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Sent: 18 August 2026 12:28

[REDACTED]

Subject: New Buildings Farm Solar Farm (SMDC - SMD/2025/0388 and ESBC - P/2026/00149) - LLFA Response (Rev 2)

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Hi Roberta,

We have received your comments in regards to our response for New Buildings Solar Farm (SMD/2025/0388 and P/2026/00149 - see attached).

I rang Staffordshire council yesterday morning to discuss some of the comments you have raised however was inform you were away from your desk, and an email would be preferable.

I am getting in touch to clarify some of the points you have raised, I would appreciate if you could provide a response so we can address these comments in our response and reduce the potential for multiple responses back and forth.

Please see below your comments in black italics and our response in blue. Please note not all comments are included below.

Hydraulic Modelling

- Solar PV arrays will be raised approximately 0.8 m above ground level and therefore will not interact or displace flood water. PV arrays are located within surface water flood depths however the flood depths are significantly lower than the PV lowest infrastructure height (0.8 m) and therefore will not be impacted in an extreme or prolonged rainfall event. Surface water flood models representing solar farms do not include the solar panels within the model as it is not possible to do so within a 2D domain. Solar panels themselves are impermeable, however are located on racking with a minimal footprint on permeable ground and therefore can be excluded from the model and the solar panel underlying conditions should be represented to provide the most accurate modelling.*

The point of the post-dev modelling is to simulate the impact of the development but the solar panels themselves have not been simulated hence why there is only a minor difference described in the post-dev modelling results. As the site is located within an area with surface water flow paths we need to see the impact of the proposals on these flow paths. I have attached a hydraulic modelling report from a FZ3 study where there are amendments in the 2D element of a fluvial model to simulate the impacts of the solar infrastructure on flood flows within the 2D domain. The methodology (in Section 4.2.1) outlines how the panel constriction to overland flows is estimated and applied to the 2D domain. This is included as an example of a sensible and proportionate methodology to evaluate the impacts of solar panel infrastructure on

flow paths, we are happy for alternative method suggestions but we do need to see some representation of the flow restrictions for us to evaluate the impacts.

No industry standard current flood modelling software can model solar panels, representing an impermeable surface above a permeable surface, accurately and hence why the panels cannot be included within the model. What can be modelled is the underlying vegetation which will determine if solar panels increase surface runoff or not. The academic research is clear on this, solar panels have no significant increase on surface water when comparing a like for like scenario (typically short grass vs short grass pre and post development). The development is proposing to increase the vegetation coverage under the panels from the baseline short grass and therefore this vegetation change has been included within the development scenario. This change in vegetation will ultimately determine if surface water runoff is increased, not the inclusion of the solar panels.

Surface water will not be affected by the present of solar panels, surface water will simply flow around the minimal racking (see racking footprint below, approximately 150mm²). Flow pathways will not be constricted by the inclusion of the racking system. One transformers is partly located within a flow pathway and the modelling shows surface water flowing around the raised transformer. The substation is located within a flow pathway, the contributing area to this flow pathway is minimum. The flow pathway will be diverted around the substation and then continue as per the original flow pathway.

Please can you provide justification for the comparison of the site to a FZ 3 solar farm adjacent to a main river with flood depths up to 2m as the sites are not comparable in terms of flow pathway dynamics (fluvial floodplain flow pathways vs rainfall flow pathways).

Racking footprint example



- *Have the new road surfaces been represented as impermeable within the post-dev modelling? - This would be a conservative estimate in the case of infiltration not occurring as the drainage report states that infiltration will not be possible due to the clay soils. If the roads have not been represented as a surface change within the model a suggested method would be: The roads need to be represented as impermeable rainfall losses (100% runoff generation) and the Manning's values need to be increased to show the routing behaviour that the different surfacing will have compared to the surrounding grassland.*

The new internal tracks have been represented as impermeable within the model, the model uses the net rainfall from ReFH which accounts for infiltration and other factors before applying it to the model. The model has no infiltration element within the model to purely assess runoff. The model has changed the mannings value of the internal racks to determine the effect of the internal tracks on surface water runoff. The Mannings value used is (0.025). Please can you confirm, why this value should be increased?

It should be noted, development infrastructure such as transformers were raised within the model.

- *The FRA references a cross-contour perimeter swale around the downstream boundary of the site – this needs to be represented in the post-dev modelling (we appreciate the detail isn't designed at this point so just a generic zshape will be a suitable representation for outline).*

The hydraulic modelling demonstrates that swales are not required to mitigate post-development runoff rates or volumes. The proposed development results in a substantial increase in vegetation cover relative to the existing baseline (pre-development), which provides sufficient mitigation and delivers a reduction in runoff. This approach is consistent with the available academic research relating to solar farm developments and surface water runoff, as referenced within our previous response to the LLFA.

Given that the modelling indicates the proposed drainage strategy is effective without the inclusion of swales, we would welcome clarification regarding the technical basis for requiring a perimeter swale along the downstream boundary.

Should the LLFA maintain that swales are necessary, these should be targeted to locations where surface water risk is greatest. Based on the modelling results, this would be limited to Fields 12 and 13. The inclusion of downstream swales across the entire site would not be proportionate to the identified flood risk and is not supported by the modelling undertaken.

- *In terms of the drainage strategy if the modelling demonstrates no adverse impact on flood risk to third party land with the conservative proposals of the roads as impermeable (in the case of no infiltration) then there is no need to provide additional formal drainage for the roads themselves, just the permeable surfacing.*

Please can you confirm you would like us to remove the conservative approach of including the tracks within the substation compound?

- *A sensitivity run will simulate the impact of water levels within the receiving watercourse on the impact of the model results. (i.e. baseline dry run, sensitivity – wet run). This may require different return periods for the northern watercourses and the watercourse through the centre of the site as it was described that the northern tribs were much larger and steeper than the central watercourses. Modeller to provide commentary on this.*

During the meeting it was discussed incorporating a water level within the water course to provide a worse-case scenario. A flow boundary with a hydrograph of the 50% AEP was included within the model, the results showed overtopping of the watercourse for the 50% AEP alone (without rainfall) showing inaccuracy within the results and therefore the flow boundary was excluded from the model.

On the basis that the catchment descriptors don't indicate a purely rainfall fed catchment for these watercourses and we have accepted the rainfall runoff modelling as a proxy for any fluvial analysis in this case, we do need some more evidence on this point. The comments in the report explain that the model showed overtopping in the event that a flow boundary was added and hence it was removed. The purpose of the sensitivity analysis is to evaluate the impacts of any fluvial influence on these watercourses and any additional mitigation required to manage the impacts AND if the development would have any additional risk to third party flood risk in this event that would require amendments to the scheme as proposed.*

** The BFIHost values don't support the rainfall-only catchment assumption. Values around the 0.4 range are more indicative of a mixed catchment response (fluvial and rainfall) rather than purely rainfall fed because they indicate that there is a groundwater contribution. The catchment areas of the catchments are also not small which is another usual indicator of a purely rainfall fed catchment. Further to this the report states that there is evidence of subsurface land drainage with outfalls to the Bromley catchment watercourse suggesting that you've got additional inflows apart from purely surface water into the watercourse.*

While the FEH BFIHOST parameter provides a useful catchment-scale indicator of hydrological response, it is derived from regionalised soil mapping and should not be considered a substitute for site-specific observations or landowner knowledge. In this instance, direct field evidence demonstrates that the site generates surface water runoff during rainfall events. Furthermore, site conditions are characterised by thick clay soils overlying mudstone geology, both of which are typically associated with low permeability and limited infiltration potential.

As an alternative, we could provide a sensitivity testing of a smaller rainfall event (50%AEP) followed by the design event (1%AEP +CC) to demonstrate a scenario where surface water is already within the watercourse.

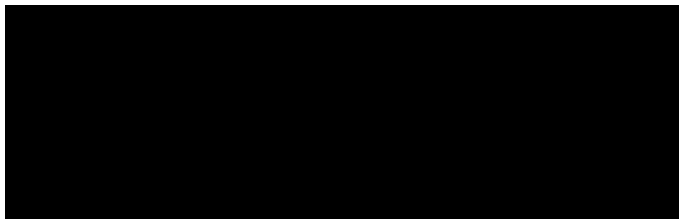
We will update the modelling to includes the other points you have raised and include this in our response.

If you would like to discuss any of the point above, please feel free to get in contact, my phone number is provided in my signature.

Kind Regards

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Senior Flood Risk
Consultant



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