APPEAL REF: APP/M3645/W/25/3372747

Land south of Barrow Green Road, Oxted.

Rebuttal of the Proof of Evidence of Brian Cafferkey

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1.0. Background

1.1 Hydro-GIS Ltd was engaged by Tandridge District Council ('TDC') in October 2025 to provide expert witness services on hydrology as part of the appeal against the decision of TDC to refuse planning permission for the Land South of Barrow Green Road, Oxted. This current document provides a rebuttal of the Proof of Evidence submitted on behalf of the appellant by Brian Cafferkey of Ardent Consulting Engineers dated December 2025.

2.0. Issues Covered

2.1 This rebuttal covers two issues which are raised in the appellant's proof: the need for a conceptual hydrological model for The Bogs and the provision of baseline hydrological conditions to understand the potential impact of the appeal scheme on The Bogs. The need for a conceptual model and baseline conditions has been raised in our previous assessments of the appellant's submissions as a way to understand the hydrological behaviour of The Bogs.

3.0. A Conceptual Hydrological Model for The Bogs

3.1 A conceptual hydrological model is a simplified representation of the hydrological system often for a particular site as a set of theoretical and interlinked components. The model is not quantitative and not used as a predictive computer software tool for purposes such as flood estimation. It is merely a representation of the natural system and its hydrological processes commonly as a diagram or flow-chart.

3.2 I refer in my proof of evidence at para 5.6 to the Eco-hydrological Guidelines for Wet Woodland Phase 1 from English Nature and the Countryside Commission For Wales (CD18.5). This has plenty of examples of conceptual models for wet woodland environments. One of these (Figure 11 on page 113 in the document) is shown below (Figure 1). It is in the form of a sketch with the movement of water through the system indicated by arrows. The document also has explanatory text as to how the system behaves.

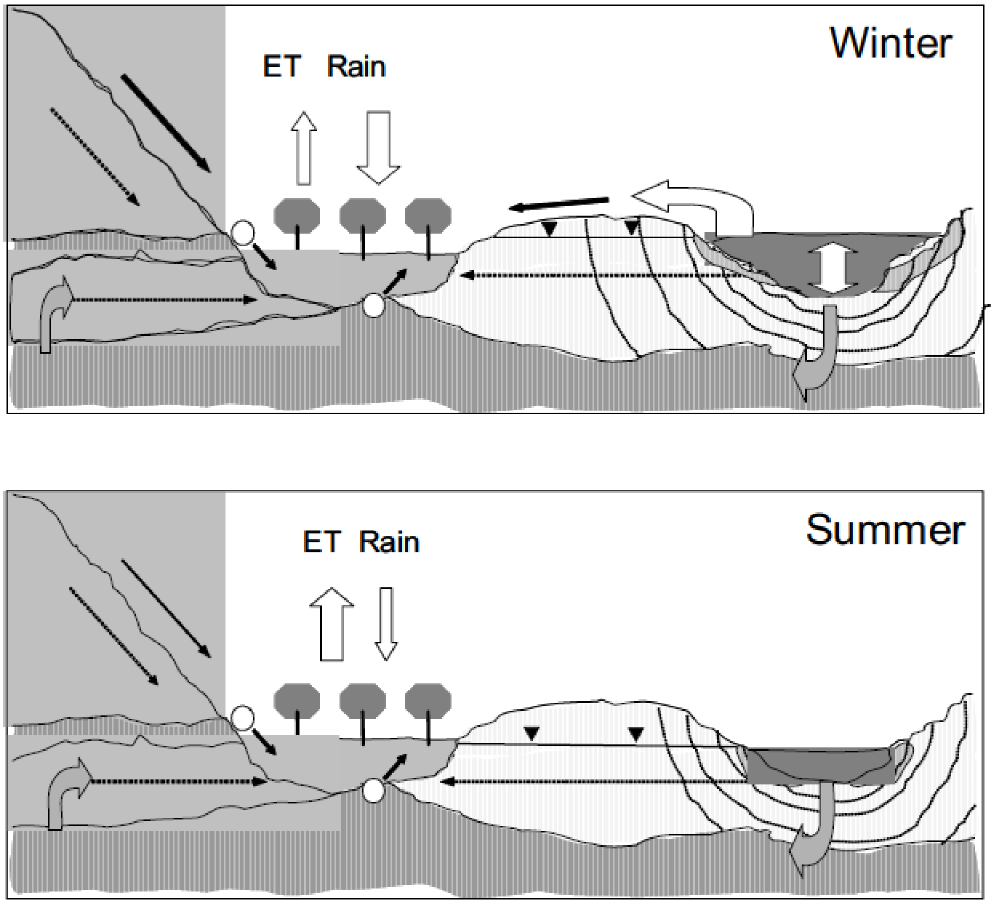

Figure 1. An example conceptual hydrological model for wet woodland taken from English Nature (2005): *Conceptual model of water supply mechanisms in Alnus glutinosa – Carex paniculata (W5) alluvial forest communities in the winter and summer*.

3.3 Conceptual models in this way are commonly put forward by wetland hydrologists based on their assessment of the site from observations and measurements over time and their expert understanding of the topic. In the above example different mechanisms are shown for the winter and summer seasons, hence the need for observations over a long period encompassing the changing seasons. The models are used to represent the key hydrological processes of the landscape and to identify potential harmful impacts.

3.4 The Appellant's Proof of Evidence has presented the existing modelling work which was undertaken as part of the Flood Risk Assessment to estimate the flows and water levels in the stream on the western edge of the development site, with further additional simulations to this modelling work in November and December 2025. The estimates have been made for pre-development with the existing agricultural land and post-development with the as built site and associated drainage strategy.

3.5 The modelling undertaken by the Appellant's consultants used standard approaches to i) estimate the flow of water in the stream channel through hydrological modelling with the ReFH2 software; and ii) estimate the depth and extent of floodwater emanating from the channel using the TUFLOW hydrodynamic modelling software. Both of these components used complex software to output predicted values in terms of flow in cubic metres per second, water level in metres above sea level and flood depth in metres. Such a modelling exercise is commonly undertaken to assess the flood risk posed to a development site and to include the necessary measures to ensure the flood risk at the development site is low and the risk of flooding to neighbouring properties is not increased. This is purely an application of flood modelling.

3.6 This modelling work was applied to the stream catchment flowing on the western edge of the development site. It did not include The Bogs, nor did it provide any representation of the hydrological processes of The Bogs. This is the case for both the original modelling work undertaken for the FRA and the additional modelling work from November and December 2025.

3.7 The Appellant's consultants have claimed in their Proof of Evidence that the modelling they have undertaken represents a conceptual model and therefore there is no need to generate a conceptual model of The Bogs.

3.8 The Appellant's consultants are wrong on two counts: the modelling work they have undertaken is clearly not generating a conceptual model of The Bogs and their modelling is applied for the catchment of the stream and is not applied to The Bogs.

3.9 In their proof the Appellant's consultants have claimed there are three types of conceptual model: lumped, distributed, and semi-distributed. This statement is also wrong. The classification of models into lumped, distributed and semi-distributed is a tier of overall hydrological model classification which defines the spatial representation of the catchment. For the benefit of those who are not familiar with hydrology, the classification of hydrological models is given in Appendix 1.

4.0. Baseline Hydrological Conditions of The Bogs

4.1 My proof of Evidence included a list of information (under section 9 - Missing Information) which should be obtained for The Bogs from observations, measurements and monitoring in order to provide details of the baseline hydrology of The Bogs.

4.2 The Appellant's consultant has not provided any of this information in their Proof of Evidence, and their submission is based purely on further flood model simulations for the stream flowing alongside the development site and the contributing catchment area. It should be stressed that this modelling is not calibrated (i.e. compared to observed data) as there is no long-term hydrological monitoring of the stream at the site to provide measurements of flood events.

4.3 The Appellant's consultants have therefore not provided any information on the baseline hydrology of The Bogs and therefore cannot assess the impact of the appeal scheme on the hydrology of The Bogs. They have only attempted to prove that flows from the stream during flood conditions will not be significantly altered and have not considered the full range of hydrological processes affecting The Bogs such as the regular overland flow from the development site, groundwater flows, and the movement of surface water through The Bogs other than in the stream channel.

4.4 One aspect of my proof (Para. 5.5) identified that overland flow from the southern part of the development site is commonly observed providing a diffuse source of water into The Bogs as photographed on 4th April 2025. There is a concern that this type of flow may no longer occur once the site is developed as all of the surface water runoff from the developed site will be conveyed into temporary detention basins and then discharged into the existing stream through two pipes as point sources.

4.5 The Appellant's consultants state in their Proof of Evidence that their flood modelling of the pre-development site only showed overland flow following extreme rainfall: "*overland flow path through the Site is predicted to form only during lower frequency, higher magnitude storm events, specifically during extreme storms equal to or greater than the 3.3% AEP (1 in 30 year) event*".

4.6 The observational evidence proves the occurrence of overland flow to be a common phenomenon, and the observation in April 2025 was during a period of dry conditions when less than 1mm of rain had fallen in the past 14 days. More recent evidence of the overland flow to The Bogs was captured in January 2026 from a Council Officer visiting The Bogs, details are included in Appendix 2.

4.7 The Appellant's consultants' assessment of the impact of the development on the hydrology of The Bogs based on simulating un-calibrated flood modelling software is not appropriate and it does not represent a full and proper assessment of the baseline hydrology of The Bogs based on observations, measurements, monitoring and the development of a conceptual model.

References

English Nature Countryside Council For Wales (2005) Eco-hydrological Guidelines for Wet Woodland Phase 1. English Nature, Northminster House, Peterborough PE1 1UA.

Appendix 1. Hydrological Model Classification

A large number of hydrological models have been developed since this aspect of the science grew rapidly with the advent of computing some 50 years ago. A way of classifying models is useful to qualify a modelling exercise or to describe some commercial modelling software. For example where a modelling study states it has used a physically based, semi-distributed, deterministic model it is helpful for readers to use a system of classification so this description is understandable. The classification commonly follows four tiers based on different aspects of the modelling.

Tier 1 Processing Classification

Conceptual - a concept for representing the system rather than any numerical simulation; or

Physically Based – solving equations of hydrological processes; or

Empirical - using equations derived from observations; or

Black Box – purely mathematical without any attempt to understand the system

Tier 2 Spatial Classification

Lumped - treating the catchment as a single entity; or

Distributed – modelling and linking different areas of the catchment e.g. as grid cells; or

Semi-distributed – different areas of the catchment are identified and used in the modelling but are not spatially linked

Tier 3 Output Classification

Deterministic - the model output is a single value; or

Stochastic - the model output is a range of values with associated probability

Tier 4 Simulation Classification

Event based - the model is simulated for a discrete event; or

Continuous - the model is simulated for continuously for as long as the input data will allow.

Appendix 2. Photographs at The Bogs

The following photographs from of The Bogs were taken by Tandridge District Council Officers on 08/01/2026 and 10/01/2026. The map in Figure A1 shows the location and orientation of the photos from the edge of The Bogs. The total rainfall for the two week periods leading up to these dates measured at Godstone was 14.5 and 37.85mm respectively. The highest daily fall was 22.4mm on 08/01/2026, but this rain commenced after the time of the visit for the photos shown below. The photos all show overland flow emanating from the development site and dispersing into The Bogs. It should be noted that in relation to point 4.5 of this rebuttal, the 30-year rainfall, which was claimed by the Appellant's Consultants to be necessary to cause overland flow, is a value of 42.2mm falling in a period of just 2.25 hours. Therefore significantly greater and more intense than what was observed at Godstone. The photos show however that overland flow is occurring with much less rain having fallen.

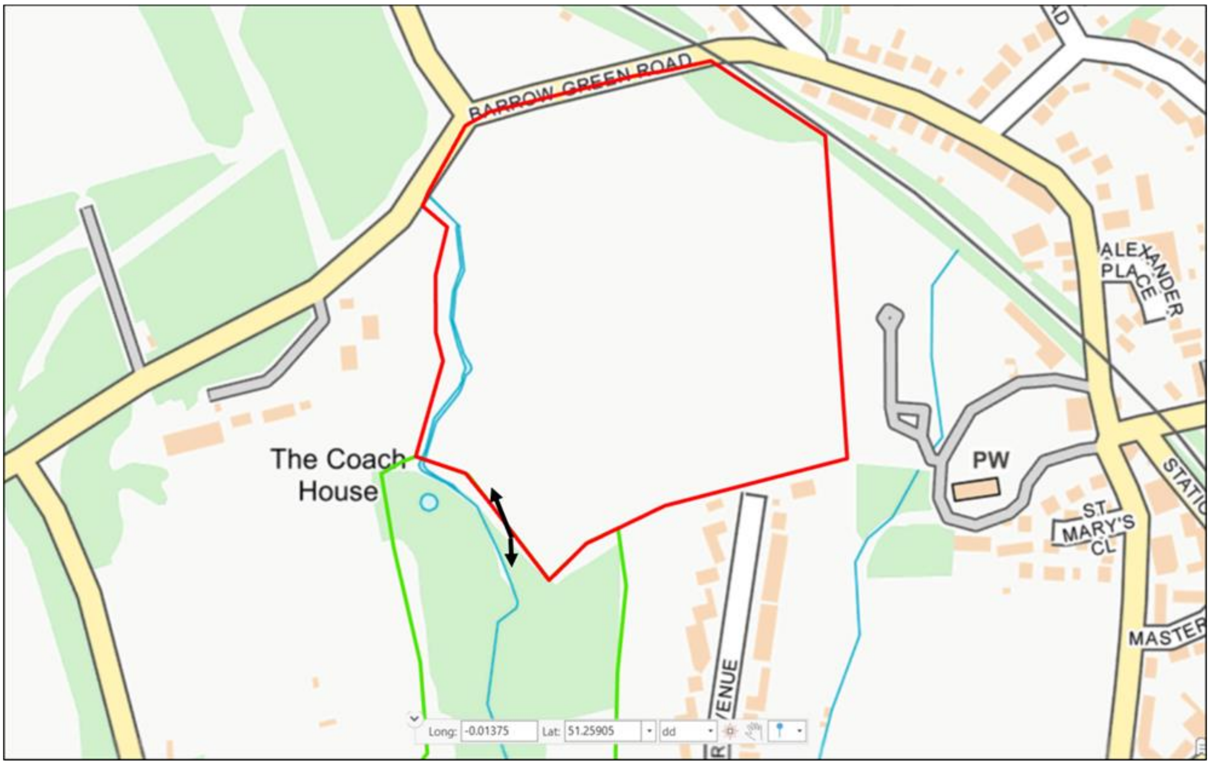

Figure A1. The location and orientation of photos shown in figures A2 – A6.

Figure A2. View of overland flow from the site towards The Bogs 08/01/2026.

Photo A3. Overland flow reaching the stream in The Bogs 08/01/2026.

Figure A4. Overland glow from the development site towards The Bogs 10/01/2026.

Figure A5. Overland flow from the development site towards The Bogs 10/01/2026.

Figure A6. Overland flow from the development site towards The Bogs 10/01/2026.