Engineers Comments Regarding Surface Water Drainage

Application Reference:	F/15/24/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 permission F/4/20/OUT for phase RM1 (North), for the erection of 341 No. residential dwellings plus associated roads, infrastructure, parking, landscaping and 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 base of structures and the peak groundwater level.	**Insufficient**

	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.	**Sufficient** – if infiltration is not viable.

	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.	
	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. Appropriate easements to watercourses and other services must be shown on all plans.	**Insufficient**

	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.	**Insufficient**
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 National Standards for SuDS and The SuDS Manual.

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

- PHASE RM1 (NORTH) DRAINAGE TECHINCAL NOTE RM1_05.B DEC 2024. Referred to as the **DTN**.
- 12th March Ardent Additional Testing Data for IRM and RM1N
- DRAINAGE COMMENTS 13.11.24 & 19.7.2024
- Covering email with LLFA Drainage response 031224
- LLFA Response from Ardent 02/12/24
- 27th February Ardent Response to LLFA Comments - 2205771/VL/25-02-2025
- RM1 - DRAINAGE STRATEGY (SHEET 1) 2205771-140 REV B - (LINKS TO TECHINCAL NOTE RM1_05.B DEC 2024)
- RM1 - DRAINAGE STRATEGY (SHEET 2) 2205771-141 REV B - (LINKS TO TECHINCAL NOTE RM1_05.B DEC 2024)
- RM1 - IMPERMEABLE AREAS PLANS (SHEET 1) 2205771 - 220 REV A
- RM1 - IMPERMEABLE AREAS PLANS (SHEET 2) 2205771 - 221 REV A
- RM1 Site Sections Sheet 1 2205771-D180 Rev A
- RM1 Site Sections Sheet 22205771 D181 Rev A
- RM1 - LEVELS STRATEGY (SHEET 1) 2205771-D160 REV.C
- RM1 - LEVELS STRATEGY (SHEET 2) 2205771-D161 REV.C

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

Two ground investigations have been submitted to support this application. These provide the justification for the discounting of infiltration as a means of surface water disposal.

Only one set of infiltration tests meet the requirements set out in BRE DG 365 and The SuDS Manual; those in Appendix C of the DTN – 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 where infiltration at any depth can be fully ruled out due to high groundwater is in the extreme north of the site and in the vicinity of the most northerly proposed attenuation basin. There are areas in the rest of this part of the wider 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.

Groundwater Monitoring

Within this phase or parcel 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 within this parcel, 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 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. This phase 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 no indication of likely groundwater levels.

There are groundwater monitoring points in the locations of all open storage features (outside this application red line boundary but necessary for its drainage). 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 a watercourse on Ford Lane, without adequately investigating or justifying the non-viability of infiltration as a means of disposal. The applicant has evidenced infiltration potential without investigating it further.

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 groundwater level, the infiltration potential of the ground and the existing topography. On a site of this scale there are multiple sub-catchments which may 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 layout means that high density housing is proposed where infiltrating surface water drainage features may have been viable. If infiltration is prioritised as it should be in accordance with the hierarchy for sustainable drainage, then the layout of the development may need to be altered.

Runoff Disposal Locations – Existing Drainage Network

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 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. If connection to the network is truly not feasible, then a justification for this (relating to the current development proposal) should be submitted for assessment.

Disposal Locations – Achievability of Connection on Third Party Land

The applicant has not submitted information to identify the relevant landowner where watercourse 1 outfalls. However, the manhole that the site needs to connect into is 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 the proposed connection 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.

The supporting documents do not demonstrate or discuss how the design meets interception drainage requirements. 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 (that serves this parcel) the contributing area is modelled as 23.378ha, the impermeable area plans indicate that 5.593ha of that total originates in this parcel. An initial estimate of the required area of flat vegetated surface that surface water must pass over or be stored within would be 20% of the total contributing area, in this instance 4.6756ha or 46,756m^2. The modelling for this catchment in Appendix E of the DTN shows that the maximum plan areas of the two basins combined for this catchment are 17,478.3m^2. This is 29,278m^2 less than the minimum requirement. Therefore, it is demonstrated that over the sub-catchment there are insufficient vegetated surfaces to provide interception in the basins alone. The additional vegetated surfaces or other means of providing interception drainage are likely to be designed into the upstream parcels.

The total contributing area for this parcel and the downstream basins is 7.3408ha. This will need 1.4682ha of flat vegetated surface for water to flow over to achieve the required interception drainage. In this high-level assessment, the requirement could theoretically be achieved by the basins. 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.

Assuming that the basins' interception potential is almost entirely consumed by this parcel then a significant plan area of interception features (approximately 29,000m^2) will need to be designed into other upstream parcels. As this has not been discussed in the DTN it is unclear if this is proposed and whether it will affect the viability of other phases. It is suggested that the National Standards for SuDS are considered for each phase and interception provided at source within this one – see phasing below.

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.

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 model does not include the contributing areas of the basins themselves, and it is unclear what the contributing areas are assumed to be from later phases. The impermeable area plans do not differentiate by node to reflect the calculations and are therefore nearly impossible to accurately check.

There is insufficient detail submitted to ensure that the correct, or most cautious estimate of contributing areas have been modelled.

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 2.10 of the DTN 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 E. The submitted modelling results 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

It is not possible to provide a direct comparison of the plans against the submitted models in Appendix E as the plans do not contain any detail which would allow comparison. Nodes are not labelled and levels are not provided. It is expected that enough detail is shown on the plans to allow them to be checked against their supporting modelling.

STANDARD 4: WATER QUALITY

No water treatment assessment has been submitted within the DTN. This is inadequate, water quality is one of the four pillars of SuDS design and one of the 7 National Standards for SuDS.

A water treatment assessment must be completed to accurately represent the water treatment that is provided for each sub-catchment of the site.

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

STANDARD 5: AMENITY

The site-wide design provides above ground SuDS features that will deliver amenity benefit, however, these are provided immediately upstream of the outfalls (outside this red line boundary) rather than throughout the development. In this parcel there are no open (ground level) conveyance or storage features.

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.

In this parcel there are no open (ground level) conveyance or storage features, nor any other drainage feature which provides biodiversity benefits.

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 affect 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.

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.

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 this 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 site and the surface water drainage design. The impact and extent of the ground level changes are not discussed within the DTN.

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"

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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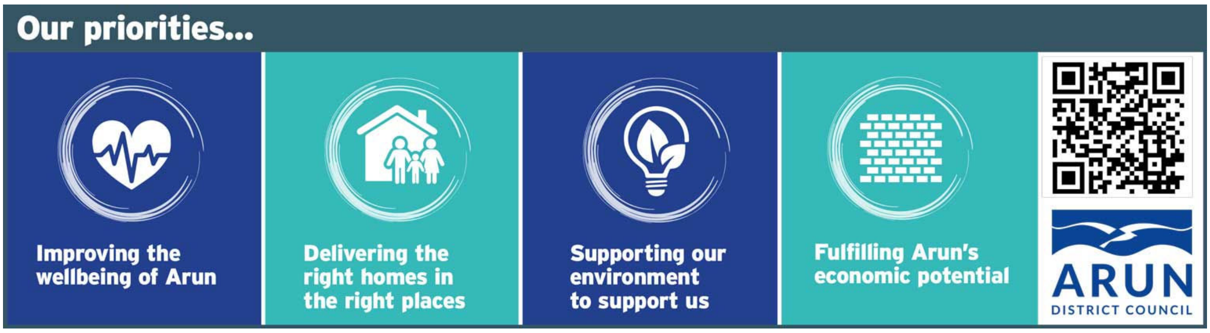

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Subject: F/15/24/RES - Ford Airfield RM1 ADC Drainage Consultation 2

Hi Jessica,

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

Kind regards

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