'SAVE HARDY'S VALE' COMMUNITY GROUP. PROPOSED SOLAR GENERATING ARRAYS ON LAND AT NORTH DAIRY FARM, PULHAM DT2 7EA

Case Officer: Rob McDonald
Dorset Council
Planning Team D, Development Services
South Walks House
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25th January 2022

ADDITIONAL COMMENTS ABOUT FLOODING – JANUARY 2022

Dear Bob,

Full Planning Application P/FUL/2021/01018

Our Interest

'Save Hardy's Vale' (SHV) is a community association[1]. It was formed to protect 190 acres of productive agricultural land, of highly sensitive and valued landscape in the heart of the Blackmore Vale.

Following the Flood Risk Management Team's consultation response, dated 3/12/2021, we ask you to consider the following comments about the flood risks posed by the solar development and the drainage systems currently proposed to manage surface runoff from the Site.

[1] SHV committee members are David Horrell, Catherine Langham, Mark Bentley, Peter Moise and Ian Bryan

The catchment – frequent flash floods

1. It is clearly established that North Dairy Farm is within a seasonally waterlogged catchment, which responds rapidly to the area's high rainfall. The catchment has a history of unpredicted rapid flash flooding, extensive inundation of the river valleys, and prolonged periods of ground saturation that often lead to surface and fluvial flooding.

The requirement to reduce flood risk

2. The National Planning Policy Framework and the Council's Strategic Flood Risk Assessment requires that new development of land should, wherever possible, seek opportunities to **reduce** the overall level of flood risk at the development Site.[2]

Why are we repeating some arguments?

3. In the SHV Letters of representation[3] we identified that: **"**The Applicant's Environmental Statement generally underestimates Site visibility in the wider landscape and therefore failed to record a fair and representative assessment of views in accordance with Guidelines for Landscape and Visual Impact Assessment (GLVIA), including those to and from the Dorset AONB." The Applicant is currently considering the Council's request for more detailed information to add to the existing LIVA.

Flooding – also underestimated

4. We believe that, just as with the visual impact of the Site, the Applicant has 'generally underestimated' the surface runoff and offsite flooding, and ignored the effect of the predicted reductions in the time to peak flow from the proposed development.

No surface runoff calculations for the panels

5. As yet, no greenfield surface runoff calculations have been presented for the ground covered by the impervious PV panels. The only calculations submitted so far are for the sustainable drainage proposed for the relatively small areas [4] of hard standing for the substation, transformers, inverters and cabins. We have been advised that

[2] 7e2ff369-f529-7b1a-e022-f3afc7599f33 (dorsetcouncil.gov.uk)
[3] SHV Letter of Representation,
[4] 0.1 hectares - calculated with no infiltration and a porosity of 1.

the method used in the Applicants FRA to calculate the surface runoff is outdated and considered to produce inaccurate results.

More frequent and intense storm rainfall events ignored

6. The Applicant notes in the Flood Risk Assessment (4.32)[5] that: "Peak rainfall intensity is expected to increase as a result of climate change and, as such, storage calculations have included a 40% increase in rainfall in accordance with current climate change guidance." While the Applicant considers the increased rainfall volume, the predicted shorter time to (higher) peak flow, due to more frequent and intense storm rainfall events, is not examined in detail.

Infiltration may not be feasible

7. From the outset, the Applicant suggested that perfect grass would avoid the need to provide Sustainable Drainage Systems (SuDS) for the PV panelled areas, and stated that sustainable drainage, and undertaking soil infiltration tests, would therefore be unnecessary. In September (2021), following the SHV representations about flooding and surface runoff, the Applicant proposed an infiltration-based SuDS, incorporating swales. This proposal has apparently been "approved?"[6] However, the applicant appears to have ignored the clear warning in the Flood Risk Assessment (FRA) at paragraph 4.33 that: "***The reported hydrological characteristics of the Site suggest that infiltration may not be feasible***". (Emphasis added)

Imperative early tests - not done

8. The Council's Strategic Flood Risk Assessment [7] also states: "For proposed developments, it is **imperative** that Site-specific infiltration tests are conducted **early on as part of the design of the developmen**t, to confirm whether the water table is low enough to allow for SuDS techniques that are designed to encourage infiltration". Without the results of these tests, it is **impossible to be confident** that the "outlined" drainage system would comply with the Guidance, to avoid, reduce, delay and manage surface water flows, or mimic the existing greenfield surface runoff volumes, and critically, reduce downstream flooding at the times of peak flow. The Applicant cites [8] FRA P20/13909/F R012 (and others) as additional justification for not undertaking the soil infiltration tests; even though the "early" tests are clearly required by the Council's Strategic Flood Risk Assessment.

[5] Copyright & Disclaimer - Application search - dorsetforyou.com (dorsetcouncil.gov.uk)
[6] Agent's letter 29th September to Simon McFarlane
[7] 7e2ff369-f529-7b1a-e022-f3afc7599f33 (dorsetcouncil.gov.uk)
[8] P20/13909/F

Unsuitable EA flood mapping - hydraulic modelling needed

9. The FRA (P20/13909/F R012), and all the other FRA cited by the Applicant, were undertaken by RMA Environmental of Exeter. All refer to the Cook and McCuen [9] 'perfect grass' findings as justification for not undertaking soil infiltration tests early in the Application stage. However, in one cited Application [10] (P20/13909/F) it is noted in the FRA that: "The Environment Agency's (EA) flood map for planning has been generated using the EA's national generalised model (JFLOW) which **is not considered** (by the Environmental Agency) as suitable for detailed flood risk assessment" and therefore, "hydraulic modelling has been undertaken to better define flood extents and more accurate flood levels."

Inappropriate Zone proxy - more detail required

10. It is noted in the Council's Foresight Future Flooding [11] that it "is often the case that it is not possible for all new development to be allocated on land that is not at risk from flooding. In these circumstances the Flood Zone maps (that show the extent of inundation assuming that there are no defences) are too simplistic, and **a greater understanding of the scale and nature of the flood risks is required."** In their FRA, the Applicant notes, that in the absence of modelling: (3.11) "it is considered acceptable to use the Flood Zone 2 extent as a proxy, given the nature of the Proposed Development and the operational lifetime of 35 years." However, the Level 1 SFRA states that the proxy is: "for strategic planning purposes only" and that: "developers of individual Sites will need to assess the potential impacts of climate change, on flood risk from all sources, **in more detail."**

Energy ten times greater than rainfall

11. We have already noted, in our previous letters, that Cook and McCuen "determined that the kinetic energy of the water draining from the solar panels could be as much as 10 times greater than the rainfall". Factor in the predicted increased rainfall intensity due to climate change (more rain falling in a shorter time - more often) to the 'high energy' water draining from the panels, and it is possible that soil below the base of the solar panels could erode. This would result in high rates of, possibly channelised surface runoff, flowing over saturated ground that has a very low infiltration rate. We believe this would result in shorter times to peak flow, and as the Cook and McCuen's results imply, increased downstream flooding.

[9] Cook and McCuen
[10] P20/13909/F
[11] Foresight Future Flooding 04-947-flooding-summary.pdf

Doubling the surface runoff

12. That the conditions described in the Cook and McCuen findings can occur during the operational stage of solar developments is illustrated in Appendix 8. of the SHV Letter of Representation, and in the British Solar Renewables image. [12] It clearly shows very poor grass cover on the worked-on area between the PV panels, and the resultant ground scouring caused by rivulet 'high kinetic energy flow' from the lower edges of the panels. These are the very conditions, modelled by Cook and McCuen, and which resulted in their findings that, in those conditions, surface runoff can increase by 100%.

Unrealistic Infiltration rates

13. We noted in the SHV Letter of Representation [13] (paragraph 40.) that: "The soil types used in the Cook and McCuen [14] modelling do not match the very low infiltration rate of the almost impervious clay soils found in the area of the Site. The model assumes loss rates of (American) B and C soils. These rates are far higher than could realistically be expected for the low permeability clay soil found on the Application Site. In places, and depending on the levels of saturation, (approximately 180 wet days a year) it is expected to frequently have infiltration rates close to zero – compared to 5.75 mm per hour for 'B and 2.54mm per hour for 'C' soil type in the Cook and McCuen model." We believe, and as indicated by Cook and McCuen, that if the actual NDF rates were used in the modelling, then the modelled surface runoff rates would increase significantly.

Increased Peak Flow

14. Increased surface runoff is also indicated by the final condition that Cook and McCuen modelled. It involved the assumption of healthy grass beneath the panels, and bare ground in the spacer section, which: "would simulate the condition of unmaintained grass and soil compaction resulting from regular maintenance vehicles driving over the spacer section. In these conditions, the **peak discharge increased by 100%,** which reflected both the increases in volume and a decrease in timing." We identified examples of these realistic ground conditions on other operational BSR Limited solar Sites, which are, as already mentioned, illustrated in the SHV Letter of Representation. [15]

[12] shv-1.-lor-ijb-18-00-18-06-2021-1.pdf (wordpress.com)
[13] SHV Letter of Representation
[14] Cook and McCuen
[15] Appendix 8

Environmental Agency modelling – not to be relied on

15. The Applicant notes (misleadingly) [16] in their FRA that: "the EA's JFLOW model, commonly overestimates fluvial flood extents." For the reasons given in our letter 16th October, [17] we do not believe that the fluvial flood events at the NDF Site are overestimated. The photographic evidence we presented clearly shows flooding which, on that occasion, exceeded the extent of Flood Zones 2 and 3, currently shown on the EA's mapping. This demonstrates that the EA model underestimated the flooding on the proposed Site. We also note the EA's warning statement, in the West of Iron Acton case cited by the Applicant [18] (P20/13909/F) that "the JFLOW mapping **should not** be relied on, and that, hydraulic modelling should be undertaken."

No EA flood record, but frequently floods

16. The Applicant's FRA also notes the: "EA's historic flood map indicates that there are no historic flood records for the Site or local area." Yet, unpredictable flash flooding occurs regularly on parts of the Site, and on the area surrounding it. Local roads, including the proposed access, flood to depths that pose a risk to life. In the application (P20/13909/F) cited by the Applicant [19] even flooding to depths of 0.3 metres was considered significant enough to warrant a full hydrological survey and a SuDS. The Applicant notes that the NDF Site floods, in places, to depths of 1 metre. A map, showing the access roads to the proposed Site that flood, is on our website [20]

Factors affecting ground infiltration - Ground water and surface flooding

17. The Applicant notes in the FRA that the proposed Site has the 'potential for groundwater flooding to occur at the surface' but comments: "However, any groundwater flooding is likely to be shallow and **would not adversely** (affect) **the proposed development."** However, the EA note "The underlying soil conditions in North Dorset indicate that there is **significant** potential for groundwater emergence which may pose a flood risk." We believe that the frequent flooding that takes place on the Site, would significantly reduce the soil and ground infiltration rates, and therefore would detrimentally affect the proposed drainage swales, and, at times, render them ineffective.

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16 The EA caveat applies to Zone 3 laying beyond flood defences.
17 letter 16th October
18 P20/13909/F
19 P20/13909/F
20 SHV Website

Contrary to the Applicants claim – surface runoff increase expected

18. We believe that additional surface runoff caused by the impervious PV panels must be included in any SuDS storage design, as it is, for example, in the mynydd y gwrhyd solar farm drainage strategy prepared by Wallingford HydroSolutions Ltd. The drainage proposals in this case, and the Essex Council Solar guidance, support the SHV view that, contrary to the approach initially taken by the Applicant, additional surface runoff must be expected from solar developments. It is noted in the Wallingford drainage strategy (for a site that does not flood) that**: "**The swale will provide a safeguard to manage the **expected increase in surface runoff volume during both the construction and operational phases of the project.**[21]

Flood Management consultation response

19. We note that the Council's Flood Risk Management Team consultation response points out that: "The RMA FRA & DS relies heavily on an academic paper authored by Cook & McCuen," and also states: "there is no reason why these conclusions can't be extrapolated to a larger Site and **no such arguments or evidence** have been presented to refute their studies." While we (and the Flood Risk Management team) are not qualified hydrologists, we do believe that we have presented 'reasonable and informed' argument about these issues in the SHV representations, [22] and that the critical matter of the infiltration rates used in the American study, the Essex Guidance and the mynydd y gwrhyd solar farm drainage strategy) undermine the Applicant's reliance on the Cook and McCuen 'perfect grass' surface runoff findings.

Failing to demonstrate a reduction in surface runoff

20. While we (along with the Flood Risk Management Team) appreciate that there is a dearth of peer reviewed academic research on the subject, we also referred to, and have been informed by, the Essex Council Solar Array Guidance 8 [23] , and the Flood Risk Management Teams comment, which states that: "Just like any other development, they (solar Sites) have the potential to cover large areas, whereby they can interrupt overland flow routes, reduce the amount of rainfall absorbed into the ground and increase the rate and volume of surface water surface runoff." The Guidance also specifically warns **against** extrapolating the Cook and McCuen findings from small arrays, up to large Sites. So, we believe we have presented reasonable "arguments and evidence" [24] which undermines the Applicants reliance on the single study – for this proposed 'unique' Site, and that without the soil infiltration and the

[21] mynydd y gwrhyd solar farm drainage strategy

[22] SHV representations

[23] Essex Council Solar Array Guidance 8

[24] Paragraph 23. Of SHV submissions as to the impact of flooding, rainfall surface runoff and the applicant's flood risk assessment 18.03.2021

existing greenfield surface runoff results, the Applicant's 'drainage outline' and claim that surface runoff rates and downstream flooding will not increase, is meaningless.

Additional surface runoff from the PV panels should be expected.

21. We also note that none of the Applications cited by the Applicant present greenfield calculations for the areas covered by the PV panels, and where grass is proposed. It is simply *hoped, expected or considered* that the mitigation proposed will mimic the existing greenfield surface runoff. BUT the Applicant's FRA clearly notes that "**infiltration** (on the NDF Site**) may not be feasible**". We agree with Wallingford Hydro Solutions Ltd[25], that additional surface runoff from the PV panels should be expected.

The NDF Site is unique

22. It is also noted by the Council's Flood Risk Management Team, that the FRA author's avoidance of the soil infiltration tests has been accepted on other recent solar farm developments (e.g., application reference P20/13909/F South Gloucestershire Council and 2/2019/0850/PAEIA Dorset Council). This 'self-certified' list of REM Environmental FRAs - may simply track back to a single 'seed' approved Application - involving completely differing ground characteristics, where soil testing after the grant of approval was, in that one case, acceptable. We suggest that the existing flood issues affecting the NDF Site must be considered as unique.

Are the swales approved?

23. We note that the swales (lately proposed and apparently "approved" [26]) which are intended to help manage the surface runoff and drain the panelled (grassed) areas, are to be located at the bottom of the fields. This would mean there would be almost no overland run below them to allow for additional infiltration (if there is any soil infiltration at all), and their proximity to the ordinary watercourses that cross the Site, and Flood Zones 2 and 3, mean they would have to directly accommodate the predicted increase in surface runoff and when full, drain almost directly into the waterways that cross the proposed Site. However, no calculations in support of the proposed SuDS have been presented to the Council. In the absence of the greenfield surface runoff calculations and soil infiltration rates, it is unreasonable to suggest that the existing, and as yet unknown surface runoff peak volume, can be accommodated in the proposed swales, or that it can safely be directly discharged into the watercourses, without increasing the risk of additional downstream

[25] mynydd y gwrhyd solar farm drainage strategy
[26] Agents letter 29th September 2021

flooding, something which would be contrary to S6 of the technical standards for sustainable drainage systems. [27]

Ground compaction and maintenance – emergency access impossible

24. The Applicant notes (FRA 4.49) that "it is possible that construction could give rise to some ground compaction; however, it is considered that this would be no worse than other traditional farming practices which use heavier machinery." According to many local farmers and land managers, this is simply not so. They point out that the land would be drastically transformed from a Site that would see minimal usage and disturbance until planting, to one that requires complete year-round accessibility by, according to the Applicant, "transit type vehicles", machines and workers.

25. They also noted that damaged grass takes time to stabilise the ground, and that re-seeding can only successfully take place at limited times of the year – which might not correspond with the proposed six-monthly maintenance inspections proposed by the Applicant.

26. The land managers, and the Applicant's FRA, also note that, because of the exceptionally high recorded rainfall in the area and low soil infiltration rates, that the land on NDF is saturated for long periods, sometimes months, that it would be impossible to access some areas of the NDF fields, even by foot, and certainly not by "transit type" vehicles. Normal maintenance or emergency access, away from the proposed access tracks, would, for long periods, be impossible.

Conclusion

27. The Flood Risk Management Team (Chris Osborne - 14th December 2021) has pointed out that the findings of Cook and McCuen are not refuted. We certainly have not attempted to do so. However, we have clearly pointed out that the study's surface runoff calculations and findings use ground infiltration rates that are very different from those likely to exist on the Site, and that we believe the differences will have a significant effect on the surface runoff rates from the development.

Infiltration testing is needed

28. For the reasons set out here, and in our other representations, we do not believe that the mitigation proposed by the Applicant will mimic the existing greenfield surface runoff arrangement or ensure that downstream flooding is reduced. We therefore believe that their suggestion that it is "not necessary to undertake

[27] Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems (publishing.service.gov.uk)

infiltration testing, or provide a controlled discharge to a watercourse" is unjustified, especially given the level of ground saturation and flooding that has been identified to frequently exist on, and around the proposed Site.

Unique flash flooding and ground saturation

29. We also believe that the suggestion that their proposed approach has been accepted on other recent solar farm developments of similar scale, does not adequately recognise the unique flash flooding and ground saturation issues, or the low infiltration rates affecting the proposed Site, and is both unconvincing, and contrary to EA and Council guidance.

Required 'demonstration' missing

30. If the infiltration rates and greenfield surface runoff rates are unknown, then, contrary to the Applicant's claim, it is impossible to "demonstrate" that the proposed development will not increase flood elsewhere.

Increased surface runoff to be expected

31. The Applicant (in the FRA) has implied that infiltration drainage systems may not be effective. We also note that where storage drainage is required, that an allowance for the expected increase in surface runoff from the impervious area of PV panels will need to be made.[28]

Inapplicable Zone 2 proxy

32. The Level 1 SFRA states that using Flood Zone 2 extent as a proxy is: "for strategic planning purposes only" and that "Developers of individual Sites will need to assess the potential impacts of climate change, on flood risk from all sources, **in more detail."**

Full hydraulic assessment needed

33. In order to gain a full and accurate understanding of the flooding, and the SuDS needed to manage it on, and surrounding, the proposed North Dairy Farm Site, we strongly believe it is reasonable that a full hydraulic assessment should be undertaken, **before any** drainage proposals are agreed, or the decision stage of the Application is reached. We do not believe the Applicants 'outline' drainage proposals, which are unsupported by any approved calculations, can be accepted at

[28] mynydd y gwrhyd solar farm drainage strategy

this stage, simply in the hope that attaching conditions will solve the drainage problems that clearly exist on and around the proposed Site.

Flood threat to life

34. Given that the area and NDF Site are prone to flash floods now, which pose a threat to life, we believe that it is an unnecessary and avoidable risk to allow the infiltration calculations and drainage design to follow a grant of approval. The FRMT point out that the risk to the operation and maintenance of the site during times of flood is "not insignificant or trivial and therefore warrants application of the Sequential Test." They also note that: "the test may need to be applied due to the positioning of the access over and through a modelled flood plain, particularly since no other emergency access has been discussed or proposed."

Avoiding building on areas at risk from flooding

35. The Council's Foresight Future Flooding Report make the point that: **"**Influencing where to build infrastructure has emerged as a key tool in managing future flood risks." and: "It is about avoiding building on areas at risk from flooding." [29]

Ian Bryan

For and on behalf of the Save Hardy's Vale community group[30]

SHV Web
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[29] 7496 Exec Summary Cover 1st (publishing.service.gov.uk) Page 41
[30] In collaboration with Mark Bentley, Peter Moise