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From: Sarah Burrow <Sarah.Burrow@arun.gov.uk>
Sent: 30 July 2025 14:33
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Cc: Jessica Riches <Jessica.Riches@arun.gov.uk>; Karl Mclaughlin <Karl.Mclaughlin@arun.gov.uk>; Paul Cann <Paul.Cann@arun.gov.uk>; Neil Crowther <Neil.Crowther@arun.gov.uk>; David Easton <David.Easton@arun.gov.uk>
Subject: F/14/24/RES - Ford Airfield IRM ADC Drainage Consultation 2

Hi Jessica,

Find the consultation – an objection in principle – attached. Apologies for the delay in response.

Kind regards

Sarah Burrow
Flood Risk and Drainage Engineer, Coastal Engineers and Flood Prevention

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Engineers Comments Regarding Surface Water Drainage

Application Reference:	F/14/24/RES	**Reviewer Reference:**	ADC/SB
Planning Officer:	Jessica Riches	**Date of Review:**	30/07/2025
Site Name:	Land at Ford Airfield Ford		
Application Description:	Approval of reserved matters (layout, scale, appearance and landscaping) following outline consent F/4/20/OUT for the infrastructure reserved matters including the provision of a primary spine road and associated secondary road junctions, pavement, footpaths, cycle infrastructure and bus stops; site wide drainage infrastructure including foul pumping stations, foul sewer infrastructure, SUDS basins, SUDS swales, surface water infrastructure; acoustic fencing; public open space including landscape details, play areas, footpaths & associated works. This application affects a Public Right of Way, may affect the setting of a Listed Building and falls within CIL Zone 1 (Ford strategic site - zero rated).		
Assessment Number:	2 of 1		

Policy and Guidance Information

Arun District Council Surface Water Drainage Guidance - https://www.arun.gov.uk/surfacewater

Land Drainage Consent – https://www.westsussex.gov.uk/fire-emergencies-and-crime/dealing-with-extreme-weather/flooding/flood-risk-management/ordinary-watercourse-land-drainage-consent/ and https://www.arun.gov.uk/land-drainage-consent/

Arun District Council surface water pre-commencement conditions - https://www.arun.gov.uk/planning-pre-commencement-conditions

The SuDS Manual [C753] by CIRIA

Sustainable drainage systems: non-statutory technical standards' https://assets.publishing.service.gov.uk/media/5a815646ed915d74e6231b43/sustainable-drainage-technical-standards.pdf

Response	**Objection**

Critical Items for Surface Water Drainage Design Conditions

The failure to adequately address the following items will result in an objection to a surface water drainage design.

If any of these items are inadequately addressed by the submission, then their correction may result in a redesign of the surface water drainage scheme. A redesign is likely to have site wide implications such as the potential for storage structures to increase in volume or plan area.

Critical Item	Reason	Status
Winter groundwater monitoring data.	Adequate winter groundwater monitoring data must be supplied to evidence that infiltration designs have sufficient freeboard from the	**Insufficient**

	base of structures and the peak groundwater level. The same data is necessary to ensure that the potential for buoyancy has been adequately considered in attenuation designs.	
Winter infiltration testing data.	Adequate winter infiltration testing must be supplied to justify the proposed discharge method and design infiltration rates. Infiltration tests must be completed strictly in accordance with BRE DG 365, CIRIA R156 or a similar approved method. Testing depths must account for peak groundwater levels and correspond with the location and depth of proposed infiltration features. Designs must be based upon the slowest infiltration rate evidenced closest to a proposed infiltration feature. Average design rates will not be accepted. The results of incomplete tests should not be extrapolated to obtain design values for infiltration rates.	**Insufficient**
The hierarchy for sustainable drainage.	The proposed discharge method must accord with the SuDS hierarchy as given below. Evidence must be supplied to justify the proposed discharge method. 1. Rainwater reuse where possible. 2. Complete discharge into the ground (infiltration). 3. Hybrid infiltration and restricted discharge to an appropriate water body or surface water sewer. 4. Restricted discharge to an appropriate water body. 5. Restricted discharge to a surface water sewer. 6. Restricted discharge to a combined sewer. A water body may be defined as a river, watercourse, ditch, culverted watercourse, reservoir, wetland or the sea. **Engineers cannot support any proposed connection of surface water to the foul sewer.**	**Insufficient**

Calculations	Calculations for pre-development run off rates must be based upon the positively drained area only. 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.	**Sufficient** – if infiltration is not viable.
	Designs must be based on the most recently available rainfall data at the time of conditions being applied. **FSR rainfall data will not be accepted.** FEH rainfall data is based upon more recent records and continues to be updated.	**Sufficient**
	Designs must use the correct climate change allowances at the time of determination of the outline or full planning application. CV values for all events must be set to 1. This includes summer, winter, design, and simulation events. The correct allowance for urban creep must be applied. Additional storage must be set to zero unless it can be evidenced where this is provided. Infiltration half-drain times must be less than 24 hours. Infiltration design rates must be applied to the sides of soakaways, or to the base of infiltration blankets. Design rates must not be applied to both the base and sides of infiltration structures. A surcharged outfall must be modelled.	**Insufficient – contributing areas are incorrect, CV values are incorrect for the 1 in 100 year + climate change event, surcharge levels are not shown on the models.**
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. The condition, performance (including capacity where appropriate) and ownership of any existing site surface water drainage infrastructure must be accurately reported.	**Insufficient**

	Appropriate easements to watercourses and other services must be shown on all plans. Where there are areas of flood risk from any source on the site, it must be shown how a sustainable surface water drainage design can be accommodated on the site without conflicting with those areas of flood risk. Designs must replicate the natural drainage catchments of the site. All surface water drainage designs must therefore drain via gravity to corresponding points of discharge. **The use of pumps for surface water drainage is not sustainable and will not be supported**. .	
Plans	Plan areas, depths and levels of drainage infrastructure must accurately correspond with the supporting calculations.	**Insufficient**
Water quality benefits.	An assessment of water quality is necessary to evidence that the proposed design provides adequate treatment of surface water.	**Insufficient**
Biodiversity and amenity benefits.	The surface water drainage design must provide biodiversity and amenity benefits.	
Trees and planting	There should be no conflict between surface water drainage infrastructure and existing or proposed trees or planting. The design must consider the potential growth of proposed trees and adequate mitigation must be provided to protect drainage infrastructure where conflict **cannot** be avoided.	**Not Assessed**

Drainage Impact on Other Planning Matters

This application has been assessed with regards to surface water drainage design only.

Other planning matters occasionally effect the surface water drainage design. If plans relating to other matters have been assessed for their impact on the proposed drainage, then it must not be assumed that they have been assessed for any other purpose. The planning officer is advised to check for conflicts with any existing approved plans and to consult any relevant consultees as appropriate.

It has been identified that the following consultees may have comments about the plans that have been submitted and reviewed for this application:

☐ Landscaping officer (proposed trees and landscaping)
☐ Tree officer (existing trees)
☐ Environment Agency (main rivers and fluvial/tidal flood risk, groundwater source protection zones)
☐ Southern Water (foul drainage and surface water disposal to public sewer network)
☐ Portsmouth Water (groundwater source protection zones)
☒ **Lead local flood authority (all other sources of flooding and ordinary watercourses)**
☐ Other:
☐ None

Additional comments to the planning officer

The NPPF states that when determining any planning application, local planning authorities should ensure that flood risk is not increased elsewhere (paragraph 181, 182 and 187e). The PPG guides local planning authorities to refer to 'Sustainable drainage systems: non-statutory technical standards' and detailed industry guidance like The SuDS Manual [C753] by CIRIA to guide decisions about the design, maintenance, and operation of sustainable drainage systems for non-major development.

This consultation has been primarily informed by The SuDS Manual.

The following documents have been submitted to support the application with reference to surface water drainage:

- IRM Drainage Strategy Report 2205771-R16-D - May 2025. Referred to as the **DSR.**
- IRM Drainage Strategy Report Appendix A1 – In 28 parts - Outline Flood Risk Assessment and Drainage Strategy
- IRM Drainage Strategy Report Appendix A2 - Excerpt of Land Deal
- IRM Drainage Strategy Report Appendix A2 - On-Site CCTV Drainage Survey Report
- IRM Drainage Strategy Report Appendix B - Proposed Development Layout
- IRM Drainage Strategy Report Appendix BC - ADC Drainage Team and WSCC (LLFA) Post-Submission Responses
- IRM Drainage Strategy Report Appendix D1 - In 3 parts - RSK Geo-Environmental and Geotechnical Site Assessment November 2018
- IRM Drainage Strategy Report Appendix D2 - In 3 parts - RSK Infiltration Testing Investigation April 2020
- IRM Drainage Strategy Report Appendix D3 - In 7 parts - Omnia Winter Groundwater Monitoring May 2024
- IRM Drainage Strategy Report Appendix D4 - Part 2 of 2 - Omnia Infiltration Factual Report December 2024
- IRM Drainage Strategy Report Appendix D5 - Infiltration Constraints Plan North (Ardent Drg No. 2205773-1955)
- IRM Drainage Strategy Report Appendix E - In 9 parts - Foul and Surface Water Drainage Strategy Plans
- IRM Drainage Strategy Report Appendix F - Greenfield Runoff Calculations
- IRM Drainage Strategy Report Appendix F1 - Northern Infra Network 1-1 Year and 1-30 Year

- IRM Drainage Strategy Report Appendix F2 - Northern Infra Network 1-100 Year + 40% CC
- IRM Drainage Strategy Report Appendix F3 - Southern Infra Network 1-1 Year + 1-30 Year
- IRM Drainage Strategy Report Appendix F4 - Southern Infra Network 1-100 Year + 40% CC
- IRM Drainage Strategy Report Appendix F5 - Southern Infra Network 2-1 Year and 1-30 Year
- IRM Drainage Strategy Report Appendix F6 - Southern Infra Network 2-100 Year + 40% CC
- IRM Drainage Strategy Report Appendix G - Maintenance and Management Plan
- FORD DRAINAGE RESPONSE to LLFA 13.11.24 & 19.7.2024
- LLFA Response from Ardent 02/12/24
- 12th March - Ardent Response Additional Testing Data for IRM and RM1
- IRM Infiltration Constraints Plan North 2205773-1995 Rev A
- 2205771-D020 Rev H - Sitewide Indicative Surface Water Drainage Strategy. Referred to as **ISW Plan.**
- 2205771-250 – Pre-development Drainage Catchments Plan. Referred to as the **Greenfield Catchment Plan.** [Note that this plan was not uploaded to the portal to this application at the time of review].
- IRM Drainage Strategy (Sheet 1 of 7) 2205771-D130 Rev C
- IRM Drainage Strategy (Sheet 2 of 7) 2205771-D131 Rev D
- IRM Drainage Strategy (Sheet 3 of 7) 2205771-D132 Rev D
- IRM Drainage Strategy (Sheet 4 of 7) 2205771-D133 Rev D
- IRM Drainage Strategy (Sheet 5 of 7) 2205771-D134 Rev C
- IRM Drainage Strategy (Sheet 5 of 7) 2205771-D134 Rev C
- IRM Drainage Strategy (Sheet 7 of 7) 2205771-D136 Rev C
- INFRASTRUCTURE RM-IMPERMEABLE AREAS PLAN (SHEET 1) 2205771-210 REV B
- INFRASTRUCTURE RM-IMPERMEABLE AREAS PLAN (SHEET 2) 2205771-211 REV B
- IRM Enabling Infrastructure General Arrangement 2205771-D0100 Rev P13
- IRM-SITE SECTIONS (SHEET 1) 2205771-D170 REV A
- IRM-SITE SECTIONS (SHEET 2) 2205771-D171 REV A
- IRM-SITE SECTIONS (SHEET 3) 2205771-D172 REV A
- Site Sections Landings Green TOR-RMIN-XX-DR-L-P-011 Rev B
- Site Sections Ryebank Park TOR-RMIN-XX-DR-L-P-012 Rev B
- Ryebank Park Basin Sections 1 of 2 TOR-RMIN-XX-DR-L-P-021 Rev A
- Ryebank Park Basin Sections 2 of 2 TOR-RMIN-XX-DR-L-022 Rev A
- IRM LEVEL STRATEGY (SHEET 1) 2205771-D150 REV C
- IRM LEVEL STRATEGY (SHEET 2) 2205771-D151 REV D
- IRM LEVEL STRATEGY (SHEET 3) 2205771-D152 REV D
- IRM LEVEL STRATEGY (SHEET 4) 2205771-D153 REV C
- IRM LEVEL STRATEGY (SHEET 5) 2205771-D154 REV C
- IRM LEVEL STRATEGY (SHEET 6) 2205771-D155 REV C
- IRM LEVEL STRATEGY (SHEET 7) 2205771-D156 REV C
- Landscape Primary Street North 2 of 2 TOR-RMIN-XX-DR-L-P-005 Rev D
- Landscape Primary Street Central TOR-RMIN-XX-DR-L-P-006 Rev D
- Landscape Primary Street South TOR-RMIN-XX-DR-L-P-007 Rev D
- Reserved Matters Infrastructure Ryebank Park 1 of 2 TOR-RMIN-XX-DR-L-P-008 Rev D

Insufficient information has been submitted regarding the existing site, it's current drainage arrangements and natural catchments to determine if the proposed discharge locations and rates will not increase flood risk.

STANDARD 1: RUNOFF DISPOSAL LOCATIONS

Infiltration Viability

Four ground investigation reports have been submitted to support this application. These provide the justification for the discounting of infiltration as a means of surface water disposal. Brief informal notes relating to each of these are appended to this consultation.

Only one set of infiltration tests meet the requirements set out in BRE DG 365 and The SuDS Manual; those in Appendix D2 – RSK Infiltration Testing Investigation April 2020. Infiltration tests completed in summer months do not represent worst case conditions and those completed at depths greater than the highest recorded groundwater cannot allow for 1m of unsaturated ground. Significant areas remain untested.

The only area in the north of the site where the applicant has demonstrated that infiltration at any depth can be fully ruled out due to high groundwater is in the extreme north and in the vicinity of the most northerly proposed attenuation basin. There are some areas in the rest of the north of the site where infiltration rates are prohibitively slow and the applicant has demonstrated that infiltration could not be used as a total disposal solution. However, there are some areas where infiltration has not been adequately tested, and others where due to the groundwater depths, the applicant should consider if infiltration could still be allowed for to provide interception drainage.

The designer states in paragraph 2.8 of the DSR that infiltration tests undertaken within the brickearth deposits were unsuccessful with infiltration rates incalculable. This is true in some but not all cases. The designer has presented a contradictory justification and evidence stating that there is no merit in undertaking shallower infiltration tests, at depths which would allow for 1m of unsaturated ground to the groundwater, as the additional testing would still fall within the same stratum. However, BRE DG 365 indicates that the effective area of outflow and the infiltration rate can vary with depth, even when the soil conditions themselves do not vary. This is demonstrated by the results that have already been submitted, many of which are in similar if not the same stratum and yet have varying infiltration rates.

Groundwater Monitoring

In the south of the site, the groundwater levels have been evidenced to be consistently high, at a level that is high enough to rule out infiltration as a means of surface water disposal. This is because 1m of unsaturated ground must be allowed for between the base of the soakaway or infiltration structure and the peak groundwater level. This approach allows for potential groundwater level rise over the lifetime of the development and provides surface water treatment and thus protection to the groundwater.

Despite ground investigations being sparse towards the north of RM4 (South), the groundwater levels are so consistently high that enough confidence has been offered that infiltration is not viable for this area.

However, in the north of the wider site, the ground conditions are different and variable. At the most northern boundary, groundwater levels are high enough to rule out infiltration. However, for a significant area of the site peak groundwater levels would suggest infiltration may be viable.

As the ground conditions and the groundwater levels are variable in the north of the site, the applicant should evidence a more rigorous monitoring regime. This ensures that infiltration is maximised where possible and that the natural drainage characteristics are emulated.

At present the groundwater monitoring in the north of the site is not extensive enough for this purpose. The number of monitoring locations may seem high when plotted or listed without context. However, when compared with the scale of this proposed development they are insufficient in number. RM1 (North) alone, comprises of 341 dwellings. Within this parcel there are 3 groundwater monitoring points, 2 of which have groundwater levels that are low enough to justify further investigation into infiltration potential.

The planning officer is reminded that all proposed development of at least 2 dwellings within this district is expected to evidence the ground conditions on site to justify their drainage strategy. This will include a full winter of groundwater monitoring in all cases. All major development of least 10 dwellings as assessed by the Lead Local Flood Authority [LLFA] will also be expected to complete groundwater monitoring to justify their drainage strategy. In this parcel the developer has one monitoring location per 113.7 dwellings. There are entire blocks of houses where we have not been presented with an indication of likely groundwater levels.

There are groundwater monitoring points in the locations of all open storage features. All of which are proposed to attenuate surface water before discharging it at a restricted rate to three boundary watercourses. It is noted that WS413 in one of the detention basins (named differently between plans), had peak groundwater levels that are low enough that infiltration could be viable.

Impact

The proposed design discharges all surface water for the site to three watercourses, without adequately investigating or justifying the non-viability of infiltration as a means of disposal. Whilst it is agreed that infiltration is not viable for most (if not all), of the south of the site, the applicant has evidenced infiltration potential without investigating it further in the north.

Surface water drainage locations must replicate the natural drainage catchments of the site to ensure that flood risk is not increased. To understand how a site naturally drains, ground investigations are required. The applicant must demonstrate the peak ground water level, the infiltration potential of the ground and the existing topography. On a site of this scale there are multiple sub-catchments which may need to drain surface water by different means and to different locations. This means that the applicant has not sufficiently evidenced that the proposed design and therefore layout, are following the hierarchy for sustainable drainage.

The ground investigations appear to have been programmed to align with the proposed layout rather that to inform it. The infiltration potential of the site should have been thoroughly investigated before the layout was submitted for approval. This would ensure that areas where infiltration was possible were reserved for this purpose, thus reducing the impact of additional surface water flow to the watercourse network.

By displacing surface water that would naturally drain to ground to a watercourse, flood risk will be increased. Designers may argue that by reducing runoff rates to below greenfield runoff rates they are mitigating for this risk. But the greenfield runoff rate applies to the land that would drain to watercourses naturally. By adding additional areas which naturally drain to ground, even at reduced runoff rates, a developer will increase the volume of surface water that ultimately ends up in the watercourse system. This volume may impact flood risk.

Where there is potential to drain surface water to ground, this must be prioritised in accordance with the surface water drainage hierarchy prescribed by The SuDS Manual, Approved Document H of the Building Regulations, and the National Standards for SuDS.

The proposed site layout means that high density housing is proposed where infiltrating surface water drainage features may have been viable. Naturally, the layout of the infrastructure must follow the housing which it supports, therefore we must object in principle to the application as the connected housing reserved matters application (RM1) may not be respecting natural catchments. This is subject to further ground investigations as outlined above.

Runoff Disposal Locations – Existing Drainage Network

Insufficient information has been submitted regarding the existing site and its current drainage arrangements.

There is existing drainage infrastructure on the site installed to serve Ford Airfield. The existing drainage networks ultimately discharge to the River Arun. At the point where the southern network outfalls, the river is a tidal waterbody and therefore less sensitive to the effects of surface water discharge.

In the outline application, before infiltration was proposed in the north of the site, the strategy suggested that surface water would be discharged to 'the large channel to the east of the site adjacent to Ford Road'. This existing drainage network also ultimately discharges to the River Arun.

Our Local Plan Policy W DM3 states that SuDS must: *"e. Retain the existing drainage network of the site and the wider area".*

It is unclear, why, if infiltration is not viable, this existing network is not being used as it is larger in scale and a less sensitive receptor.

The SuDS Manual states that an applicant is required to define the *"state, performance and ownership of any existing site surface water drainage infrastructure and* [demonstrate] *that the drainage proposals consider, use or protect these systems (where appropriate)."* Table B.2 p806. This is necessary in the information that is submitted to support outline and full planning applications.

Further investigation and evidence of the existing networks is required. If connection to the networks is truly not feasible, then a justification for this (relating to the current development proposal) must be submitted for assessment.

Appendix A (part 13 of 28) of the DSR includes survey work which was summarised in the Outline Technical Note. There is reference to the southern airfield drainage survey and a justification for it not being used. In addition, a more recent CCTV report has been submitted in Appendix A2. This does not include a plan and is therefore impossible to reference. The original survey(s) and CCTV

reports have not been submitted, and the applicant has offered no clarity regarding the ownership of the network or it's right to protection. If it has a right to protection or maintenance in any deeds or other legal agreements, then these must be honoured.

It is noted that it has been acknowledged in Appendix A1 of the DSR (part 1 of 28, paragraph 15.13) that; "During a severe storm event it is likely any overland water which flows across the fields would be intercepted and captured by the existing infrastructure and drainage systems which discharge to the River Arun and Ryebank Rife."

The DSR itself does not refer to the CCTV survey which noted that; "Based on the surveyed sections the inspected pipes are in an acceptable structural condition". [Our emphasis].

Drainage elements covered within the IRM application (the sewer network, swales and basins) will be offered for adoption by a New Appointments and Variations (NAV) company under a S104 agreement and that the connecting pipework will be maintained by a private company. The adoption standards of the proposed company have not been defined.

Irrespective of whether the airfield drainage can and should be used, it is not acknowledged or protected. The ExAF Network is not shown on any of the site plans and nor has it been considered a constraint to the development of the layout of the site. The status and condition of the network is unknown, and it is unclear whether the network has a legal right to protection via our Land Drainage Byelaws. An easement of 3m either side of the edge of the culverts may be necessary. The onus is on the applicant to demonstrate that this network is not a constraint to the wider site layout which affects the infrastructure layout.

Disposal Locations – Achievability of Connection on Third Party Land

The surface water drainage for the site relies on connection to watercourses on third party land. The achievability of the proposed surface water drainage scheme is reliant upon installation of drainage infrastructure on this land.

The applicant has submitted evidence of an excerpt of the land sale agreement, allegedly confirming permission to provide the proposed drainage outfalls. The wording of the excerpt relates only to the 'Yapton Road Roundabout Drainage Installations'. This applies to outfall 2 to watercourse 2, on third party land. The language of the agreement is specific to the roundabout, whereas the connection and proposed outfall will serve a significant proportion of the wider site. The following areas are all proposed to drain to this watercourse:

- Part of southern infrastructure (IRM),
- Northern part of RM4,
- Residential RM5,
- Primary school,
- Local centre RM, and;
- Part of residential RM2.

The wording of the agreement does not appear to acknowledge the wider site drainage connection. We offer no comment regarding the legal position of this agreement, but we raise concern that there is therefore a risk that the applicant may not have permission for that connection. It is unclear how the applicant will drain a significant area of the south of the site if permission is withheld by the third-party landowner. There are no other watercourses, surface water or combined sewers in the vicinity

of the site. Given this uncertainty regarding the connection, we cannot be sure that flood risk will not be increased by the proposed development. The planning officer is invited to consider the appeal decision on application reference APP/K0425/W/23/3332129 which was dismissed on similar grounds.

The applicant has not submitted information to identify the relevant landowner where watercourses 1 and 3 outfall. However, the manholes that the site needs to connect into are both on adopted highway land. The applicant should be aware that this means that permission from WSCC Highways will be required for the works on their land. This is expected to be achieved.

Ordinary watercourse land drainage consent (also from WSCC) will be required for all of the proposed connections to the culverted ordinary watercourses. Evidence of all relevant consents will be necessary as part of the application(s) to discharge surface water drainage design conditions.

STANDARD 2: INTERCEPTION

The development must demonstrate that the first 5mm of rainfall for the majority of rainfall events does not result in any runoff from the site. This is to replicate greenfield conditions. If all rainwater from frequent events is allowed to discharge from the site when it would not naturally then this will increase flood risk.

Paragraph 2.19 of the DSR states that interception drainage will be achieved through evapotranspiration and infiltration into the topsoil within the basins. It is claimed that this will adequately manage the first 5mm of any storm. No supporting calculations or evidence to justify this claim have been submitted.

It is understood that infiltration could provide interception drainage where groundwater levels allow, even where it could not be relied upon for a total disposal solution, particularly for extreme events. However, where this is possible, or to what extent infiltration can assist in the achievement of interception drainage, has not been demonstrated by the submission. Given the assertion that infiltration is not viable, it can reasonably be assumed that there is a risk that interception drainage may only be achieved via evapotranspiration.

As an example, for Outfall 1 the contributing area is claimed to be 21.208ha on the ISW Plan, the same catchment is modelled as 23.358ha. An initial estimate of the required area of flat vegetated surface that surface water must pass over or be stored within is 20% of the total contributing area, in this instance 4.6716ha or 46,716m^2. The model in appendix F of the DSR shows that the maximum plan areas of the two basins combined for this catchment are 15,035.8m^2. This is 27,381m^2 less than the minimum requirement. However, surface water is unlikely to achieve the depths required to make use of this plan area on regular events and part of the plan area is permanently wetted which is assumed not to deliver interception. There will also be a potential increase in wetted area due to side slopes, however, this will not deliver the area that is required.

This is a basic and cursory assessment to demonstrate that when interception drainage has been properly considered by the designer, further area, scale or layout changes are likely to be required to account for this standard. This assessment must account for the full site as the size and location of SuDS storage features are being decided by this IRM and they may need to be changed, even when some interception is being delivered at source in each phase.

STANDARD 3: EXTREME RAINFALL

Modelling – Greenfield and Proposed Runoff Rates

If infiltration is not viable, then the per hectare calculations for QBAR are appropriate and acceptable. Likewise, the proposed discharge rates are unlikely to increase flood risk in extreme events due to the significant reduction when compared with greenfield runoff rates for the full contributing area (both pervious and impervious surfaces). The reduction is of such a scale that if infiltration is proven to not be viable, then there is no need for further evidence relating to the contributing areas for the proposed discharge rates.

Modelling – Contributing Areas

The contributing areas for the design calculations (for the size of the storage in the systems) are still unclear. The impermeable area plans for this submission do not include all of the access roads that are within the red line boundary, nor the contributing area of the basins themselves. In addition, the contributing area plans for phases where the proposed layout is known, have not been submitted. Using these would give a more accurate representation of the contributing areas.

North contributing area is 23.358ha

The modelled areas for all three catchments are significantly different between the ISW Plan and DSR Appendix F. This is illustrated in the table below. It is understood that the ISW Plan uses contributing areas based on an assumed 60% impermeable area with urban creep applied. These contributing areas are likely to be a cautious estimate, as they should be, given the uncertainty at this stage. There is insufficient justification for the change in contributing areas between the ISW Plan and the models.

	Modelled Areas (ha)	ISW Plan Areas (ha)	Difference (ha)
North	23.358	21.208	+2.15
South 1	4.245	9.521	-5.276
South 2	6.51	10.467	-3.957

These discrepancies are further complicated by the impermeable area plans. The only phase where these can be checked against the modelling is for RM4 in the south of the site as this phase represents all of the southern 2 modelling (DSR Appendices F5 and F6).

The model does not include the contributing areas of the basins themselves. The contributing area is 6.51ha, whereas the impermeable area plan states that RM4 has a total contributing area of 7.084ha. This is complicated by the inclusion of a northern section of RM4 which actually drains to outfall 2. The contributing area from the impermeable area plans is therefore corrected to account for this, to 6.22ha. Again, the contributing areas of the basins are not included in the impermeable area plans. When added, these give a total contributing area of 7.46ha, 0.95ha more than that which has been modelled. When the contributing areas have been modelled correctly more storage will be required in the network. This may affect the scale and layout of the proposed development.

	Stated Areas (ha)	Basin Areas - not included (ha)	Total inc basins (ha)
Model (South 2)	6.510	1.172	7.682

Impermeable Area Plans	7.084 6.22 (corrected – measured by ADC)	1.240 (measured by ADC)	8.324 7.46 (corrected)
ISW Plan Area	NA	NA	10.467

As it is not possible to complete a direct comparison between the other parts of the site and the contributing area plans this has not been completed. There is insufficient detail submitted to ensure that the correct, or most cautious estimate of contributing areas have been modelled for all catchments.

Modelling - CV Values

The 1% AEP (1 in 100 year) + 40% models for all three catchments have the CV values set at 0.75 and 0.84 for summer and winter events respectively. CV values should be set to 1 as previously agreed, this ensures that 100% of the rainfall that falls on the impermeable surfaces is accounted for in the system. By reducing the CV values in the model, the level of storage needed is likely to be underestimated. If further storage is required in the system, then the basins and possibly the layout of the development may need to be altered.

Modelling - Surcharging

Paragraph 2.22 of the DSR states that all outfalls have been modelled as fully surcharged up to the flood levels (assumed top of bank). This is not evidenced within the submitted models in Appendix F. It has been previously agreed that watercourse 2 need not be modelled with a surcharge as the outfall from the site is at the upstream head of the watercourse. However, the submitted modelling results for south 2 and the northern networks do not demonstrate that they have been run to assess the risk of their outfalls being surcharged.

If the site is unable to effectively drain under surcharged outfall conditions, then this will increase flood risk, adjusting the design to account for this may affect the scale and layout of the proposed development as extra storage may be needed.

Discrepancies between plans and modelling

A full comparison of all the plans against the submitted models in Appendix F has not been completed due to the anticipated changes to the design associated with the response to this consultation. However, a spot check of some levels and all the basins has been completed, and discrepancies have been identified. Most of these are insignificant and inconsequential.

However, there are consistent discrepancies between the levels plans and the cover levels on the drainage layouts and modelling which mean that water would overflow at a lower level than assumed. In the most extreme case, Basin 2 in the north of the site would overflow in the most extreme event with no freeboard at all. The consequences of this have not been modelled or described.

The maximum water level on South Detention Basin 2 is also described as significantly shallower on the plans than the model demonstrates (4.89m compared with 5.745m respectively). The same basin has a lower cover level on the levels plans than shown on the model and drainage layout. The cover level is described as 6.4m, however the levels plan show that water would be able to overflow

at a level of 6.0m. This is unlikely to affect the design as there is significant freeboard provided in the basin (see below).

The comparison between the models and the plans is appended to this consultation for reference.

Freeboard

Freeboard is the distance between the design water level and the threshold of a structure provided as a precautionary factor of safety. For all basins in the south of the site, with the exception of Basin 5, a significant freeboard is provided. Indeed, this may be reduced, but it is considered that the basin depths are as such to achieve a gravity solution rather than for the storage required in this area. Had shallow or open conveyance been provided upstream, there is a possibility that the basin depths and freeboard could be reduced, this would have an impact on layout.

In the north of the site, both basins have a much shallower freeboard provided. Basin 1 is modelled with a freeboard of 0.214m and the levels plan indicates that this would be reduced to 0.014m. Basin 2 is modelled with a freeboard of 0.314 but the levels plans indicate that this would overspill at a level of 4.1m (-0.08m freeboard). The designer has not commented on the implications of this reduced freeboard.

Buoyancy – Groundwater flood risk

To mitigate for the risk of buoyancy – groundwater forcing up the impermeable basin liner and reducing capacity – the designer has proposed a pozidrain collector pipe around the following basins:

- Detention basin 1 north – draining downstream of the outfall Hydrobrake SW293,
- Detention basin 2 north – draining into the SuDS system upstream of detention basin 1 and downstream of Hydrobrake SW289,
- All southern basins for south networks 1 and 2 – draining downstream of the Hydrobrake for the southern 2 network (SW520).

Insufficient information has been submitted to demonstrate that this strategy will not increase flood risk. The pozidrains will collect an unquantifiable volume of groundwater and discharge it unrestricted to nearby watercourses. These flows are not accounted for in terms of the allowable runoff from the site. The designer has not demonstrated that this volume of groundwater would naturally flow to these watercourses at this rate. If groundwater is discharged to the watercourses at a faster rate or in greater volumes than it would naturally, then this will increase flood risk.

The additional water within the drainage system may also have the effect of surcharging it beyond a level that has been modelled.

The use of the pozidrain within the SuDS system for detention basin 2 north, also means that an unquantifiable volume of groundwater will be introduced to the site's surface water drainage system, upstream of the outfall flow control. This will consume storage that is reserved for surface water which increases flood risk onsite.

If the buoyancy mitigation needs to be redesigned to ensure that flood risk is not increased this may affect the scale and layout of the development, particularly if the basins need to be reduced in depth (as they may increase in plan area).

STANDARD 4: WATER QUALITY

A brief water treatment assessment has been submitted within the DSR. This high-level assessment is inadequate. It misclassifies the attenuation storage (either detention basins or ponds) as bioretention systems. The assessment also includes the swales for the south of the site, despite these not serving that whole catchment. The swales also provide limited water treatment for the surface water flowing through the perforated pipe from other parts of the site beneath the surface. This is because surface water does not flow over the surface of the swale and infiltrate through the ground to the underdrain. It must be demonstrated that the swales are performing the water treatment function that they are intended for.

The water treatment assessment must be adjusted to accurately represent the water treatment that is provided for each sub-catchment of the site. There are multiple sub-catchments or mini-networks. Some pass through 3 detention basins and others only one, some use swales, others do not. Where there are sub-catchments which have the same water treatment and hazard indices, these may not be repeated but it must be demonstrated that all of the site is adequately treated without the layout being affected.

It is expected that both source and site control measures are provided.

STANDARD 5: AMENITY

The design provides above ground SuDS features that will deliver amenity benefit, however, these are provided immediately upstream of the outfalls rather than throughout the development. In the north of the site there are no open (ground level) conveyance features.

The depths of the water in the basins exceeds those recommended to manage health and safety risk. This may mean that amenity benefit is reduced.

Maximum depths (including permanent water levels) are 2.486m and 2.69m in the northern basins. The SuDS Manual indicates that where deeper and larger open water storage features are required, they should have a maximum depth of 1.5m and should not exceed 2m in the most extreme design event.

Both basin 4 and 5 in the south of the site also exceed 1.5m maximum water depth in an extreme event when the permanent water levels are accounted for (1.768m and 1.541 or 1.63m respectively).

The planning officer and designer are expected to consider the health and safety risk of the depths of the basins, in terms of increased risk, or the implications on amenity if barrier fencing is required. It is noted that The SuDS Manual dissuades the use of physical barriers to water as they can prevent or obstruct visual observance of the water body, and the provision of help in an emergency.

STANDARD 6: BIODIVERISTY

On a side-wide scale the SuDS design offers biodiversity benefits through the inclusion of permanently wetted areas and planting within the basins. The extent to how far this integrates with the biodiversity net gain requirements and the National Standards for SuDS should be assessed by the ecological consultee.

STANDARD 7: CONSTRUCTION, OPERATION, MAINTENANCE, DECOMISSIONING AND STRUCTURAL INTEGRITY

The National Standards for SuDS indicate that designers shall prioritise source control features to minimise large attenuation ponds at the downstream end of the system which have safety critical maintenance requirements. This design approach has not been followed, there is very little source control, and this results in large and deep basins as discussed above.

Management and maintenance of the system is assumed to be controlled via conditions already applied to the outline application with no obvious impact on scale or layout as proposed.

Phasing

A SuDS design principle is that where a development is phased, the design of the surface water drainage system should ensure that each of the SuDS standards are delivered for each phase. This has not been demonstrated on this site, nor is it clear at what stage of the planning process it should be assessed. As the basins are a fundamental element of the drainage strategy and form part of this planning application for reserved matters, it is discussed now but will need to be addressed in each application for reserved matters for each of the phases of development.

Initial assessment indicates that the basins will form part of the SuDS strategy for each phase, and therefore ultimately contribute towards many of the standards being met. However, attention is drawn to water quality and interception standards as outlined above, and it is highlighted that these will be assessed for each phase independently.

The designer is expected to provide a phased management plan (linked to condition 5) to demonstrate how the surface water drainage design will operate during each phase of construction. This should include detail on how flow control will be managed across the phases. No such plan has been submitted for the infrastructure phase, in which it is assumed that the discharge rates will reflect those for the full site, which may increase flood risk.

Ground Raising

There are significant alterations to the ground levels proposed as part of the delivery of the wider site and the surface water drainage design. The impact and extent of the ground level changes are not discussed within the DSR aside from to state in paragraph 2.12 that the proposed catchments take account of any land raising as part of the proposed scheme.

POLICY

The proposed layout appears to conflict with the following policies:

Local Plan Policy W SP1:

A: “Sustainable Drainage Systems reduces the creation and flow of surface water”

B: “reduces the risk to homes and places of work from flooding”

Local Plan Policy W DM2:

B: “without increasing flood risk elsewhere and reduce flood risk overall”

Local Plan Policy W DM3:

F: “Follow the hierarchy for preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SuDS manual produced by CIRIA.”

Ford Neighbourhood Plan Policy EH4

“ensure that the risk of flooding both on-site and downstream is not increased.”

NPPF Paragraph 181

“ensure that flood risk is not increased elsewhere”

NPPF Paragraph 182

“incorporate sustainable drainage systems to […] reduce volumes of runoff”

South 1

Basin	Source	Cover Level	Depth of Storage	Invert Level	Permenant Wetted Depth
South 1					
1 (Node 452)	Model	6.65	2.075	4.575	-
	D Plans	6.673	2.098	4.575	0.3
	L Plans	6.2	1.625	4.575	0.3
3 (Node 463)	Model	6.4	2.51	3.89	-
	D Plans	6.423	2.533	3.89	0
2 (Node 444)	Model	6.4	2.05	4.35	-
	D Plans	6.403	2.053	4.35	0.3
	L Plans	6	1.65	4.35	0.3
South 2					
5 (Node 519)	Model	5.75	2	3.75	-
	D Plans	5.75	2	3.75	0.3
	L Plans	5.35	1.6	3.75	0.3
4 (Node 513)	Model	6.15	1.975	4.175	-
	D Plans	6.2	2.025	4.175	0.3
	L Plans	5.8	1.625	4.175	0.3
North					
1 (Node 292)	Model	4.1	2.4	1.7	-
	Plans	4.186	2.486	1.7	0.3
	L Plans	3.9	2.2	1.7	0.3
2 (Node 288)	Model	6.8	2.7	4.1	-
	Plans	6.8	2.7	4.1	0.3
	L Plans	6.41	2.31	4.1	0.3

		Wetted Depth			
Total Depth	Max Water Level	2 year	30 year	100 year	Freeboard
2.075	5.748	0.609	0.88	1.173	0.902
2.398	5.743	-	-	1.468	0.93
1.925	5.743			1.468	0.457
2.51	5.019	0.602	0.902	1.129	1.381
2.533	4.936	-	-	1.046	1.487
2.05	5.745	0.832	1.102	1.395	0.655
2.053	4.89	-	-	0.84	1.513
1.65	4.89			0.84	1.11
2	5.218	0.952	1.221	1.468	0.532
2.3	5.218	-	-	1.768	0.532
1.9	5.218			1.768	0.132
1.975	5.505	0.562	0.861	1.33	0.645
2.325	5.416	-	-	1.541	0.784
1.925	5.416			1.541	0.384
2.4	3.886	1.325	1.684	2.186	0.214
2.786	3.886	-	-	2.486	0.3
2.5	3.886			2.486	0.014
2.7	6.486	1.076	1.694	2.386	0.314
3	6.49	-	-	2.69	0.31
2.61	6.49			2.69	-0.08

Ground Investigation Notes

IRM Drainage Strategy Report Appendix D1 - In 3 parts - RSK Geo-Environmental and Geotechnical Site Assessment November 2018

Information is sparse for the north of the site. The site investigations were completed in August 2018 therefore not representative of worst-case conditions. There is only one borehole for groundwater monitoring in the north of the site (BH6) and this was monitored on three occasions, not that those are recorded in the appendices, only in the body of the report. Groundwater was noted to peak at 5.368mbgl on 29/08/2018.

Four infiltration tests were completed in the north of the site, the results of the testing (Appendix I) were not submitted, however, these would not have been usable due to the date of testing. They also vary in depth from 2.1m bgl (S7) to 3m bgl (S8), which is likely to be too deep.

The report notes that due to the underlying chalk soakaways should be positioned 10m from structures. Some contamination found, particularly around old landfill.

IRM Drainage Strategy Report Appendix D2 - In 3 parts - RSK Infiltration Testing Investigation April 2020

Infiltration testing is all accepted, some are at depths that are too deep, but there is evidence that infiltration may be viable at several places across the site.

Groundwater monitoring undertaken between December 2019 and March 2020 is referred to but the report not submitted.

IRM Drainage Strategy Report Appendix D3 - In 7 parts - Omnia Winter Groundwater Monitoring May 2024

The groundwater monitoring is accepted. The dataloggers broadly correspond with the physical observations. However, there are instances where the deepest groundwater level is shallower than that observed physically.

The report refers to an RSK groundwater monitoring exercise, the report for which has not been submitted.

IRM Drainage Strategy Report Appendix D4 - Part 2 of 2 - Omnia Infiltration Factual Report December 2024

The infiltration testing in all cases was completed at 3m depth – too deep to correspond with the proposed depth of any potential infiltration feature, as 1m of unsaturated ground cannot be achieved to any peak recorded groundwater levels on the site. This testing must be disregarded.

The testing cannot be used to give an indication of infiltration potential.

IRM Drainage Strategy Report Appendix D5 - Infiltration Constraints Plan â?? North (Ardent Drg No. 2205773-1955)

The plan is convoluted and gives the impression of more valid testing than what has been demonstrated. The 2019-2020 RSK groundwater monitoring is not included, and several untested trial pits are included to demonstrate strata. Testing which cannot be used due to it's depth are included on the plan which makes it seem like infiltration is less likely to be viable.