Proof of Evidence on drainage: Councillor Simon Pike

Land at Lawrences Lane, Thatcham, West Berkshire

Change of use to 7 no. Gypsy/Traveller pitches comprising 7 no. static caravans, 7 no. day rooms, 7 no. touring caravans and associated works

Appeal Reference: APP/W0340/W/22/3292211

(West Berkshire Council Planning Application No: 21/02112/FUL)

1 Introduction

1. I am Councillor Simon Pike, a Thatcham Town Councillor for the Thatcham West Ward, elected in May 2019. I became a member of its Planning and Highways Committee, and have been the Chairman of the Committee since May 2021. I am a Chartered Engineer and member of the Institution of Engineering and Technology. I have a BA(Hons) in physics from the University of Oxford.
2. I have more than thirty years' professional experience in writing and interpreting technical standards and regulations. Between 1999 and 2016 I was Chief Engineer, Regulatory and Spectrum for Vodafone Group, representing it in national and international meetings, either as a company representative or as a member of the UK delegation. This included presenting and scrutinising computer modelling relating to radiowave propagation.
3. This proof of evidence reviews the Outline Sustainable Drainage Strategy prepared by SLR Consulting and dated November 2022, which includes the earlier assessment dated 17 May 2022. It also addresses incompatibility of different plans, where this affects the feasibility of the proposed drainage strategy.
4. As a Chartered Engineer, I confirm that the opinions in this Proof of Evidence are my own views. I believe that they are within my competence as a practicing engineer, as they do not rely on any specialist knowledge or experience of drainage or hydrology.

2 Analysis of proposed drainage strategy

5. It appears to me that the proposed Surface Water Drainage Plan is unsound. It is not a feasible or deliverable scheme for managing surface water on this site. There are several reasons for this, mainly due to the slopes of the terrain across the site:
    - Because of the slope across the pitches, the permeable paving will not achieve the calculated storage capacity as a 'tank', and will therefore overflow.
    - This slope will also result in the flow of water downhill over the surface of the permeable paving blocks.
    - These will lead to an uncontrolled flow of surface water into the swale and down the bank outside the site onto Lawrences Lane.
    - There is an uncontrolled discharge of water into the culvert along Lawrences Lane.
    - The cutoff drain will direct surface water towards the neighbouring property and/or an uncontrolled flow to the detention pond.

6. My analysis is described in more detail in Appendix 1 to this document. The key elements are annotated on an extract of the Surface Water Drainage Plan in Appendix 4 of this document.
7. There are also inconsistencies between different plans associated with this application, so no single plan could form the basis of planning approval (to which many conditions would also need to be applied). This is described in more detail in Appendix 2.

Appendix 1

The key elements of the comments below are annotated on an extract of the Schematic of the Drainage Strategy, in appendix 4 of this document.

A1.1 Attenuation Pond (17th May report)

8. The diagrams in the report of 17th May show two alternative designs of attenuation pond, both with a capacity of 237m^3 (pdf pages 63 and 75 of the Outline Sustainable Drainage Strategy). This volume is apparently calculated on the basis of the pitches having an impermeable surface. Neither design is compatible with the site plan that was the basis of the analysis (TDA.2692.02), which has a proposed swale and attenuation pond with probably less than half this volume. Combined with an outflow limited to 3.3 litres per second, this volume would take twenty hours to empty.
9. The report states that "We therefore conclude that there is a deliverable drainage solution and as such would contend this could be dealt with by a suitably worded condition. It is difficult to understand how conditions made on the approval of an application based on the plan "Revised Site Layout, Landscape Strategy and Arboricultural Mitigation Measures" (TDA.2692.02) could have provided an adequate drainage strategy.

A1.2 Permeable Paving

10. The Outline Sustainable Drainage Strategy states that "The permeable sub-base to the permeable paving has been modelled as a tank assuming a depth of 0.3m and porosity of 0.3. The essence of a tank is that the surface of the liquid is horizontal. However, the permeable paving has a slope of 1.5m or more over a distance of just over 20m – or a gradient of around 7.5%.
11. The guidance document 'Understanding Our Paving' cautions that "When constructing concrete block permeable paving on sloping sites care is needed to ensure that the water in the permeable sub-base does not simply run to and collect or overflow at the lowest point, or the available storage will be reduced." British Standard 7533-13:2009 recommends that "For sloping sites where the subgrade gradient exceeds 5%, terraced areas of paving are separated below the surface by compartmental walls." (the relevant parts of both documents are copied in Appendix 3).

12. The modelling of the permeable paving as a tank is therefore fundamentally unsound.
13. The top surface of the permeable paving is shown as aligning with the natural ground contours and the constructed contours of the detention pond. To achieve this, the topsoil would need to be excavated to the total depth of the permeable paving system - which is around 450mm - and removed from the site. This would render invalid any assumptions about the ability of the site to absorb surface water.
14. The guidance document ‘Understanding Our Paving’ advises that “the maximum gradient of the pavement surface itself should be about 5% (1 in 20) to prevent water flowing over the surface rather than into the paving joints.”
15. The Outline Sustainable Drainage Strategy proposes that “Runoff from the roofs of the mobile home and dayroom on each pitch will be shed to the surface of the permeable paving”. It is likely that this concentrated source of water will flow down the surface of the and not percolate through - especially for the side of the mobile homes closest to Lawrences Lane, which will be very close to the edge of the paving.
16. For these reasons, an extreme rainfall event would result in overflow of the storage capacity of the permeable paving system, and surface water flow from the paving blocks. For the three southern pitches, any surface water flow will enter the swale in an uncontrolled manner. For the four northern pitches, it is likely to flow down the bank of Lawrences Lane and onto the highway.

A1.3 Cut-off drain

17. Along the line of the cut-off drain, the ground rises by around 0.7 m from where the boundary of the site bends from north to north-east (estimated from contours on Drawings 002 and 003 of the Surface Water Drainage Plan on pdf pages 28-29 and spot heights on the unnamed plan on pdf page 80). The total depth of the cutoff drain is 0.6m (measured from the inset detail on Drawing 003).
18. Therefore, any surface water that enters the cut-off drain to the south of the high point will flow southwards, and then either flow directly into the detention pond or onto the adjacent property.
19. The letter dated 17 May states (page 3 of letter; top of pdf page 34 of the Outline Sustainable Drainage Strategy):

    “During a site visit, a small ditch was noted immediately to the south of the site access at the northern end of the Site on the eastern side of Lawrences Lane. The ditch drains under the road in a small culvert and continues along the western side of Lawrences Lane before turning west along the rear of the properties along the northern side of Southend.

    This ditch therefore potentially provides a point of connection for the discharge of surface water runoff from the proposed development. Again, runoff off would have to attenuated to that of the undeveloped site …”

20. The Surface Water Drainage Plan does not show any attenuation of water from the cutoff drain (pdf page 29).

21. The slope of the southern part of the site is towards the south of where the culvert crosses Lawrences Lane. Therefore, any runoff from the southern part of the undeveloped site would not have been captured by the culvert.

A1.4 Capacity of drainage scheme

22. The storage capacity requirement of the drainage scheme is totally unclear. Section 5.7 of the Outline Sustainable Drainage Strategy states (pdf page 11): "The drained area has been taken as the area of hardstanding within the development as shown by the proposed development details enclosed at Appendix 03. This is an area of 3,100m^2". Appendix 03 is a form for a Thames Water pre-planning enquiry dated 1 February 2022, which gives a 'proposed impermeable area per connection' of 3200m^2 (pdf page 60). This led to a storage requirement of 237 m^3. However, section 5.8.1 of the Strategy provides a calculation leading to a volume of 40m^3. There is no explanation of how these two values for volume are consistent.

23. It appears that the proposed swale and detention pond have been dimensioned on the basis that the flow into them will be controlled by two flow control chambers. However, as discussed above, it is likely that they will receive significant uncontrolled flows, from overflow of the permeable paving, surface flow over the permeable paving, and from the cutoff drain. If the flow into the Detention Pond is significantly greater than has been calculated, it is likely to reach the overflow weir, and flow down into Lawrences lane

Appendix 2 Incompatibility of plans

24. The site boundary ('red line' area) on the Local Topography, Surface Water Drainage Plan and Network Schematic of the Drainage Strategy (Drawings 002, 003 and 004, pdf pages 28-30) is different to the Block Plan of the original application (001 09/08/2021); the amended plan for the Wheatcroft consultation (TDA.2692.02) does not show site boundary.

25. The amended plan for the Wheatcroft consultation (TDA.2692.02) shows a 'proposed pedestrian link' onto the southern end of the site from Lawrences Lane, with new timber steps to the site boundary and a path around the south of the proposed attenuation pond. The drawings in the Schematic of the Drainage Strategy do not show any pedestrian access, and the design of the proposed detention pond precludes one being added.

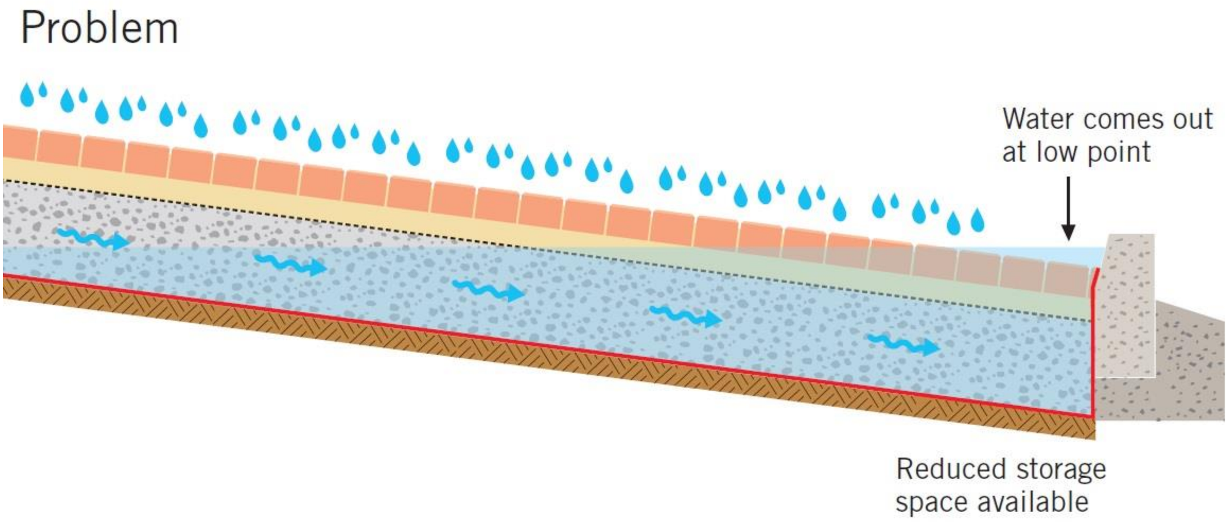
Appendix 3: Extracts from guidance documents

A3.1 Understanding Our Paving

From 'Understanding Our Paving: Guidance for designers, developers, planners and Local Authorities' (edition 5); published by Interpave, the Precast Concrete, Paving and Kerb Association[1].

Optimising site levels with CBPP *(concrete block permeable paving)*

"The maximum gradient of the pavement surface itself should be about 5% (1 in 20) to prevent water flowing over the surface rather than into the paving joints. To some extent, the CBPP surface can be considered independently of pavement base and existing ground levels. When constructing CBPP on sloping sites care is needed to ensure that the water in the permeable sub-base does not simply run to and collect or overflow at the lowest point, or the available storage will be reduced."



A3.2 British Standard 7533-13:2009

From BS 7533-13:2009; Pavements constructed with clay, natural stone or concrete pavers - Part 13: Guide for the design of permeable pavements constructed with concrete paving blocks and flags, natural stone slabs and setts and clay pavers.

5.3 Sloping sites

"In System B and System C the base can have a gradient of approximately 0.5% towards the drainage outlets. For sloping sites where the subgrade gradient exceeds 5%, terraced areas of paving are separated below the surface by compartmental walls."

4.2 Design considerations

There are three types of permeable pavement systems as given in 4.2.2, 4.2.3 and 4.2.4.

[1] http://www.paving.org.uk/documents/understanding-permeable-paving.pdf (page 10)

4.2.2 System A – total infiltration

"System A allows all water falling onto the pavement to infiltrate down through the joints or voids between the paving units passing through the constructed layers below and eventually into the subgrade. Some retention of the water will occur temporarily in the sub-base layer allowing for initial storage before it eventually passes through."

4.2.3 System B – partial infiltration

"System B allows all water falling onto the pavement to infiltrate down through the joints or voids between units passing through into the sub-base. A series of perforated pipes or fin-drains are normally laid at or near the top of subgrade to collect and to allow excess water to be drained to suitable sustainable drainage systems, e.g. sewers, swales or watercourses or a drainage system if permitted."

4.2.4 System C – no infiltration

"System C allows for the complete capture of the water using an impermeable, flexible membrane placed on top of the formation level and to the sides of the sub-base to effectively form a storage tank. A series of perforated pipes or fin-drains are placed on top of the impermeable membrane to transmit the water to sewers, watercourses or treatment systems."

Appendix 4 Annotated Surface Water Drainage Plan