

Engineers Comments Regarding Surface Water Drainage

Application Reference:	F/16/24/RES	Reviewer Reference:	ADC/SB
Planning Officer:	Jessica Riches	Date of Review:	13/05/2025
Site Name:	Land at Ford Airfield Ford		
Application Description:	Approval of reserved matters following outline permission F/4/20/OUT for phase reserved matters 4 (south), for the erection of 357 No. residential dwellings plus associated roads, infrastructure, parking, landscaping, open space & play areas 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 – Further information required.
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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.

Items are further elaborated upon in the attached comment tracker where necessary.

Further comments which are unlikely to impact the design methodology will be provided in the comment tracker, these relate to the detailed design. Unless clearly stated, it is considered that these additional comments are unlikely to result in a redesign of the system. These can be addressed following a second consultation to prevent unnecessary refusals.

Critical Item	Reason	Status
Winter groundwater monitoring data.	<p>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.</p> <p>The same data is necessary to ensure that the potential for buoyancy has been adequately considered in attenuation designs.</p>	Compliant
Winter infiltration testing data.	<p>Adequate winter infiltration testing must be supplied to justify the proposed discharge method and design infiltration rates.</p> <p>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.</p> <p>Designs must be based upon the <u>slowest</u> infiltration rate evidenced closest to a proposed infiltration feature. Average design rates will not be accepted.</p> <p>The results of incomplete tests should not be extrapolated to obtain design values for infiltration rates.</p>	Compliant
The hierarchy for sustainable drainage.	<p>The proposed discharge method must accord with the SuDS hierarchy as given below. Evidence must be supplied to justify the proposed discharge method.</p> <ol style="list-style-type: none"> 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. <p>A water body may be defined as a river, watercourse, ditch, culverted watercourse, reservoir, wetland or the sea.</p>	Compliant

	Engineers cannot support any proposed connection of surface water to the foul sewer.	
Calculations	<p>Calculations for pre-development run off rates must be based upon the positively drained area only.</p> <p>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.</p>	Insufficient justification
	<p>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.</p>	Compliant
	<p>Designs must use the correct climate change allowances at the time of determination of the outline or full planning application.</p> <p>CV values for all events must be set to 1. This includes summer, winter, design, and simulation events.</p> <p>The correct allowance for urban creep must be applied.</p> <p>Additional storage must be set to zero unless it can be evidenced where this is provided.</p> <p>Infiltration half-drain times must be less than 24 hours.</p> <p>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.</p> <p>A surcharged outfall must be modelled.</p>	Insufficient
Natural catchments design.	<p>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.</p> <p>The condition, performance (including capacity where appropriate) and ownership of any</p>	Insufficient

	<p>existing site surface water drainage infrastructure must be accurately reported.</p> <p>Appropriate easements to watercourses and other services must be shown on all plans.</p> <p>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.</p> <p>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.</p> <p>The use of pumps for surface water drainage is not sustainable and will not be supported.</p>	
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.	Compliant
Trees and planting	<p>There should be no conflict between surface water drainage infrastructure and existing or proposed trees or planting.</p> <p>The design must consider the potential growth of proposed trees and adequate mitigation must be provided to protect drainage infrastructure where conflict <u>cannot</u> be avoided.</p>	Insufficient

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 173 and 180e). 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 and plans have been assessed to inform this consultation:

- Drainage Technical Note. Report ref: 2205771-R18-C, dated 22/08/2024 (split into five parts for this submission). Referred to as the **Technical Note**.
- Drainage Strategy Addendum (Arun District Comments). Report ref: 2205771-R29, dated 18/02/2025. Referred to as the **DS Addendum**.
- 2205771-222 Rev A - RM4 – Impermeable Areas Plan (Sheet 1)
- 2205771-223 Rev A - RM4 – Impermeable Areas Plan (Sheet 2)
- 2205771-162 Rev B – RM4 – Levels Strategy (Sheet 1 of 2)
- 2205771-163 Rev B – RM4 – Levels Strategy (Sheet 2 of 2)
- 24053-16 - RM4 – Tree Protection
- 2205771-D190 Rev A – RM4 – Site Sections (Sheet 1). Referred to as **Site Sections 1**.
- 2205771-D191 Rev A – RM4 – Site Sections (Sheet 2). Referred to as **Site Sections 2**.
- TOR-RM4-XX-DR-L-P-012 Rev B – Softworks 1 of 10
- TOR-RM4-XX-DR-L-P-013 Rev B – Softworks 2 of 10
- TOR-RM4-XX-DR-L-P-014 Rev B – Softworks 3 of 10
- TOR-RM4-XX-DR-L-P-015 Rev B – Softworks 4 of 10
- TOR-RM4-XX-DR-L-P-016 Rev B – Softworks 5 of 10
- TOR-RM4-XX-DR-L-P-017 Rev B – Softworks 6 of 10
- TOR-RM4-XX-DR-L-P-018 Rev B – Softworks 7 of 10
- TOR-RM4-XX-DR-L-P-019 Rev B – Softworks 8 of 10
- TOR-RM4-XX-DR-L-P-020 Rev B – Softworks 9 of 10
- TOR-RM4-XX-DR-L-P-021 Rev B – Softworks 10 of 10
- 2205771-D020 Rev H - Sitewide Indicative Surface Water Drainage Strategy. Referred to as **ISW Plan [H]**. Assumed superseded but not shown as such on the portal.
- 2205771-142 Rev B – RM4 - Drainage Strategy (Sheet 1). Referred to as **Drainage Layout 1 [B]**. Assumed superseded but not shown as such on the portal. Assumed superseded but not shown as such on the portal. Also contained within Technical Note. Report Ref: 2205771-R18-C.
- 2205771-143 Rev A – RM4 - Drainage Strategy (Sheet 2) – Referred to as **Drainage Layout 2 [B]**. Assumed superseded but not shown as such on the portal. Also contained within Technical Note. Report Ref: 2205771-R18-C.

Within the Technical Note, the following plans are contained and referred to as follows:

- Winter GW Monitoring Report. Reference: A11918-3/220326/L1, dated March 2024. Referred to as the **Omnia Report**.
- 2205771-142 Rev B – RM4 - Drainage Strategy (Sheet 1) – Appendix D (part 4 on the portal). Referred to as **Drainage Layout 1 [B]**. Assumed superseded but not shown as such on the portal.
- 2205771-143 Rev B – RM4 - Drainage Strategy (Sheet 2) – Appendix D (part 4 on the portal). Referred to as **Drainage Layout 2 [B]**. Assumed superseded but not shown as such on the portal.
- 2205773-SK003 – Groundwater Monitoring and Infiltration Testing Results. Referred to as the **Site Investigation Plan**.
- Network modelling dated 12/12/2024 & 13/12/2024.
- Network modelling dated 11/11/2024. Assumed superseded but not shown as such on the portal.

Within the DS Addendum, the following plans are contained and referred to as follows:

- 2205771-250 – Pre-development Drainage Catchments Plan. Referred to as the **Catchments Plan**.
- Greenfield runoff rate estimations for sites
- 2205771-D020 Rev I - Sitewide Indicative Surface Water Drainage Strategy. Referred to as **ISW Plan [I]**. Assumed to supersede revision H listed above.
- 2205771-142 Rev C – RM4 - Drainage Strategy (Sheet 1). Referred to as **Drainage Layout 1 [C]**. Assumed to supersede revision B listed above.
- 2205771-143 Rev C – RM4 - Drainage Strategy (Sheet 2). Referred to as **Drainage Layout 2 [C]**. Assumed to supersede revision B listed above.

Existing watercourses are referred to as follows:

- Watercourse 1: The watercourse on the opposite side of Ford Lane adjacent to Wicks Farm as shown on Inset 1 on the ISW Plan.
- Watercourse 2: The watercourse opposite the site entrance on Yapton Road as shown on Inset 2 on the ISW Plan.
- Watercourse 3: The watercourse opposite Horsemere Green Lane as shown on Inset 3 on the ISW Plan.
- ExAF Network – The existing Airfield Drainage Network. Not shown on plans.

The following document has not been submitted but has been referred to by the designer. The applicant is reminded that all documents that are necessary to support the assessment of an application must be submitted and uploaded to that application:

- Technical Note. Reference C85228-JNP-92-XX-RP-C-1004, dated 09/07/2021. Submitted as an additional document for application reference F/4/20/OUT and uploaded to that application on 15/07/2021. Referred to as the **Outline Technical Note**.

Summary

Inadequate information has been submitted to overcome the previous objection relating to the surface water drainage of this phase. The submission is fragmented, documentation is missing or submitted under historic applications, and plans are contradictory.

Disposal locations on third party land have not been adequately confirmed in terms of permissions and there is insufficient investigation into the existing drainage [ExAF] network on the site.

All information that is required to assess this application for surface water drainage, should be submitted together to support it. This is to ensure that consultations and subsequent decision making is transparent.

Full comments follow this summary, however, the planning officer and applicant are guided to the following administrative suggestions to ensure clarity and transparency:

1. Supersede the DS Addendum and Technical Note and all associated appendices.
2. Submit a substitute SW Technical Note, this must include any previously acceptable and current information from the DS Addendum and the Technical Note, plus the following;

Content

- a. Robust justification for the use/abandonment of the existing airfield drainage network including;
 - i. clarification of the ownership of the network,
 - ii. clarification of any legal right of protection or maintenance of the network,
 - iii. consideration of the implication on flood risk,
 - iv. reference to surveys (appended see below),
 - v. evidence of adoption standards and communication with adopting body,
 - vi. clarification as to whether adoption of the onsite drainage network is necessary, and;
 - vii. clarification as to whether adoption of the offsite drainage network would be necessary.
- b. Justification for the proposed discharge rates, this must include;
 - i. reference to the inputs,
 - ii. reference to the contributing areas and how they are derived.
- c. Demonstrate third party permission for the wider site connection to the culverted watercourse on third party land, or;

Demonstrate that an alternative sustainable drainage solution can be achieved if permission is later withheld.
- d. Justification for the proposed pipe gradients beneath the swales, including supporting guidance.
- e. Updated assessment of water treatment for each sub-catchment.
- f. Assessment of interception drainage for each sub-catchment.
- g. Assessment of ground raising impact.
- h. Specification of how drainage infrastructure will be protected from proposed tree roots.

Appendices

- i. Full reports of ground investigations completed within this phase.
- j. All original survey and CCTV reports for the existing drainage infrastructure on the site and downstream ExAF drainage.
- k. Greenfield runoff rate calculations.
- l. Latest network modelling for the two networks that discharge to watercourse 2 and 3. This must correspond with the drainage layouts, contributing area plans, and proposed runoff rate calculations/justification.

3. Submit all plans separate to the substitute Technical Note – refer to them within the technical note by plan number.

- a. Existing topographical survey – noted as submitted previously on the outline application but not here.
- b. Contributing area plans, these must ideally be demarcated to correspond with the network models (as previously requested).
- c. Drainage layouts (latest revisions)
 - i. 2205771-142 – RM4 - Drainage Strategy (Sheet 1).
 - ii. 2205771-143 – RM4 - Drainage Strategy (Sheet 2).
 - iii. 2205771-136 – IRM Drainage Strategy (Sheet 7).
 - iv. 2205771-134 – IRM Drainage Strategy (Sheet 5).

- d. 2205771-250 – Pre-development Drainage Catchments Plan. (Latest revision).
- e. 2205771-D020 – Sitewide Indicative Surface Water Drainage Strategy. (Latest revision).
- f. 2205773-SK003 – Groundwater Monitoring and Infiltration Testing Results. (Latest revision).
- g. Any other updated levels strategies, site sections or supplementary plans that are needed to aid assessment.

4. Submit the FEH 22 point data files for this parcel, in accordance with clause 5.1.7 of the FEH Web Service terms of use (<https://fehweb.ceh.ac.uk/Home/Terms>). These must be submitted directly to land.drainage@arun.gov.uk rather than to the planning portal (via the planning officer), this is to ensure that the data remains confidential in accordance with those terms.

Ground Investigations and Hierarchy

This parcel has sufficient groundwater monitoring observations to evidence that groundwater levels will be too high across the parcel to achieve 1m of unsaturated ground between the base of any infiltrating structure and groundwater. We therefore agree that infiltration will not be possible in this parcel. We support the proposed overarching strategy of water reuse with water butts, and then storing surface water before discharging at a restricted rate to an appropriate receiving waterbody.

However, further information is required about the strata evidenced in the boreholes. This is necessary to assess the QBAR calculations once submitted - see below. This information is noted to be included in Attachment III to the Omnia Letter (Appendix C of the technical note) but has not been included in this submission.

Disposal locations – Existing Network

The designer has not adequately addressed the comments relating to the existing surface water drainage network on the site. Insufficient information has been submitted regarding the existing site, its current drainage arrangements and natural catchments to determine if the proposed discharge locations and rates will not increase flood risk.

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

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.

In addition, our Local Plan Policy W DM3 states that SuDS must: *“e. Retain the existing drainage network of the site and the wider area”*.

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

The DS Addendum refers to survey work which was summarised in the Outline Technical Note. This technical note has not been submitted and nor does it adequately address the previous objection comments. 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 its right to protection. If it has a right to protection or maintenance in any deeds or other legal agreements, then these must be honoured.

The DS Addendum 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].

The following reasons have been offered to explain why connecting to the network is not 'feasible':

- It is private sewer and is [sic] not been regularly maintained
- The asset is approximately 80 years old
- Buildings have been constructed over the sewer which could prevent a sewer requisition agreement
- It is extremely unlikely any of the building owners would consent to build over agreements retrospectively.
- The specification [and gradient] of the sewer is [sic] does not meet current adoptable standards
- There are incoming sewers from other existing premises further downstream. Existing incoming flows are not regulated.

At the time of the outline application the developer was investigating adoption of the surface water drainage network of the site by Southern Water Services [SWS]. The bullet points above are specifically referenced as reasons why the offsite sewer should not be used as, 'this is a private sewer and might prevent Southern Water adopting the onsite surface water drainage infrastructure' [our emphasis]. Since the Outline Technical Note, the adoption proposals for the site have changed and therefore these comments may not applicable.

The Technical Note states that the 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 referred to.

It is unclear if adoption of the offsite private network is necessary. Due to the lack of clarity regarding ownership it is also unclear if permission to connect would be required, although this is considered unlikely. The questions regarding maintenance, age and downstream connections are no different to those that would apply to any other connection to an existing watercourse or sewer and are therefore likely moot.

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 layout.

Disposal Locations – Achievability of Connection on Third Party Land

The surface water drainage for this parcel relies on connection to basins outside of this Reserved Matters application. These basins connect to watercourses 2 and 3, they are both located 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 now submitted evidence of an excerpt of the land sale agreement, apparently 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:

- Northern part of RM4 (this parcel),
- Residential RM5,
- Part of southern infrastructure (IRM),
- 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 and there is therefore a risk that the applicant may not have permission for that connection. It is unclear how the applicant will drain the north of this parcel 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.

Although the outfalls from watercourses 1 and 3 appear to be on land that does not have a title, the manholes that the site need to connect into are both on adopted highway land. 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.

Disposal Locations – Impermeable area plans and modelled contributing areas

Without an accurate understanding of the contributing areas to the drainage system it is not possible to determine if flood risk will be increased because of the development, or whether the scale and layout of the development may later be affected by changes to the SuDS system for the site.

The calculations do not include any reference to the contributing area inputs. Therefore, it is not possible to check if the appropriate contributing areas have been modelled to ensure that flood risk is not increased.

The impermeable area plan differentiates contributing areas by type; driveways or roofs for example. It is understood why residential roofs may be distinguished - as these have an allowance for urban creep applied to them – however, the other types need not be categorised. The contributing area plan should support the calculations (once updated). Therefore, it would make more sense for the areas within different catchments and sub-catchments to be delineated to coordinate with the inputs in the calculations.

It is not clear if the contributing areas for the basins have been allowed for. They are not shown on the impermeable area plans.

It is imperative that the contributing areas are accurately modelled for each phase to ensure that both the discharge rates and the volume of storage is adequate. Where the scale and layout of an unsubmitted phase is unknown, it is expected that a cautious estimate is used. This would involve overestimating the contributing areas for volume of surface water, and underestimating them for the discharge rates. Ultimately each phase of the development should accurately evidence its contributing areas. If there is insufficient spare capacity in the wider system, this may need to be provided upstream within the phase.

Proposed Discharge Rates

QBAR is quoted as being 2.42 l/s/ha in section 2.9 of the drainage technical note. The greenfield runoff rate calculations have now been submitted. We request that the FEH22 point data for this part of the site is submitted (see above). This is to ensure that the correct BFI Host input is being used. Initial checks indicate that it is likely that a point from the north of the site was used to generate the greenfield runoff rate, this means that the greenfield runoff rate (per hectare) may be lower than suggested.

Further scrutiny is required to understand the methodology behind the proposed discharge rates. On initial inspection they seem to be a dramatic reduction compared to the greenfield runoff rate, and may yet be acceptable, but it is unclear how the rates were derived. We query this because of the sensitivity of the downstream receptors.

Network Model

The network model (dated 12 and 13/12/2024) needs to be revised to meet our requirements and ensure that flood risk is not increased. CV values must be set to 1 for the 1% Annual Exceedance Probability [AEP] event (as per the 3.33% and 1% events). The correct climate change allowance must be applied to the 3.33% AEP event.

It is unclear why best practice design rules have not been checked on the design settings on Southern Infra 1 (to outfall and watercourse 2). It is likely that this is linked to the gradients of the perforated pipes – see below – but clarification is required.

The allowance for additional storage in the network has been increased from the standard 20m³/ha to 35m³/ha. It is unclear if this capacity is provided, if it is not then flood risk may be increased due to the artificial additional storage provided within the model.

Half drain times for the system do not appear to have been checked.

The assessment of the model relies upon comparison with drainage layouts that have not been submitted to support this application. Detailed network modelling of this parcel has not been submitted and may not be necessary at this stage of the planning process, however, the high-level model and its related plans must be submitted to ensure that they correlate with the contributing areas and levels.

These have been briefly checked and do not appear to correlate exactly with the submitted models. Invert levels for the following nodes are all incorrect:

- 504 (Infra 2)
- 518 (Infra 2)
- 508 (Infra 2)
- 515 (Infra 2)
- 451 (Infra 1)
- 454 (Infra 1)
- 446 (Infra 1)
- 448 (Infra 1)
- 278 Headwall 1 (Infra 1)

In addition, the invert levels of the headwalls are lower than the base levels of the two basins in Southern Infra 1. Three of those invert levels are also below the bottom of the stay wet level. They are therefore shown discharging into, and out of the ground, below the impermeable liner. The layout and model must be adjusted to accurately represent the design and each other.

The invert levels of the headwalls into Detention Basin 1 are set 10mm above the base level which is likely to be insufficient freeboard to reduce the risk of siltation and blockage.

Please submit:

- 2205771-136 IRM Drainage Strategy (Sheet 7) – latest revision
- 2205771-134 IRM Drainage Strategy (Sheet 5) – latest revision

Gradients

Drainage Layouts 1 and 2 [C] show that the 150mm diameter perforated pipes that convey surface water beneath the swales are laid at gradients that will not achieve self-cleansing velocities. These pipes are the primary conveyance system for the upstream network, as the swale surface only serves itself. If self-cleansing velocity is not achieved, then flood risk may be increased due to increased risk of blockage.

The designer is asked to justify the suggested gradients, with supporting guidance, to ensure that the proposed design will not increase flood risk. If a satisfactory gravity solution is not possible then ground levels may need to be artificially raised. Pumping surface water is not sustainable and should only be considered when it is demonstrated that they are a last resort, this would include demonstrating that an alternative layout would not avoid their use. Therefore, it is important to ensure that a suitable gravity solution can be achieved prior to the determination of the scale or layout of the development.

Water Treatment

A brief water treatment assessment has been submitted with the DS Addendum. 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 site as a whole, despite these not serving the whole development. They also provide limited water treatment for the surface water flowing through the perforated pipe from other parts of the site beneath the surface.

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 9 sub-catchments or mini-networks, 6 of these do not include any swales. Some pass through 2 detention basins and others only one. Where there are sub-catchments which have the same water treatment and hazard indices, these may not be repeated if it is clear which sub-catchments the assessment relates to. A plan would assist in this regard.

If the design requires modification to ensure water treatment at source, then this may affect the layout or landscaping. Water quality is one of the four pillars of sustainable drainage design. The design must support the management of water quality in receiving surface waters. This involves:

- Preventing runoff from the site to receiving surface waters for the majority of small rainfall events.
- Treating runoff to prevent negative impacts on the receiving water quality.

The SuDS Manual, Section 4.3.

Ground Raising

The designer has provided no further commentary relating to the previous comments about ground raising. Substitute site section and level plans have been submitted. These remove reference to road numbers and give 5 representative sections through the site. The plans show that there is significant land raising (around 1m) in the southeast of the parcel. The Levels Strategies indicate that there will be land raising elsewhere on the site which is not illustrated by the submitted sections. For example, south of plot 146, the proposed levels are 0.705m higher than the existing level of 6.87mAOD. It is unclear how this land raising will affect the drainage strategy or the natural drainage catchments. There is no mention of land raising in the DS Addendum or the Technical Note.

The planning officer should note the proposed levels and any impact these may have on other considerations prior to determination.

Landscaping conflicts

The landscaping has been adjusted to show that trees which were previously within swales are now outside of the swale extents and within small adjacent strips of landscaping. The DS Addendum does not explain how the lined drainage infrastructure will be protected from damage by tree roots. This is important as if the drainage is not protected, roots will damage the liners and may allow groundwater ingress. This is not allowed for in the design. If groundwater can enter the system, its volume is unquantifiable and will consume capacity that is reserved for surface water storage. By extension this is likely to increase flood risk.

It is assumed that this objection comment will be easily overcome with respect of surface water drainage – by specifying protection measures. However, the landscaping officer must be consulted to ensure that any specified drainage protection will not inhibit the expected growth of the proposed trees.

Biodiversity, Amenity and Interception Drainage

In our last consultation we stated that it was expected that the designer evidenced how interception drainage is provided on the site.

Interception can be defined as the capture and retention on site of the first 5mm (or other specified depth) of the majority of all rainfall events.

The SuDS Manual offers design criteria and standards. The **standards should be met in full**, unless there are local or national standards that take precedence. In this instance there are not.

Two of the 8 parts of the standards relate to the provision of interception:

“Water Quantity Design Standard 1a): Volume control for frequent rainfall events

The drainage system should be designed so that runoff from the site to receiving surface waters does not occur for the majority of small rainfall events.”

and

“Water Quality Design Standard 1: Prevent runoff from the site to receiving surface waters for the majority of small rainfall events.”

The manual explains that interception is required as under greenfield conditions a site will not usually produce any runoff for small rainfall events. Therefore, if a site is allowed to discharge for frequent rainfall events, when it previously would not have done, this will increase flood risk.

“Interception can be delivered by using one or a combination of processes:

- *rainwater harvesting*
- *infiltration*
- *evapotranspiration using temporary shallow ponding or storage within the soil or upper aggregate layers.”*

No formal assessment of how the site is delivering interception has been submitted by the appellant.

Infiltration is not viable on this site so may not be used.

In the case of rainwater harvesting systems, these can be assumed to provide interception when they are “*designed for supply purposes (ie it has a regular daily demand)*”. The designer has proposed rainwater butts for water reuse, however, these do not appear to be designed for water supply purposes. It is assumed therefore that these will not provide adequate interception drainage as there is a risk that the water butts will not provide this function for the lifetime of the development (as they may not be used or emptied).

Where a site uses evapotranspiration only to deliver interception (as here), a simple approach may be used to calculate compliance. A ratio of 1:4 for the vegetated surface area to contributing

impermeable area may be used. An allowance may be applied where a feature has side slopes to account for the effective wetted area. This is dependent upon 250mm depth of soil with at least 20% voids beneath the vegetated surface.

Lined permeable paving (if proposed – it is not) would be compliant to serve itself (rain falling on its own surface), but not additional areas which discharge to it.

The swales will only provide interception for the rain that falls on their surface as they do not convey water from the rest of the site over their surface. Instead, water is conveyed via perforated pipes beneath the surface. This means that water from other parts of the site would only receive the interception benefits of the swales if the system surcharged and water rose above the surface of the swale as it backed up.

When interception drainage is appropriately assessed and considered by the designer, there is a risk that the scale and layout of the proposed development will need to be altered. This may be necessary to accommodate additional vegetated surface as part of the drainage system to achieve compliance. It is understood that the interception assessment will have to include the basins that form part of the infrastructure reserved matter application [F/14/24/RES].

The inclusion of further vegetated surface to achieve the water quantity and water quality standards prescribed by The SuDS Manual has the dual benefit of providing biodiversity and amenity benefit. It is assumed that the design will be assessed by the ecology consultee regarding the biodiversity benefits that are provided.

Flood Risk

The Flood Risk Assessment [FRA] for the site has not been submitted. It is acknowledged that the FRA is unlikely to affect the surface water drainage design. However, there may be details in the document that answer some of the points raised above. It is also important to consider all sources of flood risk and how these may influence the development of the layout and drainage strategy.

Overcoming our objection

If the planning officer is minded to allow the applicant additional time to submit further documents to support this application, then further evidence may overcome our objection. Please do not submit further documents without prior discussion with the planning officer as to whether it will be possible for these to be assessed or influence their determination.

A reduced site-specific version of our full surface water drainage design checklist is provided below. This has been edited to remove elements that are not applicable to this site, either due to the scale of the proposal or the method of disposal. The checklist is provided to assist the applicant and designer in preparing a revised design to meet our requirements. It is applicable to Ford Airfield RM4 only.

Items highlighted should be submitted prior to determination of this application to overcome our objection.

The full unedited surface water design checklist is available on our website at <https://www.arun.gov.uk/surfacewater/>. If the design is amended following receipt of our

consultation the designer may need to refer to the full checklist to ensure that the revised design meets our requirements.

Ford Airfield RM4 Designer Checklist

Ground Investigation Results

Comment: Items highlighted should be submitted prior to determination of this application to overcome our objection.

Groundwater monitoring

- Plan showing location of monitoring points provided.
- Depths of holes detailed.
- Dates of observations and depth to groundwater recorded.
- Evidence of the strata within borehole or monitoring pits provided.

Requested to aid speed of assessment

- Plan showing the peak groundwater levels at each monitoring point in mAOD.
- Peak groundwater levels recorded in metres below ground level and mAOD.

Infiltration testing

Not required due to high groundwater.

Surface Water Drainage Statement

Comment: Items highlighted should be submitted prior to determination of this application to overcome our objection.

Where information has been partially submitted, the missing information has been highlighted in **bold**.

Disposal method (Select as appropriate)

- Rainwater reuse is proposed where possible.
- ~~Infiltration is proposed and maximised wherever possible.~~
- Restricted discharge to a water body is proposed where a full infiltration design is not possible.
- Restricted discharge to a public or private highway drainage network is proposed where a full infiltration design is not possible and there are no nearby water bodies or surface water sewers.

Disposal method justification

- Infiltration has been adequately investigated, in winter, at appropriate and varying depths where appropriate, above peak recorded winter groundwater levels at the given location.
- Onsite and boundary, open and culverted water bodies are investigated (**location, mapping, network, flow direction, ownership/responsibility, depth, and condition**).
- Offsite nearby downstream water bodies are investigated (location, mapping, network, flow direction, **ownership/responsibility, depth, and condition**).
- Any relevant permissions or legal agreements from asset or landowners that are needed are identified and evidence of consents provided.

Requested to aid speed of assessment

- Any previous relevant correspondence or pre-application advice from the **Local Planning Authority [LPA]** or the Lead Local Flood Authority [LLFA] regarding the surface water drainage design is included with the statement.

Existing Site

Essential

- It is clear what the **natural** drainage characteristics of the site and hydraulically linked areas are.
- Natural flow paths are identified on a plan (where applicable).
- Existing site drainage features are investigated – condition, performance, and ownership.
- Any appropriate easements to watercourses or other infrastructure are investigated.
- Existing and future flood risk from any source is detailed.

It is suggested that the above is achieved with the following, which may be combined where appropriate:

- An existing topographical plan. **On ISW Plan**
- An existing drainage catchment plan.
- An existing site surface water drainage plan (where applicable).
- Flood maps (fluvial, tidal, pluvial, groundwater, sewer, and reservoir) are supplied (or Flood Risk Assessment referred to).
- Confirmation and surveys of any existing drainage infrastructure on the site.
- Full details of any known flooding on the site.

Proposed Design

Essential

- Statement confirming the proposed design criteria including fixed design calculation inputs for the SuDS system. Examples include:

- Climate change allowances,
- Urban creep allowance,
- CV values,
- Rainfall data,
- MADD factor or additional storage.

- Natural catchments are followed.
- Where phased construction is proposed, the phases correspond to natural catchments and can function independently from each other.
- The design is gravity based with no use of pumps.
- Natural systems that deliver specific hydrological function, such as watercourses or wetlands, are preserved.
- Where there is existing drainage infrastructure on the site it is clearly explained or illustrated what is being retained, upgraded, or removed.
- Details of necessary off-site works and consents are provided. **Consents only for RES.**
- ~~If the surface water drainage is designed to flood in the 1% Annual Exceedance Probability [AEP] + Climate Change Allowance [CCA] event, then the flood volume is contained safely on site without flooding any part of a building or utility plant susceptible to water or affecting safe access or egress.~~
- The design provides and evidences interception drainage and is able to capture and retain on site the first 5mm of the majority of all rainfall events.
- Water quality and treatment is adequately assessed – with an assessment appropriate for the scale and proposed use of the site.
- Adequate freeboard is provided between the top water level of any open storage features and the top of the bank.
- There are no clashes with other infrastructure.
- Self-cleansing velocities are achieved where pipes are proposed.
- The proposed discharge rate is explained and justified (for attenuation designs).

- Where there is a risk that the base of an attenuation feature may penetrate peak groundwater levels, additional mitigation measures to prevent groundwater ingress are incorporated into the design and construction method statement.
- Where there is a risk that the base of an attenuation feature may penetrate peak groundwater levels the effects of buoyancy have been considered in the design.
- Amenity benefits are provided by the drainage system (assessed by others).
- Biodiversity benefits are provided by the drainage system (assessed by others).
- Landscaping has been designed to ensure ease of maintenance of drainage assets.
- The justification and criteria for tree root avoidance and mitigation measures is clear, referencing adopting body standards where applicable.
- Biodiversity and ecological enhancements do not impede the functionality, maintenance or capacity of the drainage system.
- It is confirmed what elements of the SuDS will be private.
- It is confirmed what the adoption arrangements for SuDS components will be.
- A construction method statement for the SuDS system, appropriate to the scale of the development, is submitted.
- A maintenance plan for the SuDS system, appropriate to the scale of the development, is submitted. [Please refer to our SuDS Maintenance Checklist where this is stipulated by condition.]
- Any potential health and safety issues relating to SuDS implementation and management have been considered and managed.

Preferred

- Ground raising is avoided where possible.
- The drainage system is considered by and contributes to the biodiversity net gain statement (assessed by others).

Impermeable Area/Catchment Plan

Comment: Items highlighted should be submitted prior to determination of this application to overcome our objection.

Catchments and sub-catchments need to be demarcated. If the wider phase (RM4) is likely to be constructed in sub-phases, these should be shown on a plan and tie in with the sub-catchments.

Essential

- Different drainage catchments are demarcated.
- Where phased construction is proposed, each phase is shown on a plan. **Will there be phasing within this parcel?**
- An impermeable area plan is provided showing all positively drained areas including open surface water storage plan areas.

Preferred

- Impermeable areas are shown in m² on the impermeable areas plan(s).
- Demarcated impermeable areas correspond with the distribution of those areas in the supporting calculations.

Surface Water Drainage Calculations

Comment: Items highlighted should be submitted prior to determination of this application to overcome our objection.

General

- The most recently applicable, or previously agreed FEH rainfall data is used.
- CV values for all events are set to 1. This includes summer, winter, design, and simulation events.
- The correct climate change allowances, appropriate for the full lifetime of the development, have been applied to all calculations.
- A 10% allowance for urban creep is applied to all residential roof areas.
- 100% Annual Exceedance Probability [AEP] + Climate Change Allowance [CCA] (1 in 1 year) event calculations provided.
- 3.33% AEP + CCA (1 in 30 year) event calculations provided showing that the full surface water volume is contained within the designed system without flooding.
- 1% AEP + CCA (1 in 100 year) event calculations provided showing that the full surface water volume is contained safely on site, without flooding any part of a building or utility plant susceptible to water or affecting safe access or egress.

Attenuation and Restricted Discharge

- Greenfield run off rates are based upon the positively drained area of the site only.
- Discharge rates are restricted to QBAR or 2 l/s/ha, depending on whichever is higher, for all storms up to the 1% AEP + CCA event.
- Half drain times and available capacity in the drainage system for subsequent storms are considered.
- A surcharged outfall to a watercourse or sewer has been modelled. The surcharge level is the 1% AEP + CCA flood event for the receiving watercourse, or to the top of the bank if appropriate hydraulic modelling is not available.

Requested to aid assessment

- FEH22 point descriptors for the site are provided.

Drainage Plans and Specifications

Comment: Items highlighted should be submitted prior to determination of this application to overcome our objection.

Where only part of an item is required for the RES or we have specific comment, then this is highlighted in **bold**.

Essential

Plans are provided showing:

- The proposed design within the proposed site layout. **Further detail required.**
- Existing site sections and levels.
- Proposed site sections and levels.
- Long and cross sections for the proposed drainage system including final finished floor levels.
- Exceedance flow management routes.
- Details of connections to watercourses and sewers. **Levels only for RES.**
- Maintenance access and any arisings storage and disposal arrangements.

These plans must be of sufficient detail that a reviewer can be confident that the design can be constructed without flood risk being increased on site or elsewhere.

Specifications are required for all materials used in the design. We suggest that this is best achieved and illustrated with site specific construction detail drawings. The combination of construction details, with plans and sections, ensure that the proposed standard of construction will facilitate adoption and maintenance by an appropriate body and have structural integrity.

The following checklist is designed to demonstrate the level of detail required:

Easements

- 3m easements are shown from the top of the bank of all ordinary watercourses, and from the edge of all culverted watercourses on all plans.
- Any appropriate easements as stipulated by any public or private utility provider shown on all plans.
- Maintenance easements are shown from the top of the bank from all open SuDS features on all plans.
- Existing trees and their root protection zones are shown on any drainage layout.
- Proposed trees and appropriate easements are shown on any drainage layout.

Detail

- It can be clearly determined what a pipe's **diameter**, pipe materials, **gradients**, flow directions and invert levels are from the plans.
- It can be clearly determined what an inspection chamber or manhole's **cover level**, **invert level**, cover loading grade and sump depth (where applicable) are from the plans.
- All attenuation features (including permeable paving) are clearly labelled with their **dimensions**, **invert/base levels** and **cover levels**.
- Control structures are labelled with **discharge rates**, **hydraulic head**, **invert** and **cover levels** and ideally model number.
- Measures to protect drainage from tree root damage are clearly shown on any drainage layout.
- Any areas of necessary ground raising are clearly justified and demarcated on a plan, with depths and levels.
- Potential flow routes off site are shown. The plan also includes proposed external ground levels, finished floor levels of buildings and designed slopes on all impermeable surfaces such as highways or car parks.
- Cross sections and long sections of all open features are provided.
- Construction detail drawings are site specific.
- Construction detail drawings are provided for all components including but not limited to:
 - Attenuation structures
 - Manholes/inspection chambers
 - Catchpits/silt traps
 - Flow control devices
 - Permeable paving
 - Headwalls
 - Channel drains
 - Gullies
 - Pipe bed and surround
 - Pipe to pipe connections
 - Filter strips or drains
 - Swales
 - Bio-retention systems
 - Ponds
 - Tree pits and measures to protect drainage from root incursion

- Water treatment features
- Water butts or alternative methods of water reuse – also to be shown on plans.

The following items are requested to aid assessment or confidence in construction:

- Where features have a non-uniform plan area, a plan showing the coordinates of the perimeter is provided.
- All drainage infrastructure is labelled to correspond with the supporting calculations.

Other

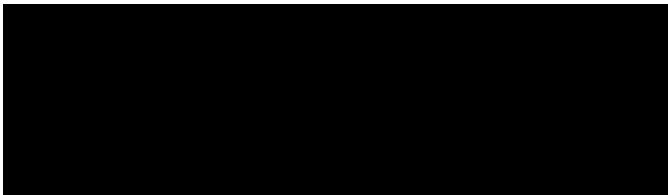
- Open feature planting specification is provided (to be assessed by others).

This checklist is designed to aid an applicant with their submission. The list is not exhaustive, and our engineers may request additional information to enable them to review a proposal to their satisfaction.

The checklist may also request information that an applicant does not feel is relevant to their submission. In this case the applicant can provide an explanation as to why they have omitted certain information in their drainage statement. However, the appraising engineer reserves the right to request this information if they believe it is necessary for their review.



Drainage Engineers response



Arun District Council, Civic Centre, Maltravers Rd
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Our priorities...



From: Sarah Burrow <Sarah.Burrow@arun.gov.uk>

Sent: 13 May 2025 11:57

To: Planning Responses <Planning.Responses@arun.gov.uk>

Cc: Jessica Riches <Jessica.Riches@arun.gov.uk>; David Easton <David.Easton@arun.gov.uk>; Paul Cann <Paul.Cann@arun.gov.uk>; Karl McLaughlin <Karl.McLaughlin@arun.gov.uk>

Subject: F/16/24/RES - Ford Airfield

Hi Jessica,

Find our consultation attached, this remains an objection with a request for further information. You will note that I have included specific requests for the administration of any further submissions if made.

As discussed, please can you also broach with the applicant how this parcel will be phased in construction. I note that the verification of the parcel is linked to the phasing agreed under condition 5 of the outline. The phasing is high level, and as written and approved, the applicant would not be able to occupy any homes on this parcel until they have all been verified. It is suggested that it is considered how this can be phased on a sub-catchment scale. This is not critical at this stage.

Kind regards

Sarah Burrow

Flood Risk and Drainage Engineer, Coastal Engineers and Flood Prevention

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Our priorities...

