



Land at Bird in Eye Farm, South of Bird in Eye Hill, Uckfield

Proof of Evidence

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PINS Ref: APP/C1435/W/22/3307820

LPA Ref: WD/2021/2198/MAO

On behalf of **Croudace Homes Ltd**

Project Ref: 48494/2002 | Rev: | Date: August 2023

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1 Introduction

1.1 Introduction

- 1.1.1 I am Amy Hensler BSc (Hons), MSc, MCIWEM, C.WEM, CEnv, Director of Flood Risk at Stantec UK Limited (Stantec). I am an experienced practitioner with over 20 years' experience in professional engineering and environmental consultancy and a chartered environmentalist and chartered water and environmental manager. My academic qualifications include a BSc (Hons) in Geography from the University of Southampton and an MSc in Water Resource Management and Technology from the University of Birmingham.
- 1.1.2 The evidence that I have prepared and provide for this appeal (APP/C1435/W/22/3307820) in this proof of evidence and the accompanying appendices is true and has been prepared and is given in accordance with the guidance of my professional institution and I confirm that the opinions expressed are my true and professional opinions.
- 1.1.3 This Proof of Evidence addresses matters relating to flood risk and drainage. A Flood Risk Assessment (FRA), including Drainage Strategy and SuDS Report, (April 2021) was prepared for the Appeal Site by Stantec (appeal document CDA.18), submitted to Wealden District Council as part of planning application WD/2021/2198/MAO.
- 1.1.4 The Appeal site is located at Bird in Eye Farm, to the east of Uckfield in East Sussex. The site is split into two parcels, an area of approximately 25ha of land which has been set aside as Suitable Alternative Natural Green Space (SANG) and an area of approximately 16ha of where up to 290 dwellings plus associated infrastructure and green space are proposed.

1.2 Scope

- 1.2.1 My proof of evidence will concern flood risk and drainage, and address concerns raised by the local planning authority and the Rule 6 party within their respective Statements of Case.
- 1.2.2 As set out in the Weald District Council's Statement of case, there is a putative reason for refusal relating to surface water drainage, as follows:

Putative Reason for Refusal 3 – this reason for refusal is dependent upon the Inspector's *Wheatcroft* ruling on drainage details:

Whilst the site is within flood risk zone 1, details in the flood risk assessment and surface water drainage strategy in relation to surface water flooding for this major development fail to demonstrate to the satisfaction of the Local Planning Authority that the proposed development on the site would not increase flood risk elsewhere.

The scheme, as amended in March 2022, relies on infiltration from the SuDS basin when it is not demonstrated that the site conditions will allow for infiltration. In the absence of proof that infiltration potential exists, insufficient information has been lodged to demonstrate water quality improvements will be provided to ensure that runoff from the application site will not result in the deterioration of the lower land. This includes to the adjacent Ancient Woodland, but also the Framfield Stream which is a tributary of the River Uck.

Whilst the Council cannot demonstrate (at the time of writing) an up to date 5 Year Housing Land Supply, and the proposed development would provide a contribution to addressing the undersupply, the potential effects of the proposal upon flood risk and the conflict with development plan policies significantly and demonstrably outweigh the benefits of development. The presumption in favour of development is, therefore, outweighed by the significant and demonstrable harm. The proposal therefore conflicts with Saved Policies EN1, EN8, EN13 and CS1 of the adopted Wealden Local Plan (1998), coupled with Policies WCS12 and WCS14 of the adopted Wealden Core Strategy Local Plan (2013) and the NPPF 2021.

- 1.2.3 However, pursuant to receipt of the Lead Local Flood Authority's consultation dated 2nd August 2023 stating their position of no objection to the surface water drainage, Wealden District Council confirmed on 8th August 2023 that they will no longer be pursuing Putative Reason for Refusal 3.
- 1.2.4 Nevertheless to assist the inspector within this proof, I will consider the sequential approach and set out information regarding flood risk to aid the application of the sequential test. Mr Brown will address the policy elements of the sequential test within his evidence.
- 1.2.5 I will demonstrate that the development proposals are resistant and resilient to all sources of flood risk, taking into account the projected impacts of climate change, and that flood risk would not be increased to third parties. I will set out the surface water drainage strategy and confirm that there will be no detrimental impact on the ancient woodland and as such addresses the Putative Reason for Refusal.
- 1.2.6 Evidence will also be provided that addresses concerns raised within the Rule 6 Party's statement of case, within Section 8. In summary, I will confirm that the proposals are in accordance with national and local planning policy with regard to flood risk and drainage.

2 Relevant Planning Policy and Guidance

2.1 National Planning Policy

- 2.1.1 The National Planning Policy Framework (NPPF) (2021) Section 14 relates to development, flood risk and climate change. The associated Planning Practice Guidance (PPG) (last updated August 2022) 'Flood risk and coastal change' provides further clarification on the application of the NPPF in practice.

159. *Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*
160. *Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.*
161. *All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:*
- a) applying the sequential test and then, if necessary, the exception test as set out below.*
 - b) safeguarding land from development that is required, or likely to be required, for current or future flood management.*
 - c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management), and*
 - d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.*
162. *The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.*
163. *If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.*
164. *The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that: a) the development would provide wider sustainability benefits to the community that outweigh*

the flood risk; and b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

165. *Both elements of the exception test should be satisfied for development to be allocated or permitted.*

166. *Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-making stage, or if more recent information about existing or potential flood risk should be taken into account.*

167. *When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment⁵⁵. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

168. *Applications for some minor development and changes of use⁵⁶ should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.*

169. *Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits.*

2.1.2 It is noted that NPPF was updated in July 2021, following submission. The one change within the Planning and Flood Risk section is in Paragraph 161 (then paragraph 157), and included the addition of the words highlighted bold below:

161. *All plans should apply a sequential, risk-based approach to the location of development – **taking into account all sources of flood risk** and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.*

2.1.3 However, it should further be noted that paragraph 160 (then paragraph 156) refers to 'flood risk from all sources' and this is unchanged. As such, the July 2021 changes to NPPF did not fundamentally change planning policy with regard to flood risk and how the Sequential Test should be applied, rather the change serves to reinforce the policy and the intent was always for all sources of flooding to be considered.

2.1.4 The PPG provides more information on the sequential approach as follows:

The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Avoiding flood risk through the sequential test is the most effective way of addressing flood risk because it places the least reliance on measures like flood defences, flood warnings and property level resilience features. Even where a flood risk assessment shows the development can be made safe throughout its lifetime without increasing risk elsewhere, the sequential test still needs to be satisfied. Application of the sequential approach in the plan-making and decision-making process will help to ensure that development is steered to the lowest risk areas, where it is compatible with sustainable development objectives to do so, and developers do not waste resources promoting proposals which would fail to satisfy the test. Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk. (Paragraph: 023 Reference ID: 7-023-20220825).

2.2 Local Planning Policy

2.2.1 Relevant Wealden Local Plan (1998) included states:

EN4 New development will be resisted within areas at risk of deep tidal flooding, coastal erosion or within river floodplains.

2.3 Climate Change

- 2.3.1 Climate change guidance is set out within the Flood Risk Assessments: Climate Change Allowances document (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>), last updated in May 2022.
- 2.3.2 The FRA and surface water drainage strategy consider impacts of climate change as set out in the February 2016 revision of this guidance. Since the issue of the FRA and Surface Water Drainage Strategy, it has been updated further, and the latest update was published in May 2022. The implications of the May 2022 updates are considered in this proof of evidence.

3 Consultation Responses

- 3.1.1 The responses received from statutory consultees with a remit including flood risk and surface water drainage are summarised in this section.

3.2 Environment Agency

- 3.2.1 The Environment Agency (EA) responded to the planning application on 26th October 2021.
- 3.2.2 Their response noted that they have no objection to the application as submitted.
- 3.2.3 Their response also notes that a permit would be required for any works on or within 8m of the Framfield Stream, which is a Main River. Any Flood Risk Activity Permit would need to be sought prior to construction.

3.3 East Sussex County Council as Lead Local Flood Authority

- 3.3.1 Pre-application discussions were held with the LLFA in 2020 as detailed within Appendix F of the FRA.
- 3.3.2 On 4th November and later the 15th December 2021, East Sussex County Council as the Lead Local Flood Authority (LLFA) issued responses which detailed an objection due to insufficient information.
- 3.3.3 Specifically, this objection related to the proposal to discharge the attenuated surface water through an existing clearing through the Ancient Woodland.
- 3.3.4 An updated response on 11th March 2022 removed this objection, noting that the information provided is satisfactory and enables the LLFA to determine that the proposed development is capable of managing flood risk effectively. Recommended conditions were included within this response.
- 3.3.5 The surface water drainage strategy had been amended, following infiltration testing, to drain the site via infiltration rather than through a discharge into the Framfield Stream.
- 3.3.6 On 2nd August 2023, the LLFA stated their position regarding the Appeal Scheme which proposed discharging the surface water, attenuated, into the Framfield Stream north of the ancient woodland. They have stated that they do not object to the proposals and proposed conditions, and in consequence the Local Planning Authority has indicated that it does not propose to defend putative reason for refusal 3.

3.4 Wealden District Council Engineers

- 3.4.1 A response to the planning application was received on 25th October 2021 noting *“the sequential test is met, and the exception test is not required for this site. The nearby areas in Flood Zones 2 and 3 alongside the watercourses described below are outside the site boundary. The site does not appear to be at risk from tidal, sea or fluvial flooding or from failure of a drainage asset such as a canal or reservoir. The site is at very low risk of flooding from surface water, with medium to high-risk areas alongside the watercourses described below outside the site. There is no information on groundwater..... There are no records of flooding at or near this location within this Council’s land drainage database .”*
- 3.4.2 This statement by WDC accords with the evidence within the FRA and this proof. The vast majority of the site is at low or very low risk of flooding from fluvial, pluvial (surface water) or groundwater sources and therefore there is a negligible risk of flooding to the residential development. The proposals within areas of higher risk of flooding – a drainage outfall and a

footbridge across an ordinary watercourse – are de minimis in terms of any potential impacts and are Water-Compatible Development as defined in Annex 3 of the NPPF.

- 3.4.3 An objection was received, primarily related to the proposal to discharge the attenuated surface water through an existing clearing through the Ancient Woodland.
- 3.4.4 A further response was received on 2nd November 2021, responding to further information from Stantec. (17th November). The objection was maintained and requested that infiltration testing be carried out at this stage in the planning process to determine whether infiltration is feasible.
- 3.4.5 A further memorandum was received on 1st March 2022, in response to the amendment to the scheme to drain via infiltration. In this response, no objection is noted, and conditions are recommended.
- 3.4.6 To date, no response has been received by the WDC Engineer to the Appeal Scheme which proposes discharging the surface water, attenuated, into the Framfield Stream to the north of the ancient woodland.

3.5 Southern Water – Foul Water

- 3.5.1 Southern Water responded to the planning application consultation on 22nd October 2021. This response is appended. Southern Water does not object to the proposals.
- 3.5.2 Their response primarily focuses on foul water, although some commentary and guidance are provided on adoption of SuDS features.
- 3.5.3 Their response notes that an initial desktop study undertaken by them has indicated that the additional foul sewerage flows may lead to an increased risk of foul flooding from the sewer network and that any network reinforcement that is deemed necessary to mitigate this will be provided by Southern Water.
- 3.5.4 It recommends that the developer should work with Southern Water to ensure that the delivery of the network reinforcement aligns with the proposed occupation. The response advises that:
“Southern Water endeavour to provide reinforcement within 24 months of planning consent being granted (Full or Outline) however for large developments our assessment of the timescales needed will require an allowance for the following which may result in an extension of the 24-month period: - Initial feasibility, detail modelling and preliminary estimates.
- Flow monitoring (If required)
- Detailed design, including land negotiations.
- Construction.”

Southern Water hence requests the following condition to be applied:

Occupation of the development is to be phased and implemented to align with the delivery by Southern Water of any sewerage network reinforcement required to ensure that adequate wastewater network capacity is available to adequately drain the development.

- 3.5.5 Southern Water has confirmed that they have no objection to the development, and that it is their responsibility to provide the infrastructure for the development's foul sewerage system to connect into the wider network beyond the site. A condition is proposed, with regard to phasing, to ensure that there is no detrimental impact on the wider network as a result of the development. As such, this matter is addressed, and no further consideration is given to foul water within my evidence.

4 Development Proposals and Flood Risk Management

- 4.1.1 Within this section, I consider each potential source of flooding in turn, setting out the potential risk, under existing conditions and under the potential impacts of climate change, and set out how the development proposals have responded to flood risk to manage this risk.
- 4.1.2 A series of flood maps based on the EA's opensource data can be found in Appendix A for the whole site including the SANG.

4.2 Hydrological Context

- 4.2.1 The nearest 'Main River' watercourses to the Appeal Site are the Framfield Stream which flows from south to north along the western boundary of the Appeal Site towards its confluence with the River Uck, also a 'Main River' approximately 375m north of the site boundary. The Chalybeate Arm, designated as an Ordinary Watercourse, runs in parallel to the Framfield Stream to the west of the site, and is a tributary of Framfield Stream before its discharges into the River Uck.
- 4.2.2 There is an Ordinary Watercourse which flows east to west from Hailwell Farm to the Framfield Stream through the centre of the site. OS mapping indicates that there is a spring joining this ordinary watercourse and another joining the Framfield Stream to the north of the site.

4.3 Fluvial Flood Risk

- 4.3.1 Fluvial flood risk, i.e. that from rivers, occurs when channel capacity is exceeded either due to heavy rainfall or high groundwater, or a combination of both.
- 4.3.2 The majority of the appeal site is shown by the EA's 'Flood Map for Planning' to lie within **Flood Zone 1 'Low probability'**. The areas adjacent to the Framfield Stream, along the western boundary, and the unnamed watercourse through the centre of the site are shown by the EA 'Flood Map for Planning' to lie within Flood Zone 2 and 3 'Medium and High probability' (see figure 4 in Appendix A). The areas at medium or high probability of fluvial flooding are very small, as set out in Table below.

	Flood Zone 3 (1 in 100 annual probability of flooding)	Flood Zone 2 (1 in 1000 annual probability of flooding)
Area of whole Appeal site in Flood Zones	1,960m ² , 0.5%	10,550m ² , 2.5%
Area to north of Woodland W2	1,880m ² , 1.1%	5,080m ² , 2.9%
Area of proposed houses	0m ² , 0.0%	0m ² , 0.0%
Area of proposed residential parking	0m ² , 0.0%	0m ² , 0.0%
Area of proposed roads	0m ² , 0.0%	0m ² , 0.0%
Area of proposed SANG car park	0m ² , 0.0%	0m ² , 0.0%

- 4.3.3 It should be noted that the flood zones for the ordinary watercourse through the centre of the site are based on the worst historic flood extent in the absence of any detailed modelling of this watercourse. Additionally, there is no national-scale fluvial modelling of this watercourse due to its catchment size. However, based on the remotely sensed topographic data in Figure: 03.1 in Appendix A it is anticipated that the floodplain would be narrow and largely contained within the ancient woodland area.
- 4.3.4 The topographic survey, undertaken in March 2020 by Encompass Surveys Ltd (appendix B of the FRA) of the site has been undertaken and confirms that the site falls west from a high point of approximate 53.0m AOD at the northeast corner, towards a low point of 21.0m AOD on the western boundary.
- 4.3.5 The EA provided modelled design flood levels for the Framfield Stream in April 2020, found in Appendix D of the FRA. The modelled flood level at the south of the site, the most upstream point of the site, is 21.95mAOD in a 1 in 100 annual probability event plus 45% allowance for climate change in an undefended scenario. The EA also provided defended scenario flood levels, for the 1 in 100 plus climate change event, though did not specify the allowance assumed in this climate change event; in any case the flood level is lower, at 21.79mAOD.
- 4.3.6 The vast majority of the site beyond the woodland corridor lies above 22mAOD and is therefore the risk posed to the majority of the site is negligible and limited only to the far west of the site adjacent to the watercourse. As shown by the 5m contours presented in Figure: 03.1, the vast majority of the site lies at least 5m above the elevation of the river corridors.
- 4.3.7 Fluvial climate change allowances, as recommended by the Government, can be found at <https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow>, to be used as set out in the guidance summarised in Section 2.3. The recommended allowance varies according to the lifetime of the development, the geographical location and the proposed land use. The Appeal Site lies within the Adur and Ouse Management Catchment; the proposed land use is More Vulnerable and the design life, as residential, would be 100 years. Therefore, the appropriate allowance for use would be the 37% increase in peak flow, taken from the Central Allowance projection to the 2080s.
- 4.3.8 The relevant allowances considered within the 2021 FRA were 45% and 105%, as set out Section 3.7 and paragraph 5.2.2 of the FRA. The latest guidance requires the consideration of a lower allowance for climate change and therefore the recommendations within the FRA with regard to fluvial flood management are still valid.
- 4.3.9 There are no proposals for built development within Flood Zones 2 or 3 beyond the (water compatible) outfall to the Framfield Stream toward the north of the site and the possible need to upgrade a pedestrian crossing over the unnamed watercourse into the SANG and as such there will be negligible impact on fluvial flood risk as a result of the proposals.
- 4.3.10 Given the low risk of flooding to the Appeal Site from fluvial flooding, there are no specific management measures required with regard to fluvial flood risk, the development will be safe from fluvial flooding, including the allowance for climate change scenario, and will not increase risk to third parties. In the event of a fluvial flood event to the extent shown on Figure 4 in Appendix A, people would route to the southern SANG area via the path to the east of W2 (which bridges over the relevant watercourse on an existing raised track) which is at lower risk of fluvial flooding.
- 4.3.11 Beyond the site, there is a flood risk associated with the Framfield Stream to the B2102 from a fluvial flood on the Framfield Stream as shown on the EA's Flood Map for Planning.
- 4.3.12 Photographs are provided within Appendix D of the Rule 6 Statement of Case of 'recent flooding'. No dates are provided for these event(s), and it is not clear whether this was caused by a fluvial or pluvial event, but these photographs indicate shallow flooding to the road near to the Framfield Stream crossing. One photograph indicates a vehicle passing through this flood water.

- 4.3.13 Given the relatively small catchment area and resultant catchment response, it is anticipated than any flooding would recede quickly, within a matter of hours.
- 4.3.14 Safe access is available to the site to the east, towards Framfield, should flood depths on the B2102 be temporarily too deep for traffic.
- 4.3.15 The fluvial flood risk to Framfield Road is an existing risk. As noted in paragraph 4.1.11 above, there will be no increase in fluvial flood risk as a result of the development and therefore the development will not exacerbate this flood risk. This is because runoff will be controlled to current greenfield rates and there is negligible encroachment into the fluvial floodplain.
- 4.3.16 In conclusion, as accordance with NPPF paragraph 167 (specifically parts a, b, d and e),
- a sequential approach has been applied such that the highest vulnerability land uses are located in the areas of lowest flood risk.
 - the development is flood resistant and resilient and no specific management measures are recommended with regard to flood risk for the lifetime of the development.
 - a significant freeboard of several metres is provided between fluvial flood levels and the residential development, to manage any residual risk, and
 - safe access is provided.

4.4 Pluvial Flood Risk

- 4.4.1 Pluvial flooding is that which occurs from rainfall falling into the land and running overland before it is infiltrated into the ground or reaches a watercourse.
- 4.4.2 The EA's Flood Risk from Surface Water maps show that pluvial flood risk in the vicinity of the appeal site is predominantly limited to the main rivers and ordinary watercourse corridors along the western boundary and through the centre of the site. (see Figures 5 and 5.1-5.3 in Appendix A).
- 4.4.3 The vast majority of the site is shown to be at Very Low probability of pluvial flooding, with a probability of less than 1 in 1000 annual probability.
- 4.4.4 There are very small, isolated corridors shown to be at Low probability of flooding, with a probability of between 1% and 0.1% annual probability, and with a flood depth of below 300mm. This limited flooding, based on the topography of the site, would be caused by rainfall falling on the site rather than flowing onto the site from elsewhere, and would be readily managed by the surface water drainage strategy.

- 4.4.5 The areas at medium or high probability of pluvial flooding are very small, as set out in Table below.

	High risk of surface water flooding (greater than 1 in 33 annual probability of flooding) (Figure 5.1)	Medium risk of surface water flooding (between 1 in 33 and 1 in 100 annual probability of flooding) (Figure 5.2)
Area of whole Appeal site at risk of surface water flooding	680m ² , 0.2%	2,590m ² , 0.6%
Area north of Woodland W2	280m ² , 0.15%	460m ² , 0.25%
Area of proposed houses	0m ² , 0.0%	0m ² , 0.0%
Area of proposed residential parking	0m ² , 0.0%	0m ² , 0.0%
Area of proposed roads	0m ² , 0.0%	0m ² , 0.0%
Area of proposed SANG car park	0m ² , 0.0%	0m ² , 0.0%

- 4.4.6 Rainfall climate change allowances, as recommended by the Government, can be found at <https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall>, to be used as set out in the guidance summarised in Section 2.3. The recommended allowance varies according to the lifetime of the development, the geographical location and the proposed land use. The Appeal Site lies within the Adur and Ouse Management Catchment and the design life, as residential, would be 100 years. Therefore, the appropriate allowances for consideration would be 25% and 45% increases in rainfall during the 1 in 100 annual probability rainfall event. The relevant allowances at the time of the preparation of the FRA were 20% and 40%. As the risk of pluvial flood risk to the majority of the site is low or very low, the small increase in climate change allowances will have a negligible impact on the site.
- 4.4.7 The vast majority of the site beyond the woodland corridor lies above 22mAOD and therefore the risk posed to the majority of the site is negligible and limited only to the far west of the site adjacent to the watercourse. As shown by the 5m contours presented in Figure: 03.1, the vast majority of the site lies at least 5m above the elevation of the floodplain corridors. As such, significant freeboard is provided to the residential development from any pluvial flooding within the watercourses.
- 4.4.8 Furthermore, as set out in the FRA in Section 5.2.3, it is recommended that the finished floor levels of all residential units are set a minimum of 150mm above surrounding ground level to manage the residual risk associated with excess surface water in an exceedance rainfall event. It is also recommended that exterior ground levels are contoured to direct water away from dwellings in such a scenario. Qualitative exceedance flow routes are presented in Figure 48494/2002/SK07 in Appendix D.
- 4.4.9 All of the More Vulnerable development (i.e. the housing and associated roads, parking etc) will be located in areas at Low or Very Low probability of pluvial flooding, and as explained above, the very small areas at Low Risk (0.1%) are readily addressed through standard mitigation as just described. There is a footpath route through the SANG which will cross the ordinary watercourse in two locations, including one new footbridge. This watercourse corridor is at high surface water flood risk; as amenity open space, this land use is Water Compatible Development.
- 4.4.10 Figure 05.2 in Appendix A shows the EA's risk of surface water flooding in the 1 in 100 annual probability event (It should be noted that this modelling is coarse and national scale and takes no account structures such as bridges). At the eastern crossing of this watercourse, the

proposed footpath will utilise the existing track crossing over the watercourse, so there will be no changes to the landform. Depths are shown to be less than 300mm depth of flooding, noting that no account is made for the existing structure itself, so this is likely to be conservative. As such, flood depths are likely to be negligible on this crossing and it will be safe to walk through for pedestrians.

- 4.4.11 For the western, new crossing, depths are indicated to be up to 600mm. Any crossing will be set in accordance with LLFA requirements but will be raised above the channel. In the event that the footbridge or footpath is inundated, safe passage can be provided at the existing, eastern crossing of the circular route. In the unlikely event of both crossings being temporarily too deep to cross, there is still an area of the SANG at low flood risk to the north which would be safe and accessible to all. As such, there would be negligible risk to people using the bridge crossing, and there would be no risk to the bridge crossing itself as it would be designed in accordance with EA requirements. A land drainage consent would be required prior to construction of any replacement footbridge.
- 4.4.12 As such, there will be negligible impact on pluvial flood risk as a result of the proposals. The footbridge crossing will be subject to land drainage consent and designed to have a negligible impact to flow processes and therefore any impact on water levels will be local and not extend beyond the red line.
- 4.4.13 Beyond the site, there is a flood risk associated with the Framfield Stream to the B2102 from pluvial flooding as shown on the EA's Risk of Flooding from Surface Water map. It is noted that the depths presented on the EA's surface water flood map are shallow, up to 300mm. A number of the local roads to the south of the B2102 are also at risk of pluvial flooding.
- 4.4.14 Safe access is available to the site to the east, towards Framfield, should flood depths on the B2102 be temporarily too deep for traffic.
- 4.4.15 In conclusion, as accordance with NPPF paragraph 167 (specifically parts a, b, d and e),
- a sequential approach has been applied such that the highest vulnerability land uses are located in the areas of lowest flood risk,
 - the development is flood resistant and resilient and no specific management measures are recommended with regard to pluvial flood risk for the lifetime of the development,
 - a freeboard of 150mm is recommended for the residential units to manage the residual risk of an exceedance rainfall event, and
 - safe access is provided.

4.5 Groundwater Flood Risk

- 4.5.1 There is no site-specific dataset of groundwater flood risk, however, as set out within this section, it is anticipated that the areas of groundwater flood risk are limited to those areas closest to the watercourses, in the lowest lying areas of the site, following a similar, narrow corridor to the fluvial and pluvial floodplains.

- 4.5.2 As noted in the Wealden Level 1 SFRA, paragraph 132, groundwater flooding can be caused by
- High water tables – influenced by the type of bedrock and superficial geology.
 - Seasonal flows in dry valleys, which are particularly common in areas of chalk geology.
 - Rebounding groundwater levels, where these have been historically lowered for industrial or mining purposes.
 - Where there are long culverts that prevent water easily getting into watercourses.
- 4.5.3 Of these, the first cause, a high-water table, may affect parts of the site. It is noted that there is a spring emerging, as shown on OS maps, near Hailwell Farm, adjacent to the ordinary watercourse that runs east-west through the ancient woodland in the centre of the site towards the Framfield Stream. Additionally, there is a spring emerging within the woodland immediately south of Framfield Road, close to the Framfield Stream. The existence of the springs indicates that these watercourses flow has a high groundwater component, Further that the proximity of these springs close the watercourses indicates that due to the topography of the site, high groundwater would not impact the majority of the site.
- 4.5.4 There is no evidence, following a walkover survey and inspection of the topographic survey, of any dry valleys. There is no evidence that groundwater levels have been historically lowered and there are no long culverts adjacent to the site.
- 4.5.5 The FRA, paragraph 3.2.1, notes that there are no records of groundwater flooding within the site boundary.
- 4.5.6 Although there are no data sets that set out risk zones or probabilities for groundwater flood risk, it is reasonable to conclude that parts of the site (those already within the fluvial and pluvial floodplains) are at high risk of groundwater flooding due to underlying ground conditions.
- 4.5.7 The Wealden SFRA (May 2022) provides a district-wide map of groundwater flood risk obtained from East Sussex County Council within Appendix F of their report. This shows areas of groundwater concern, where geological and hydrogeological conditions indicate that groundwater might emerge or impact basements or subterranean infrastructure. It does not show the likelihood of groundwater flooding for any particular return period. The resolution is coarse, but the map indicates the northern half of the site is shown to be in an area of groundwater concern, as well as the very southern part of the SANG area.
- 4.5.8 Paragraph 135 of the SFRA notes that the dataset covers “a large area of land, and only isolated locations within the overall susceptible area are likely to suffer the consequences of groundwater flooding.” Parts of the site are indicated to lie within an area of groundwater concern based on the maps within Appendix F of the Wealden SFRA (2021).
- 4.5.9 It is anticipated that the water table will be closely related to the water level within the channels of the watercourses on and adjacent to the site. The site rises steeply away from these watercourses, and while it is acknowledged that the groundwater hydraulic gradient will also rise away from the watercourses, it is considered that the hydraulic gradient of the groundwater will be much less steep than the topography above. There is no evidence of dry valleys within the site or any anecdotal evidence of groundwater flooding on the site, and the springs indicated on OS mapping are located in low-lying areas of the site very near the watercourses. It is therefore anticipated that any groundwater flooding within the appeal site would be limited to adjacent to the watercourses, on the lowest lying areas of the site.
- 4.5.10 No specific measures are recommended to manage groundwater flood risk over and above those set out in Sections 4.2 and 4.3. This is because measures to manage fluvial or pluvial

flood risk will also manage the localised risk of groundwater flood risk as a matter of course. The only proposed encroachment into the groundwater flood risk area would be the drainage outfall and the proposed pedestrian access bridge. As already mentioned, these are water-compatible developments, as provided in Annex 3 of the NPPF.

- 4.5.11 There is no national guidance on how groundwater flood risk may change with climate change. However, it is likely that the lowest lying areas of the site will continue to be at risk of groundwater flood risk.
- 4.5.12 In conclusion, as accordance with NPPF paragraph 167 (specifically parts a, b, d and e),
- a sequential approach has been applied such that the highest vulnerability land uses are located in the areas of lowest flood risk.
 - the development is flood resistant and resilient and no specific management measures are recommended with regard to groundwater flood risk for the lifetime of the development.
 - significant freeboard is provided above any likely groundwater flood level due to the topography of the site, and
 - safe access is provided.

4.6 Summary of Flood Risk

- 4.6.1 The vast majority of the site is located at low or very low risk of flooding from all sources, including fluvial, pluvial and groundwater sources. There are corridors immediately adjacent to the watercourses to the west and south of the site that are at a higher risk of flooding, but these are constrained by the steep nature of the site.
- 4.6.2 There is a reservoir located in the upper reaches of the Framfield Stream, far upstream of the site. In the unlikely event that this failed during a 'wet day' extreme flood event, the fluvial floodplain through the site from the Framfield Stream would be marginally increased, as shown in Figure 6 in Appendix A, but still contained within the narrow floodplain corridor. As set out in Section 3 of the FRA, there is no history of sewer flooding within the site, and there are no other manmade sources of flooding that could affect the site.

4.7 Response of the Development to Flood Risk

- 4.7.1 The NPPF encourages the application of the 'sequential approach' in the master-planning process for new development, i.e. locating the more sensitive/vulnerable elements of new development in the areas which lie at lowest probability of flooding. The intention of this is to ensure that people, buildings and infrastructure are not exposed to unnecessary risk, and that there is no burden placed on regulators and emergency services as a result of this unnecessary risk.
- 4.7.2 A sequential approach has been followed in determining the layout for the site, in accordance with NPPF paragraph 159 and WDC Local Plan EN4. As all residential development lies within Flood Zone 1 and at low risk of flooding from pluvial and groundwater sources, the sequential approach is inherent in the proposed layout and the SANG proposals.
- 4.7.3 The FRA recommends that finished floor levels of the residential development is located above the design flood level including allowance for climate change and a freeboard, as recommended by British Standards and EA guidance. As set out in paragraph 5.2.2 of the FRA, the finished floor levels will be at approximately 26mAOD or higher, approximately 4m higher than the design flood level, well above the British standards recommended freeboard of 300mm. The FRA further recommends that ground flood levels are set above the surrounding

ground level, by a minimum of 150mm, to manage any risk associated with excess surface water runoff during an exceedance event.

- 4.7.4 A pedestrian crossing is proposed to cross the unnamed watercourse through the centre of the site. A new bridge would require land drainage consent prior to construction and will be in accordance with LLFA requirements and will therefore have a negligible impact on fluvial and pluvial flood flows.
- 4.7.5 The access to the site and the B2102 adjacent to the site are at low risk of flooding from fluvial, surface water and groundwater sources and therefore safe access is available to the proposed development.
- 4.7.6 It is noted that some localised parts of the Uckfield road network, including the Framfield Road, are at higher risk of flooding from fluvial or surface water sources, but alternative routes are available, particularly to the east.
- 4.7.7 There will be no change to fluvial flood risk to the Framfield Stream as a result of the development, as no residential development is proposed within the floodplain. Further, surface water runoff from the site will be restricted to greenfield runoff rates. As such, the existing local flood risk to the road network will not be increased by the development.

5 Surface Water Drainage

5.1 Surface Water Drainage Strategy

- 5.1.1 The outline surface water drainage strategy has evolved since the 2021 submission, responding to comments received from both ESCC, as LLFA, and WDC. The Appeal submission includes a surface water strategy that takes on board concerns regarding whether an infiltration-based strategy (by itself) is feasible and potential impacts on the Ancient Woodland.
- 5.1.2 The Strategy is presented in Technical Summary – Surface Water Drainage Strategy (dated January 2023) and illustrative drawing 48494-2002-SK05-A (Appendix B). This was submitted to ESCC and WBC in January 2023, but no response has been received from either party to date.
- 5.1.3 In August 2023, a topographic survey was provided for the outfall location on the Framfield Stream. The illustrative Drainage Strategy plan 48494-2002-500 B has been produced, incorporating this topographic survey. Illustrative plan 48494-2002-SK05-A has also been revised to revision B, incorporating this survey. These plans are appended in Appendix B, along with the topographic survey. These illustrative drawings supersede the drawings discussed in Section 5.1.2 above.
- 5.1.4 This additional topographic survey has confirmed an outfall level of 19.157mAOD, where revision A had estimated an outfall level of approximately 19.974mAOD. The outfall location is slightly different, following review of the additional topographic information and Root Protection Areas of existing trees at that location, so the final pipe run has increased in depth and length marginally and the gradient has slacked from 1:10 to 1:10.7. The revision plan provides greater certainty and detail regarding the outfall and confirms that the proposals are robust. No other changes are incorporated into these revisions.
- 5.1.5 It should be noted that the majority of the drainage strategy is unchanged since the LLFA approved the strategy in March 2022. The basin and the routes from the site to this basin are unchanged; it is only the method of conveying water from the basin into the wider network that has changed.
- 5.1.6 The details of the surface water drainage strategy are as follows:
- Runoff from courtyard parking areas will drain directly to permeable paving, which will form the courtyard parking surface itself. Each block is served by at least one courtyard parking area. These will then drain to a conventional pipe system.
 - Runoff from residential roof areas and highways will drain directly to the conventional pipe system.
 - Flows will be conveyed by the pipe system towards two perimeter swales to the south and west of the site. The vegetated swales themselves will intercept highway runoff, via filter strips, from adjacent highway areas.
 - The swales will convey runoff toward a detention basin which will provide strategic attenuation storage for the proposed development.
 - The detention basin has been designed to manage runoff from the development up to the 1 in 100 annual probability storm event, plus additional allowance for increased peak rainfall intensities due to the anticipated effects of climate change. Peak discharge rates will be limited to match the present-day existing greenfield runoff rate up to the 1 in 100-year storm event. This has been calculated to 16.5 l/s/ha – based on the calculated

impermeable area of the proposed development this results in a peak discharge rate of 199.5 l/s.

- The detention basin has a maximum storage depth of 1.0m above its base level and a maximum freeboard of 0.6m above that i.e. maximum detention basin depth is 1.6m. Some areas of the detention basin will be deeper owing to accommodating the local topography. The detention basin will have side slopes no steeper than 1 in 3. The detention basin design also includes a 2m wide maintenance strip at the top of the freeboard level.
- During the detailed design, additional excavation will be incorporated into the basin to provide an over dug area set approximately 150mm below the outfall level. This would be designed to hold the first 'flush' of rainfall during any event, for up to 5mm of rainfall; this volume of water would then be able to infiltrate, as it will be set below the outfall invert. The volume of this over dug area would not form part of the volume of the basin. This would serve to maintain the hydrological processes as existing during normal conditions.
- Restricted discharges from the basin will be conveyed by a pipe and discharged into the Framfield Stream. The route of the outfall pipe has been designed to avoid being within 15m of the Ancient Semi-Natural Woodland (ASNW) both in its construction and ongoing operation and maintenance.

5.1.7 It should be noted that the recommended climate change allowances for rainfall are now 25% and 45%, where the allowances were 20% and 40% at the time the calculations were undertaken. Additional analysis presented in Appendix C demonstrates that the change to the recommended rainfall allowances would result in an increase in area of the detention basin by approximately 150m², which equates to approximately 3% of the area of the basin. This can readily be accommodated within the public open space as detailed design progresses. No material change to the current illustrative proposals would be indicated to incorporate this.

5.1.8 The components of the surface water drainage strategy have been developed to adoptable standards, so far as practicable for an outline planning application. It is intended that the surface water drainage strategy will be adopted by Southern Water for operation and maintenance once constructed. The exception being the permeable paving which does not comply with adoption criteria, this would need to be privately maintained.

5.1.9 The drainage strategy described within this section addresses part c of paragraph 167 of the NPPF.

5.1.10 As per Section 3.3, the LLFA has no objection to the proposed drainage strategy and has proposed conditions.

5.2 Water Quality

5.2.1 The surface water drainage strategy incorporates water treatment measures, in line with current guidance, to manage water quality.

5.2.2 All surfaces (residential roofs, driveways, car parks, highways) of the development will benefit from water quality treatment processes by draining via the perimeter swales and detention basin.

5.2.3 The FRA demonstrated that, using the industry-accepted Simple Indices Approach within CIRIA C753 (the SuDS Manual), surface water runoff from all surfaces would be adequately treated by these two components.

5.2.4 Additionally, further water quality treatment will be provided at source for the courtyard parking areas by a permeable paving construction and by the filter strip for areas of highway adjacent

to the perimeter swales, which will intercept this runoff rather than it entering the piped system before the swale.

- 5.2.5 The FRA recommends that rain gardens / bioretention features are utilised where possible within the development proposals, and locations will be determined at detailed design.
- 5.2.6 With reference to CIRIA C753, the drainage strategy proposed provides a greater degree of treatment than required.
- 5.2.7 As such, the quality of the surface water entering the ancient woodland as interflow or runoff will have been more than sufficiently treated. There will be no deterioration in terms of water quality entering the ancient woodland. This will also ensure that the water entering the Framfield Stream via the attenuation basin is also of sufficient quality that there will be no detriment to that water body.

5.3 Outfall from the Detention Basin

- 5.3.1 Drawing 48494-2002-SK05-B sets out a proposed route for pipes to convey the surface water outfall from the detention basin into the Framfield Stream to the north of the Ancient Woodland. This will drain by gravity and will not require pumps.
- 5.3.2 The location of the manholes has been determined to ensure that they are less than 6m below ground level, which would be the maximum adoptable depth. As shown on the drawing, the proposed depths do not exceed approximately 4.9m depth.
- 5.3.3 The manholes indicated for the surface water outfall route will require excavation for their installation. Although the detailed design has not progressed to date, it is anticipated that the manholes would be 1350mm, as the outfall pipe is 375mm diameter. Allowing for 150mm during installation, it is expected that a construction hole of 1650mm diameter would be needed, and manhole boxes and trench boxes would be used to hold the excavation for the manholes. A 6m wide construction zone is recommended.
- 5.3.4 The 375mm diameter pipe would likely require a trench for construction, with the laid pipe sitting in a type s surround – 150mm granular material around invert and sides of the pipe. Ground could then be reinstated above. A 3m easement has been allowed either side of pipe centreline.
- 5.3.5 The outfall to Framfield Stream is proposed to be constructed out of vegetated bag work.
- 5.3.6 In conclusion, an outfall can be provided to the north of the ancient woodland and its buffer. Further, there will be no requirement for any construction or maintenance within this buffer area.

6 SANG

6.1 SANG Proposals

- 6.1.1 The FRA (2021) does not explicitly consider the SANG. This is because this element of the development processes does not incorporate significant construction or landform changes. The plans in Appendix A indicate the flood risk situation for the full site including the SANG.
- 6.1.2 As shown in Landscape plan (CDA.53), the SANG proposals are for public open space with biodiversity improvement measures such as nesting boxes, footpaths, and tree planting. Footpaths through the majority of the SANG are proposed to be mown grass. In the woodland through the centre of the site, the footpath will be self-binding gravel, which is permeable. The car park (which will include facilities for cycle parking) will not be heavily engineered, and the surface will be grasscrete or similar.

6.2 Hydrological Setting

- 6.2.1 As noted in Section 4.1, there is a risk of fluvial flooding along the ordinary watercourse that flows east to west through the ancient woodland that divides the SANG. Due to the topography, this floodplain corridor is well defined. It is noted that, due to the catchment size, there is no Flood Zone 2 or 3 determined for the upper reaches of this watercourse.
- 6.2.2 The EA's Risk of Surface Water Flooding map indicates there is a narrow corridor at risk of surface water flooding along the ordinary watercourse, up to the eastern boundary and beyond. This is because this is not affected by the same mapping assumptions as the EA's Flood Map for Planning, and it is reasonable to assume that the fluvial floodplain would be similar to this pluvial floodplain. The two footpath accesses to the southern half of the SANG cross this watercourse and therefore there is a short reach of both of these accesses that is at risk of flooding.
- 6.2.3 There is a surface water flow route that runs along the south-eastern boundary of the site, from the B2102 to south of Hailwell Farm where it joins the unnamed watercourse. This is a narrow corridor, predominantly at Low to Medium probability of pluvial flooding.
- 6.2.4 No site-specific information is available regarding groundwater flood risk, but as with the development site, it is anticipated that groundwater flood risk would be limited to the lowest lying areas of the site adjacent to the watercourses, and the vast majority of the site would be at low risk of groundwater flooding.
- 6.2.5 It is noted that there are springs and open water features near Hailwell Farm and the unnamed ordinary watercourse. It is therefore anticipated that groundwater flooding would be restricted to a corridor adjacent to these features.

6.3 Sequential Approach

- 6.3.1 The SANG itself would be classified as water compatible development, as "*Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.*", as set out within the NPPF Annex 3: Flood risk vulnerability classification.
- 6.3.2 The car park, at the north of the site, would be classified as Less Vulnerable development.
- 6.3.3 The car park and its access are located in an area of lowest flood risk from all sources, and this is therefore in accordance with the sequential approach.

7 Hydrological Regime

7.1 Existing Conditions

- 7.1.1 The hydrological regime of the site and the ancient woodlands is considered in the Technical Note appended in Appendix D.
- 7.1.2 The site, including the SANG, forms approximately 25% of the catchment draining to the watercourse that flows east-west through the centre of the site. The area of the site that is proposed for residential development forms approximately 7.5% of the total catchment area of that watercourse.
- 7.1.3 Under existing conditions, in a non-extreme rainfall, rainfall falling onto the site would flow to the woodland either as runoff (along the surface) or interflow (through the soils). Interflow is slower than runoff.
- 7.1.4 During an extreme rainfall event, rainfall would flow as runoff or interflow, as during a non-extreme event, towards the ordinary watercourse and the Framfield Stream, through the ancient woodland.

7.2 Post-Development

- 7.2.1 Post development, hydrological processes from the majority of the site would be unchanged. Only the part of the site that is proposed for residential development would be changed. Runoff and interflow from the SANG area and the public open space between the residential development and the woodland would be unchanged.
- 7.2.2 Within the residential development, which forms approximately 7.5% of the total catchment, rainfall falling on this area would be managed within the surface water drainage scheme and ultimately conveyed to the detention basin via the two swales. During a non-extreme rainfall event, the majority of this runoff would be infiltrated either from the swales or the basin, whereby it would flow to the parcel of ancient woodland and the watercourse as interflow. Overall, the total volume of water reaching the woodland is likely to be comparable to existing, but a lesser proportion of this would be rapid runoff than existing, and more of this rainfall will become interflow rather than runoff.
- 7.2.3 During an extreme rainfall event, the runoff would be conveyed through the surface water management scheme to the swales and the attenuation basin. A small proportion of this volume of water would be infiltrated and conveyed to the woodlands and watercourse via interflow. The majority of the rainfall volume will be retained within the detention basin and released via a pipeline to the Framfield Stream to the north of the ancient woodland and its buffer. This will be discharged at greenfield rate (i.e. as existing) but will effectively bypass the ancient woodland. By definition, these events are extremely rare, and those changes in water management regime will have negligible effect on water tables or water availability for the vegetation in the ancient woodland.

7.3 Impact on Woodland

- 7.3.1 Natural England guidance (January 2022) on Ancient woodland, ancient trees and veteran trees recommends consideration of the construction and operational effects through direct and indirect effects of development. The majority of these impacts are considered in the proofs of Mr Rose and Mr Hyett; this Proof will consider the potential direct effect “changing the water table or drainage” and the potential indirect effect relating to increasing the amount of water and/or soil pollution.

- 7.3.2 As set in Section 7.2 above, there will be a negligible impact on the hydrological regime to the parcel of ancient woodland as a result of the development proposals. As such, there will be no material direct impact on the water table or surface water drainage.
- 7.3.3 As set out in Section 5.2, there will be no material indirect effect on the parcel of ancient woodland through deterioration of the quality of the water reaching the woodland, due to the proposed SuDS treatment measures as set out within the SuDS Manual.

8 Rule 6 Party Concerns

- 8.1.1 The concerns raised by the Rule 6 Party are considered in the table below, with cross reference to where points are addressed within the main Proof.

Rule 6 Concern	Stantec Response
Evidence will show how the Appellant's Flood Risk Assessment dated April 2021 (the "FRA") has not been revised to reflect the updates to the National Planning Policy Framework (the "NPPF") in July 2021, nor the updates to the Planning Practice Guidance (the "PPG") "Flood Risk and Coastal Change" in August 2022, most notably the requirement of the application of the sequential test to the Proposed Development.	<p>The changes to sequential test within NPPF not fundamental – additions served to reinforce approach that had always been advocated (see 2.1.2-2.1.3).</p> <p>A sequential approach has been applied to development layout, as set out in 4.7.2.</p> <p>Vast majority of the site including all residential development located in area of lowest flood risk from all sources (4.6.1).</p>
At the time the FRA was prepared, the application of the sequential test to the Proposed Development would still have been necessary as the Appeal Site is not allocated within the District Council's local plan. At paragraph 4.3.2 of the FRA, it is stated that "It is assumed that owing to the site's allocation in the emerging Local Plan, that the Sequential Test has been applied by Wealden District Council and determined as passed". On this basis, the sequential test has not been applied to the Proposed Development by the Appellant in assessing the flood risk of the Appeal Site. Due to consultation on the Levelling-up and Regeneration Bill, the District Council confirmed in December 2022 that it had paused work on its own local plan consultation and as a result the Appeal Site has not been allocated. In accordance with the NPPF any tilted planning balance should be disengaged and in any event the Appeal should not be allowed.	See Mr Brown's Proof.
Ms Smith therefore proposes to present evidence which shows that, as the Appeal Site and off-site infrastructure is partially located within flood zones 2 and 3 and is not allocated, the impacts of climate change and the risk from any form of flooding should have been and needs to be considered now. The photographs appended to this Statement of Case at Appendix D again illustrate the flood risk experienced in the area which has not been appropriately	<p>There has been no change to flood risk data for all sources since FRA produced; previous assessment therefore valid.</p> <p>Climate change guidance has been updated since the 2021 FRA, but this is considered in this Proof, see Sections 4.3.7, 4.4.6, 5.1.7 and Appendix C. Impacts of climate change have been considered and incorporated into recommendations.</p>

<p>considered in the Application. An updated flood risk assessment in respect of the Appeal Site which applies the sequential test should therefore be prepared and considered.</p>	<p>There is an existing flood risk to a small stretch of Framfield Road from both the Framfield Stream and pluvial flooding. Safe access can still be provided to the site to the east. The proposed development will not increase this existing risk. (4.3.11-15, 4.3.13-14)</p> <p>Section 4.7 sets out how the development proposals have responded to manage flood risk.</p>
<p>Evidence will also show that sufficient consideration was not given to the risk of flooding from all sources in accordance with NPPF 2021 & the updated PPG. The FRA fails to consider the potential effect of surface water on access to the SANG. The Government's "Risk of Flooding from Surface Water" maps show that the access to the SANG lies within the area at risk from surface water flooding and this source should therefore have been considered as part of the sequential test. The FRA also fails to consider the risk of flooding from small watercourses such as the Bird-in-Eye Shaw watercourse situated within flood zone 2, which provides access to and egress from the Appeal Site. The District Council's Strategic Flood Risk Assessment 2022 (the "SFRA") makes clear that small watercourses with a catchment area of 3km² or less should be considered as part of site-specific flood risk assessments and the application of the sequential test due to not being included in the District Council's flood zone mapping. Ms Smith notes the failure of the FRA to address these matters properly means that Natural England are not aware of the limitations of access to the SANG in this respect. The proposed pathway is likely to be washed away regularly.</p>	<p>FRA does consider all sources of flooding including groundwater and the ordinary watercourse.</p> <p>This proof considers flood risk from fluvial, surface water and groundwater sources (Sections 4.3, 4.4 and 4.5).</p> <p>The two pedestrian access routes to the southern half of the SANG are at local risk of flooding at the point where the watercourse flowing east-west is crossed. This is considered in Sections 4.3.10-11.</p> <p>The flood risk from the ordinary watercourse is considered in 4.3.3, 4.4.2, and 4.5.9.</p> <p>Safe access into the SANG is considered in 4.4.10 and 4.4.11.</p> <p>The pathway within the ancient woodland is proposed to be self-binding gravel (6.1.2) and is unlikely to be washed away. A management/repair regime can be conditioned. The pathways beyond the woodland will be mown grass.</p>
<p>Evidence will also be presented to demonstrate how the risk of groundwater, particularly from two groundwater springs identified as being close to the Appeal Site, has not been analysed in the FRA, a concern also raised by the District Council in its consultation response on drainage dated 25 October 2021. This evidence will show that site investigations should have taken place to assess the level of groundwater in the area and that such assessments should have been used to inform the FRA. It is noted that testing has demonstrated that the site is not suitable to accommodate a drainage strategy based upon infiltration and</p>	<p>As set out in Section 4.5, groundwater flood risk would be limited to the lowest lying areas of the site, adjacent to the watercourses, with a similar floodplain to the fluvial and principal pluvial extents.</p> <p>Infiltration testing has confirmed that infiltration will occur but the rates at which this occurs may not meet the standards required to have a surface water drainage strategy that is based solely on infiltration.</p>

<p>that subsequently the drainage strategy has been altered so that it no longer relies upon this technique. It will be critical to ensure the SUDS basin is adequately sized given the obvious potential risk of overtopping to adjacent AW but also the need to avoid exacerbating flooding of the local watercourse and the knock-on consequences to critical transport infrastructure – the only pedestrian and cycleway link to Uckfield.</p>	<p>Section 5 describes a surface water drainage strategy that assumes no infiltration. This represents a worst case. The detention basin has been sized to include a 0.6m freeboard and latest climate change allowances. This discharges to the Framfield Stream beyond the ancient woodland buffer as per Section 5.3. there will be no impact on the ancient woodland as a result of the drainage proposals.</p> <p>The surface water management strategy will restrict runoff rates to existing greenfield rates and therefore there will be no impact to third parties including the transport network (section 5.1.6, 5th bullet)</p>
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9 Conclusion

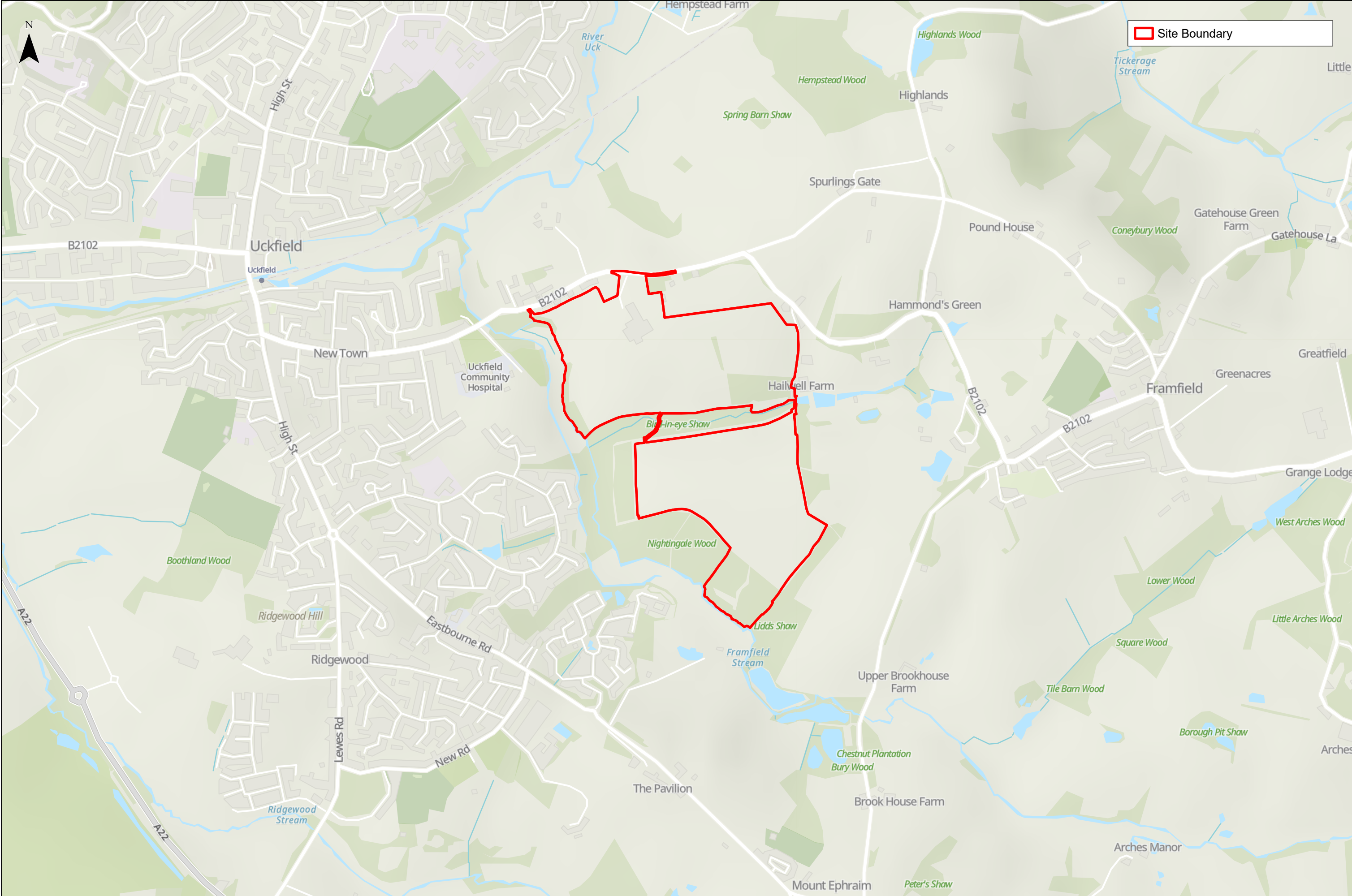
- 9.1.1 The vast majority of the Appeal Site is at low risk of flooding from fluvial sources. The fluvial floodplain is largely contained to the woodland along the western boundary and in the ancient woodland in the centre of the site.
- 9.1.2 The majority of the site is at 'Low' or 'Very Low' risk of flooding from pluvial flooding. The pluvial floodplain is predominantly contained within the lowest areas of the site, along the river corridors, and the pluvial extents are very similar to the fluvial extents.
- 9.1.3 The SFRA maps indicate that parts of the site are classified as an area of groundwater concern, i.e. where geological and hydrogeological conditions indicate that groundwater might emerge. There is no more detailed maps of groundwater flood risk or probability. However, review of OS maps and site topography indicates that groundwater emergence would occur in the locations closest to the watercourses, where existing springs exist, and in the lowest lying areas of the site.
- 9.1.4 As such, the fluvial, pluvial and groundwater floodplains are very similar, and limited to the lowest lying areas of the site in the corridors for the Framfield Stream and the unnamed watercourse. Fluvial flooding describes a source rather than a mechanism of flooding; given the mechanism of any fluvial flooding would be heavy rainfall, high groundwater or a combination of both, it is expected that these floodplains would be so similar given the proximity to the watercourses.
- 9.1.5 A sequential approach has been followed in determining the layout of the site, with water compatible public open space in the areas at highest risk of flooding, and the more vulnerable residential development within the areas at Low probability of flooding.
- 9.1.6 All residential development has been proposed to lie outside of the 1 in 100 annual probability fluvial and pluvial flood extent, including the recommended allowances for climate change. Additionally, all surface water management features, beyond the outfall to the Framfield Stream, are located outside of this flood extent. Given the similarity between the groundwater floodplain to other sources of flooding, the development is also at low risk of groundwater flooding.
- 9.1.7 The WDC Putative Reason for Refusal with regard to flood risk and drainage states that it has not been demonstrated that the development would not increase flood risk elsewhere. However, as of 8th August 2023, based on the LLFA's position of no objection in their consultation dated 2nd August 2023, WDC have indicated they will no longer be pursuing this Putative Reason for Refusal.
- 9.1.8 Nevertheless, to assist the Inspector, this proof has confirmed that the surface water runoff rate will be attenuated to the 1 in 100 greenfield runoff rate within a detention basin, and that therefore there will be no increase in pluvial flood risk to third parties as a result of the development. Further, it has been demonstrated that there will be negligible encroachment into the fluvial, pluvial or groundwater floodplains and therefore there will be a negligible impact on these flooding mechanisms, such that there will be no increase in flood risk to third parties as a result of the proposals.
- 9.1.9 The Putative Reason for Refusal also relates to concerns over water quality impacts due to concerns over whether sufficient evidence had been provided to support an infiltration-based drainage strategy. The drainage strategy set out within Appendix B does not rely on infiltration and provides an attenuated discharge via a pipe to the Framfield Stream which lies beyond the designated ancient woodland and its buffer zone. No construction or maintenance activities will encroach into the ancient woodland or its buffer zone. The proposed freeboard on the basin and the outfall pipe to the watercourse will ensure that there is no overtopping mechanism of surface water directly into the ancient woodland. The SuDS treatment train

measures set out in Section 8.3 of the FRA and summarised in Section 5.2 of this proof confirm that the proposed strategy would provide a greater degree of treatment than the minimum requirement and therefore there will be no impact on the ancient woodland in terms of water quality.

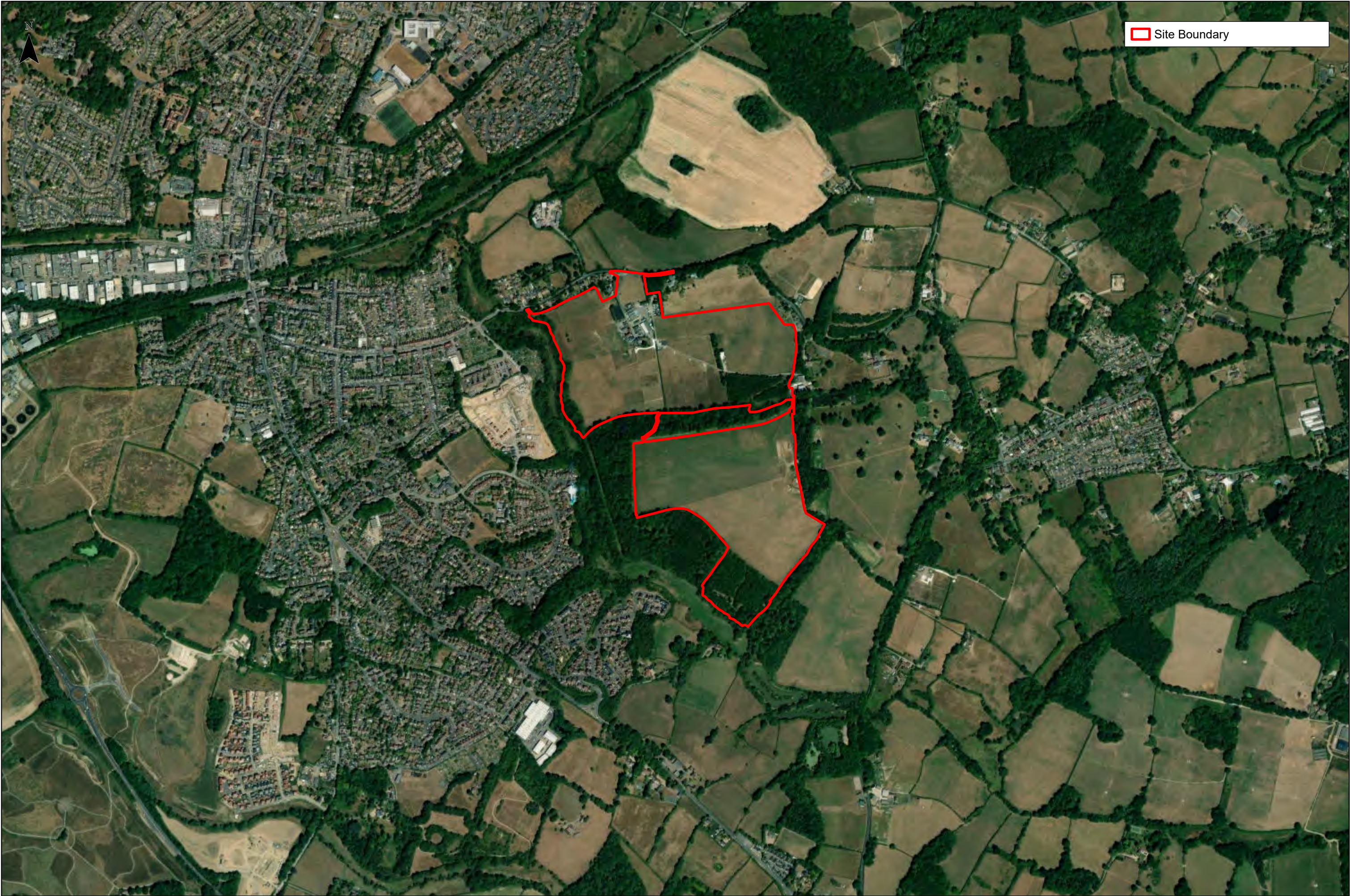
9.1.10 As such, the concerns set out within the original Putative Reason for Refusal are unfounded.

9.1.11 The development proposals will be flood resilient and resistant from all sources of flooding, the development will be safe and will not increase flood risk to third parties, including allowance for climate change. The development proposals are therefore in accordance with paragraph 167 of the NPPF.

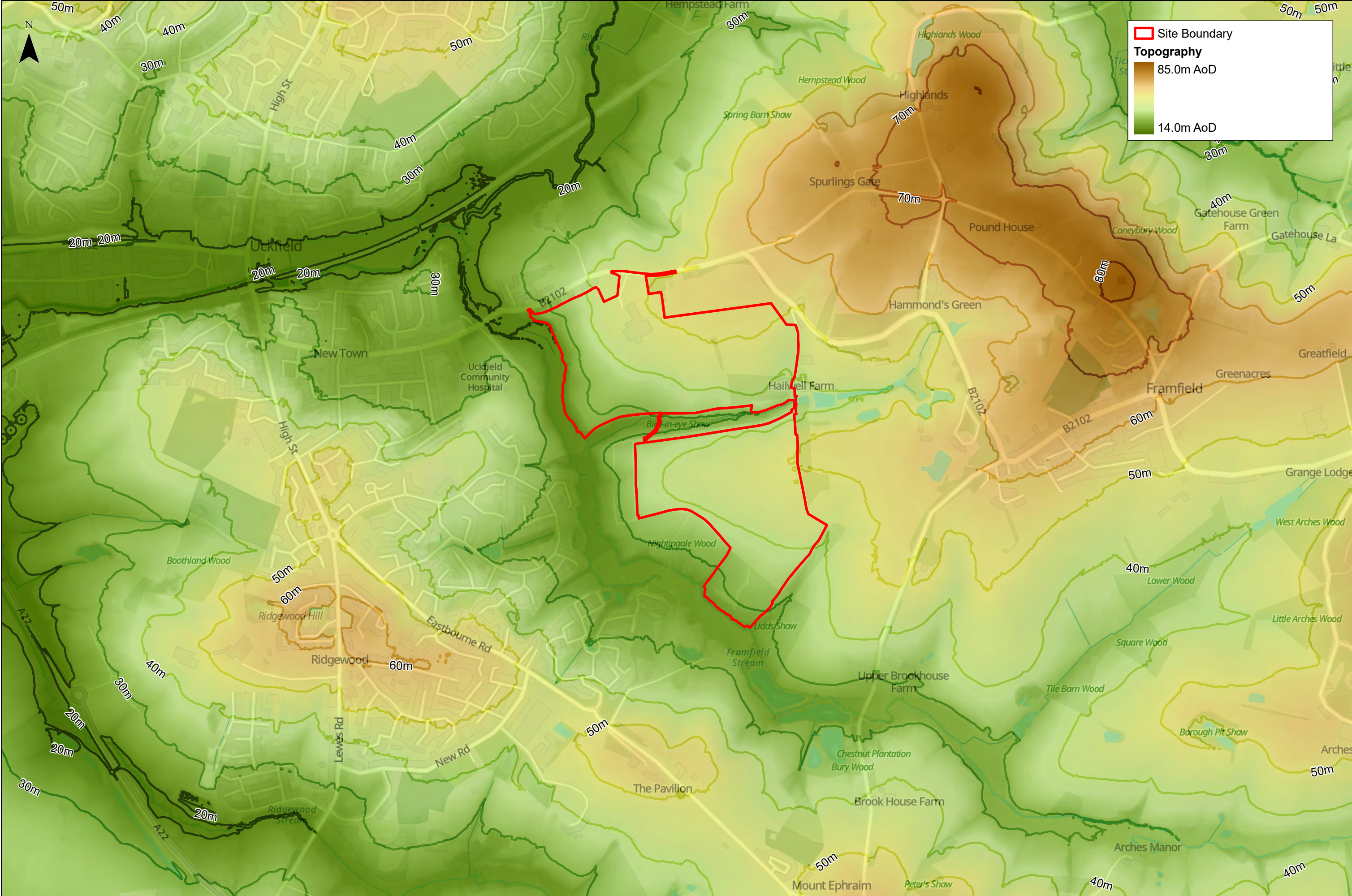
Appendix A FRA Maps



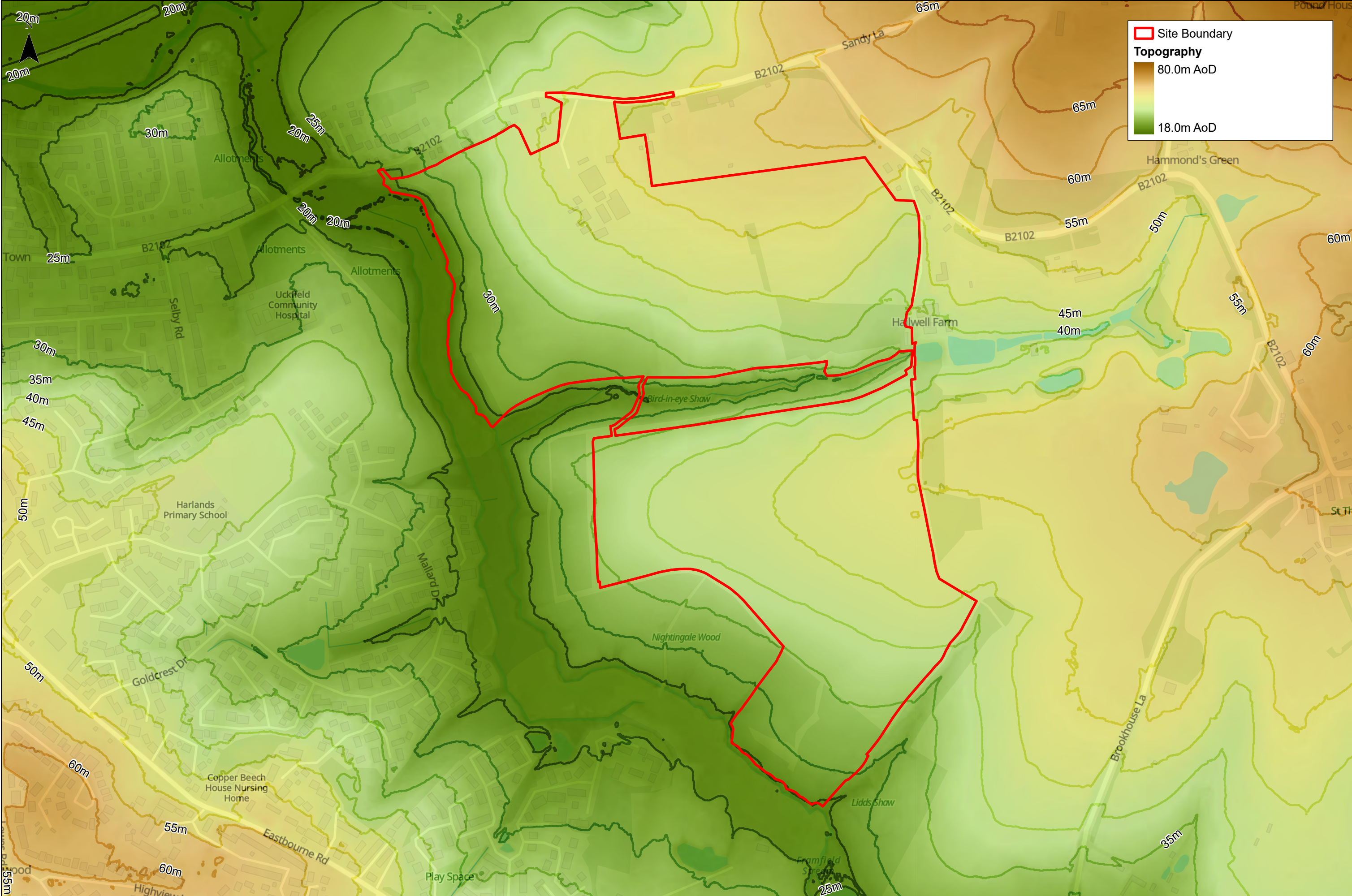
	Client	BIRD IN THE EYE FARM, UCKFIELD Site Location	 <small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019</small>	1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd			Drawn: AD	Checked: AH
				Figure: 01	Rev: A



	Client	BIRD IN THE EYE FARM, UCKFIELD Site Location - Aerial	05001,000 m		1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd		Maxar, Microsoft, Contains OS data © Crown Copyright and database right 2019		Drawn: AD	Checked: AH
					Figure: 02	Rev: A



	Client Croudace Homes Ltd	BIRD IN THE EYE FARM, UCKFIELD Topography			1:10,000 @ A3	Date: 31/07/2023
			<small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019</small>		Drawn: AD	Checked: AH
					Figure: 03	Rev: A



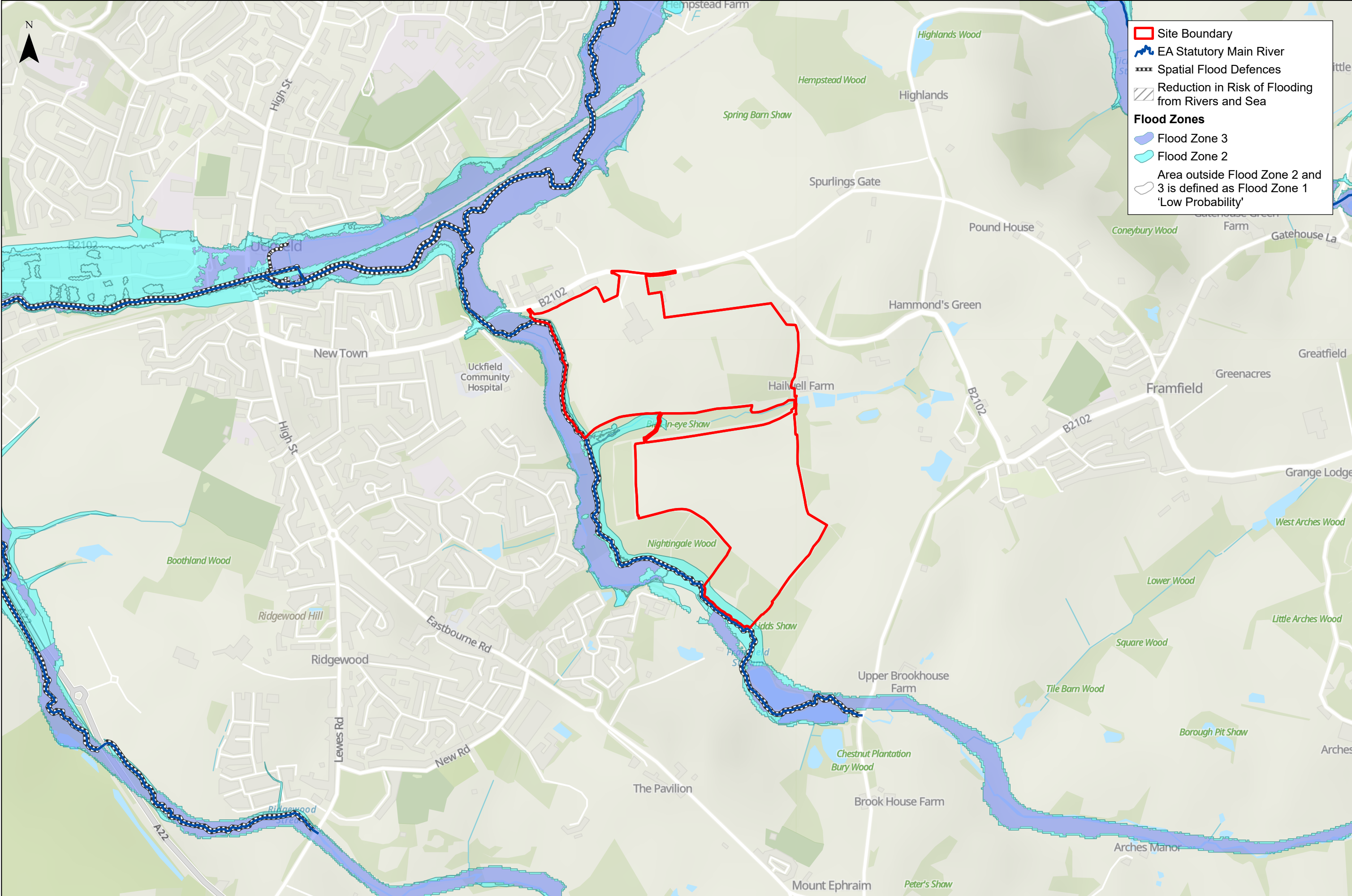
Site Boundary

Topography

80.0m AoD

18.0m AoD

	Client	BIRD IN THE EYE FARM, UCKFIELD Topography - Detailed	<div>0250500</div> <div><div></div><div></div><div></div></div> <div>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019</div>	1:5,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd		Drawn: AD	Checked: AH	
			Figure: 03.1		Rev: A



Site Boundary

EA Statutory Main River

Spatial Flood Defences

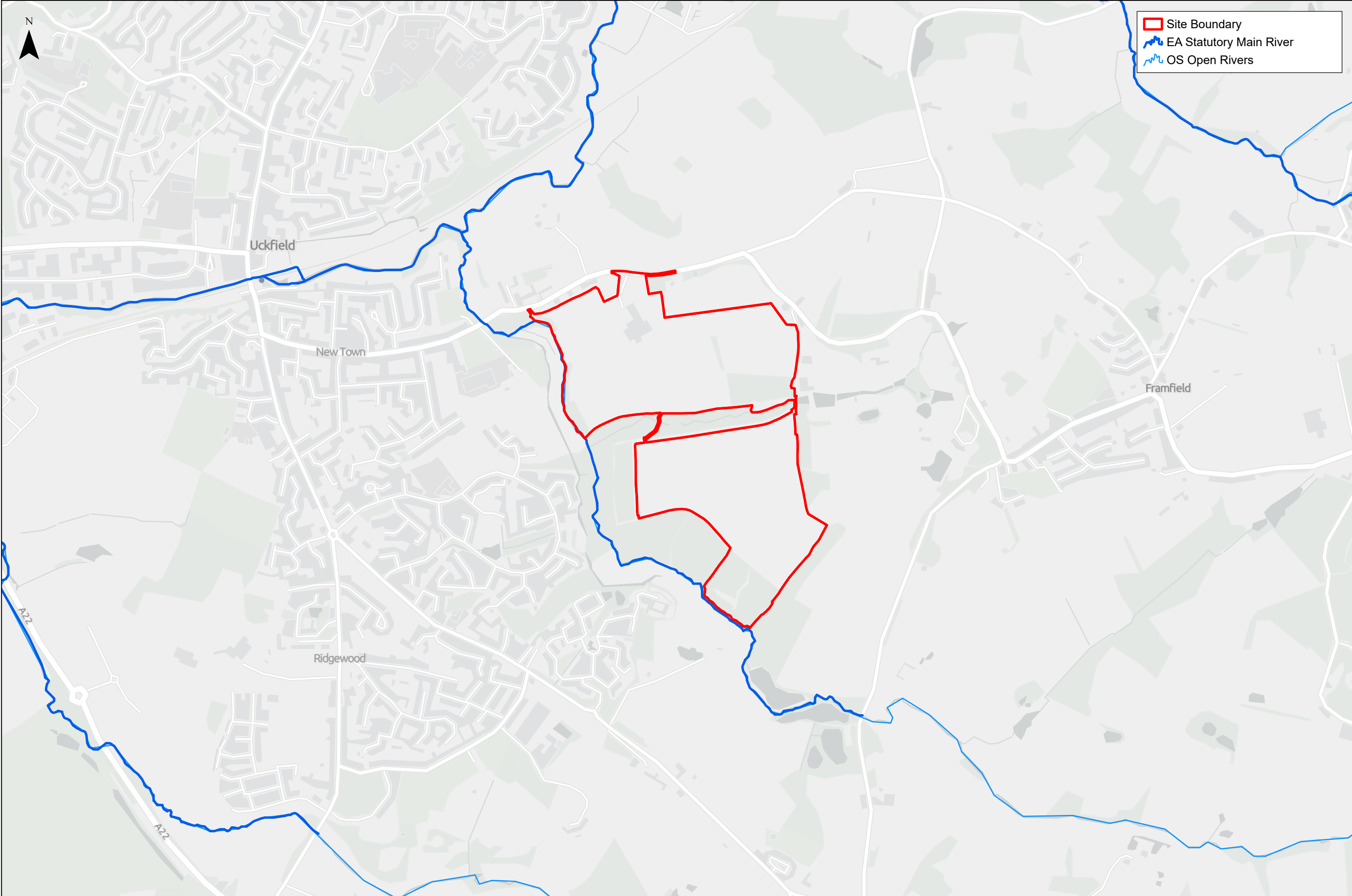
Reduction in Risk of Flooding from Rivers and Sea

Flood Zones

Flood Zone 3

Flood Zone 2

Area outside Flood Zone 2 and 3 is defined as Flood Zone 1 'Low Probability'

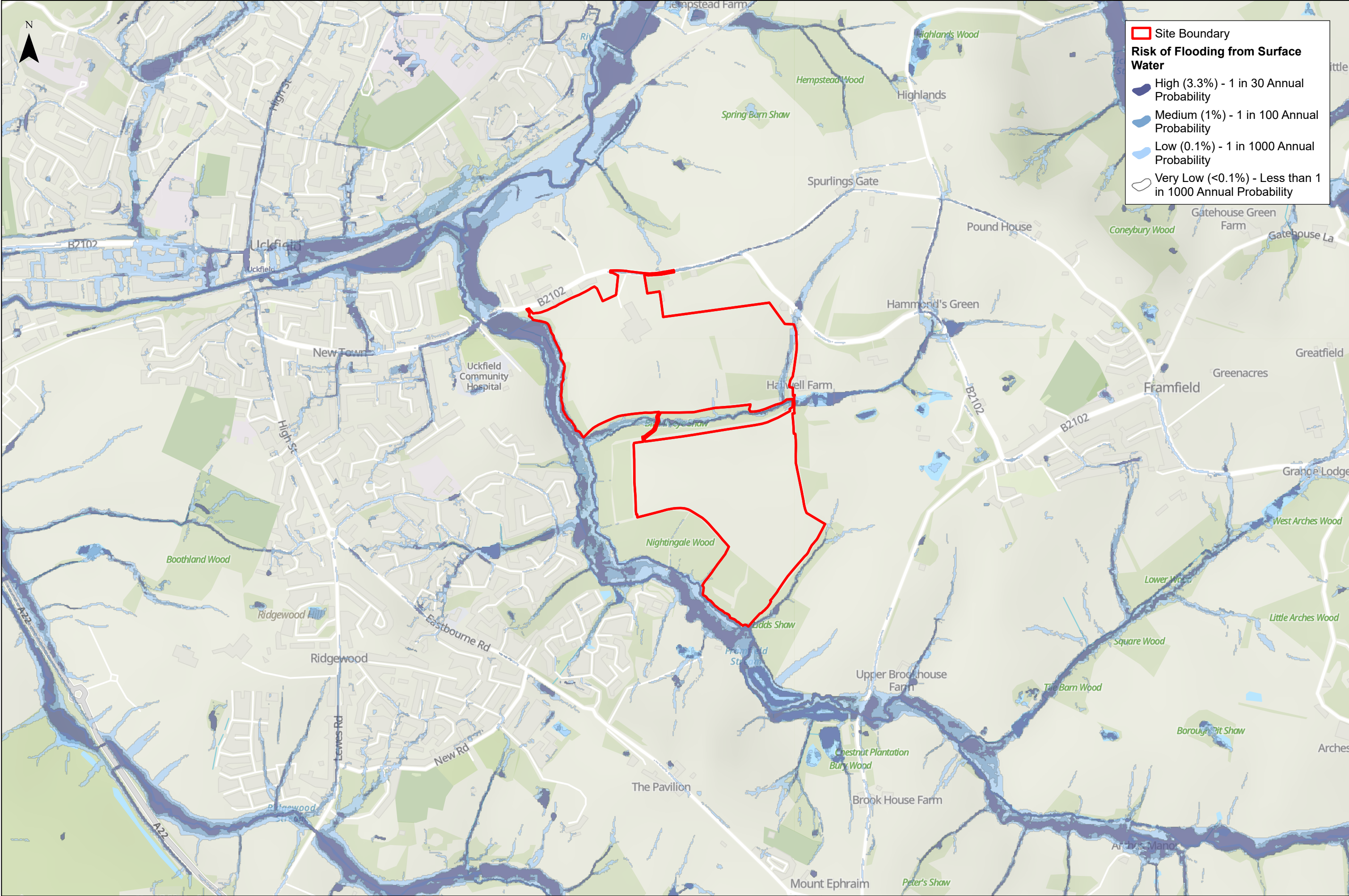


Site Boundary

EA Statutory Main River

OS Open Rivers

<div><div></div><div>Stantec</div></div>	Client Croudace Homes Ltd	BIRD IN THE EYE FARM, UCKFIELD Watercourse Location	<div>05001,000</div> <div>Contains OS data © Crown Copyright and database right 2020 Contains data from OS Zoomstack Contains OS data © Crown copyright and database right 2021 Contains Ordnance Survey data © Crown copyright and database right 2022 © Environment Agency copyright and/or database right. Contains OS data © Crown copyright and database right 2023</div>	1:10,000 @ A3	Date: 31/07/2023
			Drawn: AD	Checked: AH	
			Figure: 04.1		Rev: A



	Client	BIRD IN THE EYE FARM, UCKFIELD EA Surface Water Flood Risk	0 500 1,000 m		1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd		<small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains Environment Agency information © Environment Agency and database right. Map based on EA updated 'Flood Map for Surface Water' ('uFMSW') released in 2013 as the latest iteration of a national scale surface water modelling exercise.</small>		Drawn: AD	Checked: AH
					Figure: 05	Rev: A



	Client	BIRD IN THE EYE FARM, UCKFIELD EA Surface Water Flood Risk - Depth 3.3 Percent Chance	0 500 1,000 m		1:10,000 @ A3	Date: 31/07/2023	
	Croudace Homes Ltd		<small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains Environment Agency information © Environment Agency and database right. Map based on EA updated 'Flood Map for Surface Water' ('uFMSW') released in 2013 as the latest iteration of a national scale surface water modelling exercise.</small>				
			Drawn: AD	Checked: AH			
			Figure: 05.1	Rev: A			



	Client	BIRD IN THE EYE FARM, UCKFIELD EA Surface Water Flood Risk - Depth 1.0 Percent Chance	05001,000 m		1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd		<small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains Environment Agency information © Environment Agency and database right. Map based on EA updated 'Flood Map for Surface Water' ('uFMSW') released in 2013 as the latest iteration of a national scale surface water modelling exercise.</small>		Drawn: AD	Checked: AH
					Figure: 05.2	Rev: A



Site Boundary

Risk of Flooding from Surface Water - Depth

Below 150mm

150 - 300mm

300 - 600mm

600 - 900mm

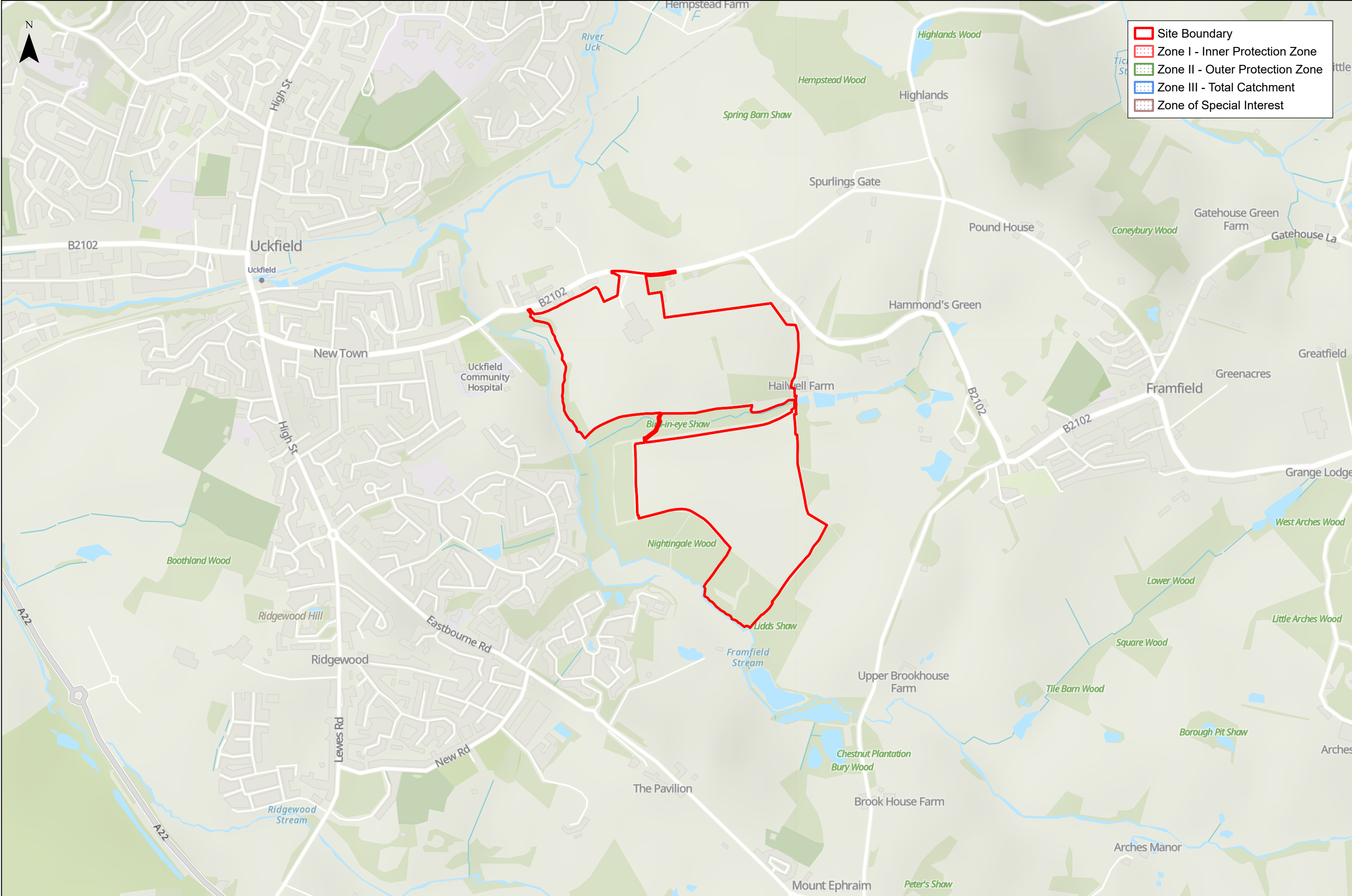
900 - 1200mm

Over 1200mm

	Client	BIRD IN THE EYE FARM, UCKFIELD EA Surface Water Flood Risk - Depth 0.1 Percent Chance	<div><div></div><div>05001,000 J m</div></div> <div><div>Contains OS data © Crown Copyright and database right 2023</div><div>Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019</div><div>Contains Environment Agency information © Environment Agency and database right</div><div>Maps based on EA updated 'Flood Map for Surface Water' ('uFMSW') released in 2013 as the latest iteration of a national scale surface water modelling exercise.</div></div>		1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd			Drawn: AD	Checked: AH	
				Figure: 05.3	Rev: A	



	Client	BIRD IN THE EYE FARM, UCKFIELD Risk of Flooding from Reservoirs - Maximum Flood Extent	<div><div></div><div>05001,000</div><div>m</div></div> <div><div>Contains OS data © Crown Copyright and database right 2023</div><div>Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019</div><div>Contains Environment Agency information © Environment Agency and database right.</div></div>	1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd			Drawn: AD	Checked: AH
				Figure: 06	Rev: A



	Client	BIRD IN THE EYE FARM, UCKFIELD EA Ground Water Source Protection Zones	05001,000 m		1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains Environment Agency information © Environment Agency and database right.		Drawn: AD	Checked: AH
					Figure: 07	
					Rev: A	



	Client	BIRD IN THE EYE FARM, UCKFIELD EA Recorded Historic Flood Extents	 <small>Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains Environment Agency information © Environment Agency and database right. Historic Flood Map shows the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England. Recorded Flood Outlines shows all EA records of historic flooding from rivers, the sea, groundwater and surface water</small>	1:10,000 @ A3	Date: 31/07/2023
	Croudace Homes Ltd			Drawn: AD	Checked: AH
				Figure: 08	Rev: A

Appendix B Drainage Strategy Drawings

48494/2002/500 Rev A - Indicative Surface Water & Foul Drainage

48494/2002/SK05 Rev A - Assessment of Alternative Outfall Route

48494/2002/500 Rev B - Indicative Surface Water & Foul Drainage

48494/2002/SK05 Rev B - Assessment of Outfall Route



- Notes:
1. This drawing is to be read in conjunction with all other Engineer's drawings.
 2. Do not scale from this drawing.
 3. All dimensions are in metres unless noted otherwise.
 4. All levels are in metres above Ordnance Datum (AOD).
 5. All areas of permeable paving comprise 300mm sub-base storage with 20mm Ø orifice flow control. Permeable paving, flow control and flow control chamber will not be proposed for adoption by Southern Water.
 6. Surface water drainage network downstream of permeable paving flow chambers is proposed for adoption by Southern Water.
 7. Surface water drainage outfall to utilise existing clearing in Ancient Woodland (as observed on site) to minimise impact. Further details included 48494/2002/SK01.
 - 8.
 9. Proposed foul drainage Point of Connection (POC) approximately 100m west of site at existing public foul drainage manhole, subject to further assessment and confirmation by Southern Water. Assessment undertaken by Stantec provided to Southern Water indicates that a reasonable connection can be made at this point.

- Key:
- Application Boundary
 - Ancient Woodland 15m Buffer Zone
 - Tree Root Protection Area
 - Proposed Surface Water Drainage Sewer (indicative only)
 - Proposed Foul Drainage Sewer (indicative only)
 - Proposed Surface Water Drainage Headwall
 - Proposed Permeable Paving
 - Proposed Swale
 - Proposed Detention Basin
 - MicroDrainage Model Reference Code

A	Masterplan updated for planning submission	29.04.21	LWD	ET	ET
Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status
For Outline Planning

Land at Bird in Eye Farm
South of Bird in Eye Hill, Uckfield

Indicative Surface Water & Foul Drainage

Client
Croudace Homes Limited and Mr & Mrs Berry

Date of 1st Issue
11.11.2020

Designed
LWD

Drawn
LWD

A1 Scale
1:1000

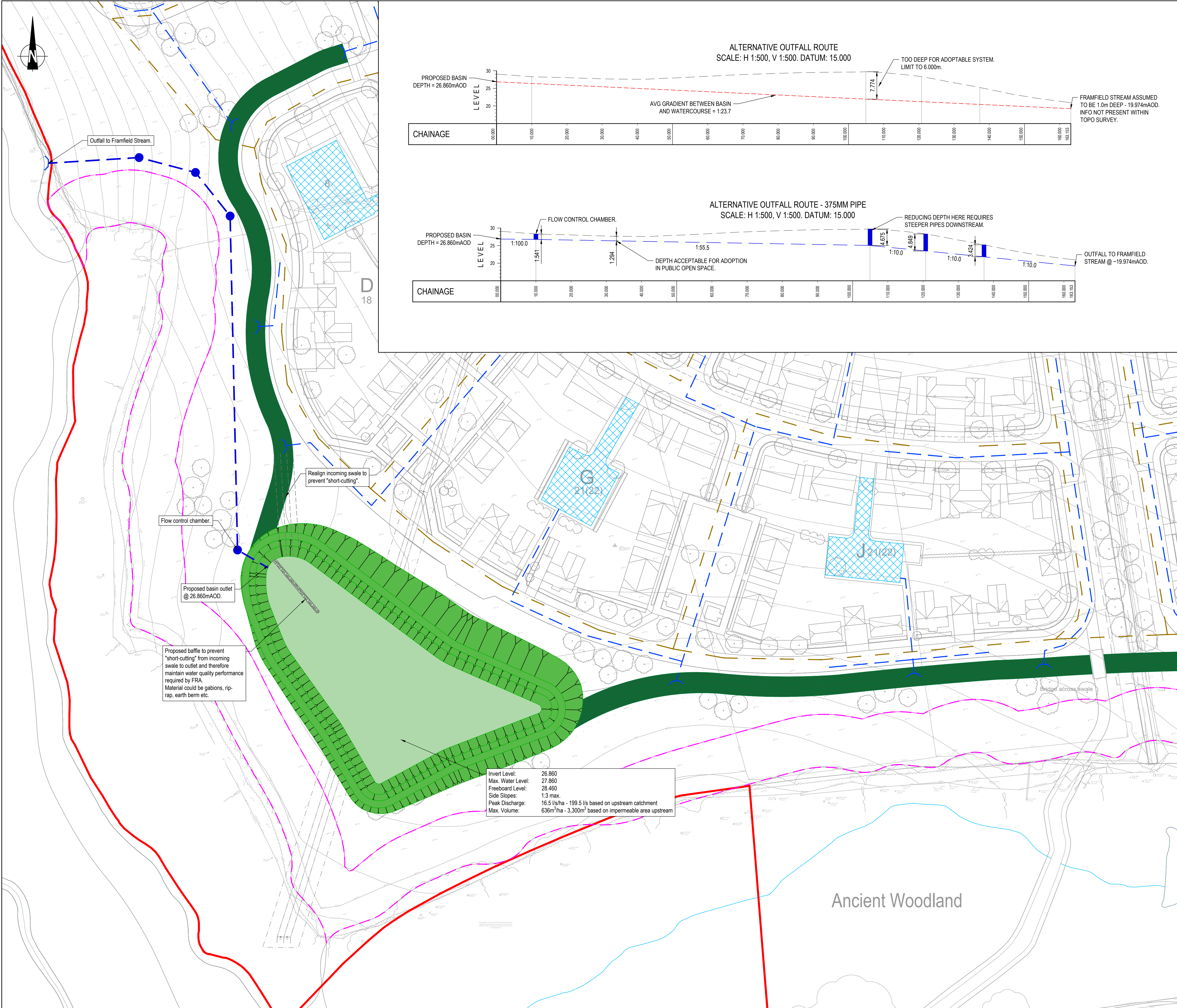
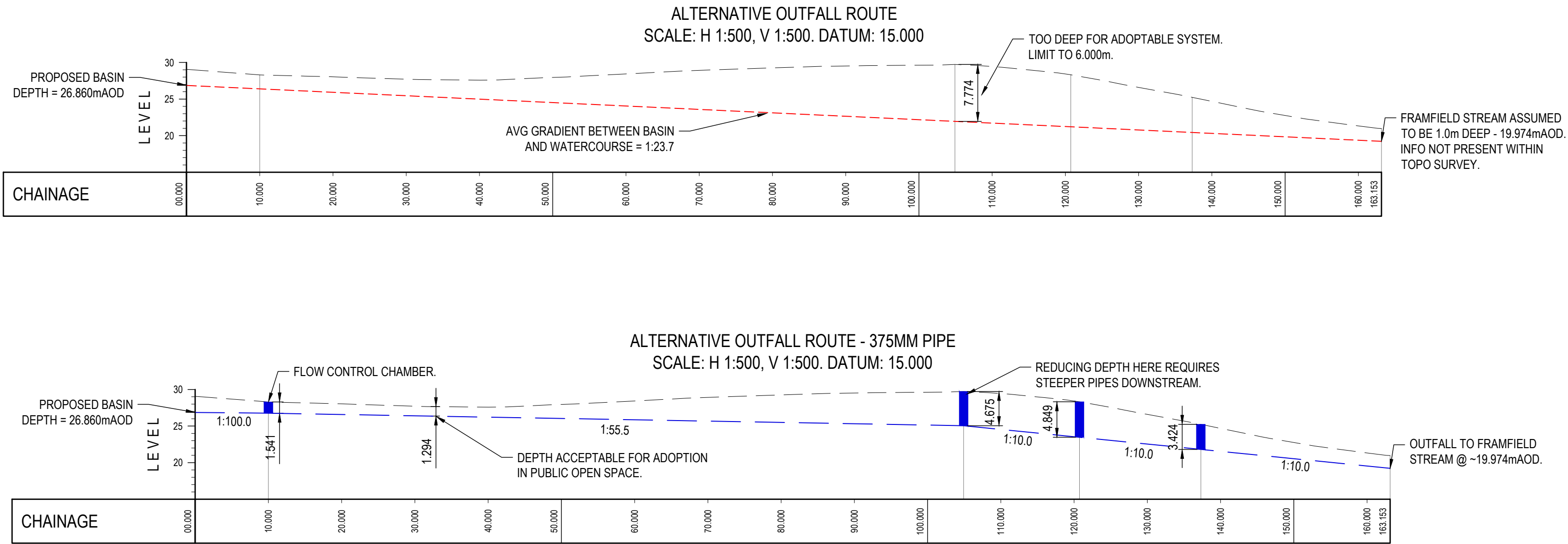
Checked
ET

Approved
ET

Drawing Number
48494/2002/500

Revision
A

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 2. Do not scale from this drawing.
 3. All dimensions are in metres unless noted otherwise.
 4. All levels are in metres above Ordnance Datum (AOD).
 5. Levels, pipe diameters and gradients, and manhole depths are indicative only and subject to detailed design.

- Key:
- Application Boundary
 - Ancient Woodland 15m Buffer Zone
 - Proposed Surface Water Drainage Sewer (indicative only)
 - Proposed Foul Drainage Sewer (indicative only)
 - Proposed Surface Water Drainage Headwall
 - Proposed Permeable Paving
 - Proposed Swale
 - Proposed Basin

A	Outfall alignment amended	11.01.23	LWD	-	-
Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status

For Information

Land at Bird in Eye Farm
South of Bird in Eye Hill, Uckfield

Assessment of Alternative Outfall Route

Client			 Stantec
Croudace Homes Limited			
Date of 1st Issue 08.11.2022	Designed LWD	Drawn LWD	stantec.com/uk
A1 Scale 1:500	Checked -	Approved -	
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1. This drawing is to be read in conjunction with all other Engineer's drawings.
 2. Do not scale from this drawing.
 3. All dimensions are in metres unless noted otherwise.
 4. All levels are in metres above Ordnance Datum (AOD).
 5. All areas of permeable paving comprise 300mm sub-base storage with 20mm Ø orifice flow control. Permeable paving, flow control and flow control chamber will not be proposed for adoption by Southern Water.
 6. Surface water drainage network downstream of permeable paving flow chambers is proposed for adoption by Southern Water.
 7. Land ownership indicated to extend to top of bank of Framfield Stream, therefore indicates Riparian Ownership. Further details included 48494/2002/SK05.
 8. Proposed foul drainage Point of Connection (POC) approximately 100m west of site at existing public foul drainage manhole, subject to further assessment and confirmation by Southern Water. Assessment undertaken by Stantec provided to Southern Water indicates that a reasonable connection can be made at this point.

- Key:**
- Ancient Woodland 15m Buffer Zone
 - Tree Root Protection Area
 - Proposed Surface Water Drainage Sewer (indicative only)
 - Proposed Foul Drainage Sewer (indicative only)
 - Proposed Surface Water Drainage Headwall
 - Proposed Permeable Paving
 - Proposed Swale
 - Proposed Detention Basin
 - MicroDrainage Model Reference Code

B	Outfall amended	02.08.23	LWD	AH	AH
A	Masterplan updated for planning submission	29.04.21	LWD	ET	ET
Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status

For Appeal

Land at Bird in Eye Farm
South of Bird in Eye Hill, Uckfield

Indicative Surface Water & Foul Drainage

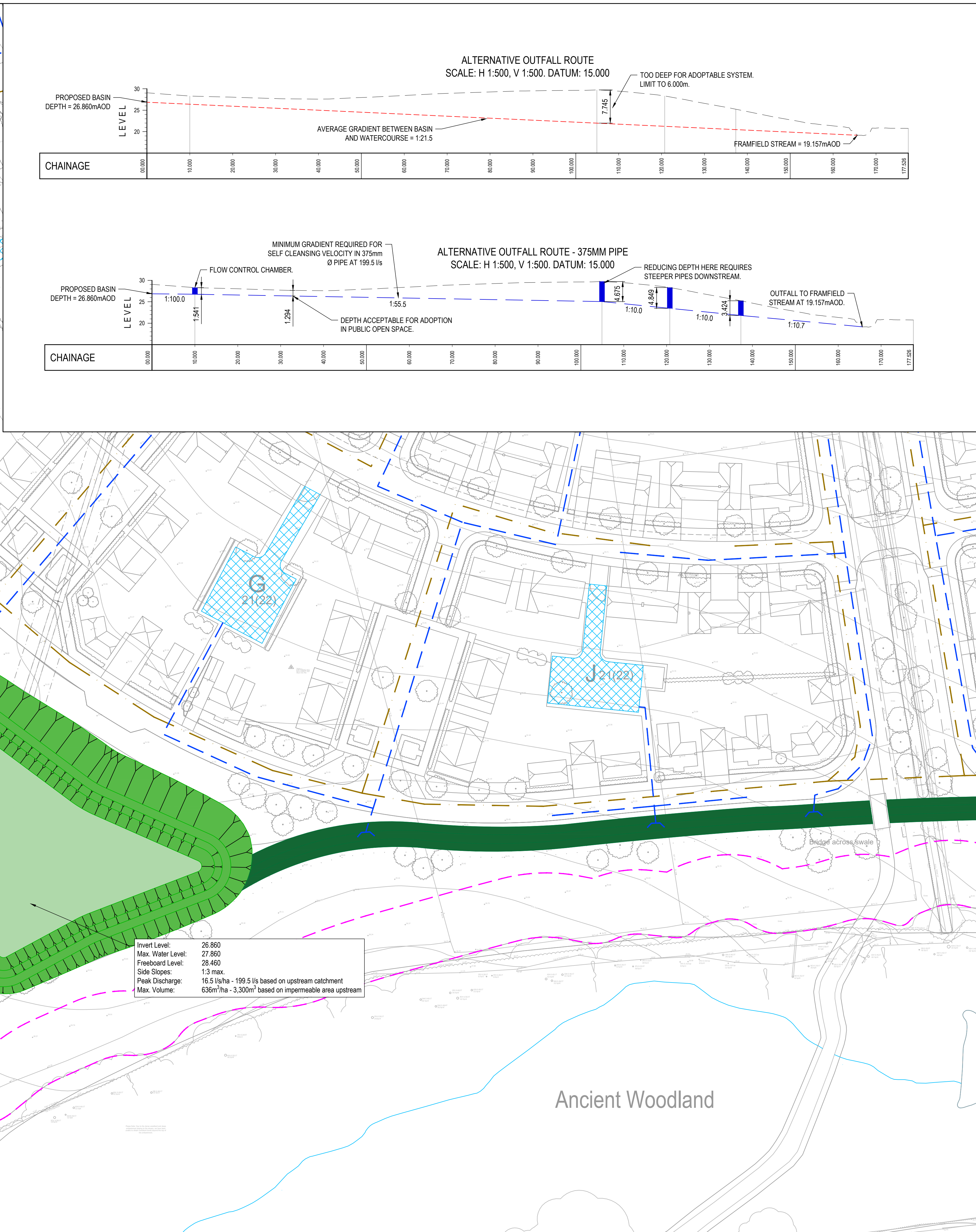
Client

Croudace Homes Limited

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Date of 1st Issue	Designed	Drawn
11.11.2020	LWD	LWD
A1 Scale	Checked	Approved
1:1000	ET	ET
Drawing Number	Revision	
48494/2002/500	B	



- | | |
|---|---|
| Key: | |
|  | Ancient Woodland 15m Buffer Zone |
|  | Proposed Surface Water Drainage Sewer (indicative only) |
|  | Proposed Foul Drainage Sewer (indicative only) |
|  | Proposed Surface Water Drainage Headwall |
|  | Proposed Permeable Paving |
|  | Proposed Swale |
|  | Proposed Basin |
|  | Root Protection Area |

B	Outfall amended following detailed topographical survey	02.08.23	LWD	AH	AH
A	Outfall alignment amended	11.01.23	LWD	-	-
Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status	For Appeal
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Land at Bird in Eye Farm
South of Bird in Eye Hill, Uckfield

Assessment of Outfall Route

Client	
Croudace Homes Limited	

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A1 Scale 1:500	Checked -	Approved -	

Drawing Number	Revision	authorized by drawing is not shown. TAUNTON Tel: 01823 218 940
48494/2002/SK05	B	

Appendix C Climate Change Sensitivity Test

TECHNICAL NOTE

Job Name: Land at Bird in Eye Farm, South of Bird in Eye Hill, Uckfield
Job No: 48494/2002
Note No: TN006
Date: 02 August 2023
Prepared By: Lewis Derrick
Subject: Sensitivity Test of Detention Basin following Updated Climate Change Guidance

1. Introduction

- 1.1. Stantec has prepared this Technical Note to determine the impacts of the updated climate change allowances on the outline Surface Water Drainage Strategy (SWDS), as contained within:
- Flood Risk Assessment (FRA) (ref: 48494/2002/C, date: 29 April 2021); and,
 - Indicative Surface Water & Foul Drainage Strategy (ref: 48494/2002/500/B, date: 02 August 2023);
 - Outfall Route sketch (ref: 48494/2002/SK05/B, date: 02 August 2023).

2. Updates to Climate Change Guidance

Overview

- 2.1. In May 2022, DEFRA updated its guidance related to peak rainfall intensities due to the impacts of climate change and how these should be applied during the planning process. The application of allowances for increased peak rainfall intensities has become more nuanced and now varies geographically across the UK.

Previous Climate Change Guidance

- 2.2. DEFRA's climate change guidance regarding peak rainfall intensities at the time of the outline planning application submission (August 2021) provided fixed allowance that were applied uniformly across all of England.
- 2.3. To account for the anticipated increase in peak rainfall intensities due to climate change, the guidance stated that an additional allowance should be made when assessing flood risk across the lifespan of the proposed development. In the case of the residential development proposed, the allowances to be applied were for the '2080s' (2010 to 2115) epoch. These were given as shown in **Table 1**.
- 2.4. It should be noted that this guidance stated that the two allowances should be considered; no guidance was provided as to how those two allowances should be used, though typical convention is that Lead Local Flood Authorities (LLFAs) used the lower allowance as the design and the higher allowance as a sensitivity for freeboard.

TECHNICAL NOTE

Applies Across All of England	Total Potential Change Anticipated for the '2080s' (2010 to 2115)
Upper end	40%
Central	20%

Table 1 - DEFRA Climate Change Peak Rainfall Allowances at time of Planning Submission (Aug 21)

- 2.5. Therefore, in accordance with this guidance and the National Planning Policy Framework (NPPF) and relevant Planning Practice Guidance (PPG), the SWDS for the outline application was developed to manage surface water runoff on site up to the 1 in 100 year plus 40% additional allowance for climate change rainfall event.

Updated Climate Change Guidance (May 2022)

- 2.6. The principal updates to DEFRA's climate change guidance in May 2022 was the inclusion of geographical variation of peak rainfall intensity allowances (extracted via an online mapping service) and the requirement that climate change must now be assessed for the 1 in 30 year (also referred to '3.3% annual exceedance event') storm in addition to the 1 in 100 year (1% annual exceedance event).
- 2.7. Uckfield lies within the Adur and Ouse Management Catchment and therefore has the following peak rainfall intensity allowances:

Annual Exceedance Event	Epoch	Central Allowance	Upper end Allowance
3.3%	2050s	20%	35%
	2070s	20%	40%
1.0%	2050s	20%	45%
	2070s	25%	45%

Table 2 - Current DEFRA Climate Change Peak Rainfall Allowances (as of May 2022)

- 2.8. The guidance states that residential developments are considered to have a minimum design life of 100 years; the guidance continues that:

"For flood risk assessments and strategic flood risk assessments assess the upper end allowances. You must do this for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125). Design your development so that for the upper end allowance in the 1% annual exceedance probability event: there is no increase in flood risk elsewhere and your development will be safe from surface water flooding."

- 2.9. In the case of this site, this means managing surface water runoff on site for the 1 in 100 year storm event plus 45% additional allowance for climate change.
- 2.10. At reserved matters stage, whereby the SWDS is developed to a greater level of detail, in order to be adoptable by the local sewerage undertaker i.e. Southern Water, it must be demonstrated that:
- The SWDS does not surcharge in the 1 in 1 year to 1 in 5 year storm event (dependent on on-site gradients).

TECHNICAL NOTE

- The SWDS does not flood in the 1 in 30 year storm event.
 - The SWDS manages surface water runoff on site i.e. no off-site flooding, for the 1 in 100 year storm event plus allowance for climate change in order to.
- 2.11. No guidance has been received to date from the LLFA or Southern Water regarding whether the performance criteria for the 1 in 30 year storm event now also needs to account for the new allowance for climate change or not. However, the impact of this would most likely be to the size of conveyance features e.g. pipes, swales etc. within the site itself, rather than strategic features such as basins which are typically designed to the 1 in 100 year performance standard.
- 2.12. This matter would need to be clarified by the LLFA and/or Southern Water prior to commencement of the next stage of design works and the detailed design of the surface water drainage system would be secured through conditions.

3. Implications for Detention Basin DB-1

- 3.1. Stantec has undertaken a sensitivity test to demonstrate the impact of the updated climate change allowance guidance on the proposed development at Bird in Eye Farm.
- 3.2. In support of the submitted FRA (date: 29 April 2021), 'Detention Basin DB-1' managed surface water runoff on site up to the 1 in 100 year storm event plus 40% additional allowance for climate change, as per the guidance at the time of writing. The required volume was determined using Flood Estimation Handbook (FEH) rainfall data and methodology, and MicroDrainage Source Control software.
- 3.3. Therefore, based on an upstream impermeable area of 5.192ha, a peak discharge rate of 16.5 l/s/ha (199.5 l/s), 1.0 max storage depth and 1:3 max side slopes, DB-1 was calculated to require 3,300m³ storage volume to manage surface water runoff for the 1 in 100 year storm event plus 40% additional allowance for climate change without utilising the basin's 0.6m freeboard. As stated in the submitted FRA, this is considered to be a conservative estimate based on the modelling methodology.
- 3.4. To determine the implications of the updated May 2022 climate change guidance, Stantec has tested the proposed detention basin under the updated climate change allowance (45%) to determine the maximum storage volume required whilst maintaining the 1.0 maximum storage depth and 0.6m freeboard.
- 3.5. This testing has indicated that the maximum storage volume would increase by 155m³ to 3,455m³, resulting in a footprint increase by approximately 200m². It should be noted this footprint increase is based on the software model up to the freeboard level and does not account for residual earthworks required to reach existing ground levels.
- 3.6. **Table 3** below provides a summary of the implications:

TECHNICAL NOTE

	As submitted for Outline Planning	Sensitivity Test
Design Storm	1 in 100 year + 40% allowance for climate change	1 in 100 year + 45% allowance for climate change
Upstream Impermeable Area	5.192ha	5.192ha
Peak Discharge Rate	199.5 l/s (16.5 l/s/ha)	199.5 l/s (16.5 l/s/ha)
Maximum Side Slopes	1:3	1:3
Maximum Storage Depth	1.0m	1.0m
Freeboard	0.6m	0.6m
Total Storage Volume	3,300m ³	3,455m³
Estimated Land-Take	5,630m ²	5,830m²

Table 3 - Summary of Implications to Detention Basin DB-1 as a result of the Updated Guidance

4. Recommendations

- 4.1. To accommodate the updated climate change guidance, the footprint of detention basin DB-1 (as shown in the submitted FRA) would need to increase by approximately 200m² to accommodate the additional 155m³ of storage required.
- 4.2. This additional volume maintains the peak discharge rate of 16.5 l/s/ha, the maximum storage depth of 1.0m, freeboard of 0.6m, and 1:3 maximum side slope gradient as proposed within the submitted FRA.
- 4.3. Therefore, any modifications to the geometry of DB-1 to accommodate the updated climate change allowances are deemed to be very minor and can be readily accommodated within further detailed design of the SWDS in a future reserved matters application.

TECHNICAL NOTE

Attachments:

- Detention Basin DB-1 1 in 100 year (plus 40% Climate Change) Model
- Detention Basin DB-1 1 in 100 year (plus 45% Climate Change) Model

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
48494/2002/TN006	-	02/08/2023	LWD	AH		AH

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Peter Brett Associates		Page 1
Blackbrook Business Park	BIRD IN EYE	
Blackbrook Avenue	UCKFIELD	
Taunton TA1 2PX	HYDROBRAKE AND ORIFICE	
Date 07/04/2020 16:22	Designed by EAD	
File BIRD IN EYE WITH ORIFICE.SRCX	Checked by	
Innovyze	Source Control 2018.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.510	0.510	6.6	279.6	O K
30 min Summer	0.646	0.646	10.7	369.1	O K
60 min Summer	0.776	0.776	13.2	461.3	O K
120 min Summer	0.852	0.852	14.4	518.5	O K
180 min Summer	0.885	0.885	14.9	543.7	O K
240 min Summer	0.898	0.898	15.1	554.3	O K
360 min Summer	0.910	0.910	15.3	563.2	O K
480 min Summer	0.914	0.914	15.3	566.9	O K
600 min Summer	0.915	0.915	15.4	567.6	O K
720 min Summer	0.913	0.913	15.3	566.0	O K
960 min Summer	0.905	0.905	15.2	559.3	O K
1440 min Summer	0.876	0.876	14.8	537.2	O K
2160 min Summer	0.833	0.833	14.1	504.4	O K
2880 min Summer	0.794	0.794	13.5	475.0	O K
4320 min Summer	0.728	0.728	12.3	426.9	O K
5760 min Summer	0.679	0.679	11.3	392.0	O K
7200 min Summer	0.000	0.000	0.0	0.0	O K
8640 min Summer	0.000	0.000	0.0	0.0	O K
10080 min Summer	0.000	0.000	0.0	0.0	O K
15 min Winter	0.561	0.561	8.6	312.5	O K
30 min Winter	0.710	0.710	12.0	413.7	O K
60 min Winter	0.851	0.851	14.4	518.1	O K
120 min Winter	0.936	0.936	15.7	583.8	O K
180 min Winter	0.974	0.974	16.2	614.3	O K
240 min Winter	0.991	0.991	16.4	628.7	O K
360 min Winter	0.999	0.999	16.5	634.8	O K
480 min Winter	1.000	1.000	16.5	635.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	150.752	0.0	193.1	19
30 min Summer	101.080	0.0	268.2	33
60 min Summer	64.792	0.0	475.8	62
120 min Summer	38.150	0.0	560.1	122
180 min Summer	27.925	0.0	614.4	180
240 min Summer	22.344	0.0	654.6	240
360 min Summer	16.277	0.0	712.5	292
480 min Summer	12.968	0.0	752.8	352
600 min Summer	10.865	0.0	782.7	420
720 min Summer	9.403	0.0	805.4	488
960 min Summer	7.495	0.0	838.7	624
1440 min Summer	5.444	0.0	880.8	894
2160 min Summer	3.997	0.0	1075.2	1296
2880 min Summer	3.231	0.0	1157.2	1672
4320 min Summer	2.409	0.0	1252.8	2420
5760 min Summer	1.967	0.0	1414.4	3120
7200 min Summer	-0.012	0.0	-10.5	0
8640 min Summer	-0.010	0.0	-10.5	0
10080 min Summer	-0.008	0.0	-10.5	0
15 min Winter	150.752	0.0	218.7	19
30 min Winter	101.080	0.0	306.2	33
60 min Winter	64.792	0.0	533.1	62
120 min Winter	38.150	0.0	627.4	120
180 min Winter	27.925	0.0	687.9	176
240 min Winter	22.344	0.0	732.6	232
360 min Winter	16.277	0.0	796.6	330
480 min Winter	12.968	0.0	840.6	372

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
600 min Winter	0.996	0.996	16.5	632.6	O K
720 min Winter	0.988	0.988	16.4	626.3	O K
960 min Winter	0.968	0.968	16.1	609.4	O K
1440 min Winter	0.916	0.916	15.4	567.8	O K
2160 min Winter	0.845	0.845	14.3	513.0	O K
2880 min Winter	0.784	0.784	13.3	467.8	O K
4320 min Winter	0.692	0.692	11.6	401.0	O K
5760 min Winter	0.628	0.628	10.3	357.4	O K
7200 min Winter	0.000	0.000	0.0	0.0	O K
8640 min Winter	0.000	0.000	0.0	0.0	O K
10080 min Winter	0.000	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.865	0.0	873.0	448
720 min Winter	9.403	0.0	898.0	526
960 min Winter	7.495	0.0	937.5	674
1440 min Winter	5.444	0.0	990.0	954
2160 min Winter	3.997	0.0	1204.6	1364
2880 min Winter	3.231	0.0	1296.7	1756
4320 min Winter	2.409	0.0	1408.8	2504
5760 min Winter	1.967	0.0	1584.3	3224
7200 min Winter	-0.012	0.0	-11.8	0
8640 min Winter	-0.010	0.0	-11.8	0
10080 min Winter	-0.008	0.0	-11.8	0

Peter Brett Associates		Page 3
Blackbrook Business Park	BIRD IN EYE	
Blackbrook Avenue	UCKFIELD	
Taunton TA1 2PX	HYDROBRAKE AND ORIFICE	
Date 07/04/2020 16:22	Designed by EAD	
File BIRD IN EYE WITH ORIFICE.SRCX	Checked by	
Innovyze	Source Control 2018.1	

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 548274 120643 TQ 48274 20643	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.000

Time (mins)		Area
From:	To:	(ha)
0	4	1.000

Peter Brett Associates		Page 4
Blackbrook Business Park	BIRD IN EYE	
Blackbrook Avenue	UCKFIELD	
Taunton TA1 2PX	HYDROBRAKE AND ORIFICE	
Date 07/04/2020 16:22	Designed by EAD	
File BIRD IN EYE WITH ORIFICE.SRCX	Checked by	
Innovyze	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 1.600

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	466.0	0.395	594.8	1.000	822.4	1.600	1084.4

Complex Outflow Control

Hydro-Brake® Optimum

Unit Reference MD-SHE-0076-2000-0395-2000
Design Head (m) 0.395
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 76
Invert Level (m) 0.000
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.395	2.0	Kick-Flo®	0.284	1.7
Flush-Flo™	0.124	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	0.800	2.8	2.000	4.2	4.000	5.8	7.000	7.7
0.200	1.9	1.000	3.1	2.200	4.4	4.500	6.2	7.500	8.0
0.300	1.8	1.200	3.3	2.400	4.6	5.000	6.5	8.000	8.2
0.400	2.0	1.400	3.6	2.600	4.8	5.500	6.8	8.500	8.5
0.500	2.2	1.600	3.8	3.000	5.1	6.000	7.1	9.000	8.7
0.600	2.4	1.800	4.0	3.500	5.5	6.500	7.4	9.500	9.0

Orifice

Diameter (m) 0.093 Discharge Coefficient 0.600 Invert Level (m) 0.395

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Caversham Bridge House	BIRD IN EYE	
Waterman Place	UCKFIELD	
Reading, RG1 8DN	HYDROBRAKE AND ORIFICE	
Date 31/07/2023 15:33	Designed by LWD	
File 230731_Hydrobrake and orifice_1...	Checked by	
Innovyze	Source Control 2020.1	

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.504	0.504	6.2	289.8	O K
30 min Summer	0.639	0.639	10.5	382.8	O K
60 min Summer	0.769	0.769	13.0	478.9	O K
120 min Summer	0.847	0.847	14.3	539.4	O K
180 min Summer	0.881	0.881	14.9	566.6	O K
240 min Summer	0.896	0.896	15.1	578.9	O K
360 min Summer	0.908	0.908	15.2	588.3	O K
480 min Summer	0.913	0.913	15.3	592.5	O K
600 min Summer	0.914	0.914	15.3	593.7	O K
720 min Summer	0.913	0.913	15.3	592.7	O K
960 min Summer	0.906	0.906	15.2	586.8	O K
1440 min Summer	0.880	0.880	14.8	565.6	O K
2160 min Summer	0.840	0.840	14.2	533.5	O K
2880 min Summer	0.802	0.802	13.6	503.9	O K
4320 min Summer	0.737	0.737	12.5	454.5	O K
5760 min Summer	0.688	0.688	11.5	418.0	O K
15 min Winter	0.555	0.555	8.4	323.9	O K
30 min Winter	0.703	0.703	11.8	429.0	O K
60 min Winter	0.845	0.845	14.3	537.8	O K
120 min Winter	0.931	0.931	15.6	607.2	O K
180 min Winter	0.970	0.970	16.1	639.9	O K
240 min Winter	0.989	0.989	16.4	656.0	O K
360 min Winter	0.999	0.999	16.5	664.3	O K
480 min Winter	1.000	1.000	16.5	665.1	O K
600 min Winter	0.997	0.997	16.5	662.7	O K
720 min Winter	0.990	0.990	16.4	657.1	O K
960 min Winter	0.971	0.971	16.2	641.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	156.136	0.0	191.4	19
30 min Summer	104.690	0.0	268.9	33
60 min Summer	67.106	0.0	490.5	62
120 min Summer	39.513	0.0	577.0	122
180 min Summer	28.923	0.0	632.4	180
240 min Summer	23.142	0.0	673.0	240
360 min Summer	16.859	0.0	730.7	298
480 min Summer	13.431	0.0	769.7	358
600 min Summer	11.253	0.0	798.0	422
720 min Summer	9.739	0.0	820.0	492
960 min Summer	7.763	0.0	854.7	626
1440 min Summer	5.638	0.0	900.0	896
2160 min Summer	4.140	0.0	1113.1	1296
2880 min Summer	3.346	0.0	1197.5	1672
4320 min Summer	2.495	0.0	1285.3	2420
5760 min Summer	2.037	0.0	1464.7	3168
15 min Winter	156.136	0.0	217.7	19
30 min Winter	104.690	0.0	308.2	33
60 min Winter	67.106	0.0	549.5	62
120 min Winter	39.513	0.0	646.0	120
180 min Winter	28.923	0.0	707.5	176
240 min Winter	23.142	0.0	752.4	232
360 min Winter	16.859	0.0	815.7	334
480 min Winter	13.431	0.0	858.2	376
600 min Winter	11.253	0.0	889.8	452
720 min Winter	9.739	0.0	915.6	528
960 min Winter	7.763	0.0	957.0	676

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Caversham Bridge House	BIRD IN EYE	
Waterman Place	UCKFIELD	
Reading, RG1 8DN	HYDROBRAKE AND ORIFICE	
Date 31/07/2023 15:33	Designed by LWD	
File 230731_Hydrobrake and orifice_1...	Checked by	
Innovyze	Source Control 2020.1	

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
1440 min Winter	0.922	0.922	15.5	600.2	O K
2160 min Winter	0.854	0.854	14.4	545.0	O K
2880 min Winter	0.796	0.796	13.5	498.9	O K
4320 min Winter	0.703	0.703	11.8	429.4	O K
5760 min Winter	0.639	0.639	10.5	382.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
1440 min Winter	5.638	0.0	1013.0	966
2160 min Winter	4.140	0.0	1247.0	1364
2880 min Winter	3.346	0.0	1342.0	1760
4320 min Winter	2.495	0.0	1447.2	2508
5760 min Winter	2.037	0.0	1640.7	3224

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 548274 120643 TQ 48274 20643	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	5760
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 1.000

Time (mins)	Area
From:	To: (ha)
0	4 1.000

Stantec UK Ltd		Page 4
Caversham Bridge House	BIRD IN EYE	
Waterman Place	UCKFIELD	
Reading, RG1 8DN	HYDROBRAKE AND ORIFICE	
Date 31/07/2023 15:33	Designed by LWD	
File 230731_Hydrobrake and orifice_1...	Checked by	
Innovyze	Source Control 2020.1	

Model Details

Storage is Online Cover Level (m) 1.600

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	491.5	0.395	623.5	1.000	856.1	1.600	1123.2

Complex Outflow Control

Hydro-Brake® Optimum

Unit Reference MD-SHE-0076-2000-0395-2000	
Design Head (m)	0.395
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	76
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.395	2.0	Kick-Flo®	0.284	1.7
Flush-Flo™	0.124	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	0.800	2.8	2.000	4.2	4.000	5.8	7.000	7.7
0.200	1.9	1.000	3.1	2.200	4.4	4.500	6.2	7.500	8.0
0.300	1.8	1.200	3.3	2.400	4.6	5.000	6.5	8.000	8.2
0.400	2.0	1.400	3.6	2.600	4.8	5.500	6.8	8.500	8.5
0.500	2.2	1.600	3.8	3.000	5.1	6.000	7.1	9.000	8.7
0.600	2.4	1.800	4.0	3.500	5.5	6.500	7.4	9.500	9.0

Orifice

Diameter (m) 0.093 Discharge Coefficient 0.600 Invert Level (m) 0.395

Appendix D Hydrological Note

TECHNICAL NOTE

Job Name: Land at Bird in Eye Farm, South of Bird in Eye Hill, Uckfield

Job No: 48494/2002

Note No: TN007

Date: 02 August 2023

Prepared By: Paul Davison

Subject: **Potential Changes to Hydrological Regime**

1. Introduction

- 1.1. This technical note describes a conceptual model of the hydrology of the site at Bird in Eye Farm under non-extreme (non-flood) conditions. It then sets out, at a conceptual level, how the hydrological regime at the site might be expected to change under development proposals.
- 1.2. The site drains from the high ground in the north and east of the site, to the south and west towards an area of ancient woodland, as shown in Figure 1.



Figure 1: Areas of ancient woodland to the south and west of the site (Defra MAGIC map).

- 1.3. The development of the site thus has the potential to impact the quantity of runoff that will reach the woodland areas.
- 1.4. There are watercourses that flow through the centre of the ancient woodland. There is an ordinary watercourse that flows east to west from Hailwell Farm to the Framfield Stream. Based on the topography of the area, the catchment of this watercourse extends up as far as Framfield village, with the development site forming approximately 25% of the total catchment area (see Figure 2 below). The Framfield Stream main river also flows along the western boundary of the site, and has a much larger catchment, draining from Hawkhurst Common approximately 5km east of the site.

TECHNICAL NOTE

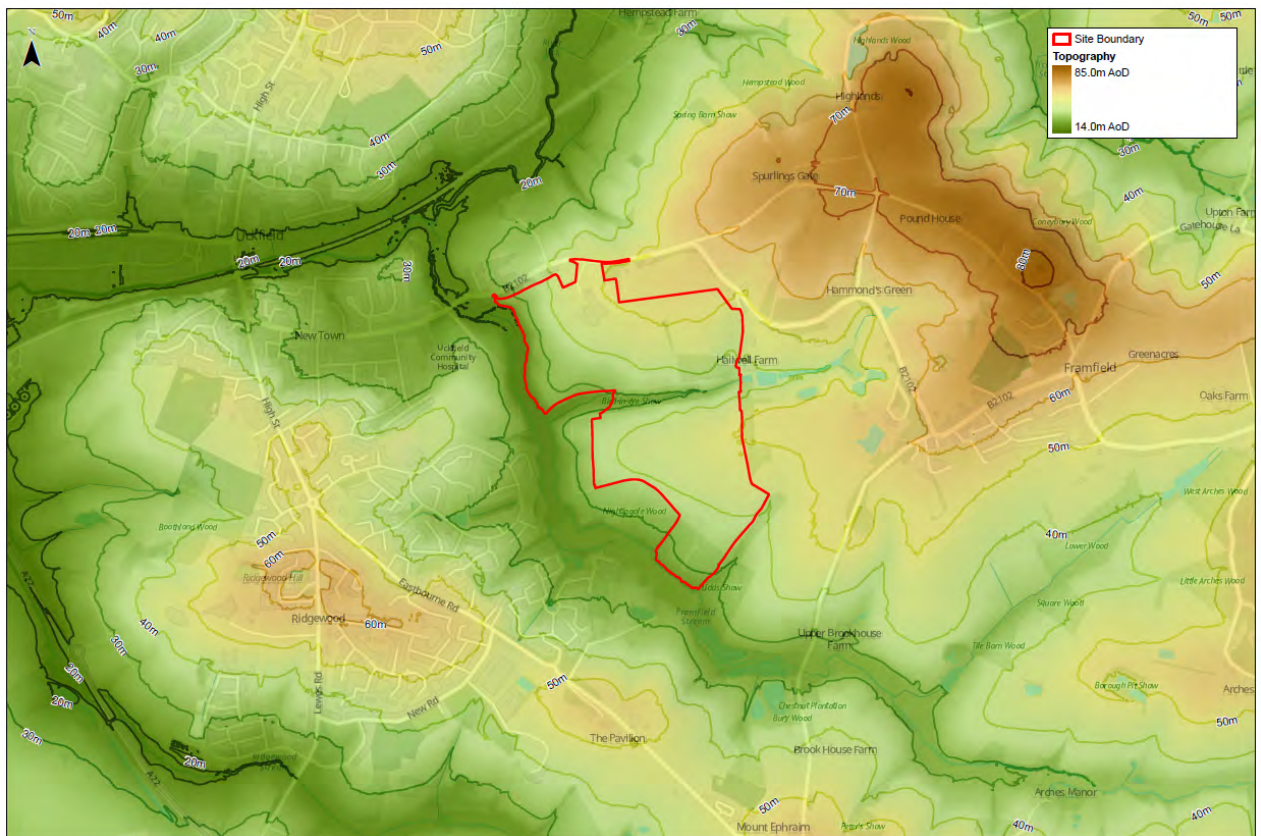


Figure 2: Topography of the area

2. Soil Hydrology

- 2.1. Soilscape soils mapping¹ indicates that soils on the site are loamy and clayey with impeded drainage.
- 2.2. This is supported by evidence from infiltration tests carried out in November 2022. The excavation of four trial pits at three locations on the site revealed largely sandy and silty soils. A layer of clay at 0.4-1.4 mbgl was found in one trial pit, but not at the other two locations.
- 2.3. Groundwater seepage was also noted at 0.8 mbgl (two pits) and 2.70 mbgl (one pit). No groundwater was encountered in the fourth pit.
- 2.4. This suggests that the principal hydrological pathways for incident rainfall are likely to be surface runoff and shallow lateral subsurface flow. There may also be some drainage to shallow groundwater where this is present, and when the subsoil is not waterlogged. However, the seasonal variability in groundwater levels at the site is not known, and it is likely that the significance of this pathway is reduced during the summer.
- 2.5. The relative proportions of runoff and shallow subsurface flow will be spatially variable and likely to be influenced by the presence or otherwise of clay soils, which appear to be discontinuous across the site.

¹ <https://www.landis.org.uk/soilsapes/>

TECHNICAL NOTE

3. Water Balance Pre-Development

- 3.1. The site is currently managed as improved grassland utilised as paddocks, with a few areas of woodland. Incident rainfall will generate some surface runoff, with the remaining rainfall infiltrating the soil surface. Runoff will follow the topography of the site, draining to the south or west, with some re-infiltration likely before reaching the site boundary. Indicative flow routes are presented in Figure 48494-2002-SK06 appended to this note.
- 3.2. Infiltrating rainfall will be subject to losses from evapotranspiration (ET) by the grassland and woodland. In a normal summer it would be expected that a soil moisture deficit (SMD) would develop and any remaining infiltration, after evapotranspiration, would act partially to replenish this SMD, rather than draining from the soil.
- 3.3. In the autumn, the SMD will reduce to zero as incident rainfall exceeds losses to ET. Further infiltrating winter rainfall would drain from the soil either as recharge to shallow groundwater or laterally, if there is an impermeable or slowly permeable soil layer present, or if the subsoil becomes waterlogged.
- 3.4. This shallow subsurface flow would also be expected to follow the topography of the site, draining to the south or west. Runoff rates will be higher in the winter than in the summer, and ET losses lower.

4. Potential Changes to the Water Balance

- 4.1. The proposed development of the site will introduce some new urban area in the north-west of the site, but the majority of the site will be SANG. There will also be some new tree planting in the public open space, and street trees within the urban area. Further marginal planting will protect the existing woodland to the south and west of the site.
- 4.2. The replacement of some of the existing grassland with new urban area would be expected to slightly reduce ET losses from this part of the catchment. However, this would be partly or wholly offset by increases in ET from the new tree planting. Per unit area, ET losses from woodland are higher than from grassland.
- 4.3. The new urban area covers approximately 7.5% of the total catchment area of the watercourse draining east-west through the parcel of ancient woodland to the south, and so overall this effect is not expected to be significant.
- 4.4. Runoff from the new impermeable residential area will be intercepted by a vegetated swale and channelled to an attenuation basin. Post development flow routes are indicated on Figure 48494-2002-SK07 appended to this note. During non-extreme rainfall events it would be expected that some of the runoff intercepted by the swale would re-infiltrate before reaching the basin, particularly during the summer months. There will also be some minor ET losses to the vegetation in the swale.
- 4.5. Under normal conditions, particularly in the summer months when an SMD would develop, these losses to seepage and infiltration could be substantial, so not all rainfall runoff would reach the basin. Water lost to seepage from the swale (and the base of the basin) would, however, still ultimately drain from the site to the south and west towards the woodland.
- 4.6. In winter months, ET losses from all vegetation types are much lower than in the summer. Losses to re-infiltration would also be expected to be relatively small, especially given the findings of the infiltration tests which showed modest rates of seepage, and the majority of the runoff intercepted by the swales would be expected to reach the attenuation basin.
- 4.7. It is proposed to create an overdug area within the basin below the outfall level. This would ensure that the first few mm of rainfall would remain in the basin and ultimately be infiltrated, if not already lost to seepage and infiltration through the swales, to ensure that the hydrological regime to the ancient woodland during normal conditions is not changed significantly.

TECHNICAL NOTE

- 4.8. Drainage from the SANG areas would not be expected to change due to the proposed development, with flow draining southwards towards the woodland as at present.

5. Summary

- 5.1. Under existing conditions, incident rainfall, after any ET losses, will become either rapid runoff or interflow under normal conditions. Due to the local topography, runoff would reach the woodland relatively quickly. The interflow will also reach the woodland but much more slowly.
- 5.2. Post development, with the surface water drainage scheme in place, runoff arising from the developed portion of the site (i.e. residential) will be intercepted by the swales. During a normal rainfall event, the majority of the runoff would infiltrate either from the base of the swale or the base of the attenuation basin, and this will still follow the topography towards the woodland as interflow. Overall, the total volume of water reaching the woodland is likely to be comparable to existing, but a lesser proportion of this would be rapid runoff than existing, and more of this rainfall will become interflow rather than runoff.
- 5.3. The impact of this change, to 7.5% of the catchment, is likely to be minor. The ancient woodland would receive a similar volume of rainfall as currently, though with a greater proportion of that rainfall being slower moving interflow.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Director)
48494/2002/TN007	-	02.08.23	PD	AH		AH

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TECHNICAL NOTE

Attachments:

48494-2002-SK06 Overland Flow Paths - Existing Site (Draft)

48494-2002-SK07 Flow Paths - Developed Site (Draft)



- Notes:
1. This drawing is to be read in conjunction with all other Engineer's drawings.
 2. Do not scale from this drawing.
 3. All dimensions are in metres unless noted otherwise.
 4. All levels are in metres above Ordnance Datum (AOD).
 5. Levels, pipe diameters and gradients, and manhole depths are indicative only and subject to detailed design.

Key:

Application Boundary

Ancient Woodland 15m Buffer Zone

Indicative Overland Flow Path

Mark	Revision		Date	Drawn	Chkd
					Appd

SCALING NOTE: Do not scale this drawing - any errors or omissions shall be reported to Stantec without delay.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

For Information

Land at Bird in Eye Farm
South of Bird in Eye Hill, Lockfield
Overland Runoff Flow Paths
Existing / Pre-Development Site

Client

Croudace Homes Limited

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Date of 1st Issue	Designed	Drawn
20.07.2023	-	LWD
A1 Scale	Checked	Approved
1:1000	AH	AH
Drawing Number	Revision	
48494/2002/SK06	-	



- | | | |
|---|--|---|
| Key: | | |
|  | | Application Boundary |
|  | | Ancient Woodland 15m Buffer Zone |
|  | | Indicative Overland Flow Path |
|  | | Indicative Development Runoff Flow Path |

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Land at Bird in Eye Farm
South of Bird in Eye Hill, Rockfield
Runoff Flow Path
Post-Development Site

		
Date of 1st Issue 20.07.2023	Designed -	Drawn LWD
A1 Scale 1:1000	Checked AH	Approved AH

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