

Drainage Calculations For The Development At 66a Ladydell Road, Worthing, West Sussex, BN11 2JT.

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Executive Summary

H2Ogeo Ltd was commissioned by Beachview Estates Ltd to undertake infiltration testing and drainage capacity calculations in support of a planning condition relating to the installed surface water drainage system at 66a Ladydell Road, Worthing, West Sussex. The Local Planning Authority requested evidence that the installed soakaway had been constructed appropriately, that the underlying ground is capable of accommodating infiltration drainage and that the drainage system would not result in flooding during the 1 in 100-year rainfall event with a 45% allowance for climate change.

An as-built drainage drawing was provided by the Client and infiltration testing was undertaken in the existing soakage crate with the results presented separately (20260612 BRE365 Soakage Tests Ladydell v1.0).

This drainage assessment considers the volume of runoff generated during the design rainfall event and compared this against the available storage and infiltration capacity of the installed drainage infrastructure. The assessment incorporated site-specific infiltration performance derived from BRE365 testing together with a conservative approach to runoff generation and climate change allowances.

The calculations demonstrate that the installed drainage system provides sufficient capacity to manage runoff generated by the design event without causing flooding. The available storage and infiltration capacity exceeds the calculated runoff volume associated with the 1 in 100-year rainfall event with a 45% climate change allowance, resulting in a positive storage balance.

On the basis of the information reviewed and the testing undertaken, the installed soakaway is considered capable of providing an appropriate means of surface water disposal for the development and is not predicted to result in flooding under the assessed design conditions.

1 Introduction

In correspondence between the Local Planning Authority and the Client (By email, 12 May 2026 at 11:40:21 BST) the following scope of work had been requested:

- *An as-built drainage drawing detailing the size, location, and depth of the soakaway.*
- *Infiltration testing (which can be conducted now rather than during winter to avoid further delay) to BRE 365 at the same depth as the base of the installed soakaway.*
- *Calculations evidencing that the installed drainage has been sized correctly and will not cause flooding in the 1 in 100-year event with a 45% allowance for climate change.*

H2Ogeo Ltd was approached by the Client (Beachview Estates Ltd) to provide a proposal to deliver BRE365 Digest Soakage Testing and calculations that assess the suitability of the existing soakaway structure at 66a Ladydell Road in Worthing, West Sussex.

This report provides the calculations and a standalone report has been prepared to show the BRE365 Soakage Testing results under separate cover.

2 Calculations

The drainage assessment has been undertaken to determine whether the installed drainage infrastructure has sufficient capacity to manage runoff generated by the critical 1 in 100-year rainfall event with an additional 45% allowance for climate change.

2.1 Methodology

The methodology is based on comparing the volume of runoff generated from the contributing impermeable surfaces against the effective storage volume provided within the drainage system. This approach is consistent with current UK drainage design guidance and provides a straightforward means of demonstrating that the drainage system will not result in flooding during the design event.

The design runoff volume is calculated by applying the adjusted rainfall depth, incorporating the 45% climate change uplift, to the total impermeable catchment area draining to the system. The resulting runoff volume represents the total quantity of water that must either be stored, conveyed or infiltrated during the storm event. Where appropriate, runoff coefficients have been applied to reflect the characteristics of the contributing surfaces, although a value of 1.0 is typically adopted for roofs and impermeable paving for conservatism.

The available drainage capacity has then been determined by calculating the effective storage volume within the installed drainage geocellular storage systems, taking account of any void ratios where applicable. An allowance has been made for the volume of water that infiltrates into the ground during the storm, based on site-specific BRE365 infiltration testing (20260612 BRE365 Soakage Testing Ladydell v1.0).

2.2 Inputs and Calculations

The following Inputs and calculations have been carried out:

Table 1 Inputs and Calculations

Parameter	Symbol	Unit	Value	Comments
Contributing impermeable area	A	m ²	64.00	House = 63.66m ²
Design rainfall return period	-	years	100.00	Conservative storm event
Climate change allowance	CC	%	45.00	As requested
1 in 100-year rainfall depth	D ₁₀₀	mm	92.36	Rainfall modelling FEH22

Parameter	Symbol	Unit	Value	Comments
Climate change adjusted rainfall depth	DCC	mm	133.92	=D100*1.45
Rainfall depth in metres	Dm	m	0.13	=Dcc/1000
Runoff coefficient	C	-	1.00	1 used for conservatism
Calculated runoff volume	Vr	m ³	8.57	=A*Dm*C
Soakaway/tank length	L	m	3.50	As Built
Soakaway/tank width	W	m	1.50	As Built
Soakaway/tank depth	H	m	1.20	As Built
Effective void ratio	n	%	95.00	Standard
Effective storage volume provided	Vs	m ³	5.99	=(L*W*D)*(n/100)
Pipe diameter (if applicable)	d	mm	100.00	
Pipe length (if applicable)	P	m	20.40	
Pipe storage volume	Vp	m ³	0.16	
BRE365 infiltration rate	f	m/s	3.00E-06	Tested infiltration rate of existing soakaway
Storm duration assessed	t	hr	24.00	
Effective Infiltrating Surface Area	As	m ²	11.25	=(L*W)+(2*(L+W)*(H/2))
Infiltration volume during storm	Vi	m ³	2.92	=f*As*(t*3600)
Total available storage capacity (storage + infiltration)	Vt	m ³	9.06	=Vs+Ps+Vi
Design runoff volume requiring management	Vr	m ³	8.57	
Storage surplus/(deficit)	Vt - Vr	m ³	0.49	=Vt-Vr
Flooding predicted during design event?			NO	

The positive value (0.49m³ surplus storage) demonstrates that the installed drainage system has sufficient capacity to accommodate the 1 in 100-year rainfall event with a 45% climate change allowance without flooding.

3 Summary

The Local Planning Authority requested evidence that the installed drainage system at 66a Ladydell Road had been constructed in accordance with the approved design and would provide an adequate standard of surface water management.

Specifically, they requested calculations demonstrating that the drainage system has sufficient capacity to accommodate the 1 in 100-year rainfall event with a 45% allowance for climate change.

H2Ogeo Ltd was commissioned by Beachview Estates Ltd to undertake the required infiltration testing and provide an independent assessment of the performance of the installed soakaway. The results of the BRE365 infiltration testing are presented in a separate report (20260612 BRE365 Soakage Tests Ladydell v1.0).

The assessment compared the volume of runoff generated from the contributing impermeable surfaces against the available drainage capacity provided by the installed geocellular soakaway, associated pipework storage and infiltration into the surrounding ground. Using a contributing

impermeable area of 64 m² and a 1 in 100-year FEH22 rainfall depth of 92.36 mm with a 45% climate change allowance, the design runoff volume was calculated to be 8.57 m³. The installed drainage system comprises a 3.5 m × 1.5 m × 1.2 m geocellular soakaway with an effective storage volume of 5.99 m³, supplemented by 0.16 m³ of pipe storage and an estimated 2.92 m³ of infiltration during the 24-hour design storm based on the site-specific BRE365 infiltration rate.

This provides a total available drainage capacity of 9.06 m³, resulting in a surplus storage volume of 0.49 m³.

The calculations therefore demonstrate that the installed drainage system has sufficient capacity to manage the 1 in 100-year rainfall event with a 45% climate change allowance and that flooding is not predicted under the assessed design conditions.

4 Annex A

FEH22 Rainfall Data – 1 in 100 Year 24 Hour Storm

