

Croudace Homes Limited

Stoneyfields, Oxted

Hydraulic Modelling Report 3

REPORT REF.

2404420_A-ACE-XX-XX-RP-C-0401

December 2025

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Document Control Sheet

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Distribution

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Return Periods / Annual Exceedance Probability Events

The following return periods / annual exceedance probability (AEP) events are referenced in the text:

Return Period	Annual Exceedance Probability
1 in 1-year	100%
1 in 2-year	50%
1 in 5-year	20%
1 in 10-year	10%
1 in 20-year	5%
1 in 30-year	3.3%
1 in 100-year	1%

1. Introduction

- 1.1. Ardent Consulting Engineers (hereafter referred to as Ardent) has been instructed by Croudace Homes Limited to undertake technical hydraulic modelling work in relation to a proposed development at Stoneyfields, Oxted.
- 1.2. A surface water hydraulic modelling study was undertaken in December 2024 covering the site and surrounding catchment. Details of the modelling are outlined within a technical model report (report ref: **2404420-ACE-XX-XX-RP-C-0501**) accompanying the site Flood Risk Assessment (FRA). The Lead Local Flood Authority (LLFA) provided no objection to the FRA and surface water hydraulic modelling, and were satisfied that the requirements of the NPPF and the Tandridge Local Plan were complied with.
- 1.3. Tandridge District Council refused the outline planning application, with one reason for refusal being '*The applicant has not demonstrated that the proposed development, and in particular the outline drainage proposals, will not result in the loss or deterioration of an irreplaceable habitat both on-site and off-site, that is The Bogs ancient woodland, within and adjoining the site boundary*'.
- 1.4. The existing modelling was updated in October 2025 to represent the latest version of the proposed development and to represent the impacts of the drainage strategy in restricting runoff to greenfield rates. The approach used within the modelling represented flows from the proposed drainage strategy as a diffuse discharge. Further details of the modelling are provided in the technical model note dated October 2025 (**Ref: 2404420_A-ACE-XX-XX-RP-C-0321**).
- 1.5. Following a meeting with the Council on 14 November 2025, concerns were raised regarding the potential effects of point discharges from various storm events on flows within The Bogs. As a result, the model was updated to represent the discharge from the proposed development at two point discharge locations in line with the proposed drainage strategy prepared by Motion.
- 1.6. This technical note details the model updates to represent point discharges from the proposed drainage network and assesses the impacts on surface water flows entering the Bogs from on and offsite.

2. Model Updates

2.1. Consistent with the accepted post-development scenario presented in the original December 2024 modelling report, the overall catchment model excluded direct rainfall over the developed area of the Site ('2D_RF' layer), as runoff from this area is intercepted and conveyed by the proposed surface water piped drainage network. The discharge from this network was represented within the model as point inflows at the two proposed discharge locations from the surface water drainage network (see **Figure 2-1**).

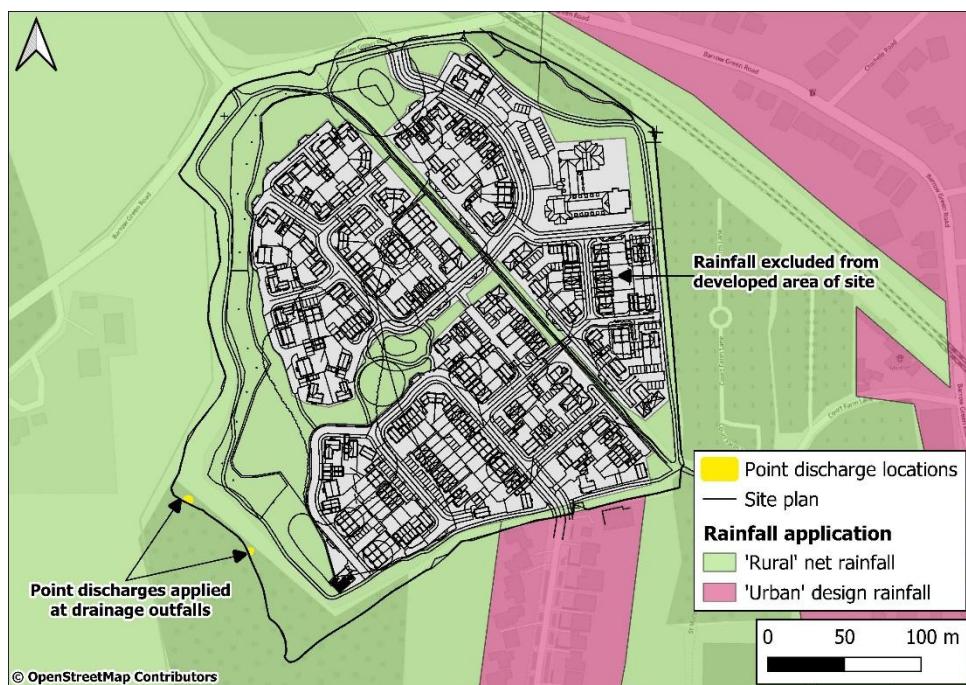


Figure 2-1: Post-development model schematic

2.2. The outflow from the proposed Site drainage system was applied at a controlled, variable greenfield runoff rate corresponding to each rainfall event modelled, ranging from the 1 in 1-year to the 1 in 100-yr + 45% Climate Change event. These greenfield runoff rates were previously agreed between Motion and the LLFA and are shown in **Table 2-1** below, as per Appendix C of Motion Technical Note 2 dated 24 July 2025.

Table 2-1: Greenfield Runoff Rates from the Proposed Development Site

Return Period	Discharge Rate (l/s)
1 in 1-yr	10.7
1 in 2 yr	11.1
1 in 10-yr	20.5
1 in 30-yr	29.1
1 in 100-yr	40.3

2.3. The modelled Microdrainage outflows over time for each event were provided by Motion for inclusion within the direct rainfall model. The outflows were applied using '2D_SA' layers.

2.4. The revised post-development models was run for the following storm events: 1 in 1-year, 1 in 2-year, 1 in 5-year, 1 in 10-year, 1 in 30-year, 1 in 100-year, and 1 in 100-year plus 45% climate change uplift.

2.5. No other changes were made to the hydraulic modelling.

3. Impacts of development proposals on flows

Post-development condition

3.1. The peak modelled flood extents during the post-development scenario are shown in **Figure 3-1.**

3.2. As with the pre-development scenario, no overland flow path is predicted to form during the lower magnitude events. During the storm events larger than and including the 3.3% AEP event the overland flows are modelled to be diverted around the western area of the site away from the residential development. The ground level reprofiling is designed to divert the flows back towards The Bogs in the same location as the pre-development scenario. This approach ensures there is a negligible impact on how overland flows reach The Bogs.

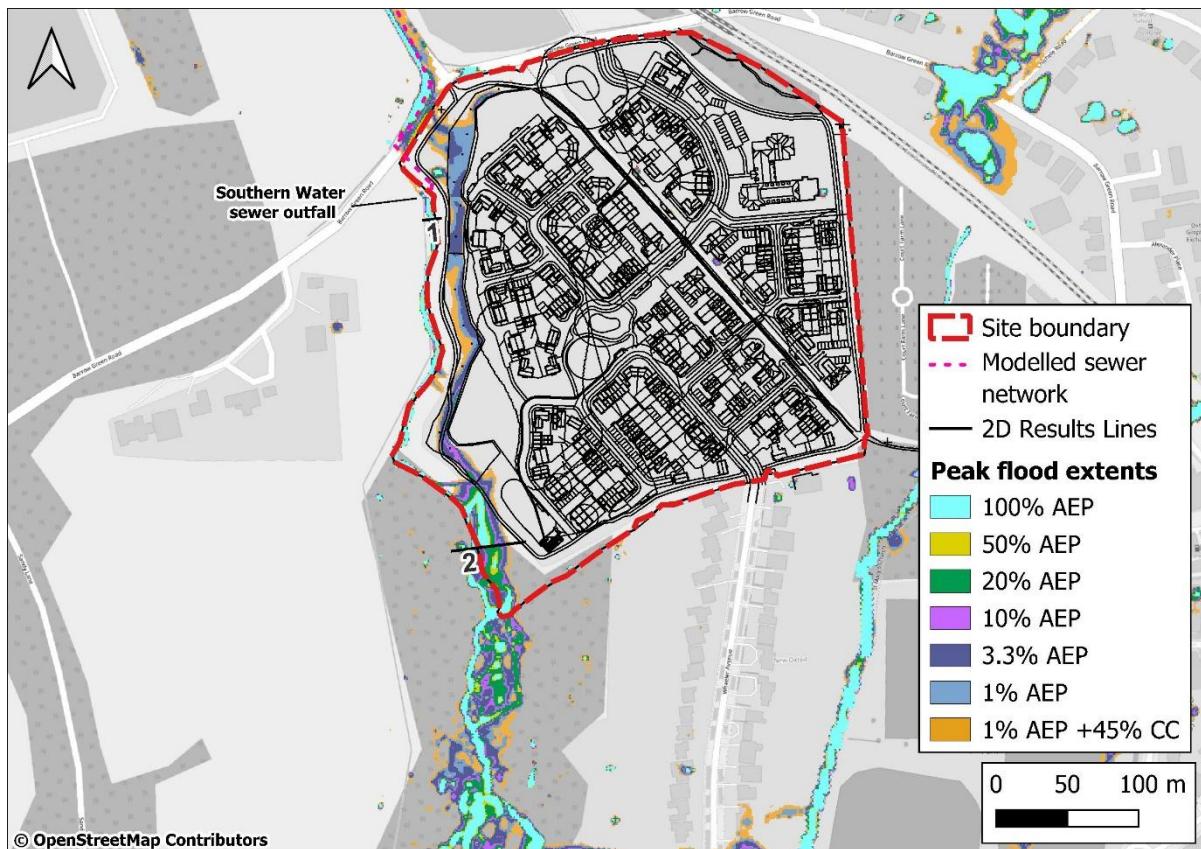


Figure 3-1: Post-development scenario peak modelled flood extents

Impact of proposals on flows to The Bogs

3.3. The peak flows during the pre-development and post-development scenarios for all modelled events for result lines 1 and 2 (see **Figure 3-1**) are shown in **Table 3-1** below.

3.4. The development proposals will have no impact on flows reaching The Bogs via the ordinary watercourse. This is supported by the fact that during each modelled event there is predicted to be no change to the flows in the watercourse immediately downstream of the Southern Water outfall (results line 1).

3.5. The comparison of peak flows at the downstream extent of the Site also shows a negligible impact in the peak flows reaching The Bogs during each modelled event. The model results therefore demonstrate that the proposed ground level modifications within the Site and the point discharge variable greenfield rates from the proposed Site have a negligible impact on the hydrology of The Bogs.

3.6. Therefore, the negligible changes in flows identify a continuity of an adequate water supply to The Bogs for all storm events (higher frequency, lower magnitude storm events and lower frequency, higher magnitude storm events).

Table 3-1: Pre-Development and Post-development peak flows at results lines shown in Figure 3-1

Results Line	Results Line peak flow (m ³ /s)							
	1				2			
Return Period	Pre-development	Post-development	Change	% Change	Pre-development	Post-development	Change	% Change
1 in 1-year	0.17	0.17	0	0	0.19	0.19	0	0
1 in 2-year	0.22	0.22	0	0	0.24	0.24	0	0
1 in 5-year	0.41	0.41	0	0	0.45	0.46	0.01	2
1 in 10-year	0.55	0.55	0	0	0.61	0.62	0.01	2
1 in 30-year	0.79	0.79	0	0	1.09	1.06	-0.03	-3
1 in 100-year	0.87	0.87	0	0	1.42	1.37	-0.05	-4
1 in 100-year + Climate Change	0.99	0.99	0	0	2.1	2.03	-0.07	-3