ABLEY LETCHFORD PARTNERSHIP
Consulting Engineers

DOWNLANDS FARM, UCKFIELD

DOWNLANDS FARM FLOOD RISK AND DRAINAGE PROOF PAUL JENKIN

GLEESON LAND

20 OCTOBER 2023

Abley Letchford Partnership Limited
3 Tealgate
Charnham Park
Hungerford
RG17 0YT

T: 01488 684390
E: contact@alpce.co.uk
W: www.alpce.co.uk

Quality Management:

Prepared by:	Paul Jenkin
Authorised by:	Paul Jenkin
Date:	20 October 2023
Document Reference:	Downlands Farm Flood Risk and Drainage Proof Paul Jenkin

COPYRIGHT © ABLEY LETCHFORD PARTNERSHIP LIMITED
The material presented in this report is confidential. This report has been prepared for the exclusive use of GLEESON LAND within the terms of the contract and shall not be distributed or made available to any other company or person without the knowledge and written consent of Abley Letchford Partnership Limited.
Any such party relies on the report at their own risk.

Contents

1.0 Witness Details 1
2.0 Introduction 2
3.0 Report Structure 3
4.0 Appeal Site 4
5.0 Planning Policy 6
6.0 Proposed Drainage Strategy 7
7.0 Reason for Refusal and Responses 10
8.0 Issues Raised by Third Parties 17
9.0 Conclusion 19

Appendices

Appendix PJ1 – Paul Jenkin CV
Appendix PJ2 – Environment Agency Flood Maps
Appendix PJ3 – Industry Proprietary Product Option
Appendix PJ4 – SuDS Management Treatment Train
Appendix PJ5 – Directional Drilling Method Statement and Relevant Experience
Appendix PJ6 – Proposed Drainage Plan and Long Section Drawings
Appendix PJ7 – Industry Erosion Control Option
Appendix PJ8 – Industry Pipeline Repair Maintenance Options
Appendix PJ9 – Alternative Outfall Detail Option

1.0 Witness Details

1.1. I am Paul Jenkin BEng(Hons), MSc, CEng, C.WEM, FCIWEM and am currently employed by Abley Letchford Partnership (ALP) as Director of Flood Risk Management. I have 29 years' experience in the assessment and management of flood risk and have worked on many projects of similar scale and complexity to the Appeal Proposals. My CV is included in **Appendix PJ1**.

1.2. I was not involved with the Flood Risk Assessment and Drainage Strategy produced by Waterman Group to support the planning application, but I have reviewed all of the technical information and can confirm that I agree with their findings. I have also visited the site with one of the Waterman Team and acquainted myself with all of the technical details. I have been asked to present the technical evidence at this Inquiry, as my Client believes that my experience of providing evidence on complex cases will assist the Inspector in understanding the key points of detail.

1.3. I confirm that this evidence is my own true opinion and I have set out which areas are within my area of expertise and which are not and has been prepared in accordance with the professional standards of CIWEM and its Code of Conduct.

1.4. The reasons for objection in this case are somewhat unusual and combine issues of surface water drainage, flood risk and hydrology with the particular interests of Ancient Woodland and its Ecology. I am not an expert in these latter two areas and will refer to the evidence of Mr Forbes-Laird and Mr Baxter who are.

2.0 Introduction

2.1. This Proof of Evidence has been prepared on behalf of the Appellant (Gleeson Land) in relation to an appeal against the decision by Wealden District Council (WDC) to refuse planning permission (reference WD/2022/1637/MEA) for development on Land at Downlands Farm, Uckfield (the Site).

2.2. My evidence deals with Surface Water Flood Risk & Drainage and in particular the matters relating to Reason for Refusal Number 4.

3.0 Report Structure

3.1. This Proof of Evidence is specific to Surface Water Flood Risk & Drainage and associated matters relating to the Site's Ancient Woodland.

3.2. Following this section, my Proof of Evidence is structured as follows:

Section 4 – Appeal Site

Section 5 – Planning Policy

Section 6 – Proposed Drainage Strategy

Section 7 –Reasons for Refusal and Responses

Section 8 – Issues Raised by Third Parties

Section 9 – Conclusion

3.3. My Proof of Evidence is supported by the following appendices:

Appendix PJ1 – Paul Jenkin's CV

Appendix PJ2 – Environment Agency's Flood Maps

Appendix PJ3 – Industry Proprietary Product Option

Appendix PJ4 – SuDS Management Treatment Train

Appendix PJ5 – Directional Drilling Method Statement, & Relevant Project Experience

Appendix PJ6 – Proposed Drainage Plan & Long Section Drawings

Appendix PJ7 – Industry Erosion Control Option

Appendix PJ8 – Industry Pipeline Repair Maintenance Options

Appendix PJ9 – Alternative Outfall Detail Option

4.0 Appeal Site

4.1. The Site falls from east to west from approximately 57.0m Above Ordnance Datum (AOD) to approximately 33.0m AOD in the southern part of the Site and to approximately 23.5m AOD in the northern corner of the Site.

4.2. The British Geological Survey (BGS) for the area shows the bedrock of the eastern side of the Site is Upper Tunbridge Wells Sand Formation (sandstones and siltstones), the north-western area is Ardingly Sandstone Formation (sandstones), and the south-western area is Grinstead Clay Formation (mudstones).

River and Watercourse Flood Risk

4.3. The Shortbridge Stream and its parallel tributary is classified as a main river, and both are located beyond the Site to the west.

4.4. The Environment Agency (EA) fluvial map (**Appendix PJ2**) shows that the floodplain of Shortbridge Stream does not extend as far as the Site. Therefore, the Site is located in Flood Zone 1 which has a low probability of flooding from rivers or the sea.

4.5. There are watercourses, namely Budletts Wood Brook, Longwood Gill Brook and Shermanreed Wood Brook, each classified as an ordinary watercourse and are located within the Site. These are shown in **Appendix PJ2**. The watercourses connect into the Shortbridge Stream via culverts beneath the A22 highway which was observed during site visits.

4.6. The EA surface water map (**Appendix PJ2**) shows that the watercourses within the Site's Ancient Woodland have a high probability of flooding. However, there are no areas at high or medium risk of surface water flooding in the area of the Appeal Site that is proposed for housing.

Overland and Groundwater Flow

4.7. The Flood Risk Assessment & Drainage Strategy (CD2.82) assessed the overland flow and groundwater flow which was determined by site visits, review of the site investigations, hydrology and hydrogeology mapping, topographical and LiDAR data, drainage catchment, and coordination with Mr Forbes-Laird and Mr Baxter.

4.8. The site investigations and reporting were undertaken by BRD Environmental Limited who authored the Geo-Environmental Site Investigation (CD2.85) and Phase 1 Geo-Environmental Desk Study (CD2.84).

4.9. The Geo-Environmental Desk Study (CD2.84) confirmed the groundwater varies from 0.1 to 4.22 metres below ground level (mbgl) and has an average groundwater level of 1.9 mbgl.

4.10. Section 6.6.2 of the Geo-Environmental Desk Study confirmed that the Site's geological ability to infiltrate rainwater is very low. The maximum recorded rate was 4mm per hour.

4.11. Given the very low infiltration rate, the great majority of rainfall falling on the Site is being converted into surface water runoff which flows overland to the watercourses within Longwood Gill and Shermanreed Wood or via other drainage pathways to the Shortbridge Stream.

4.12. It should be noted that the overland flow route is not a uniform sheet of water which enters the watercourses throughout their whole length. Over the passage of time, the runoff has created preferential flow routes which enter the watercourses at discrete points along the length of the watercourses. This is important when it comes to the strategy for surface water drainage which I expand on later.

4.13. There are existing incisions into the flanks of Longwood Gill and Shermanreed Wood Brook which provides evidence of erosion from overland flow, and this will continue and worsen with climate change.

4.14. There are existing subsoil inflows into Longwood Gill and Shermanreed Wood Brook. These wet flushes and identifiable seepage areas have been located and further details are presented within Julian Forbes-Laid and Alistair Baxter's Proofs of Evidence.

5.0 Planning Policy

5.1. The Flood Risk Assessment & Drainage Strategy (CD2.82), two Drainage Technical Notes (CD2.97 and CD2.112) and Drainage Strategy Drawing (CD2.113) conform to the relevant national and local policies. These policies have been cited below to provide context:

National Planning Policy Framework (CD6-1)

5.2. The relevant paragraphs within the NPPF relating to flood risk and drainage are paras. 167 and 169.

Wealden Local Plan 1998 (CD6-3)

5.3. The relevant policies within the Local Plan relating to the assessment of environmental effects and adequate provision of surface and foul water drainage are in EN1 and CS2.

Core Strategy Local Plan (CD6-4)

5.4. The relevant policies within the Core Strategy Local Plan relate to the protection of bio and geo diverse areas, sustainable development (SPO13), and presumption in favour of sustainable development are SPO1, SPO13 and WSC14.

Wealden Design Guide (CD6-5)

5.5. The relevant paragraphs within the Wealden Design Guide relating to sustainable drainage, offsite impacts of the drainage design and the long-term maintenance of sustainable drainage systems are 8.6, 8.7 and 8.9.

Drainage Design Standards (CD10)

5.6. The relevant design standards are CIRIA's The SuDS Manual (2015), DEFRA's Sustainable drainage systems: non-statutory technical standards (2015) and East Sussex's SuDS Decision Support Tool for Small Scale Development (Version 2).

6.0 Proposed Drainage Strategy

6.1. The Flood Risk Assessment & Drainage Strategy (CD2.82) dated May 2022 proposed an outline drainage strategy that showed how surface water will be managed onsite whilst respecting the site constraints. This included an assessment and design consideration of the geology, hydrology, hydrogeology, overland flow, drainage routing, SuDS, attenuation, flow control, pollution control, drainage outfall connections and spatial planning.

6.2. The locations of outflow points into the Ancient Woodlands have been discussed with Mr Forbes-Laird and Mr Baxter and designed to replicate the existing surface water inflows thus minimising any change in the surface water flow regime.

Proposed Discharge

6.3. The proposed drainage strategy, through the use of SuDS and flow control systems restricts the surface water flow rate to the 1 in 2 year rainfall event. The strategy has been designed to accommodate all rainfall and storms up to the 1 in 100 year +45% climate change event.

6.4. It has been noted that there are issues associated with erosion, particularly during “flash floods”, which have the potential to detrimentally impact on the Ancient Woodland. I would also suggest that these impacts are likely to increase as a result of climate change and in particular it is highly likely that “flash floods” will become more frequent and more severe as time progresses.

6.5. In adopting the strategy above it is possible to reduce some of these impacts and partly mitigate the impacts of climate change.

6.6. The drainage strategy has the effect of reducing flash flooding for the Site, the local area, and the Site’s Ancient Woodland. In addition, the above has the effect of reducing erosion of the Site’s Ancient Woodland by restricting the flow rate and by introducing an erosion control system. Details of the erosion control system are presented in Section 7.

6.7. As with any storage-based drainage system there is a reduction in the peak run off rate but the overall volume of runoff within the system will remain largely constant.

Pollution Mitigation

6.8. The Proposed Development will introduce urban contaminants which will be mobilised and washed off urban surfaces and this could cause harm to the environment if not properly mitigated.

6.9. The common urban contaminants will include pollution hazard from oil spills from cars, trace metal from metal rooftops, litter, silts and microscopic solid particles. These are known as hydrocarbons, metals and total suspended solids.

6.10. Pollutants will accumulate over time and remain on the urban surfaces until a rainfall event occurs, this is known as the first flush. Small rainfall events pose the greatest risk to the environment given the pollutant accumulation and lack of rainwater volume dilution.

6.11. The pollution hazard introduced by the Proposed Development has been assessed as medium for the main access road and low for the rest of the Proposed Development. The assessment used the industry standard method called the Simple Index Approach and the Flood Risk Assessment & Drainage Strategy (CD2.82) provides details of this at paragraphs 4.37 - 4.42.

6.12. The method assesses the pollution hazard based on the specific land use, e.g. roads, and allows the drainage designer to identify the number and type of SuDS features required to mitigate the pollution hazard.

6.13. For illustrative and spatial planning purposes, the Drainage Strategy Drawing (CD2.113) shows the proposed strategic SuDS features which include 13no. detention basins and 1no. swale. Paragraphs 4.37 - 4.42 of Flood Risk Assessment & Drainage Strategy (CD2.82) confirmed that the strategic SuDS features will achieve the required pollution mitigation for the Proposed Development.

6.14. In my view, the drainage strategy as proposed would mitigate the risk of downstream pollution and contamination to the extent required by guidance. The LLFA have not suggested that the proposals would not adequately address pollution.

6.15. However, additional measures have been incorporated within the SuDS train which would further reduce the risk of contamination.

6.16. The Flood Risk Assessment & Drainage Strategy report (CD2.82) describes the SuDS features proposed. This includes the implementation of permeable paving and swales throughout the Proposed Development, and filter drains and filter strips where appropriate. For the remainder of this Proof of Evidence these features are referred to as the local SuDS features. The local SuDS features would in isolation achieve the pollution mitigation required.

6.17. Furthermore, there are a great many proprietary products available such as oil collectors and silt removers and these can easily be included within the drainage design. The proprietary products would achieve the pollution mitigation required in isolation. Some options can be found in **Appendix PJ3**.

6.18. As such, significant additional levels of pollution mitigation resilience can be provided should the combined SuDS features and products be introduced. I am not aware of any specific additional guidance regarding pollution control for surface water drainage systems which enter Ancient Woodland but it has been clearly demonstrated, in my view, that the risk of pollution has been reduced to the lowest practical level.

6.19. Practically, pollution mitigation will be delivered by connecting the SuDS via buried pipework in a series, known as a SuDS treatment management train.

6.20. The SuDS treatment management train will capture, convey, and store all surface water runoff from urban surfaces while delivering pollution mitigation and is a tried and tested approach for achieving a robust pollutant removal strategy.

6.21. The SuDS treatment management train will consist of the following proposed SuDS features and has been diagrammatically shown in **Appendix PJ4.**

- Permeable paving systems are designed roads and footpaths that are formed with porous surfacing to allow rainwater to drain through the surface and into the gravel road foundation below. They convey and slow down surface water and the gravel provides pollution mitigation through physical processes (filtration, sorption and sedimentation) and biological processes (biodegradation).
- Roadside swales are designed open ditches formed of sloped banks and a flat base. They convey and slow down surface water. The vegetation and underlying soil structure provide pollution mitigation through physical processes (filtration and absorption) and biological processes (evapotranspiration and subsoil biota).
- Filter drains are designed ditches filled with engineering gravel to the ground level. They convey surface water and the gravel provide pollution mitigation through filtration.
- Filter strips are designed grass verges. They convey and slow down surface water and the vegetated surfaces provides pollution mitigation through filtration and sedimentation.
- Detention SuDS basins are designed dry ponds formed of sloped banks and a flat base. During heavy rainfall they fill up with surface water and provide attenuation storage together with the flow control system. The vegetation and underlying soil structure provides pollution mitigation through physical processes (filtration and sedimentation) and biological processes (evapotranspiration, biodegradation and subsoil biota).

7.0 Reason for Refusal and Responses

7.1. Further to the WDC SoC (CD1/6) and the Flood Risk & Drainage SoCG, it was provisionally agreed that the parties would respond to each outstanding issue through its Proof of Evidence, including where necessary, reference to further detail on the outline drainage proposals. The outstanding issues are:

- Point 1 - Potential impact on Ancient Woodland from elements of drainage infrastructure located within 15m buffer zones (Paragraph 5.58 of WDC SoC).
- Point 2 - Potential impacts on the Site's Ancient Woodland through directionally drilled connections and installation of prefabricated headwalls (Paragraph 5.59 of WDC SoC).
- Point 3 - Potential impacts on Ancient Woodland arising from SuDS failure or exceedance.
- Point 4 - Whether the areas at high risk of pluvial flooding in the Ancient Woodland (considered as similar to Flood Zone 3) would affect the proposed SANG.
- Point 5 - Potential impacts on Ancient Woodland from altered hydrology.
- Point 6 - Whether further details can and ought to be left to planning conditions on the Full application for the SANG, where this relates to the irreplaceable habitat.

7.2. Within the following sections I will demonstrate why this Reason for Refusal does not provide a reasonable basis for refusing planning permission.

Point 1

7.3. On this first point Mr Forbes-Laird deals with this in Section 6.2 of his Proof and in my mind there seems to be no doubt that surface water drainage features are permitted within the buffer zone subject to the provisos below.

7.4. Natural England and the Forestry Commission's Guidance (January 2021) sets out two sustainable drainage requirements for land development. They are:

- "they do not affect root protection areas"
- "any change to the water table does not negatively affect ancient woodland or ancient and veteran trees"

7.5. The proposed SuDS basins are located outside the root protection areas and therefore do not impact the Site's Ancient Woodland, ancient trees or veteran trees. The spatial planning considerations can be seen on Waterman's Drainage Layout found in **Appendix PJ6**. Further details of the Ancient Woodland are presented within Julian Forbes-Laid and Alistair Baxter's Proofs of Evidence.

7.6. The matter of the water table is one which does also relate to matters of disagreement with third parties and I set out my views on this below.

7.7. Section 6.6.2 of the Geo-Environmental Site Investigation (CD2.85) confirmed that the Site's geological ability to infiltrate rainwater was very low. The highest rate was 4mm per hour which confirms that the subsoil is in effect impermeable as it can only support a very slow movement of infiltration into the water table.

7.8. My view is that under the existing hydrological regime the vast majority of any incident rainfall will manifest itself as surface water runoff and enter the surface water drainage system that currently exists. Very little would pass downwards and into the aquifer.

7.9. Paragraph 4.9 confirmed that the groundwater varies from 0.1 to 4.22 mbgl as part of seasonal variation dictated by a regional groundwater aquifer. As such, the Ancient Woodland is supported by a fluctuating water table and of course wider natural variations such as drought to deluge. DEFRA's aquifer mapping which is included in the Phase 1 Geo-Environmental Desk Study (CD2.84) shows the extent spanning parts of Sussex and Kent and this demonstrates the scale of the water table supporting the Site's Ancient Woodland.

7.10. On this basis the proposals to develop the Site are very unlikely to change this hydrological regime or significantly alter any recharge of the aquifer.

7.11. The Proposed Development does not introduce shallow or deep borehole soakaways which may pose a risk of changing the local water table.

7.12. The Proposed Development does not include any basement construction, earthwork cuttings or groundwater extraction wells which may pose a risk of displacing the local water table.

7.13. Given the existing permeability and development proposed, I cannot see any evidence that developing the Site would change the water table.

7.14. In my view Point 1 has been satisfied and there should be no reason to object on this basis.

Point 2

7.15. The form of construction proposed for the SuDS outflow connections into watercourses will be made using directional drilling techniques. The depth of the connections will be a minimum of 1m below the existing ground level. Julian Forbes-Laird has stated that 90% of roots are within the top 60mm therefore the proposed connection will be outside the rootzone and provides a very high factor of safety. The drainage connection routes have been previously confirmed and are centrally positioned between surveyed tree locations. These are shown on Waterman's Drainage Plan & Connection Long Section Drawings found in **Appendix PJ6.**

7.16. Directional drilling is a tried and tested solution for forming trenchless drainage connections and can core through solid mass rock without the requirement for blasting. In the present case there is no solid rock present on Site and no risk of the drill encountering obstacles.

7.17. Mr Forbes-Laird deals with this in Section 6.3 of his Proof and he has reviewed the proposed strategy and method statements. He sets out why this approach would have no significant impact on the woodland and where this has been approved and implemented elsewhere.

7.18. As set out previously, I was not involved in the production of the current drainage strategy and whilst I am in agreement that it would function adequately and meet all guidance, my observations on site suggest that it would be possible to reduce the scope of the drainage strategy by shortening some of the outlet pipes and/or potentially adopting overland flow options as I discuss later. In my view, this would be a normal part of detailed design as we move from a concept plan to actual delivery and the LLFA would be fully involved in the process.

Construction Methodology:

7.19. A E Yates, a specialist drilling contractor, has relevant experience of forming trenchless connections and have been engaged throughout the project. A E Yates' project experience has been listed in **Appendix PJ5**.

7.20. To provide even greater assurance that the directional drilling will not impact on the Ancient Woodland, A E Yates and Waterman undertook a site visit in August 2023 and A E Yates has subsequently prepared a Method Statement for the Proposed Development. Refer to A E Yates' Method Statement found in **Appendix PJ5**.

7.21. In summary:

- No machinery is required within the Site's Ancient Woodland.
- Any machinery working within the Ancient Woodland's 15m buffer zone will run on temporary ground protection in accordance with BS5837:2012.
- Directional drilling can navigate through the soils with extreme levels of accuracy. A sonde radio transmitter will be used to track the exact location of the drill head.
- Directional drilling will follow the proposed drainage connection line however can be locally redirected, if required.
- The directional drilling launch pit will be 2m x 2m x 1.2m deep and located outside the Site's Ancient Woodland.
- Directional drilling does not require a receiving pit therefore no excavation is required within the Ancient Woodland.
- The pilot hole will be cored first and will detect any ground obstruction issues, however none are expected based on the ground investigations previously undertaken.
- Once the pilot hole is formed the 130mm diameter main core will be formed and 100mm diameter drainage pipeline laid simultaneous.
- To avoid the risk of polluting and damaging the Ancient Woodland, a biodegradable and unpolluting drilling cooling fluid will be used.

Erosion Control:

7.22. To consider the erosion risk in further detail, I have reviewed the proposed flow rates and connections. These are set out in the table below.

7.23. Given the flow rates and pipe diameter stated above, the need for prefabricated headwalls in the Ancient Woodland to stabilise the pipe as it emerges from the ground will not be required and therefore are no longer proposed.

7.24. To mitigate against the erosion risk as described in Paragraph 4.14, a simple geosynthetic ground matting is proposed although many other options are available. This system will be hand installed to ensure that the construction is sensitive to the existing environmental conditions. One option can be found in **Appendix PJ7**.

7.25. To reduce potential blockages and to allow easy annual maintenance, it is recommended that the pipeline be a minimum of 100mm in diameter. Pipeline repair maintenance, if required for any reason, can be undertaken by trenchless techniques from outside the Ancient Woodland. Some options can be found in **Appendix PJ8**.

7.26. As discussed previously, the drainage strategy has the effect of reducing the flow rate from larger flood events which would reduce erosional forces and create some associated betterment. The proposed drainage has the effect of significantly reducing flow rates and by implication flow velocities. These locations are shown in the drawing which accompanies **Appendix PJ6**.

Connection Ref	Existing Flow Rate (l/s)	Proposed Flow Rate (l/s)	Required Outfall Diameter (mm)
C1.1	8.5	1.1	30
C1.2	8.5	1.1	30
C2	12.1	1.6	40
C3	3.5	0.5	25
C4	4.5	0.6	25
C5	8.2	1.1	30
C6.1	12.4	1.6	40
C6.2	12.4	1.6	40
C7	47.3	6.1	60
C9	25.9	3.4	50
C10	5.2	0.7	25

Alternative Outfall:

7.27. To consider the option of an alternative outfall arrangement, I have reviewed the proposed flow rates, Site's Ancient Woodland extents and ground levels.

7.28. It is possible to form a trenched pipe outfall connection which would be outside the Site's Ancient Woodland, and which would drain overland to the watercourses. Geosynthetic ground matting would need to be applied to the SuDS basin for erosion control reasons. Refer to alternative outfall detail found in **Appendix PJ9**.

7.29. On the basis of the above, I am clear that there are many options that could be considered as part of any design solution. However, I would make the following key points in respect of this specific objection.

7.30. The design as proposed will work, will not impact on the Ancient Woodland and has been approved and successfully adopted elsewhere.

7.31. In my view, the amount of directional drilling could be reduced by creating outfalls above the level of the existing watercourses.

7.32. Furthermore, the approach of directional drilling could be avoided by utilising a less controlled overland flow approach, subject to approval.

7.33. In all cases there is no reason to conclude that the method of connecting the surface water drainage system to the existing watercourse would have any negative impact on the Ancient Woodland.

Point 3

7.34. When considering exceedance events one needs to consider that these are rainfall events which are very large and lie outside of the range for which we normally design. Under these conditions there is widespread flooding and the flows in all watercourses will be far above normal levels. All catchments are saturated and run off rates are typically 100% (or close to it).

7.35. One must also consider how the event develops. It does not occur instantaneously. What would happen is that we would experience the design event as we expect but, rather than decreasing, the rainfall would continue and the peak flow would continue to rise. In that sense, all of the things that happen in the design event happen as expected but the event gets a bit worse.

7.36. The proposed SuDS basins have been located at the lower parts of the Site to allow the proposed drainage system to drain via gravity.

7.37. The system has been designed to accommodate storms up to the 1 in 100 year +45% climate change event. Storms that exceed this threshold are known as a flood exceedance event or a critical flood event. In a post development flood exceedance event, the proposed SuDS basin would capture 9,000m^3 of surface water volume within the main basin and would also capture an additional 3,000m^3 of volume within the freeboard. The position of the SuDS basins means that when they exceed their capacity the surface water would overflow the crest of the basins and flow overland to the watercourses within the Ancient Woodland therefore mimicking the existing flood overland routing.

7.38. In a pre-development exceedance flood event, all of the surface water would flow overland in an uncontrolled manner along existing flow routes to the Site's Ancient Woodland and other watercourses.

7.39. Once developed, the proposed drainage strategy would intercept 12,000 cubic metres of this runoff and therefore has the effect of significantly reducing the flood risk and erosion of the Site's Ancient Woodland.

7.40. As far as pollution is concerned this will already have been washed off and controlled during the early part of the exceedance event and the later exceedance rainfall would be falling on essentially clean surfaces.

7.41. Section 6 above provide details of the SuDS treatment management train and confirmed that pollution is being managed by the strategic SuDS feature. Alternately and/or additionally the local SuDS features and proprietary products can also provide pollution management and resilience.

7.42. A pollution incident from SuDS failure would require a complete system failure given the level of pollution mitigation resilience achievable. As such this risk has been assessed as very low.

7.43. Any residual pollution which left the Site would be entering a drainage system in full flood flow and be subject to very high levels of dilution. In my experience we do not normally consider how to design for this small and unlikely contingency.

Point 4

7.44. This is not a matter which forms part of the Reason for refusal (4) or part of the Council's statement of case. My understanding of the Council's concern is that whilst the SANG itself would be water compatible and would therefore not be vulnerable to flooding in a conventional sense that those using the SANG might try to avoid the flooded areas and therefore enter the Ancient Woodland.

7.45. Considering this I would point out that the areas of high surface water flood risk are very limited and associated with the ditches/watercourses which currently pass through the woodlands.

7.46. On my visit to the site it seemed obvious that the existing paths crossed these ditches at a high level and would be likely to be above the relevant flood risk level. It is my understanding that these routes will be maintained and enhanced with boardwalks etc.

7.47. In my view the Council's apparent concern could be obviated by a simple condition requiring these routes to be above the relevant flood level.

Point 5

7.48. This point is not immediately part of the Reason for refusal (4) or the Councils Statement of Case. However, it is part of the general assertion that the proposed drainage strategy will create an unacceptable change to the existing flow regime. I have set out below why I do not believe this is the case and also further in Section 8 where I deal with similar concerns of the Third Parties.

7.49. It is essentially common ground that the ground conditions create low levels of infiltration and as such the vast majority of any rainfall falling on the catchment will manifest itself as surface runoff.

7.50. It is also common ground that the majority of this runoff would enter the woodland via natural processes of runoff.

7.51. Where I disagree with the Council is on the nature of this natural flow. The Council are expressing the view that runoff leaves the proposed development area in a uniform sheet which is then distributed evenly throughout the length of the woodland watercourses.

7.52. This is obviously not the case and it can be clearly seen, both on the surface of the grassland and the points where water enters the woodlands, that there are preferential pathways. These are witnessed both by the obvious erosion features and the plant life which is indicative of wetter areas (see Mr Baxter and Mr Forbes-Laird).

7.53. Geomorphologically speaking this is how landscapes are formed with water carving flow routes onto the landscape over many centuries and millenia.

7.54. In producing the drainage strategy we have adopted these preferential flow routes to guide the locations of discharge points such that the overall hydrological regime is maintained as I have set out earlier. This has been done in consultation with Mr Baxter and Mr Forbes-Laird.

7.55. I am therefore confident that the proposed drainage strategy mimics the natural flow regime to the extent that is possible.

Point 6

7.56. Although I have agreed this as part of the areas of disagreement I am still unclear what issues and conditions concern the Council.

7.57. As far as the drainage scheme itself is concerned it will have no impact on the SANG. It has been agreed that it is suitable to apply conditions to the surface water drainage design as would be normal for an outline planning consent.

7.58. Whilst there is some limited flood risk from pluvial flooding within the SANG it is common ground that this risk would not be increased by the proposed drainage strategy.

7.59. In my view the application of conditions to the proposed drainage strategy would have no bearing on flood risk to the SANG.

8.0 Issues Raised by Third Parties

8.1. In terms of flood risk and drainage and the associated surface and groundwater issues the relevant information is that from Dr Thompson in his proof dated 22nd September 2023.

8.2. The stated issues relate to how surface water and groundwater transfer between the proposed development area and the Ancient Woodland. In my opinion this has been addressed by Mr Forbes-Laird and Mr Baxter in their evidence and usefully summarised in the Sylvan Technical Note which I referred to earlier.

8.3. Recognising the limitations of my expertise in hydrogeology I have limited myself to what I consider to be the facts in respect of surface water hydrology with a limited explanation on groundwater flows.

8.4. My first point is that there seems to be no disagreement between any of the parties that the soils have low permeability and that the majority of rainfall runs off from the Site. There also seems to be no disagreement that in the main the run off follows established flow paths over land and into the streams within Longwood Gill and Shermanreed Wood.

8.5. As it is the case that most of the rainfall runs off the Site due to the soil's low permeability then it is also the case that little, if any, of the rainfall will percolate through the soils and enter the aquifer below.

8.6. The exception to the mechanism above in my view is Lake Wood. The topography of the Appeal Site would clearly drain toward the north west and under the A22 rather than heading south west towards Lake Wood and this becomes very obvious on visiting the Site.

8.7. A very small area to the south east of the Site could drain topographically towards Lake Wood. However, there is a bank which runs along the Ancient Woodland boundary and a shallow ditch to the north of it which would, in my opinion, divert any flows to the north west and ultimately under the A22 away from the Site.

8.8. I am of the view that there is no surface water connection between the Site and Lake Wood.

8.9. As far as groundwater flows are concerned I would offer a logical view based on general experience rather than a detailed hydrogeological assessment. The sandstone aquifer is very large and the water within it arises from many contributions across its entirety. The Site is small by comparison and therefore unlikely to have any significant bearing on water levels within the aquifer. This must also logically be the case as it is accepted that the overlying soils are highly impermeable and so the existing opportunities for water to travel vertically down into the aquifer must be limited.

8.10. On this basis where the impacts of the Site on the overall groundwater levels appear to be minimal I am of the view that whether the Site is developed or not is unlikely to affect groundwater levels overall.

8.11. As regards the impacts of the proposed drainage strategy on the overall hydrology of the other areas of Ancient Woodland I would make the following points (a) the proposed outfalls are in the locations where flow currently enters the woodlands; (b) the overall volume of water entering the woodlands will be very similar to the existing volumes; (c) the peak rates of flow will reduce thus reducing erosion; and (d) the impacts of flash floods and their increase due to climate change will also be reduced.

8.12. Taking these points together and recognising that the location and design of these outfalls has been discussed with Mr Forbes-Laird and Mr Baxter (both being experts in Ancient Woodland) there is no evidence that the proposed scheme would detrimentally affect the surface water hydrology of the Ancient Woodland and by extension the Woodland itself.

9.0 Conclusion

9.1. The EA fluvial map shows that the floodplain of Shortbridge Stream does not enter the Site. Therefore, the Site is located in Flood Zone 1.

9.2. The EA surface water map shows the flood extents of the watercourses to be limited in width as it follows the length of the watercourse. Nevertheless, the watercourses are subject to having a high probability of flooding.

9.3. It is common ground that the area proposed for development is at little or no risk of flooding from any source.

9.4. Given the very low infiltration rate, the great majority of rainfall landing on the Site is being converted into surface water runoff which flows overland to the watercourses within Longwood Gill and Shermanreed Wood. There are existing incisions into the flanks of Longwood Gill and Shermanreed Wood Brook which provides evidence of erosion from overland flow, and this will continue and worsen with climate change.

9.5. The proposed surface water drainage strategy adopts these flow routes as part of the outfall strategy to ensure there would be no impact on the overall surface water hydrology. This has been discussed and agreed with experts in Ancient Woodlands.

9.6. It is common ground that if implemented as proposed the surface water drainage strategy would not increase flood risk.

9.7. The proposed drainage strategy provides flood risk betterment by restricting the surface water flow rate to the 1 in 2 year rainfall event which will reduce flash flooding and erosion of the Site's Ancient Woodland which is currently at risk. This will also act to reduce erosion and any increases that might arise as a result of climate change.

9.8. I have demonstrated that the location of the balancing ponds within the Ancient Woodland buffer would be acceptable.

9.9. I have demonstrated that the proposed directional drilling will not cause harm to the Ancient Woodland, and that alternative outfall options are available.

9.10. I have demonstrated that a pollution incident from SuDS failure would be very unlikely. I have also demonstrated that the level of pollution mitigation resilience achievable through the SuDS treatment management train would be significant.

9.11. The proposed strategy would act to reduce the flooding impacts of an exceedance event and there is also no significant chance that this event would add to the risk of pollution.

9.12. It is my view that all of the issues raised by the Council have been addressed either through the existing strategy or via developments that could be made through detailed design in the normal way.

9.13. In respect of [redacted] concerns, the general surface water hydrology points are covered above. With specific reference to Lake Wood I do not believe there is a surface water flow route from the Appeal Site to Lake Wood. I also think it is unlikely that the proposed development could have any significant impact on groundwater levels within the Sandstone Aquifer.