

Project: Orchards Paddock, Swallowfield, Reading, RG7 1PT

Date: 18th September 2026

SUDS DRAINAGE STRATEGY

Planning Condition Discharge Response: Condition 4 of App. No. 252688 - Revision B

This report updates the previous SuDS Drainage Strategy following further site investigation, infiltration testing and review of the April 2026 geotechnical site investigation. The revised information confirms granular River Terrace Deposits are present on the site and has allowed a shallower, wider infiltration trench to be developed. Groundwater conditions and the required separation between the proposed infiltration system and the maximum likely groundwater level are considered further in Section 2.1.

1. Introduction

This report has been prepared to outline the revised surface water drainage strategy for the proposed development at Orchards Paddock and to support the discharge of Condition 4 of the planning approval.

The objective is to manage surface water runoff on site in a sustainable manner without increasing flood risk either within the site or elsewhere. The accompanying Site Drainage Plan, drawing 25048/901, should be read in conjunction with this report.

2. Site Conditions and Revised Ground Investigation

The site comprises an existing residential property with associated garden and landscaped areas. The earlier drainage assessment assumed that the site was underlain by clay to significant depth and the previous strategy therefore relied on the existing pond and surrounding low-lying land for attenuation.

Further excavation at the proposed drainage location identified a layer of free-draining gravel beneath the upper clay. The clay layer was found to extend to approximately 750 mm below ground level, with permeable gravel below. This materially changes the drainage options available and allows a shallow infiltration system to be considered at this location.

The revised drainage design does not rely on the existing pond, drainage ditch or the individual tree planting holes for its calculated storage capacity.

2.1 Previous Geotechnical Investigation and Groundwater

A separate geotechnical site investigation was undertaken by Albury S.I. Ltd in March 2026 and reported under reference 26/13364/GO dated April 2026. The four boreholes were positioned around the proposed extension, garage and pool area and were not located along the proposed infiltration trench. The investigation identified variable made ground over granular River Terrace Deposits, including sand and flint gravel, with London Clay Formation at greater depth.

Groundwater strikes were recorded in the geotechnical boreholes at approximately 0.70 m to 0.90 m below ground level. Based on the site survey, the relevant borehole with a 0.90 m water strike is at approximately 44.30 m AOD, corresponding to an observed water elevation of approximately 43.40 m AOD. These were short-term borehole observations and the geotechnical report notes that groundwater levels can vary seasonally and with local drainage conditions. The same report also states that near-surface drainage characteristics were not assessed as part of that investigation.

The later trial excavation undertaken specifically at the proposed infiltration location extended to approximately 1.30 m below ground level at its deepest point. No groundwater was encountered before water was introduced for the infiltration test. This provides direct local evidence that groundwater conditions at the proposed drainage location differed from those observed in the development-area boreholes at the time of testing.

To maintain the infiltration feature as high as practicable, the proposed trench has been designed to a nominal maximum depth of 0.75 m and a width of 4.00 m. The alignment is intended to follow approximately the 44.00 m AOD contour so that the trench remains broadly level rather than falling towards the lower part of the garden. The trench base will therefore be at approximately 43.25 m AOD.

No groundwater was encountered within the local trial excavation, which extended to approximately 1.30 m below ground level. However, as the proposed system relies on infiltration, a minimum 1.0 m separation should be maintained between the trench base and the maximum likely groundwater level. If site-specific groundwater information indicates that this separation cannot be achieved, the drainage design should be reviewed.

3. Infiltration Testing

A trial excavation approximately 1.0 m deep was formed on site and a 300 mm x 300 mm x 300 mm deep test hole was then formed within the gravel at the base of the excavation, giving a maximum local test depth of approximately 1.30 m below ground level. No groundwater was encountered before the infiltration test water was introduced.

During the test the water level fell from 75 mm below the top of the test hole to 225 mm below the top in 16 minutes. This represents a fall of 150 mm in 960 seconds.

Volume of water discharged = $0.30 \times 0.30 \times 0.15 = 0.0135 \text{ m}^3$

Wetted surface area at 50% effective depth = 0.27 m^2

Indicative infiltration coefficient = $0.0135 / (0.27 \times 960)$

$f = 5.21 \times 10^{-5} \text{ m/s}$

For design purposes a factor of safety of 3 has been applied to the measured result, giving a design infiltration rate of approximately $1.74 \times 10^{-5} \text{ m/s}$.

The test was a small-scale falling-head test rather than a full three-cycle BRE 365 test and the result is therefore treated as an indicative site-specific infiltration rate. The testing nevertheless clearly demonstrated the free-draining nature of the underlying gravel. A factor of safety of 3 has been applied to the measured infiltration rate for the purposes of the hydraulic assessment.

Photographs of the trial excavation and infiltration testing are included in Appendix A. These provide a visual record of the excavated gravel material, the test excavation and the infiltration test undertaken within the lower gravel horizon.

3.1 Environmental and Arboricultural Considerations

The SuDS design has been developed with regard to the advice and recommendations provided by the Client's consultant Arboriculturist, RMT, and Ecologist, Hants Ecology.

All works associated with the drainage proposals should be undertaken in accordance with the relevant recommendations contained within the following documents:

- RMT1128 Tree Report – Appendix 4, Tree Protection Plan – RMT1128 – TPP (October 2025)
- Hants Ecology Bat Survey Report – Section 5.6.2, Great Crested Newts (October 2025)

4. Drainage Hierarchy

The drainage hierarchy has been reconsidered in light of the revised ground investigation. The preferred method of discharge is now infiltration to ground through the permeable gravel layer.

- Infiltration to ground - now considered feasible and forms the primary drainage strategy.
- Discharge to the existing pond - no longer required as part of the primary design.
- Surface water sewer - no connection is proposed.
- Combined sewer - no connection is proposed.

5. Proposed Drainage Strategy

Surface water from the proposed impermeable roof area will be collected by the building drainage system and conveyed to a gravel-filled infiltration trench within the landscaped area. The current contributing roof area is approximately 180 m². A 10% allowance for future urban creep has been included in the hydraulic assessment, giving a design impermeable area of 198 m².

The proposed infiltration trench is shown on drawing 25048/901 and shows following arrangement:

- 22.5 m effective trench length.
- 4.00 m trench width.
- 0.75 m nominal maximum overall excavation depth.
- Approximately 300 mm topsoil cover over the infiltration media.
- 450 mm effective depth of clean washed single-sized gravel/pea shingle below approximately 300 mm topsoil cover.
- Minimum 30% effective void content within the granular fill.
- 150 mm diameter perforated distribution pipes within the trench.
- Permeable non-woven filter geotextile to the sides, base and over the top of the gravel, lapped to prevent migration of fines.
- Upstream inspection chamber/silt trap and rodding access, with a capped inspection/rodding point at the terminal end.

The trench base is nominally approximately 0.75 m below ground level and is intended to coincide with, or locally expose, the top of the natural permeable gravel stratum identified during the trial excavation. The design therefore relies principally on infiltration through the trench base into the underlying gravel rather than through the clay sidewalls.

The trench alignment is to follow approximately the rear boundary and formed with a level base so that the available storage is used effectively along its full length. Minor local adjustment may be required to expose the gravel, but the trench should not be deepened below the nominal 0.75 m design depth without reviewing groundwater clearance.

6. Hydraulic Assessment

The hydraulic assessment has been carried out for a 1% AEP (1 in 100-year) rainfall event with a 40% allowance for climate change and a 10% allowance for urban creep. The rainfall depths adopted within this assessment are conservative design values. The assessment may be reviewed against current site-specific FEH DDF rainfall data if required by the Lead Local Flood Authority.

6.1 Storage volume

Gross gravel zone = $22.5 \times 4.00 \times 0.45 = 40.50 \text{ m}^3$

Volume occupied by 150 mm perforated pipe = approximately 0.80 m³

Gravel-filled volume excluding pipe = approximately 39.70 m³

Available storage at 30% voids = $39.70 \times 0.30 = \text{approximately } 11.91 \text{ m}^3$

No allowance has been taken for storage within the perforated pipes. The pipes therefore provide approximately a further 0.80 m³ of physical void volume, which has not been credited in the design storage figure.

6.2 Infiltration area

For the revised shallow trench, the calculation uses the trench base only as the effective infiltration surface. No credit is taken for infiltration through the clay sidewalls. The trench base is intended to expose the natural permeable gravel stratum.

Effective trench base area = $22.5 \times 4.00 = 90.0 \text{ m}^2$

Design infiltration rate = $1.74 \times 10^{-5} \text{ m/s}$ (measured rate divided by factor of safety 3)

Design infiltration capacity = $90.0 \times 1.74 \times 10^{-5} \times 3600 = \text{approximately } 5.63 \text{ m}^3/\text{hour}$

6.3 Storm duration check

The storm duration check has been re-run using the 198 m² design impermeable area and the revised 90 m² trench base infiltration area. Infiltration occurring during each storm has been deducted from the runoff volume to determine the temporary storage requirement.

Duration	Rainfall +40%	Runoff	Infiltration	Storage req.
5 min	19.1 mm	3.78 m ³	0.47 m ³	3.31 m ³
15 min	34.4 mm	6.81 m ³	1.41 m ³	5.40 m ³
30 min	44.8 mm	8.87 m ³	2.81 m ³	6.06 m ³
60 min	56.8 mm	11.25 m ³	5.63 m ³	5.62 m ³
120 min	68.1 mm	13.48 m ³	11.25 m ³	2.23 m ³
240 min	80.5 mm	15.94 m ³	22.50 m ³	0.00 m ³
360 min	88.0 mm	17.42 m ³	33.75 m ³	0.00 m ³
600 min	96.8 mm	19.17 m ³	56.25 m ³	0.00 m ³
1440 min	115.6 mm	22.89 m ³	135.00 m ³	0.00 m ³

The approximate temporary storage requirements are 3.31 m³ for the 5-minute event, 5.40 m³ for 15 minutes, 6.06 m³ for 30 minutes, 5.62 m³ for 60 minutes and 2.23 m³ for 120 minutes. Longer-duration events are less critical because the infiltration volume increases with time.

The critical duration is approximately 30 minutes, giving a maximum calculated temporary storage requirement of approximately 6.06 m³. Available gravel storage is approximately 11.91 m³, giving a storage margin of approximately 5.85 m³, or about 97% above the calculated critical requirement.

At the design infiltration capacity of approximately 5.63 m³/hour, half of the critical stored volume would drain in approximately 0.54 hours. This is comfortably within a 24-hour drain-down period.

6.4 Interception

A 5 mm rainfall event over the 198 m² design impermeable area produces approximately 0.99 m³ of runoff. This is well within the available trench storage and will be disposed of by infiltration.

7. Tree Planting and Landscaping

The trench alignment is to run broadly along the 44.00 m AOD contour. This keeps the infiltration feature shallow and level and reduces the need for deeper excavation.

The final trench alignment should avoid the Root Protection Areas identified on the RMT Tree Protection Plan unless otherwise agreed with the project Arboriculturist. All drainage works should be undertaken in accordance with the arboricultural and ecological recommendations referenced in Section 3.1.

8. Exceedance and Flood Risk

The proposed infiltration trench has been sized to accommodate the adopted 1 in 100-year plus 40% climate change event without relying on the existing pond, ditch or tree pits.

For rainfall exceeding the design event, exceedance should be directed over landscaped ground away from the buildings and neighbouring property. The existing lower-lying landscaped areas provide additional resilience but are not included within the calculated design capacity.

9. Construction Requirements

- Confirm the gravel layer along the proposed trench alignment during excavation. If materially different ground conditions are encountered, the drainage design should be reviewed.
- Trim the trench base so that the permeable gravel stratum is exposed along the effective infiltration area; do not leave a continuous clay smear or clay layer beneath the infiltration base.
- The trench is to have a nominal maximum overall depth of approximately 0.75 m, with approximately 300 mm topsoil cover and 450 mm effective gravel depth.
- Use clean washed single-sized 20-40 mm gravel/pea shingle, free from fines, with a minimum confirmed effective void content of 30%.
- Provide permeable non-woven filter geotextile to the sides, base and top of the gravel to prevent migration of surrounding fines while allowing infiltration.
- Provide a silt trap/catchpit before the infiltration trench and maintain accessible rodding points at both ends of the perforated pipe.
- Align the trench broadly along the 44.00 m AOD contour and form the trench base level. Do not deepen the trench below approximately 0.75 m without reviewing groundwater clearance.
- The infiltration system should maintain a minimum 1.0 m separation between the trench base and the maximum likely groundwater level. This separation should be confirmed during the works. If groundwater is encountered at, or within 1.0 m below, the proposed trench base, works should be paused and the drainage design reviewed.

10. Maintenance

The following routine maintenance is recommended:

- Inspect and clean the upstream silt trap/catchpit at least annually and after significant storms.
- Inspect accessible pipework and rodding points annually and flush the perforated pipe if sediment build-up or reduced flow is observed.
- Inspect the trench alignment for settlement, erosion or persistent surface ponding.
- Prevent soil, mulch and construction debris from entering the inspection chambers or infiltration media.
- Keep the drainage maintenance information with the property records.

11. Design Notes and Limitations

The infiltration testing provides good evidence that the gravel stratum at the proposed drainage location is free draining. The test was a small-scale falling-head test rather than a full three-cycle BRE 365 test and is therefore treated as an indicative site-specific result. A factor of safety of 3 has been applied to the measured infiltration rate. The calculation also conservatively uses only the trench base area for infiltration, with no credit taken for infiltration through the clay sidewalls or for storage within the perforated distribution pipes.

The drainage design assumes that the permeable gravel layer continues beneath the proposed trench alignment. The April 2026 Albury S.I. investigation independently confirms granular River Terrace Deposits elsewhere on the site, although ground conditions are variable. The gravel stratum should therefore be confirmed along the trench alignment during construction and the design reviewed if materially different conditions are encountered.

No groundwater was encountered during the local trial excavation to approximately 1.30 m below ground level. Groundwater recorded within the earlier Albury S.I. boreholes was associated with separate locations around the development area and should not be treated as a direct measurement of groundwater at the proposed infiltration trench. Nevertheless, the infiltration system should maintain a minimum 1.0 m separation above the maximum likely groundwater level.

The hydraulic assessment has been undertaken using the conservative rainfall depths set out in Section 6. If required by the Lead Local Flood Authority, the assessment can be reviewed using current site-specific FEH DDF rainfall data.

11.1 Reference Ground Investigation

Albury S.I. Ltd, Report on a Site Investigation, Orchards Paddock, Basingstoke Road, Swallowfield, Report Ref. 26/13364/GO, Final, 17 April 2026.

12. Conclusion

Further site investigation at the proposed drainage location identified permeable gravel beneath approximately 750 mm of upper clay. The local test excavation reached approximately 1.30 m below ground level without encountering groundwater before test water was introduced, and the falling-head test gave an indicative infiltration coefficient of approximately 5.21×10^{-5} m/s. Review of the April 2026 Albury S.I. report also confirms granular River Terrace Deposits elsewhere on the site, while recording shallower groundwater within the separate development-area boreholes.

The revised strategy therefore uses a shallow 22.5 m long x 4.00 m wide x 0.75 m nominal overall deep gravel-filled infiltration trench, aligned broadly along the 44.00 m AOD contour. With approximately 450 mm effective gravel depth and a minimum 30% void content, the calculated granular storage is approximately 11.91 m³. Allowing for 10% urban creep, the critical 1 in 100-year plus 40% climate change temporary storage requirement is approximately 6.06 m³, leaving approximately 5.85 m³ of additional storage capacity.

No groundwater was encountered during the local site testing; however, the proposed infiltration system should maintain a minimum 1.0 m separation above the maximum likely groundwater level. The permeable gravel stratum should be confirmed along the final trench alignment during construction. Provided these requirements are satisfied, the revised arrangement is considered a practical and sustainable means of managing surface water runoff from the development. All works should also be undertaken in accordance with the arboricultural and ecological recommendations referenced within this report.

Yours sincerely

Matthew Neal
Director

Appendix A - Site Investigation Photographs

The photographs below record the trial excavation and infiltration testing undertaken on site. They support the ground investigation description in Sections 2 and 3, show the gravel-bearing material encountered below the upper clay and record the local test excavation. No groundwater was observed in the excavation before test water was introduced.



Photograph 1 - Excavated arisings from the trial pit showing significant gravel content encountered beneath the upper clay.

Appendix A - Site Investigation Photographs (continued)



Photograph 2 - Trial excavation and small infiltration test hole during the falling-head test. The water shown was introduced for the test and is not evidence of groundwater.

Appendix A - Site Investigation Photographs (continued)



Photograph 3 - Trial excavation showing the deeper test area formed within the lower gravel horizon. The maximum local excavation depth was approximately 1.30 m below ground level and no groundwater was observed before infiltration testing.