



Full Planning Application [P/FUL/2021/01018](#)

[HYDRO-GIS LTD HYDROLOGICAL REVIEW FEBRUARY 2022](#)

SAVE HARDY'S VALE (SHV) SUMMARY RESPONSE

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A. Overview of Findings

1. The Flood Risk Assessment¹ (FRA), undertaken by RMA Environmental, represents an initial desk-based study which is lacking in detail, and has no results of site investigations. The background information is limited, no predicted flood levels have been identified, and the assessment of risk from the development is based purely on the findings of a study in North America, is not appropriate for the local conditions at the site.
2. Estimates of greenfield surface runoff are based on an outdated method which is conceptually and mathematically wrong, and the results of drainage design software are not properly discussed and remain highly questionable. A revised FRA should be requested by the Local Authority, to include estimates of the design flood levels at the site based on detailed hydrological and hydrodynamic modelling, proper estimates of greenfield surface runoff, using the ReFH2 software in accordance with SUDS guidelines, and field measurements of soil infiltration rates, and the seasonal high groundwater. A detailed design of any drainage features should also be included.

¹ Flood Risk Assessment and drainage strategy Document Ref: R009

B. Background

3. The statement by BSR (during the 2020 online consultation) that the site was: “**not too impacted by flooding or visual impact**” has proved to be misleading.
4. We suggest it is common ground that the area floods. However, it is the cause, source, nature and intensity of the flooding which is significant in this case i.e., “unpredictable rapid discharge and flash flooding” primarily from the high escarpments² overlooking the Blackmore Vale, flowing north, north east and north west along the EA catchment areas of the Upper Lydden and Wonston Brook, and their tributaries.³ It is important to note that the multiplicity of waterways flowing from the two main catchments(39.476 km²) focus towards, closely surround and impinge on the proposed site, before flowing into the River Lydden, some 500 m from the site’s northern tip, and then to the Stour.
5. The Applicants FRA is inadequate in a number of significant ways. It suggested (up until September 2021) that sustainable drainage would not even be needed for the PV panelled areas of the site.
6. Environment Agency (EA) flood maps only ‘approximate’ the flood extents. There is evidence that the maps underestimate the extent of Flood Zones 2 and 3 (e.g., the 2021 image of the [‘lake’](#) where the proposed Maintenance Compound is to be located)
7. Approximately 96% of the proposed site is saturated for around 199 days a year.⁴
8. The Applicants FRA identifies a ‘risk to life’ from flooding at the site entrance.
9. There are many reports, of site and offsite flooding, contained in the Letters of Representation and in evidence sent to the Council by local residents, and the SHV group.

C. Key points in the Hydro-gis Ltd Review

10. Infiltration based Sustainable Drainage Systems (SuDS) are unlikely to be effective in managing or reducing surface runoff or downstream flooding, due to low infiltration rates on the proposed site.
11. A full hydrological assessment, including ground surveys, will be needed before alternative(effective) SuDS can be properly considered.

² Hydro-gis Review Page 10. Figure 1-7 The Mean annual rainfall of the River Stour catchment (CEH, 2022),

³ [See Annex 1. & 2.](#)

⁴ Agricultural Land Classification: North Dairy Farm, Pulham, Dorset Application Report Reference R015

12. The EA mapping does not predict the flood levels along the waterways and should only be used to indicate whether a more detailed study should be undertaken.
13. Historical high rainfall data is available, and is presented in the Hydrology Review.
14. The two catchments which focus around the proposed site are fed by exceptionally high average rainfall onto the high escarpments at yearly averages of 1000 - 1400mm - which have 50% runoff.⁵
15. The frequency and intensity of exceptional levels of rainfall caused by climate change is already evident, and predicted to significantly increase.
16. The Stour can be used as a surrogate for recent historical flooding in the area.
17. More detailed hydrological and hydrodynamic modelling would be required to provide estimates of flood flows and levels at the proposed site.
18. Flow over the land at the site will be affected by the soil type and the state of antecedent wetness. The Agricultural Land Classification indicates 199 days of saturated ground per year.
19. Part of the site following the tributary stream (Short Wood Brook) has the potential for groundwater flooding to occur at the surface.
20. Information in the FRA about the topography, geology and hydrology of the site is limited.
21. It is impossible to identify the overall landscape features, and there are no maps showing the geology or hydrogeology. No information at all is given on the soils of the site and surrounding area.
22. No discussion on the catchment, water balance and flow regime.
23. It appears the FRA consultants have undertaken a purely desk-based exercise. There are no ground investigations findings for the site.
24. It is normally expected that recommendations for surface water management are supported by infiltration tests, trial pits and shallow boreholes.
25. The information relating to flood risk appears to be entirely based on the EA Flood Maps at the site, and on information listed in the LA's Strategic Flood Risk Assessment.

⁵ Agricultural Land Classification: North Dairy Farm, Pulham, Dorset Application Report Reference R015
Average Annual Rainfall 980 mm

No other sources have been considered, as would be expected given that extreme rainfall and flash flooding have been frequently observed in the past.

26. Given the size and nature of the development it would be expected that proper design flood levels are provided.
27. EA's general flood zone maps which have a vertical resolution to the nearest 0.5m and are therefore too coarse for any site-specific assessment.
28. The RMA FRA is lacking recommendations for any measures which should be implemented during the construction phase of the development and fails to discuss any of the potential impacts of the construction process.
29. The discussion of the risk of flooding from the operational site is limited to reference to a scientific paper by Cook and McCuen (2013). The hydrological regime for Dorset is entirely different. Soils are often saturated (54% of the year), have a greater propensity for generating surface runoff and, the UK has experienced record winter rainfalls over prolonged periods, such as December 2013–February 2014 and in February 2020. It is therefore highly uncertain to base the whole assumption, that solar panels would pose no increase in the risk of surface water flooding on one inappropriate study.
30. A study should be undertaken to properly assess both the impact of the solar panels on the amount of surface runoff through concentrating the rainfall, and the impact of soil erosion.
31. The FRA attempts an estimate of the greenfield surface runoff from parts of the site, based on the old IH 124 methodology (Marshall and Bayliss, 1993) which is an entirely inappropriate and outdated method. It is conceptually and mathematically wrong, makes use of inaccurate paper maps, look-up tables rainfall data from the 1970s, so does not incorporate any of the climate change signals which have been apparent over the past 50 years. It has been shown to produce considerable underestimates of the true surface runoff from a plot.
32. The current SUDS guidelines (Woods Ballard et al, 2015) state that the IH 124 method should not be used, and recommend the ReFH2 software (Wallingford Hydro Solutions, 2016) as the standard method for estimating greenfield surface runoff at the plot scale, and for a proper surface water management plan.
33. There is considerable uncertainty in the RMA FRA about the use of infiltration as a measure to attenuate any surface water from new areas of impermeable surfaces at the site. It is unlikely that infiltration would be appropriate, as the soils would either not have a high enough infiltration rate, or the seasonal high water-table would be within 1m of the surface, and therefore infiltration features would not properly function.

34. The RMA FRA has not considered the soil conditions at the site, and has not undertaken any infiltration tests; therefore, it has no information about whether infiltration would be appropriate. Despite this, the recommendations to ensure that surface runoff from the developed site does not exceed the greenfield flow, continually promote the use of infiltration.
35. There is no indication in the introductory section of the FRA, or the introduction to the drainage assessment section (section 4), that there will be a further, more detailed design component to the reporting.
36. The purpose of a swale is to provide temporary storage of excess water, and allow this to gradually infiltrate into the soil. As there are no infiltration rates or depth to the water table, there is no information to support whether this would be possible.
37. "Outflow is too low, design is unsatisfactory". These status reports, and warning messages, warrant a full explanation in the RMA FRA, but nothing is provided.
38. The site is in an area susceptible to particularly intense rainfall, as shown by historical data. There is potential for surface water flooding at the site, and the emergence of groundwater from permeable underlying strata.

Ian Bryan
01258 881669

February 14th 2022
For and on behalf of the Save Hardy's Vale community group⁶

[SHV Web](#)
[SHV Facebook](#)
friends@savehardysvale.com

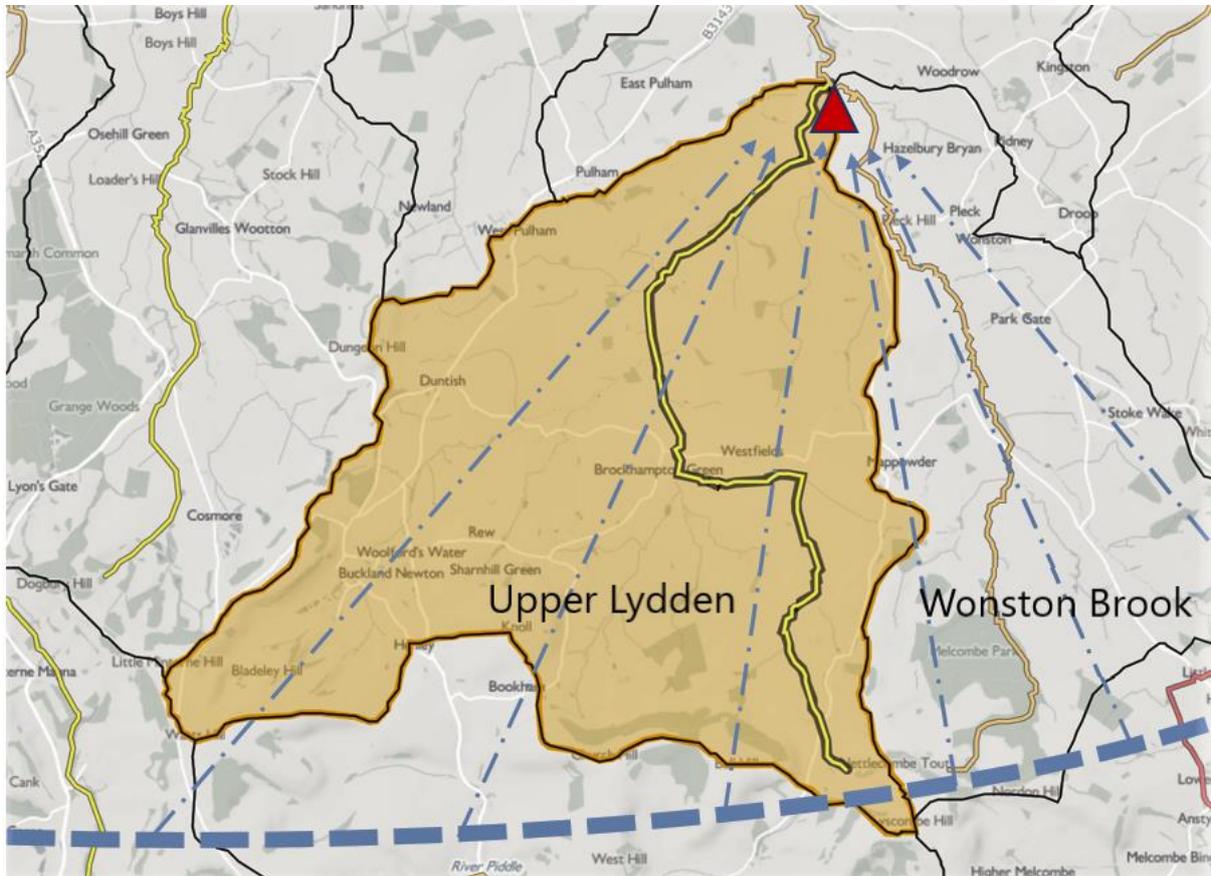


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⁶ In collaboration with Mark Bentley, Peter Moise

D. Annex 1.

1. EA Upper Lydden River catchment area. (This is a sub area of the Stour Catchment)



The Upper Lydden Catchment area is approximately 24.463 km² and length 10.04 km

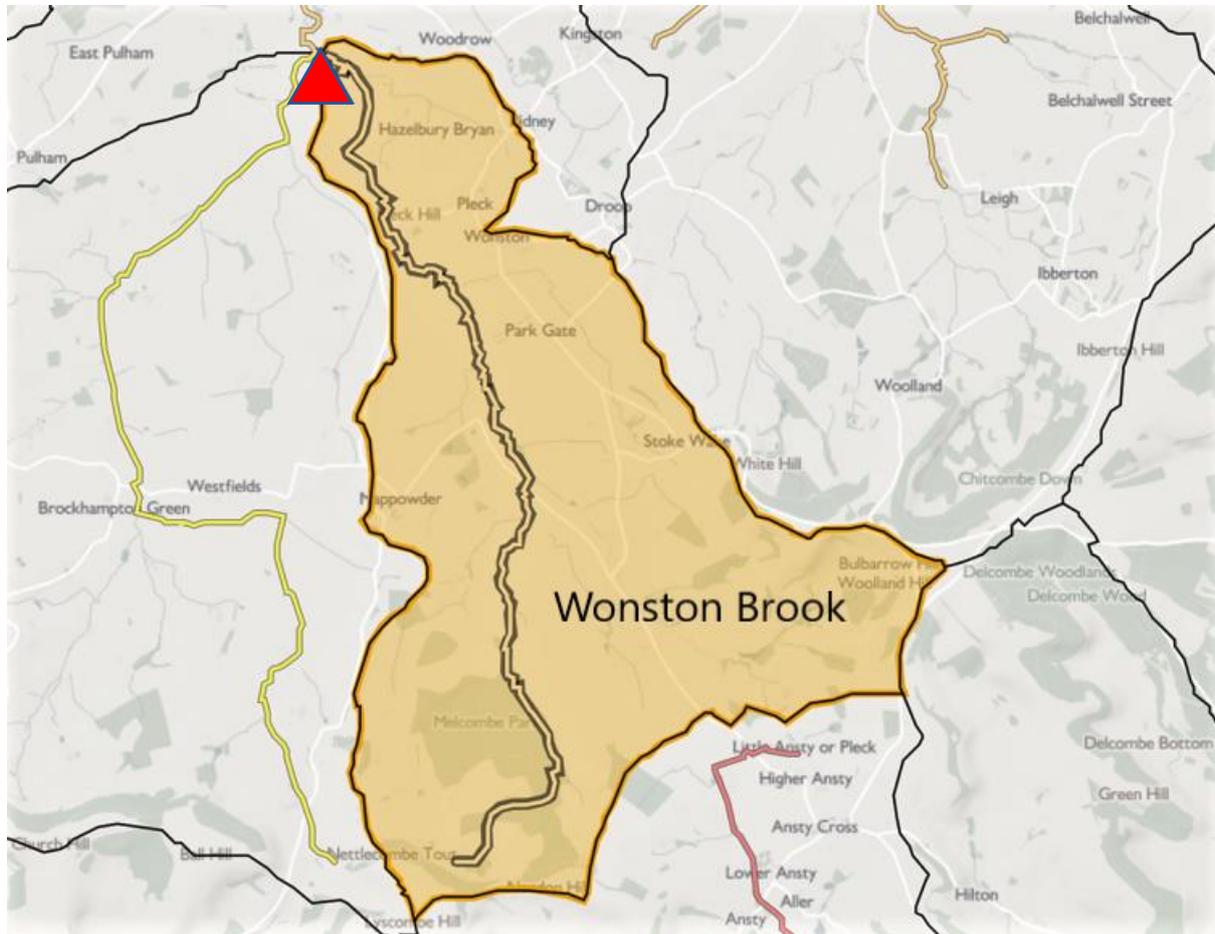
The heavy blue dashed line to the south represents the high rainfall areas of the Downs and High Escarpments (1000 – 1400 mm pa - with 50% runoff) The light dashed arrows indicate that both the Upper Lydden (yellow) and the Wonston Brook (to the right) focus their catchment flows, and runoff, around the proposed North Dairy Farm site.

 Approximate position of North Dairy Farm

[Environment Agency - CDE - Lydden \(Upper\) \(data.gov.uk\)](https://data.gov.uk)

Annex 2.

The EA Wonston Brook catchment area. (This is a sub area of the Stour Catchment)



Wonston Brook Catchment Area is approximately 15.013 km² and Length 10.366 km

As Annex 1. indicates, both the Upper Lydden (left) and Wonston Brook (centre) focus their catchment flows and runoff around the proposed North Dairy Farm site.

[Environment Agency - CDE - Wonston Brook \(data.gov.uk\)](https://data.gov.uk)



Approximate position of North Dairy Farm

Annex 3. 'Temporary Maintenance Compound' flooded.



The 'lake', shown in the image, is the site selected by the developer to be their 'Temporary Maintenance Compound' to be used during the months of construction. Flash flooding is already identified as a "threat to life" (Image, October 2021)

EXTRACTS FROM:

Agricultural Land Classification: North Dairy Farm, Pulham, Dorset Application Report Reference R015

4.1.3 The semi-detailed ALC survey carried out as part of this investigation in December 2019 has determined that the **quality of agricultural land at the Site is limited mainly by soil wetness** to Subgrade 3b and Grade 4. An ALC map of the Study Area is given as Figure 2. **In a climate area with 199 FCD, soil profiles with medium clay loam topsoil and slowly permeable clay subsoil which is waterlogged for a long period over the winter** (i.e., Wetness Class IV) are limited by soil wetness to Subgrade 3b, i.e., 25.0 ha or 15% of the Study Area.

4.1.4 Where the topsoil is heavy clay loam or clay overlying **slowly permeable clay subsoil which is waterlogged for a long period over the winter** (i.e., Wetness Class IV), the profiles are limited by soil wetness to Grade 4 in this climate area (i.e., 199 FCD). The area of Grade 4 measures 136.5 ha, which is 81% of the Study Area. 4.1.5 The farm buildings, roads and areas of hardstanding at North Dairy Farm are classed as non-agricultural / other land, i.e., 6.5 ha or 4% of the Study Area.

96% of the proposed site is waterlogged for 199 days a year – over half the year.