

Thank you Mr Crossan and good afternoon Sir. My name is Dave Howard, I have lived in Wetherby for 22 years years and am a founding member of the Better Wetherby Partnership

My initial interest in geology and the outdoors started at school, and then continued at University where I attended field trips and completed a couple of geology modules. I graduated with a degree in Chemistry in 1996 and the following year completed a 12 month post-graduate study into the “Geological Applications of Stable Isotope abundance ratios”

I’ve had a varied career incorporating Analytical Chemistry, Data Management, Contract Research, Computer System Validation, Consultancy and Quality Management. During this time I’ve published 23 scientific papers, including 20 related to Air Quality assessments.

My passion for Limestone started when I was at University after being introduced to caving. I was an active member of the British Cave Research Association from the mid seventies until about 10 years ago. During this time I participated in many BCRA scientific conferences, including chairing some sessions. I was active caver and explorer during this period; and accrued a detailed knowledge of limestone geology, principally to aid new exploration activities. I have been involved with numerous hydrological studies, for example water tracing and flood pulse testing, in Yorkshire, Derbyshire and Northern Spain.

More recently I have become an active member of a Wetherby Geology Group, participating and leading field studies and arranging lectures. I am also a regular attendee at Leeds Geological Association meetings.

What I would like to do now is to briefly summarise the more salient points of my Proof of Evidence document. This PoE identified shortcomings in the Appellants hydrological study and also provided some evidence to show that the water supply to the SAC has **already** been affected by the adjacent Bellway development.

As part of this summary I will take the opportunity too respond briefly to a few of the points raised in the Appellants rebuttal of my PoE.

In Paragraph 2.1 of my PoE I highlighted the underlying bedrock as being a “principal aquifer”. I also mentioned ‘fracture permeability’ a feature that is of prime importance to the drainage of this site.

I prepared a schematic diagram, as presented in Paragraph 2.2, depicting the fate of water draining from the proposed site. The arrows depict ‘**potential**’ subterranean water flows through the limestone bedrock. It is a feature of Permian limestones, in this instance the Cadeby formation, that water transport is controlled by fissures and fractures. The entire bedrock acts rather like a large sponge, directing water in a **predominantly** down-dip direction, until it reaches the water table, whence it is effectively free to spread in all directions.

The appellants themselves identify the bedrock as “**a highly permeable major aquifer**” on their Groundwater Vulnerability map in Appendix E of Appendix 2 of their rebuttal document. *(or page 95 of the whole document),*

The high permeability of these limestones means that it is rare to find any surface water run-off, water tends to rapidly infiltrate into the bedrock. To quote from Natural England’s profile of the Southern Magnesian Limestones “**The soils that cover 55 per cent of the area are free draining and thus valuable for aquifer recharge**”.

Accordingly I avoided any mention of soil, or surface water run-off, in my PoE; I consider them to be of very minor relevance in this scenario and would contend that virtually all the water in the SAC arises from groundwater through the underlying limestone aquifer.

I therefore believe the majority of the 170 or so pages dedicated to soil investigations in Appendix 2 of the appellants rebuttal are irrelevant and add nothing regarding impact on the SAC.

Similarly, as the drainage from the site is via groundwater, then the run-off data presented in Appendix 4 of the appellants rebuttal also adds very little.

I would now like to move on to paragraph 3.3 of my PoE, and the discussion of “dip”. The appellant has consistently claimed that the dip is to the South East. This claim was repeated approximately 8 times in their rebuttal and appears to be a cornerstone of their argument.

Yesterday I distributed the ‘correct’ version of the map depicted in Appendix 3 of the

rebuttal, this particular one is the **2003** edition of the British Geological Survey, sheet 70. You can see that I have highlighted a symbol very close to the SAC, clearly indicating a 5 degree dip to the **North-East**.

The appellants use of 'incorrect data', ie an obsolete and outdated map, fundamentally undermines much of their hydrology report, and renders many of their rebuttal comments as totally incorrect – there clearly is **not a south-easterly** “dip”, or as they incorrectly call it ‘plunge’, of the bedrock.

I find it difficult to comprehend why the appellant did not realise that the very old map in their rebuttal bore no resemblance to those shown in section 2.1 of their original hydrology report (also found in Annex E of their iHRA or pages 109 to 11 of ID10 the ecological statement). Their old map failed to identify the principle rock formations (Brotherton, Cadeby and Edlington), or even depict the ‘prominent east-west fault’ that was claimed to assist in the production of an impermeable barrier to water flow.

I would also draw your attention to Paragraph 2,3 of the rebuttal, the appellant uses obsolete bedrock names, MPM and UML; to cross reference their map, this also makes correlation with their original hydrology report problematic. Furthermore, I was very surprised to see their repeated reference to “**Magnesium**” Limestone, instead of the widely used term “**Magnesian**”.

In Paras 3.3 to 3.5 of my PoE I discuss various aspect of the appellant claims that groundwater emerges to the south and into the river Wharfe. I note that the appellant has not commented on the absence of springs and I have already shown that their claim of a dip in that direction is seriously flawed due to the reliance of incorrect and obsolete data.

I also highlighted the omission of the temporary ponds in Field A in their calculation of hydraulic gradients. The appellants claim that imposition of a hydraulic gradient to these ponds is incorrect, this claim is unsubstantiated but also probably indicative of another flaw in the original Hydrology report. I did suggest, on 13-Aug2018, in one of my original objections to this development, that the very use of hydraulic gradients in such a setting is invalid, such calculations only apply to porous, rather than permeable rock strata.

In Paras 3.6 to 3.8, I challenge the claims in the hydrology report that impermeable strata, the Edlington Formation, would impede flows. Their rebuttal simply repeated the claim that the SAC is fed by run-off, and that ground water would flow south, both of which I refute.

I would like to point out that the Edlington formation can be regarded as a 'leaky aquitard' ie something that is partially permeable. The Brotherton, Edlington and Cadeby formations are generally regarded as a single aquifer, implying that the Edlington formation could not play any role in impeding water flows.

I would now like to refer you paragraph 3.2 of their rebuttal - I should clarify that this is the second Para 3.2 and can be found on page 12. The appellants claim that the HBC Strategic Flood Risk Map 178 shown in their Appendix 6 map shows less than 25% risk of **groundwater** emergence. I believe that the appellant has again used an incorrect map in their rebuttal and that this statement is incorrect.

Yesterday I provided you with the latest version of this map and it clearly suggests that the area around ALL of the ponds I highlighted in my PoE and appendix are **indeed fed by groundwater**, typically with up to 75% risk of flooding from this source. I should also point out that this groundwater flood risk map also correlates very closely with the UK government flood risk maps I used in my PoE and appendix.

Interestingly, this map can also be filtered to show "Risk of Flooding **from Surface Water**". Such filtering shows no evidence of flooding in the area; as such it would appear to support my contention that surface water run-off has no role to play.

The appellants rebuttal statement includes many pages of historic rainfall data, attempting to disprove my photographic evidence of flooding. I suggest that these miss the simple point that my photographs were nothing more than representative example of differences on a particular day, one site showed flooding comparable to the flood risk maps, whilst another did not. I was trying to add a bit of objective evidence, to what has so far been little more than subjective opinions.

Therefore I would not wish to comment on the rainfall data, as there is no objective

evidence to correlate these with past flooding events, or more importantly impact on water levels within the SAC.

I must however comment on the assertion (Item 2.3 on page 11) that the photo of Field A taken 27 Oct was shortly after harvesting, I don't believe there is any particular evidence presented as to how recent the harvest was. I would add that some 3 weeks later I received an email from a resident of Aire Rd confirming that he has not observed any ponds on this field for about 2 years, he also included photos of Field A taken that morning. These photos were virtually identical to the one shown in my evidence - the field showed the same hay bales and virtually **no water**. That photo and email were dated 16-November, two days after commencement of the devastating floods that affected much of the north of England. I should also add that the hay bales were present on Monday this week – there was also still no signs of the flood water pond that has been present in previous years.

In summary I believe that my PoE demonstrates.

- The SAC is fed primarily from groundwater via the Permian aquifers.
- There is no evidence to support significant surface water run-off into the SAC
- There is strong evidence implicating the adjacent Bellway site with an overall reduction of water levels in the SAC
- Key aspects of the Appellants documentation are seriously flawed and based on inaccurate data

I strongly believe that, given the conservation objectives of maintaining the presence and permanence of ponds within the SAC, this development contravenes both paragraphs 175 and 177 of the NPPF, insofar as it is highly likely to produce -

1. “..significant harm..”,
2. “..significant effect..”,
3. “..loss or deterioration..” and
4. have an “..adverse effect..” on the integrity of the SAC.

Thank you very much for granting me the opportunity to express my concerns regarding this proposed development.