

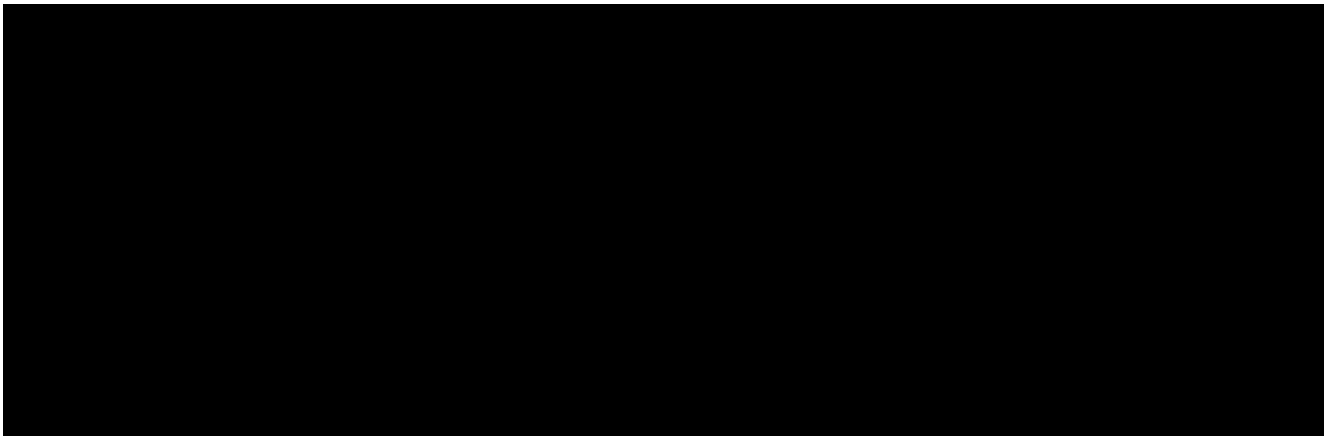
VISTRY HOMES LIMITED

THE LANDINGS, LAND AT FORD AIRFIELD, FORD

RM4 DRAINAGE STRATEGY REPORT

**REPORT REF.
2205771-R18-D**

July 2025



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Document Control Sheet

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	Final	VL	AD	MR	08/08/2024
A	Final	VL	AD	MR	15/08/2024
B	Final	VL	AD	MR	22/08/2024
C	FINAL	VL	AD	MR	13/12/2024
D	Amended to consultee comments and revised layout	MNR	AD	CC	23/07/24

Distribution

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1. Introduction

- 1.1. Ardent Consulting Engineers (ACE) has been appointed by Vistry Homes Limited to advise on the Flood Risk and Drainage aspects of the proposals for a residential-led mixed-use development on Land at Ford Airfield, Ford.
- 1.2. The proposed drainage strategy has been developed in accordance with Policy W DM2 and W DM3 Arun District Council Local Plan 2011-2031 (July 2018). This document demonstrates that the proposed development will effectively manage runoff within the proposed layout and ensure that flood risk is not increased on or off site which is sufficient for a reserved matters application.
- 1.3. Full details of the drainage proposals will be submitted as part of the applications to discharge the Outline Planning Conditions.

Planning History

Outline Application

- 1.4. Outline (all matters reserved except access) permission (ref F/4/20/OUT) was granted in July 2023 for

"the development of up to 1,500 dwellings (Use Class C3), 60-bed care home (Use Class C2), up to 9,000 sqm of employment floorspace (Use Classes B1), local centre of up to 2,350 sqm including up to 900 sqm retail / commercial (Use Classes A1-A5) and 1,450 sqm community / leisure floorspace (Use Classes D1-D2), land for a two-form entry primary school (Use Class D1), public open space, allotments, new sports pitches and associated facilities, drainage, parking and associated access, infrastructure, landscape, ancillary and site preparation works, including demolition of existing buildings and part removal of existing runway hardstanding"

Current Application

- 1.5. The development will be brought forward via a number of reserved matters applications. This Drainage Strategy Report (DSR) covers the Reserved Matter 4 (RM4) application, which consists of:

Approval of reserved matters (layout, scale, appearance and landscaping) following outline consent F/4/20/OUT for phase RM4 (South), for the erection of 357 no. residential dwellings plus associated roads, infrastructure, parking, landscaping, open space & play areas, and associated works.

- 1.6. This DSR outlines the foul and surface water design for the RM4 Phase. A separate DSR (Report Ref. 2205771-R16) has been produced to cover the foul and surface drainage strategy for the Infrastructure Reserved Matters (IRM) application (F/14/24.RES), which focuses on the enabling infrastructure, including the strategic foul and surface water drainage networks and SuDS features for the wider development site.
- 1.7. A site-wide drainage strategy was produced by JNP Group as part of the outline planning application and has been used as the basis for the detailed drainage design. The re-use of the existing drainage system serving the airfield was assessed as part of the Flood Risk Assessment and Drainage Note submitted at outline stage. This option was discounted for several reasons including the suitability of the existing sewer and the onward connectivity of the outfall. Further detail is provided in Section 11.17 of the approved JNP Flood Risk Assessment which is appended to report 2205571-R16 of the IRM Application.
- 1.8. The drainage design has been updated to incorporate further findings of ground investigations as well as pre-application discussions with West Sussex County Council as the LLFA. A response to comments made by the LLFA as part of pre-application discussions is included in Ardent's letter response in **Appendix B** (Ref. MCE/2205771). Further comments raised by Arun District Council's Flood Prevention Team, dated 28/02/2025. This report considers and addresses these comments.

Post-submission comments – Lead Local Flood Authority

- 1.9. Alongside the original RM4 (F/16/24/RES) Submission, Technical Note were also submitted as part of planning applications F/14/24/RES & F/15/24/RES in September 2024. In their response to the planning applications, West Sussex County Council (WSCC) as the Lead Local Flood Authority (LLFA) raised an objection and provided a number of comments in their response letter of 30th October 2024.
- 1.10. Following receipt of these comments, Ardent held a meeting with the LLFA on 25 November 2024, during which additional information was discussed, and clarifications were provided on several points. Ardent's letter dated 2nd December 2024, included in **Appendix G** of this technical note, summarises the discussions and sets out our detailed responses to each of the LLFA's comments.
- 1.11. In their letter dated 9th December, the LLFA confirmed they were satisfied with the information provided on several points but maintained their objection on a small

number of outstanding matters (refer to letter in **Appendix G**), which were addressed in the previous revision of this report. Following the previous revision of this report and supporting correspondence the LLFA a letter of no objection was received from the LLFA on 17th February 2025. A summary of the comments and responses is provided in **Table 1-1** on the following page.

Table 1-1 Post-submission correspondence – Lead Local Flood Authority

Comment number	Summary	Resolved/ Outstanding (as per LLFA letter 09/12/24)	Ardent's Previous responses	Resolved/ Outstanding (as per LLFA letter 17/02/25)
1	Request for additional information regarding infiltration testing.	Resolved (refer to Appendix G)	-	-
2	Request for additional information regarding groundwater levels.	Resolved (refer to Appendix G)	-	-
3	Discharge rates: <i>discharge rate for the northern part of the site will be reduced due to the existing outfall pipe size to below greenfield rates. We recommend that the updated proposed discharge rates are provided for each of the catchments as well as new drawings showing the extents of the basins</i>	Outstanding	The discharge rate from the northern part of the site has been reduced to account for the existing outfall pipe size. This results in a maximum allowable discharge rate below the previously calculated mean greenfield runoff rate (Qbar). As a result, the attenuation basin has increased in size (refer to Ardent Drawing 2205771 – D131 (Sheet 2 of 7) in Appendix D). The drainage calculations have been updated accordingly (refer to Appendix E).	Resolved (refer to Appendix G)
4	As per comment 3; rates from the northern pond should be restricted to no more than Qbar.	Outstanding	As above, refer to comment 3.	Resolved (refer to Appendix G)

5	Details of further attenuation feature.	Resolved (refer to Appendix G)	-	-
6	CV values for the 1 in 2 and 1 in 100year rainfall event should be set to 1.	Outstanding	<p><i>The updated drainage calculations use a Cv value 1 for the 2 year and 30 year events, while Cv values of 0.84 and 0.75 for winter and summer respectively have been applied to the 100 yr + CC design event.</i></p> <p>It should be noted however that we have now designed to a CV value of 1 for all design events. Refer to Appendix E.</p>	Resolved (refer to Appendix G)
7	Clearly indicate on relevant drawings the 3m maintenance easements from either side of watercourses, as well as availability of off road parking for maintenance vehicles.	Outstanding	This has been shown on drawings 2205771 – D130 to D136 in Appendix D .	Resolved (refer to Appendix G)
8	Consideration should be give to the requirement of a SuDS implementation plan to reflect how areas may drain independently in advance of further phases coming forward.	Resolved (refer to Appendix G)	-	-

Post-submission comments – Arun District Council's Flood Prevention Team

1.12. Following resolution of the LLFA's objections a holding objection requiring further information, was received from Arun District Councils Flood Prevention Team dated: 13/05/25. A copy of the holding objection is included at **Appendix G. Table 1-2** on the following page summarises the additional information requested, our response and where the supporting evidence can be found.

Table 1-2 Post-submission correspondence – ADC Flood Prevention Team

Comment Section	Summary	Ardent's response	Evidence Location
Calculations	Calculations for pre-development run off rates must be based upon the positively drained area only.	The proposed maximum allowable discharge rates for each catchment have been calculated based on their respective gross development areas. As a result, the maximum allowable discharge rates are significantly lower than the pre-development scenario.	Table 2-1
Calculations	Proposed discharge rates must not increase flood risk on site or elsewhere. Discharge rates must be restricted to QBAR or 2 l/s/ha, depending on whichever is higher.	As above	Table 2-1
Calculations	CV values for all events must be set to 1. This includes summer, winter, design, and simulation events	All storms events have now been simulated at a CV of 1. This has increased the sizes of the drainage features as reflected on drainage strategy drawings.	Appendix E
Calculations	Additional storage must be set to zero unless it can be evidenced where this is provided.	Additional storage for the RM4 specific calculations has been set to zero.	Appendix E

Natural catchments design.	The submission must define the natural drainage characteristics within, and hydraulically linked to, the site and demonstrate that the drainage proposals will integrate with and not compromise the function of the natural and existing drainage systems.	Strategy is in accordance with the approved Outline FRA which provided all supporting evidence. Natural catchments are presented in drawing 2205771-142.	Appendix H
Natural catchments design.	The condition, performance (including capacity where appropriate) and ownership of any existing site surface water drainage infrastructure must be accurately reported.	The re-use of the existing drainage system serving the airfield was assessed as part of the Flood Risk Assessment and Drainage Note submitted at outline stage. This option was discounted at outline for several reasons including the suitability of the existing sewer and the onward connectivity of the outfall.	Ardent report: 2205771-R16 IRM Drainage Strategy Report Appendix A3
Natural catchments design.	Appropriate easements to watercourses and other services must be shown on all plans	Easements to applicable features shown on drawings 2205771-142 and 143.	Appendix D
Water quality benefits.	An assessment of water quality is necessary to evidence that the proposed design provides adequate treatment of surface water.	Water quality was assessed for the Infrastructure reserved matters application within report 2205771-R16. This phase also benefits from additional swales further improving water quality.	Ardent report: 2205771-R16 IRM Drainage Strategy Report.

Phase RM4 location and site layout

1.13. The approximate RM4 site boundary relative to the wider development area are shown in Figure 1-1 below. A site layout is shown in Figure 1-2, and included in **Appendix A.**

1.14. The approximate RM4 site boundary, the wider development area, and the surrounding area are shown in Figure 1-1.



Figure 1-1: Site Boundaries and Surrounding Area



Figure 1-2: Site Layout

2. Surface Water Drainage

Technical Standards

2.1. The proposed surface water drainage strategy for the development is in accordance with the following technical standards and best practice guidance:

- West Sussex County Council (WCCC) Sustainable Drainage Systems Design Guidance;
- CIRIA SuDS Manual (C753);
- Non-statutory technical standards for sustainable drainage systems. A Best Practice Guidance was published by the Local Authority SuDS Officer Organisation (LASOO) in July 2015 to accompany this document;
- The National Planning Policy Framework.
- Arun Local Plan Policies W DM2 and W DM3

RM4 (South) Drainage Design

2.2. The drainage design for this RM application is shown on drawings 2205771 – D142 (Sheet 1 of 2) and 2205771 - D143 (Sheet 2 of 2) in **Appendix D**. Detention basins and outfall arrangements form part of the strategic drainage network which is covered in a separate Infrastructure Reserved Matters application (F/14/24/RES) and described in Ardent's Drainage Strategy report Ref. 2205771-R16.

Drainage Discharge Hierarchy

2.3. In line with CIRIA C753's discharge hierarchy, drainage strategies must aim to use a method of discharge as high up the following hierarchy as possible:

1. Store water for later use
2. Discharge to the ground via infiltration
3. Discharge to a surface water body
4. Discharge to a surface water sewer
5. Discharge to a combined sewer

- 2.4. It is proposed to include water butts across the site for water re-use. However, the benefits of rainwater harvesting on a specific design storm event cannot be quantified, due to the variable availability of storage within the structure. As such, these have not been included in the drainage strategy calculations.
- 2.5. Ground investigations including winter groundwater monitoring were undertaken by Omnia Ltd between December and April 2024 (refer to **Appendix C**). Within the RM4 boundary, the investigations recorded groundwater levels at the ground surface. As a result, infiltration systems have been discarded as a method of disposal of surface water.
- 2.6. Following the discharge hierarchy outlined above, it is proposed to attenuate flows from RM4 within an attenuation basin prior to discharging surface water into an ordinary watercourse located to the south-west of the site at a controlled rate equivalent to greenfield runoff as discussed in the following paragraphs.

Proposed discharge rates

- 2.7. Surface Water Drainage strategy drawings are included in **Appendix D**.
- 2.8. Based on the natural topography of the site, surface water runoff from the RM4 plot is conveyed via a combination of grassed swales and a piped drainage network into a series of strategic detention basins on the south-western extent of the site, prior to discharging at a rate equivalent to the mean greenfield runoff rate (Q_{bar}) into an adjacent watercourse. Flows will be controlled by a vortex flow control. It should be noted that the detention basins and outfall arrangements form part of the strategic drainage network which is covered in a separate Infrastructure Reserved Matters application, and described in Report Ref. 2205771-R16.
- 2.9. A Q_{bar} rate of 2.42 l/s/ha has been calculated for the site using the FEH method. The proposed maximum allowable discharge rate for the site is based on the gross development area. A comparison is provided in **Table 2-1** below.
- 2.10. The surface water drainage strategy for the wider development site separates the site into three catchments, each discharging to a separate offsite outfall (Outfalls 1, 2 and 3).

Table 2-1 – Comparison of Pre and Post-Development Discharge Rates (Whole Development)

Catchment/ Proposed Outfall no.	Greenfield catchment area (ha)	Pre-development Greenfield Runoff Rate (Qbar) (l/s)	Post-development maximum allowable discharge rate (1 in 100YR +CC) (l/s)
1 (north)	32.33	78.23	13.3* *Discharge rate based on existing outfall pipe.
2 (south)	8.15	19.72	6.80
3 (south)	22.19	53.70	8.40

Surface Water Drainage Calculations

2.11. Causeway Flow results for the wider site are included in **Appendix E**. FEH 2022 data has been used in the calculations. The results demonstrate there is not flooding onsite for all rainfall events up to the 1 in 100 year +40%CC, and there is no surcharging in the network during the 1 in 2 year event.

2.12. Following discussions with the LLFA and ADC Flood Prevention Team, a Volumetric Run-off Coefficient (Cv) value of 1 has been adopted for all storm event calculations.

2.13. RM4 discharges its surfaced water into the strategic drainage designed within the enabling infrastructure. All outfalls have been modelled as fully surcharged up to the flood levels (assumed as top of bank levels) in a 1 in 100 years + 40% CC event (Cv of 1).

Designing for Exceedance

2.14. Drainage exceedance may occur if the rate of surface water runoff exceeds the capacity of the drainage system, the receiving water or piped system becomes

overloaded or blocked, or when the outfall becomes restricted due to flood levels in the receiving watercourse.

- 2.15. Exceedance routes were initially identified at the outline stage in Drawing No. 2205771-D020, which has since been superseded by the RM drawings submitted in this application. As indicated above, all outfalls have been modelled under the conditions of a fully surcharged scenario up to the flood levels (top of bank levels) in a 1 in 100 years + 40% CC event (Cv of 1).

Future Maintenance

- 2.16. The drainage elements covered within the RM4 application (the sewer network, swales and basins) will be offered for adoption by a New Appointments and Variations (NAV) company under a S104 agreement.
- 2.17. The connecting pipework will be maintained by a private company.
- 2.18. A Maintenance and Management Plan for all drainage features is provided within **Appendix F**, detailing the operational requirements for each drainage element for the lifetime of the development.

3. Foul Drainage

- 3.1. Details of the strategic foul drainage infrastructure for the wider site have been submitted as part of the IRM application, and are described below for information. The foul drainage network to be approved under this application is shown in the drainage drawings in **Appendix D**.
- 3.2. The foul drainage strategy has been designed to convey foul flows to 3no. proposed adoptable pumping stations (Pump Stations 1, 2 and 3), which will in turn discharge into a fourth pump station (Terminal Pump Station 4). Foul Pump Station 4 will pump flows to Ford wastewater treatment works to the east of the site.
- 3.3. All pumping stations will be fitted with a telemetry system and emergency storage to adoptable standards.
- 3.4. Refer to Table 3-1 below for pumping station catchment details.

Table 3-1 Foul drainage catchments

Station Reference	Type	Catchment
Pump Station 1	Satellite	132 Dwellings plus 12l/s design flow from an adjacent development
Pump Station 2	Satellite	717 Dwellings
Pump Station 3	Satellite	437 Dwellings
Pump Station 4	Terminal	98 Dwellings, 60 bed care home, 2 form entry primary school, 2320m2 local centre plus pumped flows from Pump Stations 1,2 and 3

- 3.5. Total foul flows from Terminal Pump Station 4 have been calculated as 87.51 l/s. Desing flows for each pumping station are set out in Table 3-2 below.

Table 3-2 Foul drainage design flows

Pump Station	Design Flow (l/s)
1	18.22
2	33.19
3	20.23
4* (*Total site flows, including flows from PS 1, 2 and 3)	87.51

4. Summary and Conclusion

- 4.1. Ardent Consulting Engineers (ACE) has been appointed by Vistry Homes Limited to advise on the Drainage and flood risk aspects of the proposals for a residential-led mixed-use development on Land at Ford Airfield, Ford.
- 4.2. The development will be brought forward via a number of reserved matters applications and detailed drainage designs will be subject to discharging outline conditions 29-31 of the outline consent. This DSR outlines the foul and surface water design and layout for the RM4 Phase that will not increase flood risk on or off-site. A separate Drainage Strategy (Report Ref. 2205771-R16) has been produced to cover the foul and surface drainage strategy for an Infrastructure Reserved Matters (IRM) application, which focuses on the enabling infrastructure, including the strategic foul and surface water drainage networks and SuDS features for the wider development site.
- 4.3. The Local Planning Authority (LPA) is Arun District Council (ADC) and the Lead Local Flood Authority (LLFA) is West Sussex County Council (WSCC). Pre-application discussions with the LLFA have taken place and have informed the drainage design for the RM design phase. Post-submission discussions have also taken place and any outstanding comments have been addressed in this DSR to ensure the proposals are in accordance with the NPPF, National SuDS Policy, Arun Local Plan Policies W DM2 and W DM3, WSCC SuDS Design Guidance, and the Ciria SuDS Manual .
- 4.4. The surface water drainage strategy for the RM4 phase proposes to attenuate flows within an attenuation basin before discharging into an ordinary watercourse located to the south-west of the site, at a rate restricted to the equivalent mean greenfield runoff rate (Q_{bar}). It should be noted that the detention basin forms part of the strategic drainage network which is covered within the separate Infrastructure Reserved Matters application.
- 4.5. Causeway Flow results demonstrate there is not flooding onsite for all rainfall events up to the 1 in 100 year +40%CC, and there is no surcharging in the network during the 1 in 2 year event.
- 4.6. All outfalls have been modelled as fully surcharged up to the flood levels (assumed as top of bank levels) in a 1 in 100 years + 40% CC event. A Cv value of 1 has been used for all simulation events.

- 4.7. Details of the strategic foul drainage infrastructure for the wider site have been submitted as part of a separate IRM application, and included in this technical note for information. The foul drainage network to be approved under this application is shown in the drainage drawings in **Appendix D**.
- 4.8. A Maintenance and Management Plan for all drainage elements of the wider site is included in **Appendix F** of this DSR.