that:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."

3.2 In addition to the NPPF, online Planning Practice Guidance (PPG): Flood Risk and Coastal Change was published in March 2014 (and most recently revised in September 2025) to clarify planning aspects of flood risk management. The PPG clarifies which development types are considered appropriate within each flood zone and is a 'live' document with periodic reviews and updates.

3.3 According to Table 2 'Flood Risk Vulnerability Classification' of the Flood Risk and Coastal Change section of the PPG, the residential aspects of the proposed development (including the staff and guest accommodation) are considered to be 'More Vulnerable' in terms of flood risk. However, the retail, commercial and leisure aspects of the proposed development can be considered 'Less Vulnerable'. The vulnerability classifications of the proposed development remain the same as the existing site.

Sequential Test

3.4 The NPPF recommends that all plans should apply a sequential, risk-based approach to the location of development - taking into account the current and future impacts of climate change - so as to avoid, where possible flood risk to people and property. The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding.

3.5 The Site is entirely within Flood Zone 1 and the proposed development does not change the vulnerability of the site. The sequential test is therefore passed.

Exception Test

3.6 Table 3: Flood risk vulnerability and flood zone 'compatibility' of the PPG for Flood Risk and Coastal Change states that 'More Vulnerable' uses are compatible with Flood Zone 2 and Flood Zone 1. The Exception Test is therefore not required for this scheme.

Local Planning Policy

3.7 The Horsham District Planning Framework (HDPF) was adopted in November 2015 and sets out the Council's policies on development of the district up to 2031. The HDPF sets out the overall vision and planning strategy for development in the district. The main policy relevant to the development with regard to flood risk and surface water drainage comprises:

Policy 38: Flooding

- 1. Development proposals will follow a sequential approach to flood risk management, giving priority to development sites with the lowest risk of flooding and making required development safe without increasing flood risk elsewhere. Development proposals will;*

- a. take a sequential approach to ensure most vulnerable uses are placed in the lowest risk areas.
 - b. avoid the functional floodplain (Flood zone 3b) except for water-compatible uses and essential infrastructure.
 - c. only be acceptable in Flood Zone 2 and 3 following completion of a sequential test and exceptions test if necessary.
 - d. require a site-specific Flood Risk Assessments for all developments over 1 hectare in Flood Zone 1 and all proposals in Flood Zone 2 and 3.
2. Comply with the tests and recommendations set out in the Horsham District Strategic Flood Risk Assessment (SFRA).
3. Where there is the potential to increase flood risk, proposals must incorporate the use of sustainable drainage systems (SuDS) where technically feasible, or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere.
4. Consider the vulnerability and importance of local ecological resources such as water quality and biodiversity when determining the suitability of SuDS. New development should undertake more detailed assessments to consider the most appropriate SuDS methods for each site. Consideration should also be given to amenity value and green infrastructure.
5. Utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to its source as possible will be required where technically feasible.
6. Be in accordance with the objective of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements.

3.8 The proposed development was previously submitted for planning under planning reference DC/25/1146 without a flood risk assessment or drainage strategy. As the LLFA, WSCC provided comments on the proposals, stipulating requirements for the proposed drainage design. These have been appended to this report in Appendix D.

Strategic Flood Risk Assessment

3.9 A Level 1 Strategic Flood Risk Assessment (SFRA) was prepared by Aecom for HDC in September 2024. The following sources were identified within the study area:

- Fluvial
- Tidal
- Surface Water
- Groundwater
- Sewer
- Artificial Sources

3.10 Maps produced as part of the SFRA show the Site to be generally at low to very low risk of flooding from most identified sources, relevant extracts of which are contained in Appendix E. This is discussed further in the following chapters.

4 POTENTIAL FLOODING ON SITE

Flooding from Rivers and the Sea

4.1 The EA Flood Zone Map within the Flood Map for Planning shows the Site to be located entirely within Flood Zone 1, as can be seen in Figure 4.1. The EA defines Flood Zone 1 from rivers or the sea in Paragraph 078 (Table 1) of the PPG as follows:

Flood Zone 1 (Low Probability): Land having less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map - all land outside of Zones 2, 3a and 3b).

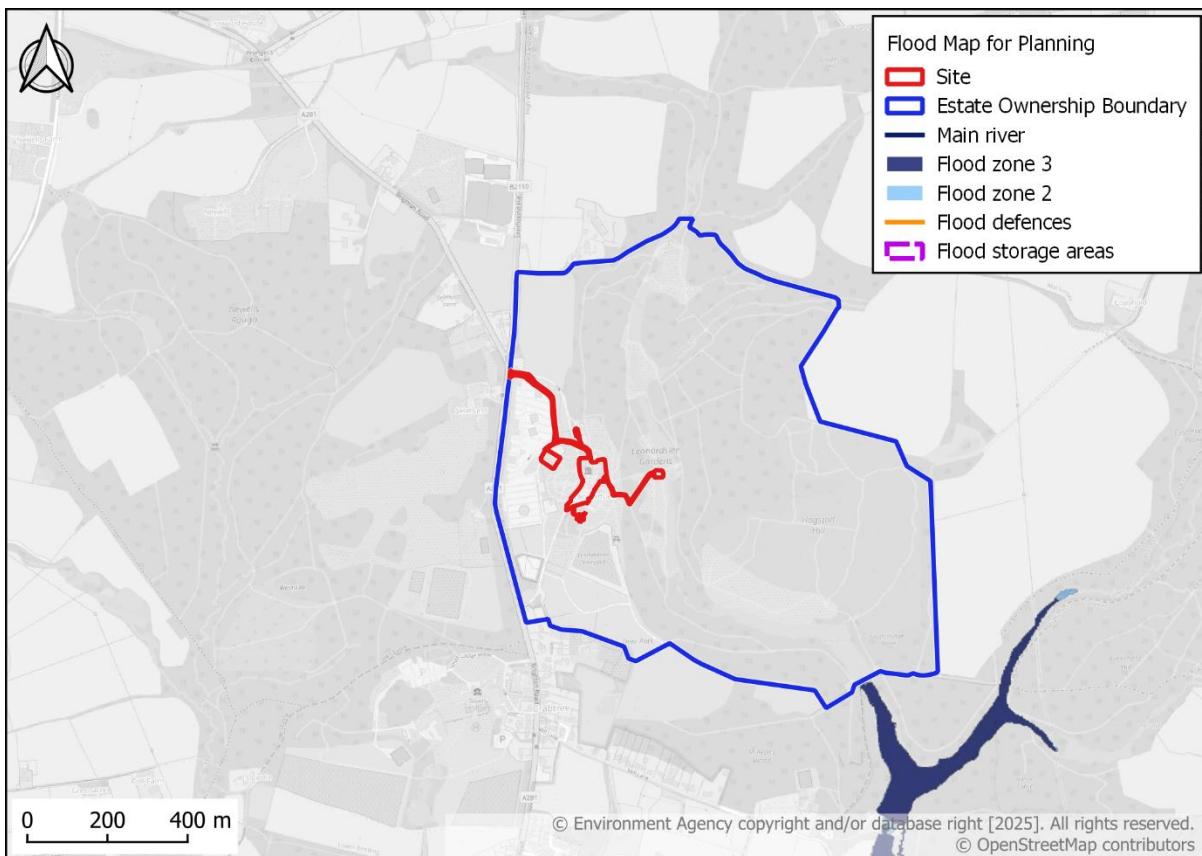


Figure 4.1: Extract of EA Flood Map for Planning

4.2 The risk of fluvial and tidal flooding is deemed **Low**.

Flooding from Surface Water

4.3 The EA classify surface water flood risk as follows:

- **VERY LOW** – the area has a chance of surface water flooding of less than 0.1%
- **LOW** – the area has a chance of surface water flooding of between 0.1% and 1%
- **MEDIUM** – the area has a chance of surface water flooding of between 1% and 3.3%
- **HIGH** - the area has a chance of surface water flooding of greater than 3.3%

4.4 The EA's Risk of Flooding from Surface Water (RoFSW) map is presented in Figure 4.2.

4.5 The Site is entirely at very low risk of surface water flooding.

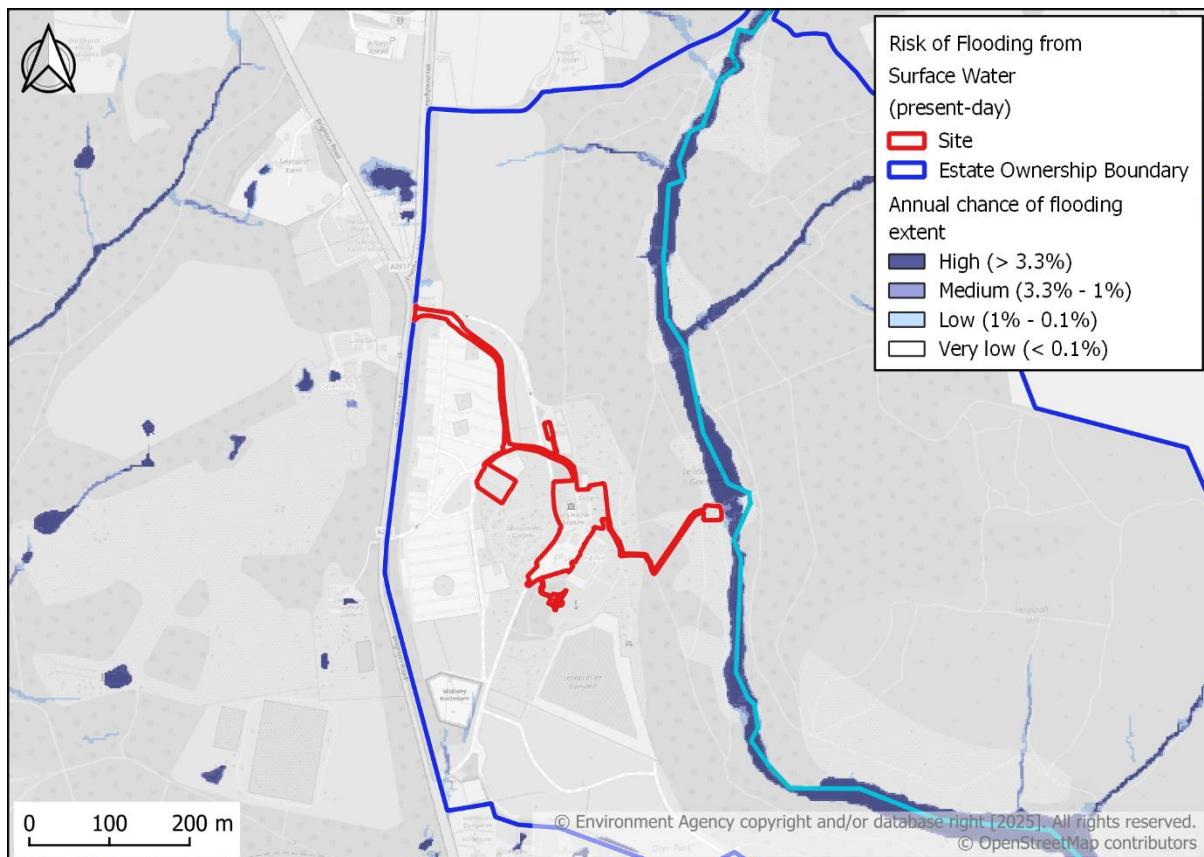


Figure 4.2: Risk of Surface Water Flooding Extent Map

4.6 Overall, the risk of surface water flooding is deemed **Very Low**.

4.7 Surface water will be managed on the Site by implementation of a SuDS strategy, reducing the risk of surface water flooding on and off the Site. The SuDS strategy is outlined in Section 5.

Flooding from Sewers

4.8 Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers.

4.9 Mapping from the HDC SFRA shows the Site to be in a postcode area (RH13) where sewer flooding has been recorded between 41 and 120 times between 2014 and 2024. However, the Site does not contain any public sewers and is not served by the public sewer network

4.10 The risk of sewer flooding for the Site is therefore considered **Low**.

Flooding from Groundwater

4.11 Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata and is often localised in low-lying areas which are underlain by permeable aquifers. Following a prolonged period of rainfall, a rise in the water table may be observed and this can result in groundwater flooding at the surface. Groundwater responds slowly to variations in rainfall and therefore flooding may be seen for extended periods of time.

4.12 A review of the SFRA mapping shows the Site to be located in an area at negligible risk of groundwater flooding.

4.13 The bedrock geology of the Site is anticipated to be Upper Tunbridge Wells Sand and is expected to be of low permeability. Groundwater levels beneath the site are currently unknown, but nearby historical records suggest that they are significantly below ground level across the site.

4.14 The risk of groundwater flooding is deemed to be **Low**.

Flooding from Other Sources

4.15 Information available from the EA for risk of inundation from reservoirs indicates that the Site is not within the flood extents from artificial sources.

4.16 The easternmost point of the site is immediately adjacent to man-made lakes within the Leonardslee Lakes & Gardens estate, and is therefore in an area liable to flooding in the event of increased levels or blockage downstream. However, the likelihood of such an event is very low, as levels and overflows are closely managed by the estate management team.

4.17 The risk of flooding from artificial sources is **Low**.

Climate Change

4.18 The projected impacts of climate change are likely to increase intensity and frequency of extreme rainfall events, resulting in increased risk of flooding from rivers. Climate change allowances are therefore included as part of the assessment.

4.19 The EA has produced a range of climate change allowances to be applied to the peak river flow and rainfall intensity based upon the river basin management catchment. Management catchments are sub-catchments of river basin districts. The Site is located in the Adur and Ouse Management Catchment. Table 4.1 shows the anticipated changes to peak flow, which should be considered for the area.

4.20 The range of allowances is based upon a statistical analysis above the 50th percentile which is regarded as being the central category. The higher central is based upon the 70th percentile and the upper end is based on the 95th percentile.

Table 4.1: Peak River flow allowances by Adur and Ouse Management Catchment

Allowance category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper	40%	57%	107%
Higher	23%	28%	55%
Central	16%	18%	37%

4.21 Climate change allowances should be applied to the peak rainfall intensities. The EA has produced updated rainfall allowances for both 1% and 3.3% annual exceedance rainfall events for each Management Catchment. Table 4.2 and Table 4.3 show the anticipated change in extreme rainfall intensity in small and urban catchments. The upper end allowances for both the 1% and 3.3% annual exceedance probability events should be applied for Flood Risk Assessments to assess the range of impact.

Table 4.2: EA Peak Rainfall allowances by Adur and Ouse Management Catchment (3.3% annual exceedance probability)

Allowance category	Total potential change anticipated for the '2050s' (2040 to 2060)	Total potential change anticipated for the '2070s' (2061 to 2125)
Upper	35%	40%
Central	20%	20%

Table 4.3: EA Peak Rainfall allowances by Adur and Ouse Management Catchment (1.0% annual exceedance probability)

Allowance category	Total potential change anticipated for the '2050s' (2040 to 2060)	Total potential change anticipated for the '2070s' (2061 to 2125)
Upper	45%	45%
Central	20%	25%

5 SURFACE WATER MANAGEMENT

Policy

- 5.1 The surface water drainage system has been designed in accordance with the NPPF and the accompanying Guidance and Technical Standards for SuDS. It also complies with the requirements under Building Regulations Part H, and is compliant with the WSCC SuDS Design Guidance.
- 5.2 In order to avoid increasing flood risk elsewhere, the surface water runoff from the Site should not increase post-development. In addition, national and local policy require the use of Sustainable Drainage Systems (SuDS) wherever practical to reduce runoff to as close to greenfield as possible. In the case of low discharge rates, the HDC Surface Water Drainage Statement Form states that pipes with flows of less than 2l/s are prone to blockage. Flows of less than 2L/s have therefore been avoided in the proposed design.
- 5.3 Surface water should be managed in line with the SuDS hierarchy under paragraph 56 of the PPG. In addition, the SCC SuDS Design Guidance states that runoff should be discharged in line with the following drainage hierarchy:
 - 1) at source reductions and reuse;
 - 2) infiltration to ground;
 - 3) attenuated discharge to a surface water body;
 - 4) to a public surface water sewer,
 - 5) to highway drain, or other private drainage system; or
 - 6) to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.

Existing Site Runoff

- 5.4 The greenfield runoff rates for the Site were calculated using the FEH statistical (2025) method and are summarised in Table 5.1.

Table 5.1: Greenfield runoff rates

Return period (years)	Greenfield Rate (L/s/ha)
Qbar	5.2
1	4.5
30	12.1
100	16.7

- 5.5 The Site is currently occupied by existing historical development. It is therefore considered a brownfield site, and is also assumed to make an unrestricted discharge to the Thames Water sewer network with no attenuation or flow controls. The brownfield runoff rates for the Site were calculated for the 6 hour rainfall event and are summarised in Table 5.2.

Table 5.2: Brownfield runoff rates

Return period (years)	Brownfield Rate (L/s/ha)
2	48.4
30	96.4
100	120.1

Permeable and Impermeable Areas

5.6 The Site is approximately 1.079 ha in size. The existing and proposed permeable and impermeable areas are presented in Table 5.3. The proposed development will yield an overall decrease in impermeable area of 0.02 ha.

Table 5.3: Existing and Proposed Permeable and Impermeable Areas

	Permeable Area (ha)	Impermeable Area (ha)
Existing	0.286	0.794
Proposed	0.305	0.774

5.7 As noted previously, the proposed development is split into seven separate areas within the red line boundary of the Site. Existing and proposed impermeable areas for each area are summarised in Table 5.4. Existing and proposed impermeable areas plans are enclosed in Appendix F.

Table 5.4: Impermeable Area Summary

Area	Existing Impermeable Area (ha)	Proposed Impermeable Area (ha)
1	0.086	0.109
2	0.234	0.188
3	0.081	0.081
4	0.067	0.068
5	0.015	0.015
6	0.006	0.006
7	0.000	0.003

Proposed Site Runoff

5.8 In accordance with the relevant policies of the HDPF and comments from WSCC, surface water runoff from the proposed development should be restricted to as close as possible to greenfield 1 in 1 year runoff rate.

5.9 However, as noted in the HDC Surface Water Drainage Statement Form, a minimum trickle rate of 2 L/s is recommended for any proposed pipes to minimise the risk of blockages and to promote the reliability and longevity of the network. Where new connections to the existing drainage network are proposed, flows have been restricted to 2L/s.

Sustainable Drainage Principles

5.10 The aim of SuDS is to emulate natural drainage processes such that watercourses and storage areas receive the hydrological profiles under which they evolved, and that water quality in local ecosystems is protected or improved. The best practice guide states that SuDS will:

- Reduce the impact of additional urbanisation on the frequency and size of floods;
- Protect or enhance river and groundwater quality;
- Be sympathetic to the needs of the local environment and community; and
- Encourage natural groundwater recharge.

5.11 Table 5.4 shows the hierarchy of SuDS techniques. The SuDS techniques that are proposed to manage surface water for the development will be discussed in relation to this hierarchy.

Table 5.5: SuDS Hierarchy

	SUDS Technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife
Most Sustainable	Green Roofs, Bioretention Areas, Tree Pits	✓	✓	✓
	Basins and Ponds 1. Constructed wetlands 2. Balancing ponds 3. Detention basins 4. Retention ponds	✓	✓	✓
	Filter Strips and Swales	✓	✓	✓
	Infiltration Devices 5. Soakaways 6. Infiltration trenches and basins	✓	✓	✓
	Permeable Surfaces and Filter Drains 7. Gravelled areas 8. Solid paving blocks 9. Porous pavios	✓	✓	
	Tanked Systems 10. Over-sized pipes/tanks 11. Box storage systems	✓		
Least Sustainable				

5.12 Due to the constraints of the existing Site, including the listed nature of the buildings and gardens, bioretention areas, basins and ponds, and swales are unable to be incorporated into the proposed surface water drainage strategy.

5.13 Infiltration is considered unlikely for the proposed development due to the anticipated geology on site. Sandstone and mudstone bedrock are unlikely to yield suitable infiltration rates for discharge of surface water from the proposed development.

5.14 Permeable resin-bound gravel surfacing is proposed to all pedestrian areas within Area 2 of the proposed development. Filter drains are also proposed to drain the proposed wedding pavilion in Area 7 of the proposed development.

5.15 In order to achieve the required reduced runoff rates from the proposed development, it is necessary to use tanked attenuation features with flow controls.

Table 5.6: Summary of proposed SuDS with reference to the SuDS Hierarchy

SuDS Technique	Practicable	Proposed	Notes
Green roofs, Bioretention areas, Tree pits	✗	✗	Green roofs, bioretention areas and tree pits cannot be used due to the listed nature of the gardens and buildings.
Basins and ponds	✗	✗	There is insufficient space available on the site.
Filter strips and swales	✗	✗	There is insufficient space available on the site.
Infiltration devices	✗	✗	Anticipated bedrock geology is likely inappropriate for infiltration.
Permeable surfaces and filter drains	✓	✓	Permeable paving proposed in Area 2.
Tanked systems	✓	✓	Tanked system to be wrapped in an impermeable membrane to drain to existing drainage network within the Site.

Proposed Surface Water Drainage System

5.16 Infiltration is considered unlikely for the proposed development due to the anticipated bedrock geology of the Site. The Site is adjacent to the man-made lakes within the wider Leonardslee estate, which ultimately discharge to the Cowfold Stream approximately 400m south of the estate boundary. Surface water runoff from the proposed development is therefore proposed to be discharge to these man-made lakes, via the existing drainage network on site and via a new outfall.

5.17 The following SuDS features have been considered within the proposed surface water drainage strategy:

- Permeable Paving
- Attenuation Tank

5.18 As the proposed development is split across several different areas, the proposed surface water drainage for each area is described separately in the following sections.

5.19 For full details of the proposed drainage strategy, please refer to plans and calculations contained within Appendix F.

5.20 The proposed surface water drainage system can effectively control all runoff generated within the Site and maintain a maximum discharge rate of 2 L/s for each separate network for storm events up to and including the 1 in 100 year return period with 45% climate change. Flood risk is not increased for the Site or for neighbouring sites .

Area 1 – New Ticket Entrance Extension

5.21 Surface water runoff from the roof of the proposed extension to the entrance building is collected via traditional rainwater pipes and conveyed to the subsurface pipe network. Here, flows are attenuated in a 9.4m³ geocellular tank to the south of the proposed extension. Flows exit the tank via a flow control manhole, which utilises a vortex flow control to discharge at no more than

2L/s. From here, surface water flows are discharged to the existing private drainage network on site via a new manhole.

5.22 Once within the existing drainage network, flows are combined with foul water from the wider estate and conveyed to the settlement tank and reed beds to the south of the site. Here, flows are treated prior to outfall to the man-made lakes within the Leonardslee estate.

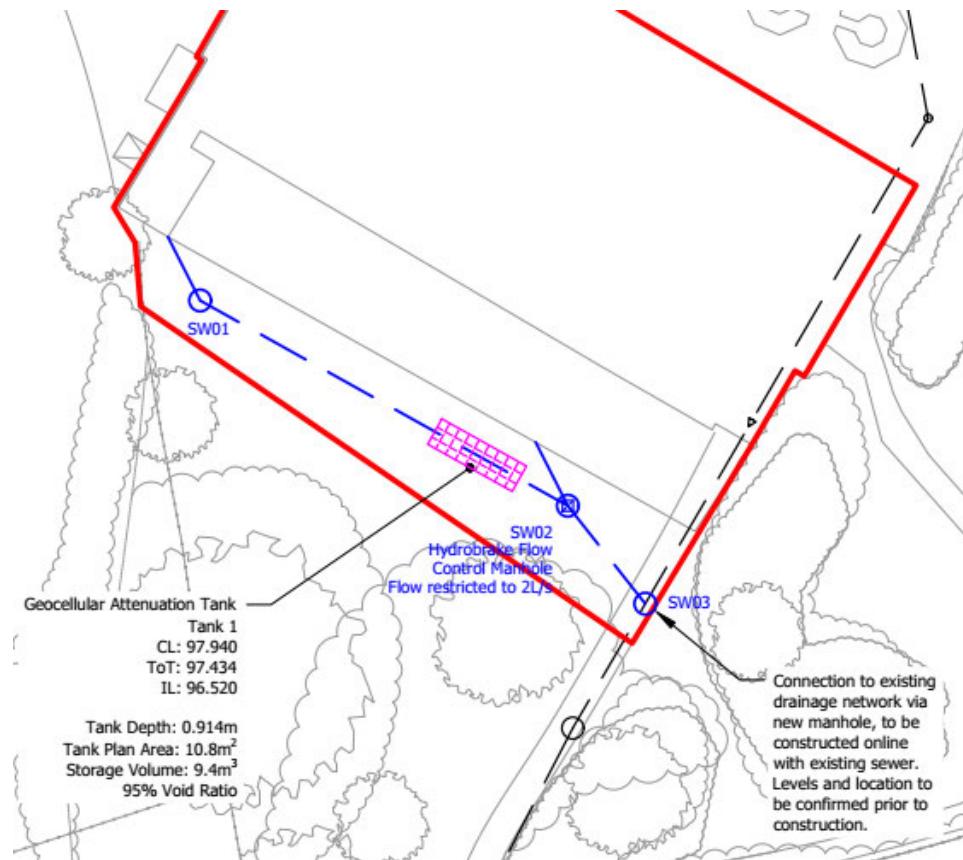


Figure 5.1: Area 1 Proposed Surface Water Drainage Strategy

Area 2 – Leonardslee House Forecourt

5.23 Drainage of Area 2 is divided into two separate networks; one draining the proposed car park and western footpath, and one draining the eastern footpath area.

5.24 Surface water runoff from the western footpath is collected using permeable resin-bound gravel surfacing, with flows attenuated within the 300mm deep paving subbase using an orifice flow control. The subbase storage provides 12.3m³ of attenuation volume. Runoff from the proposed car park is collected via a series of channel drains and gullies. Flows from both areas are combined in an 81.3m³ geocellular attenuation tank beneath the car park area. Flows exit the tank via a vortex flow control manhole at no more than 2L/s and are discharged to the existing private drainage network in the north east corner of the car park.

5.25 Surface water runoff from the eastern area of footpath is collected using permeable resin-bound gravel surfacing and attenuated within the 300mm deep paving subbase. The subbase provides 50.0m³ of attenuation storage. In addition to runoff from the paving area, this network also receives flows from the Stable Block extension in Area 3 via a diffuser box within the paving subbase. Flows exiting the paving subbase are restricted to 2L/s by a vortex flow control manhole, and discharge to the existing private drainage network via an existing manhole.

5.26 Once within the existing drainage network, flows are combined with foul water from the wider estate and conveyed to the settlement tank and reed beds to the south of the site. Here, flows are treated prior to outfall to the man-made lakes within the Leonardslee estate.

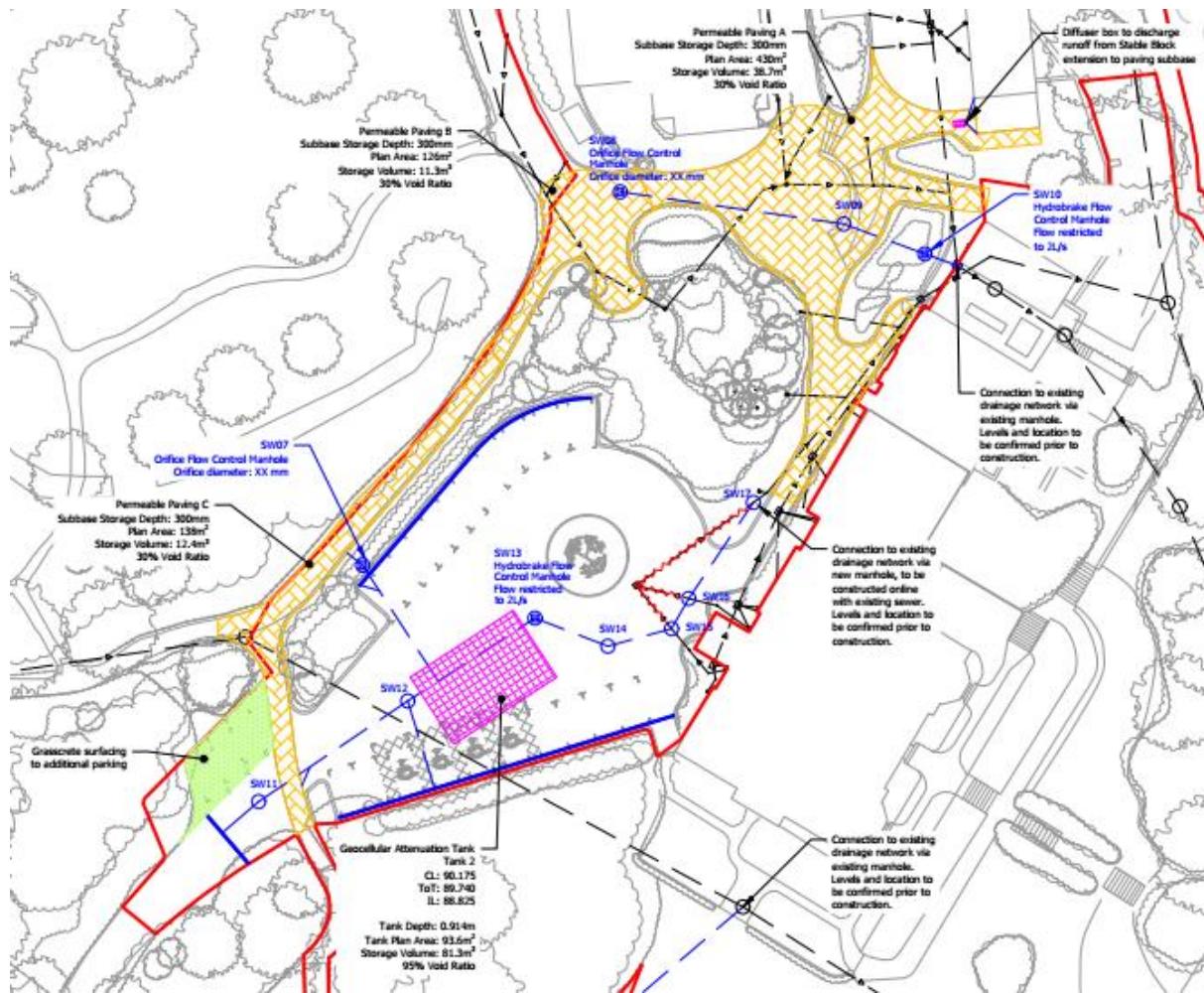


Figure 5.2: Area 2 Proposed Surface Water Drainage Strategy

Area 3 – Stable Block

5.27 As noted above, surface water runoff from the extension to the eastern wing of the stable block is discharged to the footpath subbase via a diffuser box, and will ultimately outfall to the existing drainage network on site.

5.28 No other areas of work within Area 3 increase the impermeable area of the site.

5.29 The winter garden extension takes up area within the existing courtyard and therefore does not increase the impermeable area of the site. As such, surface water runoff from the extension is proposed to discharge to the existing drainage as per the current scenario.

5.30 The new terrace to the east of the Stable Block is proposed to be constructed of wooden/composite decking. This will allow any surface water to fall through gaps in the decking and onto the soft landscaping beneath, as per the current situation. As such, no formal drainage is proposed for this area.

Area 4 – Former Generator Block

5.31 The proposed development of Area 4 does not increase the building footprint of the Former Generator Block, with the exception of a small link extension on the western elevation. This extension contributes just 6.5m² of impermeable area and results in approximately 0.7L/s of surface water runoff during the most severe 1 in 100 year storm event with a 45% allowance for climate change.

5.32 As the runoff from the proposed increase in impermeable area is less than the minimum trickle rate of 2L/s, no additional drainage is proposed for this area. Instead, the proposed extension will be connected to the existing drainage at above ground level.

Area 5 – Red House

5.33 The proposed development of Area 5 is entirely internal, and does not result in any increase in impermeable area here. As such, no changes to the existing surface water drainage of Area 5 are proposed.

Area 6 – Engine House

5.34 The existing Engine House currently has no formal below ground drainage. It is therefore proposed to provide a drainage network serving the existing Engine House, as well as the proposed extension.

5.35 Surface water runoff from the area will be collected by rainwater pipes and channel drain, and conveyed to the subsurface pipe network. Flows are restricted to 2L/s using a vortex flow control manhole, and attenuated within the pipe network. The runoff is then discharged to the nearby man-made lake to the east of the site at the restricted rate via a new outfall headwall.

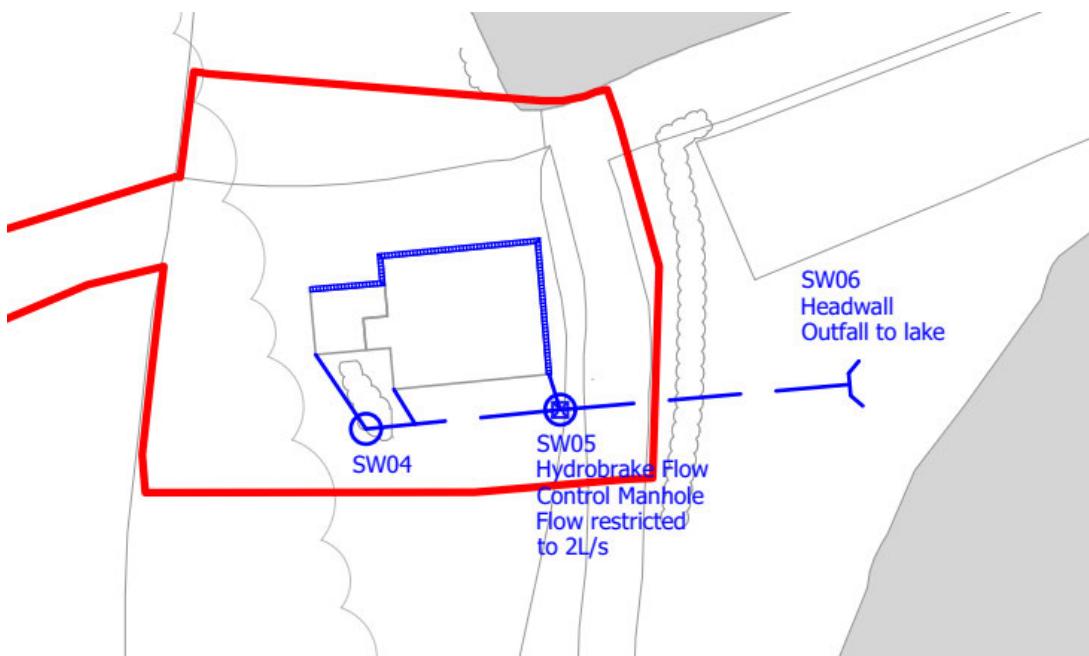


Figure 5.3: Area 6 Proposed Surface Water Drainage Strategy

Area 7 – Lightweight Wedding Pavilion

5.36 Surface water runoff from the proposed Wedding Pavilion in Area 7 is collected by a filter drain encircling the pavilion. From here, flows are conveyed to a vortex flow control manhole, which restricts discharge to 2 L/s, with attenuation provided within the pipe network. Runoff is then discharged to the existing private drainage network on site.

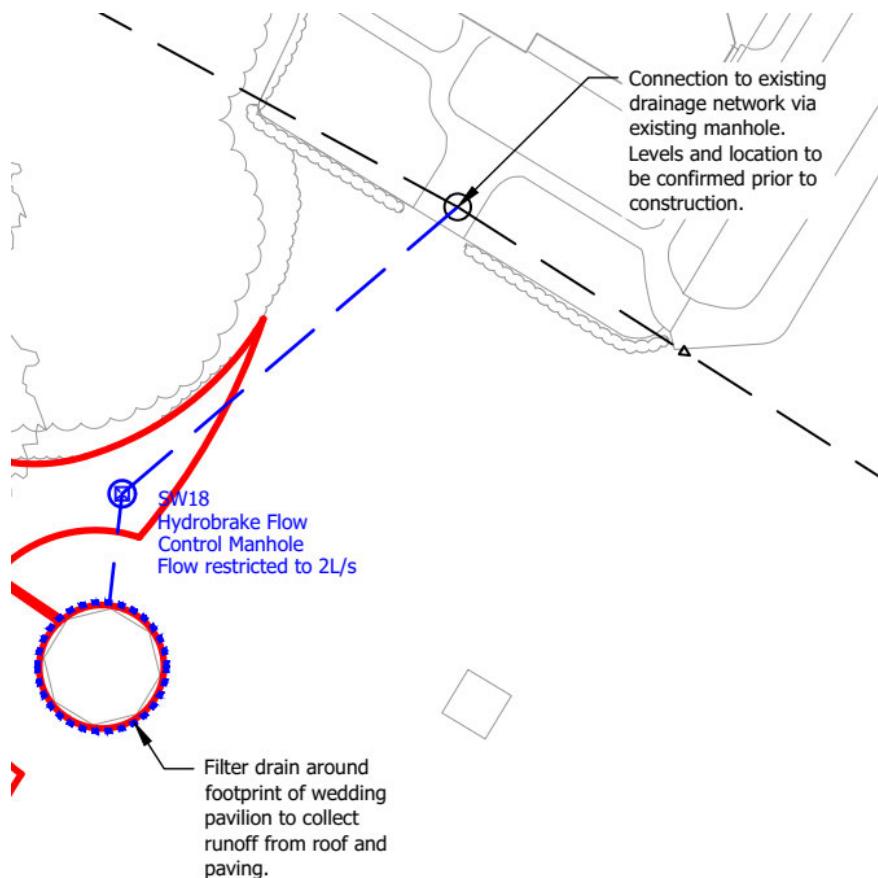


Figure 5.4: Area 6 Proposed Surface Water Drainage Strategy

Drainage Exceedance

- 5.37 The SuDS strategy outlined above is designed to contain the 100 year return period rainfall including a 45% allowance for climate change. It is highly unlikely that this system would fail and cause flooding elsewhere. Furthermore, where multiple SuDS features are employed, such as rain gardens and permeable paving, the impact of failure of any one element is substantially reduced.
- 5.38 There is a very low chance of system exceedance in more severe events or successive extreme events, which is outside the scope of the design. In this case, water would follow the existing surface water flooding routes. Due to the storage provided on the site, the total overland volumes in these scenarios would be reduced relative to existing. Consequently, the severity of flooding in these events would be reduced by the proposed development.
- 5.39 Exceedance flow routes have been mapped approximately on drawing 25087-SWD-DP-04, enclosed in Appendix F.

Effect on Flood Risk Elsewhere

- 5.40 Due to the implementation of a suitable SuDS strategy and an overall reduction in impermeable area, the overall site discharge of surface water will reduce as a result of the proposed development.
- 5.41 There will be no increased pressure on the public surface water sewer network as a result of the proposed SuDS strategy as there is no proposed connection to the public network.

5.42 The overall effect of the proposed SuDS strategy on flood risk at the Site and in the local area will be to reduce the risk of flooding.

SuDS Management and Maintenance

5.43 Management and maintenance of the drainage network will be the responsibility of the freeholder and / or management company for the site. Management and maintenance agreements and plans will be arranged prior to completion of development.

5.44 The SuDS Manual provides details for maintaining SuDS. Guidance on maintenance requirements for attenuation tanks and permeable paving are presented in Tables 5.7 and 5.8.

5.45 The CIRIA guidelines are generic and provide advice only. Management and maintenance of the drainage should be carried out in accordance with the guidance and specification provided by the supplier of each SuDS component.

Table 5.7: Operation and maintenance requirements for attenuation storage tanks

Schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required

Table 5.8: Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked of broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost joining material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6 FOUL WATER MANAGEMENT

Existing Foul Water Drainage

- 6.1 As noted in Section 2, the Site is served by a private combined drainage network, taking both foul and surface water flows from the buildings and areas of hardstanding within the wider Leonardslee estate. This combined network discharges to a settlement tank and reed bed treatment system to the south of the Site. Once treated, effluent is discharged overland to the man-made lakes to the east of the site. An environmental permit is in place for this discharge.
- 6.2 The drainage treatment system was designed by Moody Sewage Ltd and the design report can be found in Appendix G.
- 6.3 The design of the existing drainage network was based on a total foul water flow rate of 62.8m³ per day.

Proposed Foul Water Drainage

- 6.4 The proposed foul water drainage strategy is split into two areas, due to prevailing levels of the site; the Main Site (comprising Areas 1 to 5 and Area 7) and the Engine House. The proposed strategy for each area is summarised below:

Main Site

- 6.5 Foul water flows from the main area of the proposed development are proposed to connect to the existing foul water drainage network where possible.
- 6.6 The proposed development includes the addition of a number of WCs and the change of use of some buildings. This will likely lead to a change in foul water flows received by the existing treatment system. A summary of the anticipated changes to the foul water flows is provided in Table 6.1, with flow rates based on British Water – Flows and Loads 4.

Table 6.1: Anticipated change to foul water daily rates for the Main Site

Visitor Type	Flow (L/person/day)	Daily Change from Existing	Change in Daily Flow (m ³)
General (assumed one use of WC per visit)	10	+75	+0.75
Cafe	12	+10	+0.12
Staff	50	-15	-0.75
Residential Guests	250	+4	+1.00
Total			+1.12

- 6.7 Table 6.1 shows that the proposed development of the Main Site is expected to increase the average daily foul water flow by approximately 1.12 m³. It is anticipated that this increase in foul flows can be accommodated by the existing treatment system. However, this will be confirmed at the detailed design stage, and any required changes to the treatment system will be specified then.

Engine House

- 6.8 The Engine House has no existing foul water drainage. It is therefore proposed to provide a package treatment plant to treat foul water flows from the proposed WC extension and flows from the café facilities within the existing Engine House.

- 6.9 The package treatment plant has been reviewed and designed by Dirk Daude Wastewater Consultancy Services. The design report can be found in Appendix G.
- 6.10 Treated effluent from the package treatment plant is proposed to be discharged to the man-made lakes immediately east of the Engine House. This can be achieved by connection to the proposed surface water drainage network downstream of the flow control. This outfall complies with the current EA General Binding Rules for Small Sewage Discharges, as discussed in the Dirk Daude report (ref: PC1121) enclosed in Appendix G.

7 CONCLUSIONS AND RECOMMENDATIONS

- 7.1 Water Environment has produced this Flood Risk Assessment and Drainage Strategy to support the detailed planning application for the proposed development at Leonardslee Lakes & Gardens, Horsham, West Sussex.
- 7.2 The proposed development comprises a number of separate areas of development across the Leonardslee Lakes & Gardens estate, including:
 - Extension to the visitor entrance building to house a new ticket sales area and café;
 - Landscaping changes to the forecourt of Leonardslee House.
 - Single storey winter garden conservatory to the Stable Block with terrace extension to the east and internal/ external reconfigurations and change of use from redundant staff offices and staff accommodation within the stable block to guest accommodation including extension to Honey Cottage;
 - Infilling roof to the former generator block courtyard, re-roofing of the Alpine House and in-ternal/external reconfigurations and link extension;
 - Change of use to the partial first floor of the Red House to staff accommodation;
 - Small WC extension, reinstated chimney stack, and roof alterations to the Engine House; and,
 - Lightweight wedding pavilion to the lawn, south of Leonardslee House.
- 7.3 The existing site is currently occupied by a number of historic buildings, visitor amenities and historic gardens, and sits within the wider Leonardslee Lakes & Gardens estate. Within the estate, all gardens are Grade I listed and buildings are a mixture of Grade II listed, curtilage listed, and unlisted 20th Century buildings. The Site is therefore considered brownfield land.
- 7.4 The proposed development is entirely within Flood Zone 1. The Site is therefore considered to pass the sequential test and the exception test.
- 7.5 The Environment Agency Risk of Surface Water Flood maps show the existing Site to be entirely very low risk of surface water flooding.
- 7.6 The British Geological Survey Online Viewer notes the Site to be underlain by a bedrock of Upper Tunbridge Wells Sand – Sandstone and Mudstone. Ground investigations will be required to confirm the geology of the Site.
- 7.7 The Strategic Flood Risk Assessment identifies the Site to be located in an area with negligible risk of groundwater flooding.
- 7.8 The Strategic Flood Risk Assessment shows the Site to be located in an area that has previously experienced sewer flooding. However, as the Site does not contain any public sewers, it is deemed to be at low risk of sewer flooding.
- 7.9 Surface water runoff from the proposed development can be efficiently managed on site for all storm events up to and including the 1 in 100 year return period, with allowances for climate change. The proposed surface water discharge will be limited to 2 L/s at each point of connection to the existing drainage network within the Site.
- 7.10 The surface water drainage strategy for the proposed development incorporates sustainable drainage systems including permeable paving and below ground attenuation tanks. The proposed

strategy reduces site runoff and provides betterment, and will also alleviate flood risks downstream of the Site.

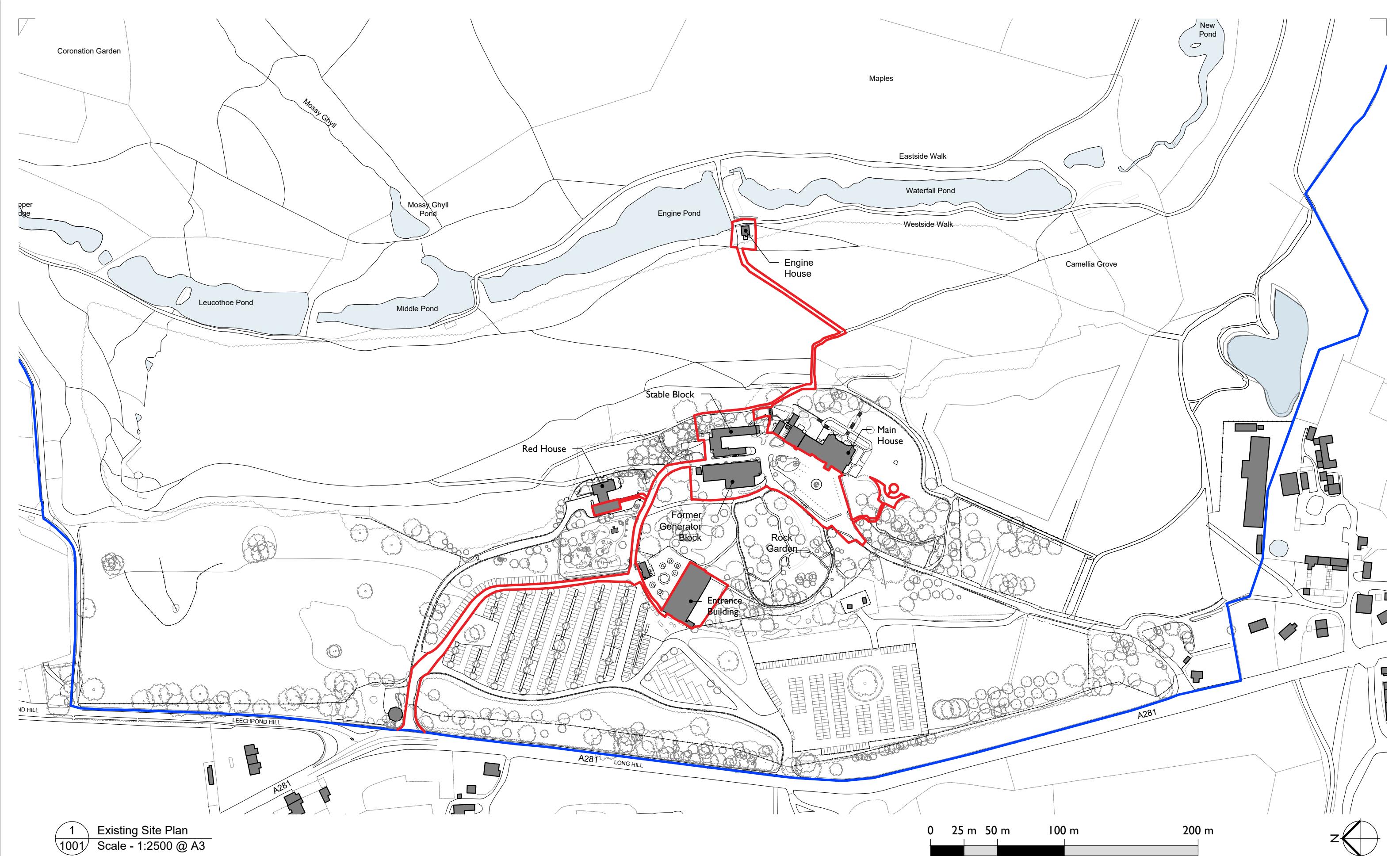
- 7.11 Based upon the available information, the guidance provided and if measures presented within this Flood Risk Assessment are followed, Water Environment considers the risks to be adequately mitigated.
- 7.12 This report has been prepared to address comments from the LLFA on the proposed development. A summary of the responses to these comments is provided in Table 7.1.

Table 7.1: Response to LLFA Comments

LLFA Comment	Water Environment Response
Site-specific assessment of flood risk	Please see Section 4
Surface water flow routes	Please see Sections 4 and 5
Existing and proposed permeable and impermeable areas	Please see Section 5 and Appendix F
Surface water management strategy	Please see Section 5 and Appendix F
Methods of foul and surface water disposal	Please see Sections 5 and 6, and Appendices F and G
Southern Water sewer connections	No connections to the Southern Water network are proposed
Rainwater harvesting	No rainwater harvesting is proposed
Proposed flows and volumes	Please see Section 5 and Appendix F
Infiltration	No infiltration is proposed due to the anticipated geology of the Site. Please refer to Section 2.
Pollution prevention	Please see Section 5
Exceedance flow routes	Please see Section 5
Foul water flow calculations	Please see Section 6 and Appendix G
Maintenance and Management Plans	Please see Section 5

APPENDIX A: EXISTING SITE INFORMATION

- A.1 Existing Site Plan (242769-PUR-00-XX-DR-A-1001 P05) – Purcell UK
- A.2 Topographic Survey (32290) – MK Surveys, March 2023
- A.3 Underground Utilities Survey (24451) – MK Surveys, October 2017
- A.4 Greenfield Runoff Rate Calculation
- A.5 Brownfield Runoff Rate Calculation



1
1001 Existing Site Plan
Scale - 1:2500 @ A3

0 25 m 50 m 100 m 200 m



Notes:
Drawings are based on survey data however any discrepancies should be notified to Purcell in writing.
Due to the scales used any measurements from this drawing should include an appropriate level of tolerance.
Where appropriate site dimensions should be taken to verify accuracy of measurement.
All dimensions are in millimetres unless noted otherwise.
Purcell shall be notified in writing of any discrepancies.
The digital content in this DWG file is the property of Purcell Architecture Limited and is shared for information only. Do not copy, share, or reuse any part of it without our written permission.

KEY
— Ownership Boundary
— Application Site Boundary

P05	12.12.25	JS	JC	Planning Issue
REV	DATE	BY	CHK	DESCRIPTION

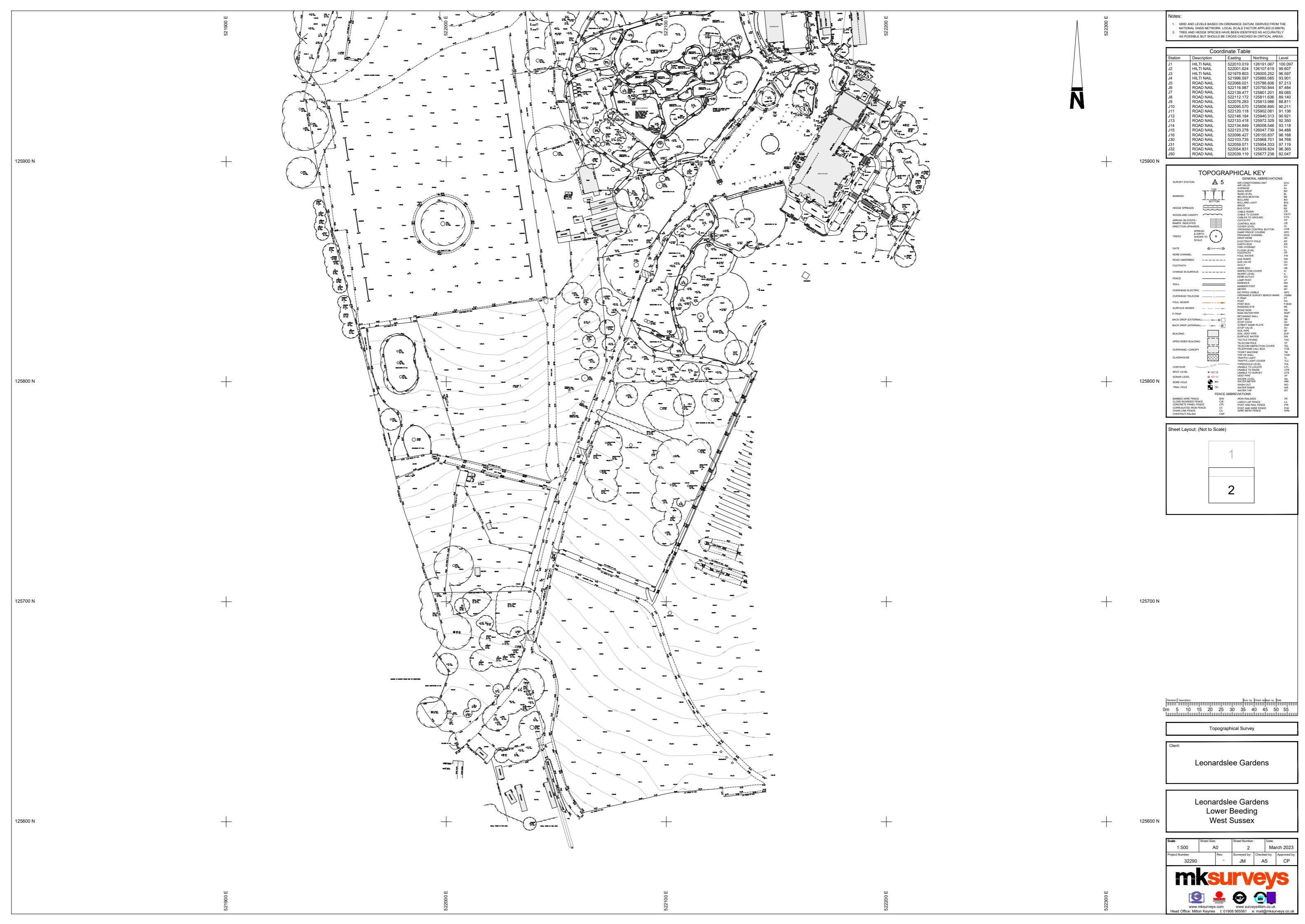
CLIENT
Leonardslee Gardens
PROJECT
Leonardslee Lakes and Gardens

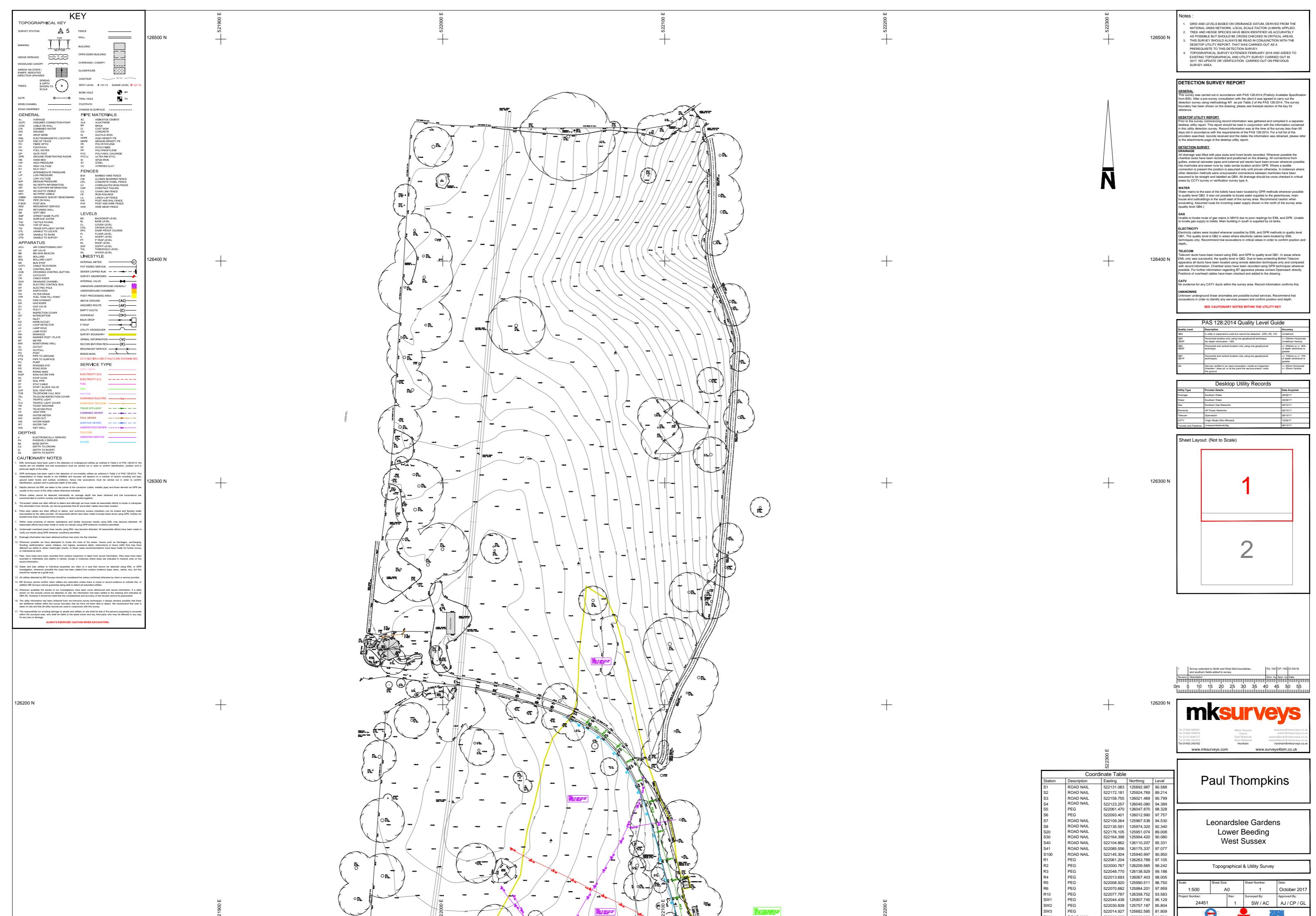
JOB NUMBER
242769
TITLE
Existing Site Location Plan

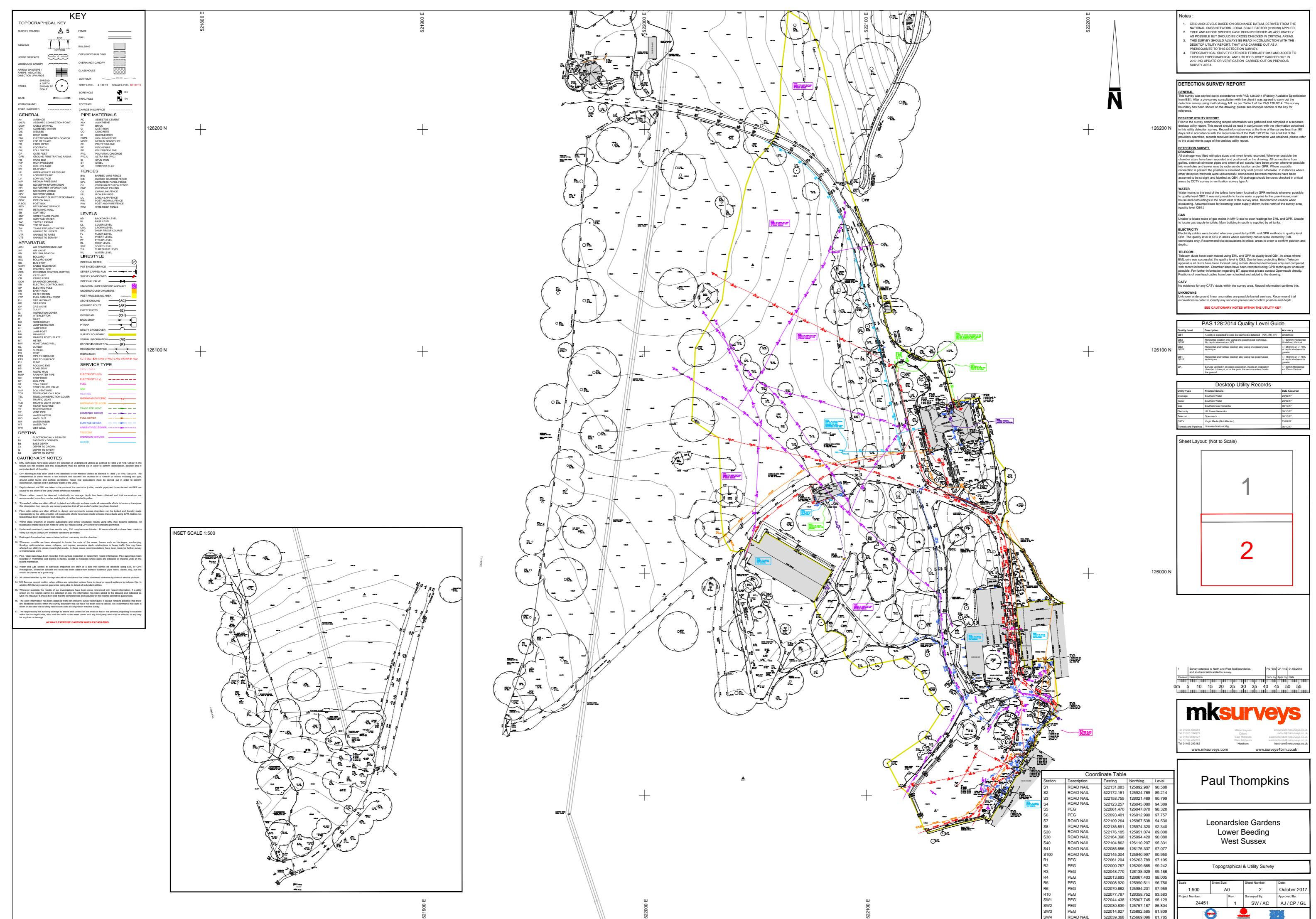
SIZE SCALE
A3L 1:2500@A3
REV SUITABILITY/REASON FOR ISSUE
P05 Planning Issue
DRAWING NUMBER
242769-PUR-00-XX-DR-A-1001











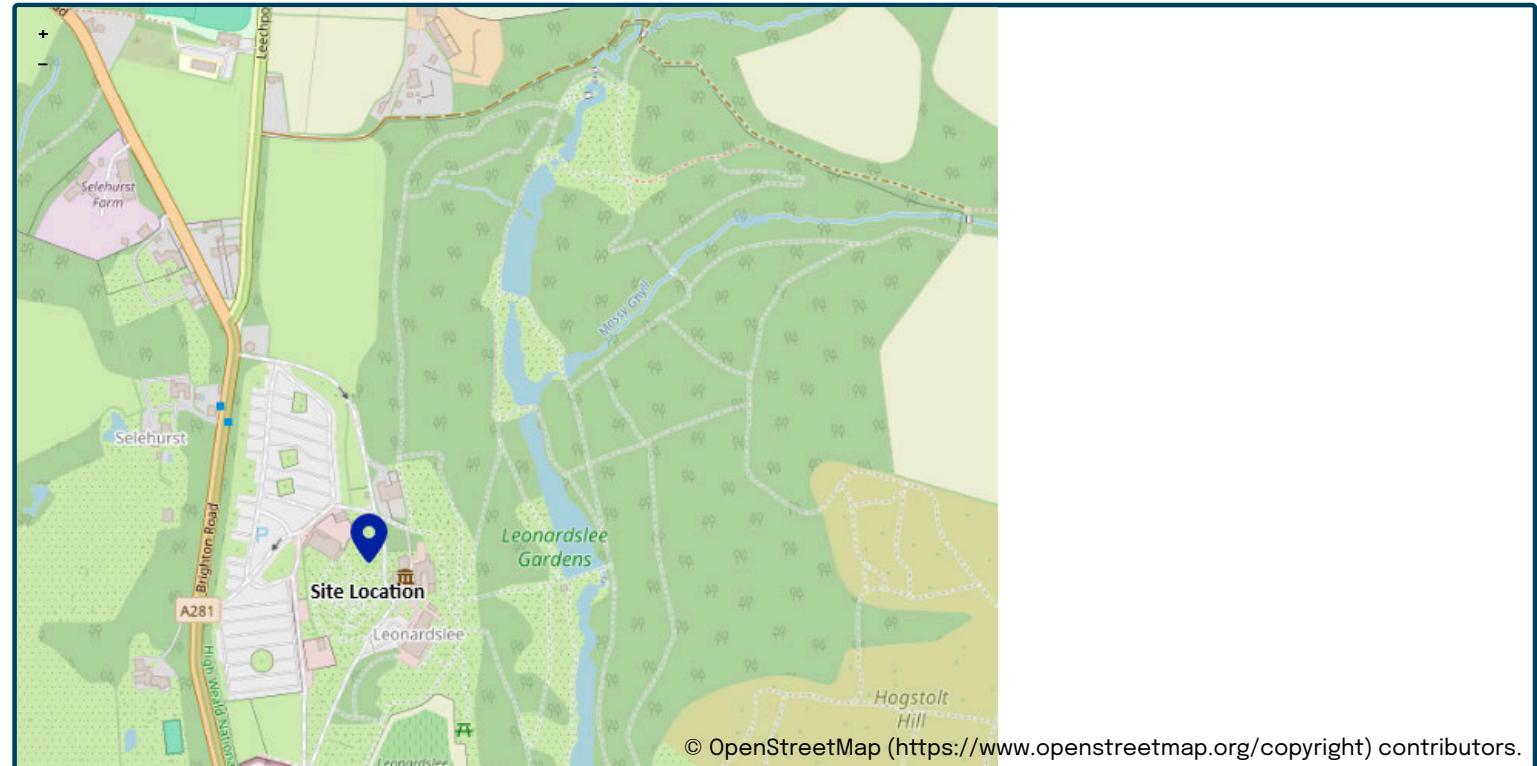
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	20/11/2025
Calculated by	Jonathan Adams
Reference	25087 Greenfield Runoff
Model version	2.2.2

Location

Site name	Leonardslee Lakes & Gardens
Site location	Horsham, West Sussex



Site easting (British National Grid)

522119

Site northing (British National Grid)

125960

Site details

Total site area (ha)

1

ha

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	My value	Map value
SAAR9120 (mm)	843	mm
BFIHOST19scaled	0.467	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	4.6	l/s
QBar (FEH statistical 2025) (l/s)	5.2	l/s

Growth curve factors

	My value	Map value
Hydrological region	7	7
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	4.5 l/s
Flow rate 2 year (l/s)	4.6 l/s
Flow rate 10 years (l/s)	8.5 l/s
Flow rate 30 years (l/s)	12.1 l/s
Flow rate 100 years (l/s)	16.7 l/s
Flow rate 200 years (l/s)	19.6 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at [uksuds.com](https://www.eksuds.com/) (<https://www.eksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.eksuds.com/terms-conditions) (<https://www.eksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1		1.000	5.00	10.000	1350	1.575
2				10.000	1350	2.475

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	53.561	0.600	8.425	7.525	0.900	59.5	375	5.38	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.352	259.8	180.7	1.200	2.100	1.000	0.0	231	2.534

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m ³ /ha)	0.0	100 year 360 minute (m ³)
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x	
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	✓	

Storm Durations

360

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	30	0	0	0
10	0	0	0	100	0	0	0

Pre-development Discharge Volume

Site Makeup	Greenfield	Soil Index	1	Return Period (years)	100	Betterment (%)	0
Greenfield Method	FSR/FEH	SPR	0.10	Climate Change (%)	0	PR	
Positively Drained Area (ha)		CWI		Storm Duration (mins)	360	Runoff Volume (m³)	

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US	Peak	Level	Depth	Inflow	Node	Flood	Status
	Node	(mins)	(m)	(m)	(l/s)	Vol (m ³)	(m ³)	
360 minute summer	1	184	8.537	0.112	48.6	0.1596	0.0000	OK
360 minute summer	2	184	7.633	0.108	48.4	0.0000	0.0000	OK
Link Event (Upstream Depth)	US	Link	DS	Outflow	Velocity	Flow/Cap	Link	Discharge
	Node	Node		(l/s)	(m/s)		Vol (m ³)	Vol (m ³)
360 minute summer	1	1.000	2	48.4	1.802	0.186	1.4393	268.4

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US	Peak	Level	Depth	Inflow	Node	Flood	Status
	Node	(mins)	(m)	(m)	(l/s)	Vol (m ³)	(m ³)	
360 minute summer	1	184	8.569	0.144	77.9	0.2063	0.0000	OK
360 minute summer	2	184	7.664	0.139	77.6	0.0000	0.0000	OK
Link Event (Upstream Depth)	US	Link	DS	Outflow	Velocity	Flow/Cap	Link	Discharge
	Node	Node		(l/s)	(m/s)		Vol (m ³)	Vol (m ³)
360 minute summer	1	1.000	2	77.6	2.044	0.299	2.0348	429.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	1	184	8.588	0.163	96.7	0.2334	0.0000	OK
360 minute summer	2	184	7.681	0.156	96.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link Node	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	1	1.000	2	96.4	2.160	0.371	2.3905	534.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US	Peak	Level	Depth	Inflow	Node	Flood	Status
	Node	(mins)	(m)	(m)	(l/s)	Vol (m ³)	(m ³)	
360 minute summer	1	184	8.611	0.186	120.5	0.2660	0.0000	OK
360 minute summer	2	184	7.701	0.176	120.1	0.0000	0.0000	OK
Link Event (Upstream Depth)	US	Link	DS	Outflow	Velocity	Flow/Cap	Link	Discharge
	Node	Node		(l/s)	(m/s)		Vol (m ³)	Vol (m ³)
360 minute summer	1	1.000	2	120.1	2.280	0.462	2.8227	665.5

APPENDIX B: SITE GEOLOGY

B.1 BGS borehole 20039220 (TQ22NW19)

WR38: Borehole record form

Borehole record

Nicholls
Boreholes

 British
Geological Survey
NATIONAL ENVIRONMENT RESEARCH COUNCIL

 Environment
Agency

Water Resources Act 1991 (as amended by the Water Act 2003)

A Site details

Borehole drilled for

Location SELHURST, BRIGHTON ROAD, LOWER REEDING, WEST SUSSEX, RH13 6PR.
NGR (ten digits) TQ21791 26136

Please attach site plan

Ground level (if known)

metres Above Ordnance Datum

Drilling company NICHOLLS BOREHOLES

Date drilling commenced 27-09-2016 (DD/MM/YYYY) Completed 03-10-2016 (DD/MM/YYYY)

B Construction details

Borehole datum (if not ground level) _____ metres (m). Please tick if this is above D or below D ground level.
(point from which all measurements of depth are taken, for example, flange, edge of chamber)

Borehole drilled diameter 200 mm from 0 to 65 m/depth

_____ mm from _____ to _____ m/depth

Casing material SOLID UPVC diameter 113 mm from 0 to 41 m/depth
and type (for example, if plain steel, plastic slotted). Please record permanent casing details, not temporary casing.

Casing material SLOTTED UPVC diameter 113 mm from 41 to 62 m/depth

Casing material SOLID UPVC diameter 113 mm from 62 to 65 m/depth

Casing material _____ diameter _____ mm from _____ to _____ m/depth

Grouting details 61 BACS SHINGLE, 14 BACS MIKOLIT SEAL TO SURFACE

Waterstruck at 1. 43m m (depth below datum - mbd) 2. _____ m (mbd)
3. _____ m (mbd) 4. _____ m (mbd)

C Test pumping summary (Please supply full details on form WR39)

Test pumping datum _____ m. Please tick if this is above D or below D ground level.
(if different from borehole datum)

Pump suction depth _____ mbd

Waterlevel (start of test) _____ mbd

Water level (end of test) _____ mbd

Type of test (for example, bailer, step, constant rate)

Pumping rate _____ m³/hour D or litres/second D. Please tick as appropriate.
for _____ days, _____ hours, _____ mins

Recovery to _____ mbd in _____ days, _____ hours, _____ mins
(from end of pumping)

Date(s) of measurements Pump started (DD/MM/YYYY)

Pump stopped (DD/MM/YYYY)

Please supply chemical analysis if available. If you have included this please tick this box D

WR38: Borehole record form

D Strata log

Geological classification (BGS only)	Description of strata	Thickness m	Depth (to base of strata) m
	TUNBRIDGE WELLS SANDSTONE - SANDY CLAY WITH OCCASIONAL HARD BANDS OF SANDSTONE	65	65
(continue on separate page if necessary)			
	Other comments (for example, gas encountered, saline water intercepted)		

E Completing this form

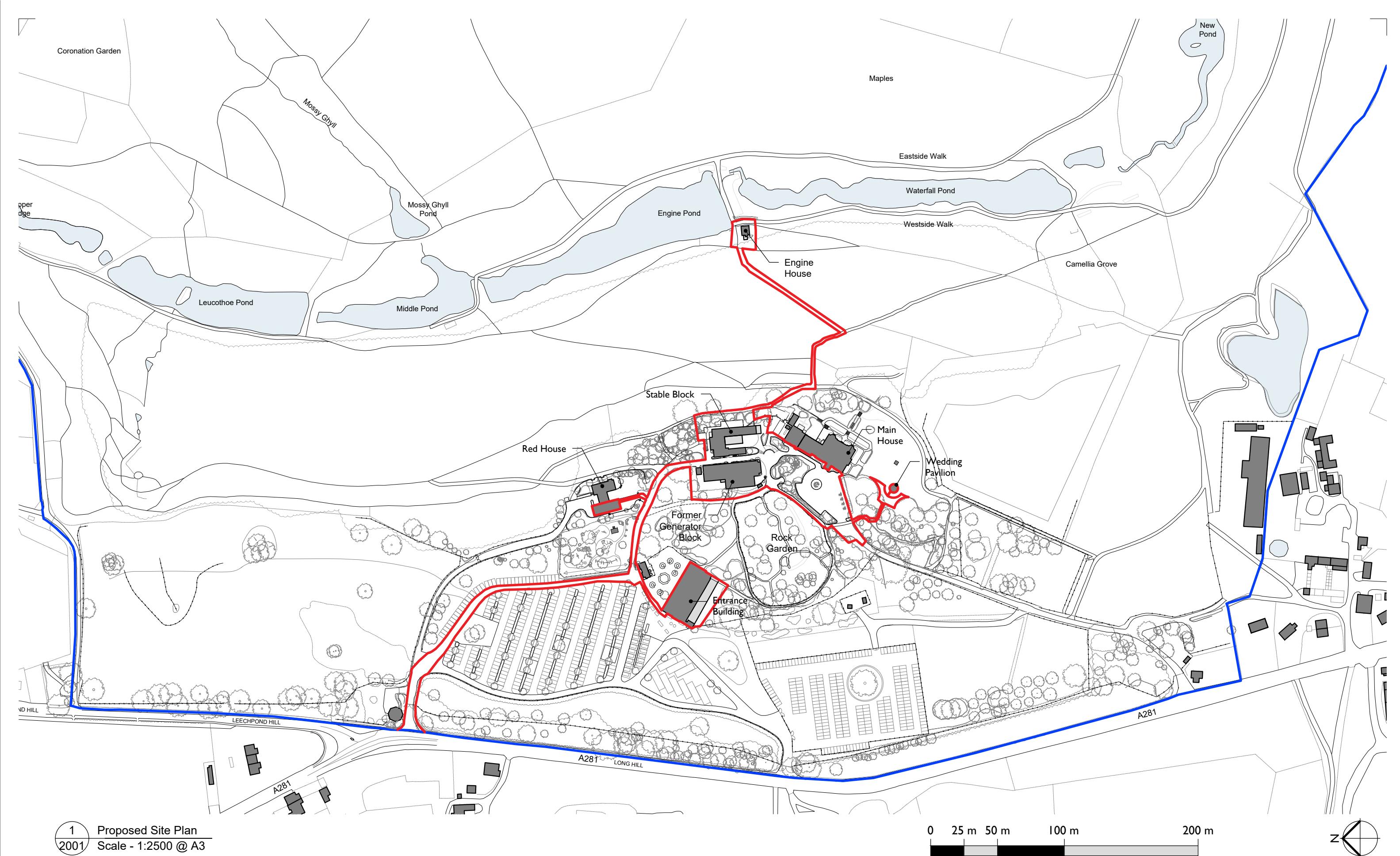
How long did it take you to fill in this form? _____

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	E reference number	
Copy number	Entered by		

APPENDIX C: PROPOSED DEVELOPMENT

C.1 Proposed Site Plan (242769-PUR-00-XX-DR-A-2001 P05) – Purcell UK



1
2001
Proposed Site Plan
Scale - 1:2500 @ A3

Notes:
Drawings are based on survey data however any discrepancies should be notified to Purcell in writing.
Due to the scales used any measurements from this drawing should include an appropriate level of tolerance.
Where appropriate site dimensions should be taken to verify accuracy of measurement.
All dimensions are in millimetres unless noted otherwise.
Purcell shall be notified in writing of any discrepancies.
The digital content in this DWG file is the property of Purcell Architecture Limited and is shared for information only. Do not copy, share, or reuse any part of it without our written permission.

KEY
— Ownership Boundary
— Application Site Boundary

P05	12.12.25	JS	JC	Planning Issue
REV	DATE	BY	CHK	DESCRIPTION

CLIENT
Leonardslee Gardens
PROJECT
Leonardslee Lakes and Gardens

JOB NUMBER
242769
TITLE
Proposed Site Location Plan

SIZE
A3L 1:2500@A3
SCALE
REV
SUITABILITY/REASON FOR ISSUE
P05 Planning Issue
DRAWING NUMBER
242769-PUR-00-XX-DR-A-2001



APPENDIX D: LLFA COMMENTS

D.1 LLFA Comments (DC/25/1146)

TO:	Horsham District Council – Planning Dept
LOCATION:	Leonardslee Gardens Brighton Road Lower Beeding West Sussex
DESCRIPTION:	<p>Extension to the visitor entrance building to house a new ticket sales area and café; Infilling roof to the former generator block courtyard, re-roofing of the Alpine House and internal/ external reconfigurations and link extension; Single storey winter garden conservatory to the Stable Block; Terrace extension to the east and internal/ external reconfiguration.</p> <p>Change of use from redundant staff offices and staff accommodation within the stable block to guest accommodation including extension to Honey Cottage; Change of use to the partial first floor of the Red House to staff accommodation; Small WC extension, reinstated chimney stack, and roof alterations to the Engine House; Lightweight wedding pavilion to the lawn, south of Leonardslee House; Landscaping changes including to the forecourt of Leonardslee House.</p>
REFERENCE:	DC/25/1146
RECOMMENDATION:	More Information
SUMMARY OF COMMENTS & RECOMMENDATION:	
The following documents have been reviewed:	
<ul style="list-style-type: none"> Existing Landscape Site Plan. Drawing No: 242769-PUR-00-XX-DR-A-1020. Rev P04. Dated: 07.07.25. PURCELL. Proposed Landscape Site Plan. Drawing No: 242769-PUR-00-XX-DR-A-2020. Rev P04. Dated: 07.07.25. PURCELL. Proposed Roof Plan, Engine House. Drawing No: 242769-PUR-02-RF-DR-A-2002. Rev P03. Dated: 07.07.25. PURCELL. Demolition Roof Plan, Engine House. Drawing No: 242769-PUR-02-RF-DR-A-1502. Rev P03. Dated: 07.07.25. PURCELL. Existing North & West Elevations, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-1011. Rev P03. Dated: 07.07.25. PURCELL. Demolition North & East Elevations, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-1511. Rev P03. Dated: 07.07.25. PURCELL. Existing South & East Elevations, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-1012. Rev P03. Dated: 07.07.25. PURCELL. Demolition South & East Elevations, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-1512. Rev P03. Dated: 07.07.25. PURCELL. Existing Sections AA & BB, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-1021. Rev P03. Dated: 07.07.25. PURCELL. Proposed Sections AA & BB, Engine House. Drawing No: 242769-PUR-02-ZZ-DR-A-2021. Rev P03. Dated: 07.07.25. PURCELL. Existing Roof Plan, The Glasshouse - Retail Block. Drawing No: 242769-PUR-08-00-DR-A-1002. Rev P03. Dated: 07.07.25. PURCELL. Proposed Roof Plan, The Glasshouse - Retail Block. Drawing No: 242769-PUR-08-00-DR-A-2002. Rev P03. Dated: 07.07.25. PURCELL. Existing Elevations, The Glasshouse - Retail Block. Drawing No: 242769-PUR-08-ZZ-DR-A-1011. Rev P03. Dated: 07.07.25. PURCELL. 	

- Proposed Elevations, The Glasshouse - Retail Block. Drawing No: 242769-PUR-08-ZZ-DR-A-2011. Rev P03. Dated: 07.07.25. PURCELL.
- Existing North & East Elevations, Former Generator Block. Drawing No: 242769-PUR-05-ZZ-DR-A-1011. Rev P03. Dated: 07.07.25. PURCELL.
- Demolition North & East Elevations, Former Generator Block. Drawing No: 242769-PUR-05-ZZ-DR-A-1511. Rev P03. Dated: 07.07.25. PURCELL.
- Existing South & West Elevations, Scale - 1:200 @ A3 Former Generator Block. Drawing No: 242769-PUR-05-ZZ-DR-A-1012. Rev P03. Dated: 07.07.25. PURCELL.
- **Existing** South & West Elevations, Scale - 1:200 @ A3 Former Generator Block. Drawing No: 242769-PUR-05-ZZ-DR-A-1512. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Ground Floor Plan, Former Generator Block. Drawing No: 242769-PUR-05-00-DR-A-1001. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Roof Plan, Former Generator Block. Drawing No: 242769-PUR-05-RF-DR-A-2002. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Roof Plan, Red House. Drawing No: 242769-PUR-06-RF-DR-A-1003. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Ground Floor Plan, Red House. Drawing No: 242769-PUR-06-00-DR-A-1001. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Ground Floor Plan, Red House. Drawing No: 242769-PUR-06-00-DR-A-2001. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Roof Plan, Stable Block. Drawing No: 242769-PUR-01-RF-DR-A-1003. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Roof Plan, Stable Block. Drawing No: 242769-PUR-01-RF-DR-A-2003. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Ground Floor Plan, Stable Block. Drawing No: 242769-PUR-01-00-DR-A-1001. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Ground Floor Plan, Stable Block. Drawing No: 242769-PUR-01-00-DR-A-2001. Rev P03. Dated: 07.07.25. PURCELL.
- Demolition Roof Plan, Stable Block. Drawing No: 242769-PUR-01-RF-DR-A-1503. Rev P03. Dated: 07.07.25. PURCELL.
- Existing South & West Elevations, Stable Block. Drawing No: Rev P03. Dated: 242769-PUR-01-ZZ-DR-A-1012. 07.07.25. PURCELL.
- Proposed South & West Elevation, Stable Block. Drawing No: 242769-PUR-01-ZZ-DR-A-2012. Rev P03. Dated: 07.07.25. PURCELL.
- Existing North & East Elevations, Stable Block. Drawing No: 242769-PUR-01-ZZ-DR-A-1011. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed North & East Elevations, Stable Block. Drawing No: 242769-PUR-01-ZZ-DR-A-2011. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Base and Roof Plans, Wedding Pavilion. Drawing No: 242769-PUR-04-00-DR-A-2001. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Elevation & Section, Wedding Pavilion. Drawing No: 242769-PUR-04-ZZ-DR-A-2011. Rev P03. Dated: 07.07.25. PURCELL.
- Existing Site Plan, Wedding Pavilion. Drawing No: 242769-PUR-04-SL-DR-A-1000. Rev P03. Dated: 07.07.25. PURCELL.
- Proposed Site Plan, Wedding Pavilion. Drawing No: 242769-PUR-04-SL-DR-A-2000. Rev P03. Dated: 07.07.25. PURCELL.
- Lead Local Flood Authority Letter, Dated 30th September 2025.

We have reviewed the evidence provided by the applicant in support of this planning application DC/25/1146.

Horsham District Council require **more information** to support the proposals to determine that the site drainage meets the requirements of the NPPF and PPG, National standards for sustainable drainage systems (June 2025), and the Horsham District Planning Framework (2015) – Policy 38.

Until the following information in the Main Comments section below is received, we are unable to determine the suitability of the proposed scheme regarding surface water and foul water drainage and flood risk.

MAIN COMMENTS:

The following information would still be required within a Drainage Strategy:

- The applicant must provide a site-specific assessment of flood risk, even where a full flood risk assessment is not required.
- The applicant must demonstrate an understanding of how surface water currently flows across the site under 'normal' conditions and during rainfall events, providing an assessment of the current and proposed drainage patterns entering the site, within the site and leaving the site.
- The applicant should provide a measurement of the total site area, all pre-development permeable and impermeable areas within the red line boundary, all post-development permeable and impermeable areas within the red line boundary, with supporting catchment plans and calculations.
- A fully designed surface water management strategy should include:
 - The aim to achieve and better greenfield runoff rates and adherence to the drainage hierarchy.
 - Rationale for SuDS selected in line with the Horsham District Planning Framework (2015) – Policy 38, and industry best practice such as The SuDS Manual (C753).
- The method of foul and surface water disposal must be confirmed in line with the drainage hierarchy (Building Regulations Part H).
- If connections to Southern Water Utilities are proposed as part of the development/redevelopment, supporting plans and assumed points of connection must be provided as well as expected flow rates. Connection to the public sewerage network is advised, wherever it is reasonable to do so.
- Where rainwater harvesting (RWH) is proposed, the appropriate sized storage unit for this system must be provided on site.
- Whilst the use of RWH is welcomed and encouraged, the operational volume within the storage unit cannot be considered a component of the total stormwater attenuation on site because there is no guarantee of water use within the property or the availability of the storage unit (system failure). Therefore, evidence is required to show the overall surface water drainage system has sufficient capacity to provide the necessary stormwater attenuation, without reliance on the RWH system.
- The following flow and volume rates must be provided:
 - existing runoff rates during a 100% Annual Exceedance Probability (AEP), 3.33% AEP, 1% AEP storm events
 - post development discharge rates during a 100% AEP, 3.33% AEP, 1% AEP and 1% AEP + 45% for Climate Change storm events
 - greenfield runoff rate (QBAR)

- water storage capacity volumes of the proposed drainage features, to attenuate the 1% AEP + climate change storm event (see details below).
- The runoff from the proposed development should, where possible, be restricted to the greenfield 1 in 1 year runoff rate (100% AEP) during all events up to and including the 1 in 100-year rainfall event (1% AEP) + 45% allowance for climate change. Where this is not possible, the runoff from the proposed development should restrict flows to as close as reasonably practical to the greenfield runoff rate for the site.
- Brownfield sites (previously developed sites) should where possible revert the drainage back to its natural state. Any proposals which are considered as redevelopment on brownfield sites, must provide surface water discharge rates equal to, or as close as feasibly possible to, the 1 in 1-year greenfield runoff rate calculated for the full development site area (subtracting any areas of large open space that will not be draining via the proposed SuDS). Should this be unattainable, the discharge rate is expected to provide a minimum of 50% betterment than the current scenario (brownfield 1 in 1-year runoff rate). Discharge rates cannot exceed/ be higher than the 50% betterment scenario.
- A 50% betterment scenario will only be considered acceptable, when lower discharge rates are proven to be unattainable. Calculations must be provided and demonstrated clearly with supporting evidence, to justify the proposed discharge rate. Corresponding storage volumes associated with those rates must also be provided.
- The surface water drainage strategy must demonstrate that the proposed SuDS attenuate all runoff from all impermeable areas (with an additional area equivalent to +10% of the area of any residential development, factored into the sum of the total impermeable areas on site, allowing for urban creep) for the 1 in 100-year rainfall event (1% AEP) + 45% allowance for climate change (upper end). Attenuation should be provided on site to ensure that:
 - The 100% AEP storm event does not generate excessive surcharging in the drainage system.
 - The 3.33% AEP storm event is safely contained underground with no flooding.
 - The 1% AEP + climate change storm event is safely contained within the site without risk to persons or property.
- Where infiltration discharge methods are proposed (soakaways/swales etc...), the applicant must provide infiltration testing in accordance with BRE365, at the location and depth of the proposed devices.
- Where infiltration testing has not been undertaken, provide an infiltration assessment, supported by a desk-based assessment of soil types, geology and suitability for infiltration potential (See the Horsham District Council Local Plan evidence base), together with an alternative option for surface water disposal.
- The applicant must provide evidence of measures to prevent pollution of the receiving groundwater and/or surface water.
- The applicant must provide plans which indicate the expected exceedance routes for storm events greater than the 1% AEP + climate change storm event. The Drainage Strategy must demonstrate that the surface water runoff from these events can be controlled, to confirm there is no adverse flood risk to the development or elsewhere. Evidence of appropriate management and mitigation of exceedance flows are expected within the Drainage Strategy, to demonstrate that the proposed conveyance systems have considered the risks associated to nature, people and property during the event of failure and/or exceedance.

- Supporting foul flow calculations, in line with Sewerage Sector Guidance and/or Building Regulations Part H, is to be provided. It should be noted that any proposed foul water system and foul water treatment unit should be in line with current legislation and best practice for the management of domestic waste, with any method for disposal justified and appropriate permits sought.
- Maintenance and Management Plans must be provided for both the proposed Foul and Surface Water Drainage Strategy, including access requirements, maintenance frequency and responsibility, and proprietary device manuals, for all drainage features and SuDS devices.

Further evidence in addition to that requested above may be required once the additional information is submitted.

Advisory notes:

- In addition to Planning Permission, the applicant may additionally require a permit to discharge treated foul water to a water body or to ground from the Environment Agency, where non-mains foul drainage is proposed.
- In addition to Planning Permission, the applicant may additionally require Ordinary Watercourse Consent (OWC) from the Lead Local Flood Authority at West Sussex County Council, to consent to any works adjacent to or within an ordinary watercourse.
- On the Horsham District Council website, there are several useful documents available to the public, which the applicant may wish to use as guides for their application. To navigate to this page you can follow this link:
<https://www.horsham.gov.uk/planning/local-plan/local-plan-examination/Examination-Library>

Alternatively, here is how to navigate to that page on the HDC Website:
 Home > Planning and development > Local Plan > Local Plan examination > Examination Library > Evidence Base Documents > Climate Change and Water

ANY RECOMMENDED CONDITIONS:

NA

NAME:	A. Furness
DEPARTMENT:	Horsham District Council - Drainage
DATE:	15/10/2025

APPENDIX E: SFRA EXTRACTS

- E.1 60730513 Figure A1
- E.2 60730513 Figure A2
- E.3 60730513 Figure A3
- E.4 60730513 Figure A4
- E.5 60730513 Figure A5
- E.6 60730513 Figure A6
- E.7 60730513 Figure A6-B
- E.8 60730513 Figure A6-D
- E.9 60730513 Figure A7
- E.10 60730513 Figure A7-B
- E.11 60730513 Figure A7-D
- E.12 60730513 Figure A8
- E.13 60730513 Figure A9
- E.14 60730513 Figure A9-B
- E.15 60730513 Figure A9-D
- E.16 60730513 Figure A10
- E.17 60730513 Figure A10-B
- E.18 60730513 Figure A10-D
- E.19 60730513 Figure A11
- E.20 60730513 Figure A12
- E.21 60730513 Figure A12-B
- E.22 60730513 Figure A12-D