8. WATER RESOURCES AND FLOOD RISK

Introduction

8.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of water resources and flood risk.

8.2 This chapter has been prepared by Waterman Infrastructure & Environment Limited (refer to Appendix 1.2).

Policy Context

National Planning Policy Framework[i]

8.3 The National Planning Policy Framework (NPPF), updated in July 2021, sets out the Government's planning policies for England and how they are expected to be applied. In terms of Water Resources and Flood Risk, the NPPF states that 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.

8.4 The NPPF states that when determining planning applications, Local Planning Authorities (LPA) should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific Flood Risk Assessment (FRA). Development should only be allowed in areas at risk of flooding where it can be demonstrated that:

- 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;
- 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;
- It incorporates Sustainable Drainage Systems (SuDS), unless there is clear evidence that this would be inappropriate;
- Any residual risk can be safely managed; and
- Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

8.5 Major developments should incorporate SuDS unless there is clear evidence that this would

be inappropriate. The systems used should:

- Take account of advice from the Lead Local Flood Authority (LLFA);
- Have appropriate proposed minimum operational standards;
- Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- Where possible, provide multifunctional benefits.

Planning Practice Guidance[ii]

8.6 The Planning Practice Guidance (PPG) provides additional guidance to LPAs to ensure effective implementation of the planning policies set out within the NPPF regarding development in areas at risk of flooding.

8.7 The PPG states that developers and LPAs should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of SuDS. Referencing information provided by the Environment Agency (EA), the PPG provides advice on taking account of climate change, setting out recommended contingency allowances for net sea level rise and peak rainfall intensities. It also advises on flood resilience and resistance measures when dealing with the residual risks remaining after applying the sequential approach and mitigating actions.

8.8 The PPG also includes advice on flood risk vulnerability and flood zone compatibility. The following flood zones refer to the probability of river and sea flooding, without the presence of defences:

- Zone 1 - low probability: less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year;
- Zone 2 - medium probability: between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% to 0.1%) in any year;
- Zone 3a - high probability: 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability flooding from the sea (>0.5%) in any year; and
- Zone 3b - the functional floodplain: where water has to flow or be stored in times of flood; identification should take account of local circumstances but would typically flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme 1 in 1,000 (0.1%) flood.

- Flood risk vulnerability is split into five classifications in Table 2 of the PPG, as follows, and the compatibility of these within each Flood Zone is set out in Table 3 of the PPG:
- Essential Infrastructure, e.g. essential transport and utility infrastructure, wind turbines;
- Highly Vulnerable, e.g. emergency services (those required to be operational during flooding), basement dwellings;
- More Vulnerable, e.g. residential dwellings, hospitals, schools, hotels, drinking establishments;
- Less Vulnerable, e.g. retail, offices, storage and distribution, leisure, restaurants; and
- Water-Compatible Development, e.g. docks, marinas, wharves.

8.9 In terms of the general planning approach to development and flood risk, the Flood Risk and Coastal Change PPG sets out the following main steps to be followed:

- Assess Flood Risk;
- Avoid Flood Risk;
- Manage and Mitigate Flood Risk.

8.10 The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding. 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.

8.11 If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), it may be necessary to demonstrate through the Exception Test that:

- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- 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.

National Standards for Sustainable Drainage Systems, 2011[iii]

8.12 The Non-Statutory Technical Standards for Sustainable Drainage Systems[iv] was published in March 2015 and is the current guidance for the design, maintenance and operation of SuDS.

8.13 The standards set out that the peak runoff rate should be as close as is reasonably practicable to the greenfield rate but should never exceed the pre-development runoff rate.

8.14 The standards also set out that the drainage system should be designed so that flooding does not occur on any part of the Site for a 1 in 30 year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100 year rainfall event.

8.15 It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

Local Planning Policy

East Sussex Preliminary Flood Risk Assessment[v]

8.16 ESCC in their role as LLFA published the Preliminary Flood Risk Assessment (PFRA) in June 2011. The PFRA provides a summary of past flooding incidents and outlines the future flood risk within the area, identifying which areas require particular focus and further assessment. Findings from the PFRA were used to inform the assessment of flood risk.

Wealden District Core Strategy Local Plan[vi]

8.17 The Wealden District Local Plan was adopted in 2013. It states that Uckfield suffered major flooding in 2000 and that flood risk remains a major constraint on future proposals in the area.

8.18 Wealden District Council (WDC) proposes significant further housing growth in Uckfield as part of the strategy for the town. Appropriate mitigation and avoidance measures should be incorporated within masterplans to ensure that future housing and employment is not subject to flood risk and does not exacerbate flood risk elsewhere.

Wealden District Strategic Flood Risk Assessment[vii]

8.19 The WDC Flood Risk Assessment (SFRA) was published in 2017 and provides a summary of latest flood risk information and available data. Findings from the SFRA were used to inform the assessment of flood risk for the Development.

8.20 Where a surface water flow path crosses through a site, the development must understand the source of the flow path, manage the flow path in a green corridor where possible, and if diversion is required, then the impact upstream, downstream, and at the site must be understood.

Uckfield Stage 1 Surface Water Management Plan[viii]

8.21 The Uckfield Surface Water Management Plan (SWMP) was published in 2016 to understand the flood risk that arises from local flooding, which includes flooding from surface water runoff, groundwater, and ordinary watercourses. Findings from the SWMP were used to inform the assessment of flood risk for the Development.

East Sussex Local Flood Risk Management Strategy 2016 – 2026[ix]

8.22 The East Sussex Local Flood Risk Management Strategy (LFRMS) was published in 2016 and provides the framework for the management of local flood risk for the next ten years as well as parameters for drainage strategy design. Findings from the LFRMS were used to inform the assessment of flood risk and drainage for the Development.

Guide to Sustainable Drainage Systems in East Sussex[x]

8.23 The Guide to Sustainable Drainage Systems was published in 2015 and outlines the process of designing and implementing SuDS within the East Sussex environment.

8.24 It states that during masterplanning and concept design, the conceptual design proposals should be discussed with the local planning authority and ESCC. In support of an outline planning application, the flow routes, storage requirements, and adoption arrangements of SuDS should be confirmed, and relevant ground investigations and surveys should be undertaken. The requirements for an outline drainage strategy stated in the Guide have informed the drainage design for the Development.

Legislative Context

Water Framework Directive, 2000[xi]

8.25 The Water Framework Directive 2000/60/EC (WFD) applies to all European Union (EU) water bodies and aims to make sure they are protected from further deterioration, and that improvements in water quality are made. The assessment and protection of water bodies should be undertaken irrespective of political or administrative boundaries by implementing River Basin Management Plans to be prepared within a formal series of six year cycles, following the identification of River Basin Districts. In general terms, there is an onus on developers to protect and, if possible, enhance water bodies close to proposed developments.

Flood Directive, 2007[xii]

8.26 The Flood Directive 2007/60/EC came into force in November 2007. This Directive requires Member States to assess whether water courses and coastlines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Directive requires Member States to carry out a preliminary assessment of flood risk by 2011, to draw up flood risk maps by 2013 and to establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive is to be implemented in co-ordination with the Water Framework Directive.

Land Drainage Acts, 1991 and 1994[xiii]

8.27 The Land Drainage Acts set out the responsibilities given to the EA, Internal Drainage Boards, Local Authorities (LAs) and riparian landowners in regard to land drainage. Under the Acts, the EA and LAs have discretionary powers of management and maintenance for 'Main Rivers' and 'Ordinary Watercourses' respectively. It is the riparian owner, i.e. the owner of the land through which the watercourse flows, who is ultimately responsible for the maintenance of the relevant section of the watercourse.

Water Resources Act, 1991 (Amendment) (England and Wales) Regulations, 2009[xiv]

8.28 The Water Resources Act (as amended by the Water Resources Act 1991 Regulations 2009) relates to the control of the water environment. The main aspects of the Act (as amended) which are relevant to the Development include provisions concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the EA in regulating the water environment.

Water Industry Act, 1991[xv]

8.29 The Water Industry Act consolidates previous legislation on water supply and sewerage services and covers a wide range of activities required of the privatised water companies that were created in 1989. The main relevant provisions relate to trade effluent discharges made to sewer for which the privatised companies act as the regulatory authorities.

Water Act 2003[xvi]

8.30 The Water Act 2003 amends the Water Resources Act 1991 and the Water Industry Act 1991. The Act brings about a number of changes, including streamlining arrangements for flood

defence organisation and funding and changes to the types of abstraction licences, and places a duty on water companies to conserve water and prepare for drought.

Water Environment (Water Framework Directive) (England and Wales) Regulations 2003[xvii]

8.31 This transposes the requirements of the WFD into UK law. Eleven River Basin Districts have been identified in England and Wales. The Regulations include a requirement for water bodies (categorised as: 'rivers'; 'lakes'; 'transitional waters'; 'coastal waters'; or 'groundwaters') to achieve 'good' status with respect to ecology and water chemistry by 2015. Progress is monitored by the EA in its role as the 'competent authority'.

Flood and Water Management Act, 2010[xviii]

8.32 The Flood and Water Management Act implements the recommendations from Sir Michel Pitt's Review of the floods in 2007 and places a series of responsibilities on County and Unitary Councils as LLFAs with the intention of improving flood risk management. It also removes the automatic right of connection into public water sewers and places the onus on LAs to adopt SuDS.

Environment Act 1995[xix]

8.33 The Environment Act 1995 (Section 57) makes provisions for a risk based framework for the identification, assessment and management of contaminated land within the UK. The provisions of the Act came into effect in April 2000 and are aimed at ensuring that actions taken with respect to contaminated land are directed by a technical assessment of risk that exists in the source/pathway/receptor scenario (pollutant linkage). This extends to preventing the contamination of controlled waters.

Assessment Methodology

Method of Baseline Data Collection

8.34 In order to comply with the NPPF and local policy, an FRA including a Drainage Strategy has been undertaken for the Site, and is provided in Appendix 8.1.

8.35 The FRA identifies all potential sources of flooding at the Site (tidal, fluvial, pluvial, groundwater, and artificial), determines the risk posed by these sources to the Development, and predicts the effect on flood risk that the Development poses to surrounding receptors, with allowances made for the likely effects of climate change.

8.36 The FRA and Drainage Strategy (Appendix 8.1) also considers surface water runoff from the Site to ensure that the Development does not increase the risk of flooding off-Site. The drainage strategy sets out the proposed rate of runoff and volume of attenuation to mimic the greenfield situation, and the SuDS features proposed.

8.37 The FRA and Drainage Strategy (Appendix 8.1) include an assessment of foul water, including estimated peak foul flow rates resulting from the Development. A pre-planning enquiry has been submitted to Southern Water to confirm sewerage capacity and the requirement for upgrades/reinforcements within the public network, with a response received in March 2022 confirming that there is a requirement for upgrades/reinforcements within the public network to serve the Development.

8.38 The assessments within the FRA and Drainage Strategy (Appendix 8.1) are summarised as follows:

- Potential sources of flooding, including recorded data of previous flood events;
- Flood alleviation measures already in place, their state of maintenance and performance;
- Potential impacts of flooding to the Site and identification of any necessary mitigation measures;
- Residual risks after implementation of necessary mitigation measures, allowing for the future impacts of climate change;
- An assessment of surface water runoff in accordance with ESCC requirements, including an assessment of the existing hydrological regime within the woodland ghylls;
- Preparation of a preliminary surface water drainage strategy including SuDS and details on their management and maintenance; and
- Consideration of the existing and proposed foul flows from the Site.

8.39 The FRA and Drainage Strategy (Appendix 8.1) has informed the likely significant effects of the Development on flood risk and drainage and the necessary mitigation measures.

Consultation

8.40 WDC and the EA were consulted as part of the EIA scoping opinion, setting out their requirements relating to flood risk and drainage.

8.41 ESCC was consulted to confirm the principles of the drainage strategy (Appendix A of the FRA, Appendix 8.1).

8.42 Southern Water was consulted to obtain historic flooding records and public sewer records (Appendix E of the FRA, Appendix 8.1).

Data Sources

8.43 Baseline data relating to flood risk and drainage considerations at the Site has been compiled using the following sources:

- EA online flood maps;
- ESCC flood mapping;
- Ordnance Survey (OS) maps, topographic survey, British Geological Survey (BGS) mapping, and FEH Hydrological Data;
- Geo-Environmental Risk Assessment[xx];
- Consultation with statutory consultees; and
- Review of relevant local planning policy documents.

Method of Assessment

Demolition & Construction Phase

8.44 The likely demolition and construction effects are based upon the information provided in Chapter 5: Construction Methodology and Phasing of this ES. A qualitative assessment of likely effects has been carried out.

Operational Phase

8.45 The assessment of the complete and operational Development is based upon the parameter plans which have been submitted as part of the ES (Refer to ES Chapter 3: Site and Development Description and Figure 3.1 to 3.3.

Significance Criteria

8.46 The methodology used to identify the sensitive receptors, the sensitivity level of the receptor, the magnitude of an impact and how the likely significance of effect is determined is based on the following factors:

- The value of the resource (international, national, regional, and local level importance);

- The magnitude of the impact;
- The duration involved;
- The reversibility of the effect; and
- The number and sensitivity of receptors.

Table 8.1: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for Assessing Impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post Development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post Development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-Development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

8.47 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in Table 8.2.

Table 8.2: Methodology for Determining Impact Sensitivity

Sensitivity	Examples of Receptor
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

8.48 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be beneficial or adverse. The Effect Significance Matrix is set out in Table 8.3.

Table 8.3: Effect Significance Matrix

Magnitude	Sensitivity		
	High	Moderate	Low
Major	Major Adverse/Beneficial	Major – Moderate Adverse/Beneficial	Moderate – Minor Adverse/Beneficial
Moderate	Major – Moderate Adverse/Beneficial	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial
Minor	Moderate – Minor Adverse/Beneficial	Minor Adverse/Beneficial	Minor Adverse/Beneficial – Negligible

Negligible	Negligible	Negligible	Negligible

8.49 For the purpose of this assessment, all effects (minor, moderate, or major) apart from negligible are considered significant.

8.50 The effects considered in this assessment are:

- Effect on off-Site flood risk;
- Effect on of groundwater flood risk;
- Effect on surface water drainage and hydrology; and
- Effect on foul drainage capacity.

8.51 The following are the sensitive receptors which will be considered in the assessment:

- Future users and residents of the Development;
- Off-site receptors (adjacent areas, receiving watercourses, Ancient Woodland); and
- Construction workers.

Limitations and Assumptions

8.52 The drainage strategy design for the Development, as outlined later in the Chapter, is based upon the following assumptions:

- Proposed developable area = 13.60ha;
- Proposed Impermeable/Hardstanding Area =60%
- A 10% increase in proposed impermeable area has incorporated to allow for the potential for future urban creep, which relates to home owners constructing sheds, garages, or other hard-standing surfaces within their gardens, effectively increasing the impermeable area;
- 10% allowance for runoff from adjacent areas;
- 10% attenuation provided within on plot permeable paving aggregate sub-base;
- 3m maintenance buffer surrounding SuDS;
- Detention basins increased by 30% to account for earthworks;
- Land raising/reprofiling required to facilitate the detention basins;
- Land-raising and/or shallow surface water conveyance measures used in the western parts of the Site to achieve gravity drainage into the detention basins; and
- The surface water attenuation volumes and SuDS dimensions are subject to detailed design.

8.53 The FRA is based upon the following assumptions/limitations:

- More than the required 8m offset is provided either side of on-site watercourses;
- The flood risk associated with the watercourses located in the developable area (Longwood Gill brook, Shermanreed Wood brook, and southern brook) is assumed to be pluvial instead of fluvial as they originate within the Site and their catchment area comprises predominantly the Site itself.

Baseline Conditions

Topography

8.54 The topographic survey (Appendix B of the FRA, Appendix 8.1) shows that the developable area falls from east to west from approximately 57.0m Above Ordnance Datum (AOD) to approximately 23.5m AOD.

Geology

8.55 The 1:50,000 scale British Geological Survey (BGS) soil mapping shows that the northern part of the developable area is underlain by sandstone which is a classified secondary aquifer. The southern part of the developable area is underlain by mudstone which is generally an unproductive stratum that does not support groundwater flows.

8.56 The Geo-Environmental Site Investigation Report (Appendix 10.2) confirms the geology shown on the BGS mapping, summarised in Table 8.4 and illustrated in the conceptual model (Appendix F of FRA, Appendix 8.1).

Table 8.4: Geology

Geology	Description	Depth	Hydrological Significance
Made Ground	Sandy silty clay	0.2m – 0.3m	Unproductive
Upper Tunbridge Wells Sand	Silty sandy clay or very dense silty fine sand	Up to 2.9m	Secondary A Aquifer
Grinstead Clay Member	Silty Clay	Up to 5.5m	Unproductive
Ardingly Sandstone Member	Tabular gravel	Varies	Secondary A Aquifer
Lower Tunbridge Wells Sand	Silty sandy clay	Varies	Secondary A Aquifer

Existing Infrastructure

8.57 The existing Site is undeveloped greenfield land. The only existing public sewerage infrastructure is a 150mm public foul sewer beneath Snatts Road to the immediate east of

the Site, as shown on the Southern Water asset plans (Appendix E of FRA, Appendix 8.1).
Flood Risk

Tidal

8.58 The Site is located inland a considerable distance from the sea, such that the risk of tidal flooding is considered to be low.

Fluvial

8.59 The EA Flood Map for Planning (Figure 2 in the FRA, Appendix 8.1) shows that the Site is located within Flood Zone 1, denoting a low risk (less than 0.1% annual probability) of flooding from rivers.

8.60 The Shortbridge Stream and its parallel tributary are located to the west of the Site. In addition, there are four watercourses within or adjacent to the Site boundary, as identified on Figure 2 in the FRA, Appendix 8.1.

8.61 Budlett's Wood brook is located to the north of the Site and Longwood Gill brook, Shermanreed Wood brook, and the Southern brook are located within/adjacent to the developable area.

8.62 The flooding mechanism for the watercourses within the Site (Longwood Gill brook, Shermanreed Wood brook, and Southern brook) is pluvial rather than fluvial as they originate on Site and their catchment area comprises predominantly the Site itself, such that they are directly responsive to rainfall. These watercourses are covered within the 'Pluvial' section of this Chapter.

<u>Shortbridge Stream</u>

8.63 The closest Main River to the Site is the Shortbridge Stream, located approximately 120m to the west of the Site. The developable area is separated from the Shortbridge Stream by the A22. In addition, the development platform would be located a minimum of 15m higher than the Flood Zone 3 extents associated with the stream. The risk of flooding from the Shortbridge Stream is therefore considered to be low.

<u>Shortbridge Stream Tributary</u>

8.64 There is an unnamed tributary, which flows generally parallel to the Shortbridge Stream

approximately 85m to the west of the Site. It has not been modelled by the EA and therefore the EA mapping (Figure 2 in the FRA, Appendix 8.1) does not show its associated fluvial floodplain. The pluvial flood extents associated with the tributary (Figure 3 in the FRA, Appendix 8.1) provide an indication of its likely fluvial flood extents and extend slightly further than the Shortbridge Stream fluvial floodplain.

8.65 The developable area is separated from the Shortbridge Stream by the A22. In addition, the developable area would be located a minimum of 15m higher than the pluvial flood extents associated with the Shortbridge Stream tributary, and the risk of flooding is therefore considered to be low.

Budlett's Wood brook

8.66 The Budlett's Wood brook is located outside of the developable area, such that no land raising or built Development is proposed in its vicinity and would not impact upon the watercourse nor displace potential floodwater.

8.67 The risk of flooding from Budlett's Wood brook is therefore considered to be low.

Pluvial

8.68 Pluvial flooding occurs when natural and/or engineered systems lack the capacity to manage the volume of rainfall. Pluvial flooding can occur in urban areas during an extreme, high intensity, low duration summer rainfall event which overwhelms the local surface water drainage system or in rural areas during medium intensity, long duration events where saturated ground conditions prevent infiltration into the subsoil. This flood water would then be conveyed via overland flow routes based on the local topography.

Overland Surface Water Flow

8.69 The EA Flood Risk from Surface Water map (Figure 3 in the FRA, Appendix 8.1) shows that the majority of the Site is at 'very low' risk (less than 0.1% annual probability) of surface water flooding.

8.70 The EA map shows several surface water flow paths through the Site, indicating the presence of the watercourses discussed in this Chapter.

8.71 The flood mechanism of the watercourses located within/adjacent to the developable area

(Longwood Gill brook, Shermanreed Wood brook, and Southern brook) is pluvial rather than fluvial as they originate on Site and their catchment area comprises predominantly the Site itself, such that they are directly responsive to rainfall.

Longwood Gill brook and Shermanreed Wood brook

8.72 The Longwood Gill and Shermanreed Wood brooks are located entirely within Ancient Woodland, before connecting into the Shortbridge Stream via culverts beneath the A22.

8.73 The pluvial floodplains associated with the woodland watercourses are narrow, which is representative of the steep banks. Naturally, the watercourses are located at the bottom of the ghylls, approximately 3m and 8m lower than the development platform for Shermanreed Wood and Longwood Gill, respectively. The levels flatten out at the downstream end of Shermanreed Wood, however, the Development is located approximately 60m away from the watercourse in that location. Ground levels would be raised to facilitate the Development and SuDS basin in this location, providing additional protection from the watercourse.

8.74 In line with ESCC requirements (Appendix A of the FRA, Appendix 8.1), the watercourses would be retained within the Development with an appropriate offset (8m) provided to allow for access and maintenance. The Ancient Woodland designation surrounding the watercourses extends further than the 8m buffer and the pluvial flood extents. The Ancient Woodland would remain undeveloped with a 15m offset surrounding the woodland boundaries so as not to impact upon the existing setting. Development would therefore be set further than the required distance from the watercourses to ensure floodwater is not displaced as a result of the Development.

8.75 The drainage strategy (outlined later in this Chapter and in the FRA, Appendix 8.1) proposes to discharge surface water runoff into the woodland brooks at the greenfield runoff rate, such that the flows within the watercourses resemble the pre-development hydrological regime. The risk of flooding from the Longwood Gill and Shermanreed Wood brooks is therefore considered to be low.

Southern brook (unmapped)

8.76 A Site visit undertaken on 27th August 2020 confirmed the presence of un unmapped brook connecting the southern end of the Site to the Shortbridge Stream via a culvert beneath the A22. The brook is shown as a flow path on the EA Flood Risk from Surface Water map (Figure 3 in the FRA, Appendix 8.1).

8.77 The drainage strategy (outlined later in this Chapter and in the FRA, Appendix 8.1) proposes to discharge surface water flows into the brook at the greenfield runoff rate, mimicking the existing drainage catchment.

8.78 In addition, the developable area is located upstream at a higher topography than the Southern brook and the risk of flooding is therefore considered to be low.

Sewer Flooding

8.79 Southern Water asset plans (Appendix E of the FRA, Appendix 8.1) indicate that there are no existing public sewers beneath the Site. The nearest public sewer is a 150mm diameter foul sewer beneath Snatts Road, to the east of the Site.

8.80 The WDC SFRA states that there have been a significant number of historic flood incidents in the district with surface water flooding being the main source. In Uckfield Parish, there have been 46 recorded surface water flood incidents according to the ESCC consultation response (Appendix A of the FRA, Appendix 8.1).

8.81 The Uckfield SWMP identified hotspots where there are repeated flood incidents along with areas of predicted flood risk, including Snatts Road. The main source of flooding has been identified as surface water from the highway caused by blocked drains. The SWMP notes that ESCC has undertaken extensive drainage improvement work in this area to resolve the blockage/capacity issues.

8.82 The flood risk from sewer flooding is considered to be low.

Groundwater

8.83 Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks.

8.84 The ESCC consultation response (Appendix A of FRA, Appendix 8.1) shows that there is limited potential for groundwater flooding to occur in the northern part of the developable area, corresponding to the presence of sandstone, which is a designated Secondary Aquifer, with an anticipated groundwater table of less than 3m below surface. The ESCC mapping shows that the groundwater table beneath the southern part of the developable area is anticipated to be in excess of 5m. The PFRA mapping (Appendix D of FRA, Appendix 8.1) does not place the Site within an area susceptible to groundwater flooding.

8.85 The Geo-Environmental Site Investigation Report (Appendix 10.2) states that shallow groundwater was encountered during the Site investigations, up to 0.64m below ground level (bgl), however this was limited to areas outside of the developable area. Within the developable area, groundwater levels were typically recorded at depths of greater than 1.90m bgl.

8.86 The risk of groundwater flooding is therefore considered to be low.

Artificial Sources

8.87 The EA Flood Risk from Reservoir mapping (Figure 5 in the FRA, Appendix 8.1) shows that the Site is not at risk of flooding in the event of a reservoir failure or overtopping.

8.88 There is an existing lake to the south of the Site, however it is topographically lower than the surrounding ground. Any exceedance flows from the lake would flow to the west towards the SANG as dictated by topography and into the adjacent watercourse. There are a number of smaller ponds within the Site, which are at ground level and therefore pose a limited risk.

8.89 The risk of flooding from artificial sources is therefore considered to be low.

Surface Water Drainage / Hydrology

8.90 The surface water drainage assessment has been prepared for the developable area only, as no built development is proposed elsewhere within the Site, and as such would not impact upon the existing surface water drainage and hydrological regime.

8.91 The existing Site is undeveloped greenfield land with no existing public surface water sewer infrastructure within or in vicinity of the Site as per Southern Water asset plans (Appendix E of the FRA, Appendix 8.1).

8.92 The existing drainage regime at the Site is governed by overland surface water flows feeding into the existing watercourses within the developable area, i.e. Longwood Gill brook, Shermanreed Wood brook, and the Southern brook. The catchment area of the watercourses predominantly comprises the developable part of the Site.

8.93 Two of the watercourses (Longwood Gill brook and Shermanreed Wood brook) are located entirely within Ancient Woodland extents, which is a protected environment sensitive to change. The drainage strategy is therefore vital in enabling the woodland brooks to retain flows as per the existing situation. A Site visit was undertaken on 9th November 2020 with

arboriculturist FLAC and ecologist Aspect Ecology to determine the existing hydrological characteristic of the woodland ghylls, so that the proposed drainage strategy could be designed to accurately mimic the existing regime and result in no material change to the Ancient Woodlands. The existing hydrological regime of the woodland brooks is described below.

Longwood Gill

8.94 Longwood Gill brook is located in a deep topographic depression, generally 8m lower than the adjacent land. There are existing incisions into the flanks of the woodland, indicating existing overland inflows into the watercourse. These inflows were visible in their channel-like appearance as well as having a particular type of water-compatible fern growing along the incision, indicating the flow of water in these locations.

Shermanreed Wood

8.95 Shermanreed Wood brook is also located in a topographic depression, generally 3m lower than the adjacent land at its upstream end. The topography flattens out towards the downstream end of the watercourse. At its upstream end, Shermanreed Wood does not have the same channel-like incisions into the woodland flanks as Longwood Gil, and the existing inflows are from overland flows driven by topography and shallow infiltration.

8.96 Along the central section of Shermanreed Wood there is an existing inflow into the brook in the form of a steep channel observed during the Site visit.

Foul Drainage

8.97 The existing Site is undeveloped agricultural land and ancient woodland, which currently produces no foul flows.

Likely Significant Effects

8.98 This section identifies the likely significant environmental effects (beneficial and adverse) resulting from the Development. Construction and operation effects are considered separately, and the assessment is based on the realistic worst-case scenario.

Construction Phase

8.99 This section identifies and assesses the scale and nature of the main effects arising from the Development during the construction phase.

Flood Risk (Tidal, Fluvial, Pluvial, Artificial Sources)

8.100 As detailed earlier in this Chapter and within the FRA (Appendix 8.1), the risk of flooding from tidal, fluvial, pluvial and artificial sources is considered to be low. This would remain the case during the construction phase. The assessment of flood risk includes for the impacts of climate change, predicting the future risk at the Site. The risk of flooding is therefore not anticipated to change by the time construction works begin. In addition, construction works would not have an impact upon the tidal, fluvial, pluvial, or artificial risk of flooding at the Site.

8.101 As such, the risk of flooding of the Site from these sources during the construction phase would be negligible.

Flood Risk (Groundwater)

8.102 As detailed earlier within this Chapter and within the FRA (Appendix 8.1), the risk of flooding from groundwater sources is considered to be low. However, during the construction phase there would be some shallow excavation and earthworks to facilitate the Development and SuDS.

8.103 Groundwater was encountered throughout the developable area, generally at depths greater than 1.9m bgl. In the absence of mitigation, there could be slight seepages into excavations/earthworks during periods of inclement weather during the construction works. This would lead to a local and temporary adverse effect of minor significance during the construction phase.

Surface Water Drainage / Hydrology

8.104 Construction works, including foundations and ground re-profiling, have potential to give rise to changes in the surface water runoff regimes particularly during and immediately following periods of heavy rainfall.

8.105 In the absence of mitigation, there would be slight surface water ingress into excavations/earthworks during periods of inclement weather.

8.106 In the absence of mitigation, there would be a change to the surface water runoff discharged off-site during construction as discharge rates may not be controlled and flow paths could potentially be diverted.

8.107 Whilst the receiving environment (Ancient Woodland and the associate woodland ghylls) is sensitive, this change in Site conditions and overland surface water flow regime would only be temporary, and as such would give rise to a local and temporary adverse effect of minor significance during the construction phase.

8.108 The proposed drainage strategy requires the construction of drainage outfalls into the woodland brooks through the Ancient Woodland. In the absence of mitigation, using traditional construction methods would damage the Ancient Woodland and as a result would lead to a local and permanent adverse effect of major to moderate significance.

Foul Water Capacity

8.109 Wastewater generation from the construction phase would include effluent from sanitary facilities, as well as sediment-laden water from excavations, washing down and wheel washing facilitates. As the Site is currently undeveloped, there are no existing foul flows.

8.110 Given the minor temporary increase in foul water flow during construction compared to the existing situation, in absence of mitigation measures, the likely significant effect of the Development to foul water capacity is expected to be a local and temporary adverse effect of minor significance.

Operational Phase

8.111 This section identifies and assesses the scale and nature of likely significant effects arising from the Development during the operational phase.

Flood Risk (Tidal/Fluvial, Pluvial, Groundwater, Artificial Sources)

8.112 As detailed earlier in this Chapter and within the FRA (Appendix 8.1), the risk of flooding from tidal/fluvial, pluvial, groundwater and artificial sources is considered to be low. This would remain the case during the operational phase. The assessment of flood risk includes for the impacts of climate change, predicting the future risk at the Site for the lifetime of the Development. Once operational, the Development would not impact upon the tidal, fluvial, pluvial, or artificial risk of flooding at this Site.

8.113 As such, the risk of flooding from these sources during the operational phase would be negligible.

Surface Water Drainage / Hydrology

8.114 In the current scenario, surface water runoff from the Site drains via overland flows into the on-site watercourses, two of which are located entirely within Ancient Woodland (Longwood Gill brook and Shermanreed Wood brook). In the absence of mitigation, the Development would change the surface water drainage regime, altering the hydrological regime within the Ancient Woodland and the associated woodland brooks and increase the risk of flooding off-site. This would result in local and permanent adverse effect of major to moderate significance.

8.115 The drainage strategy for the Development is therefore vital in enabling the watercourses to retain flows as per the existing situation to demonstrate no material change to the hydrology of the Ancient Woodland.

Foul Water Capacity

8.116 The existing Site comprises woodland and agricultural land, which currently produces no foul flows. The Development would comprise up to 424 residential units, resulting in a peak foul flow rate of 3.6 l/s, as calculated using the Water Consumption Method (Appendix J of the FRA, Appendix 8.1).

8.117 Foul water arising from the Development would be discharged via requisitioned sewers to connect into the nearest public foul sewer. Due to constraints regarding ancient woodland, this connection is likely to be beneath Rocks Road. The pre planning enquiry response from Southern Water (Appendix E of the FRA, Appendix 8.1) has not commented on the most suitable location to the east of the Site and therefore it is considered that Rocks Road is no less viable than any alternative arrangement.

8.118 Due to topography at the Site, foul water would need to be pumped off-site. An adoptable pump station has been shown on the drainage strategy plan (Appendix I of the FRA, Appendix 8.1).

8.119 Due to the scale of the Development, it is likely that the treatment works and/or existing public foul infrastructure will require upgrades or reinforcement to accommodate the proposed flows. This has been confirmed by the response to a pre-planning enquiry from Southern Water identifying insufficient capacity in their system without local upgrades/reinforcement.

8.120 Southern Water have a legal obligation to accept foul flows following granting of a planning application and would be responsible for providing upgrades to their infrastructure. Therefore, it can be assumed that upgrade/reinforcement works would be undertaken if necessary, and as a result, the Development would have a negligible effect upon the capacity of foul infrastructure and sewage treatment works.

Mitigation Measures

8.121 This section identifies the measures required to mitigate the effects of the Development.

Construction Phase

Flood Risk (Tidal/Fluvial, Pluvial, Artificial Sources)

8.122 The likely effect of flood risk from tidal/fluvial, pluvial and artificial sources during construction would be negligible. As such, no mitigation measures are required.

Flood Risk (Groundwater)

8.123 The Geo-Environmental Risk Assessment report (Appendix 10.2) states that groundwater control measures are unlikely to be required. The report concludes that limited dewatering and disposal, using standard techniques such as sumps and pumps, may be required to manage the potential for slight groundwater seepages into excavations/earthworks.

Surface Water Drainage / Hydrology

8.124 A Construction Environmental Management Plan (CEMP) would be secured via planning condition and implemented prior to the commencement of works on Site (refer to Chapter 5: Demolition and Construction), which would set out temporary measures to be put in place to control surface water runoff from the Site, and reduce the risk of any surface water runoff entering controlled watercourses.

8.125 Construction of the drainage system should be designed and managed to comply with BS 6031:2009 'The British Standard Code of Practice for Earthworks'[xxi], which details methods that should be considered for the general control of drainage on construction sites. Where appropriate, cut-off drainage would be provided around the Site during the construction phase when there is no on-site drainage network in place.

8.126 The infrastructure, including SuDS features, would be built first as part of each construction phase, to minimise the timeframe within which the runoff into the watercourses would be altered during construction. Once the SuDS features and drainage outfalls are constructed, the drainage regime would mimic that of the existing undeveloped Site.

Foul Water Capacity

8.127 A CEMP would be implemented which would set out how the management of foul water generated during construction works would be dealt with separately, therefore not impacting upon the Southern Water network.

Operational Phase

Flood Risk (Tidal/Fluvial, Pluvial, Groundwater Artificial Sources)

8.128 As detailed earlier in this Chapter, the likely effect of flood risk from tidal/fluvial, pluvial, groundwater and artificial sources during operation would be negligible. As such, no mitigation measures are required.

Surface Water Drainage / Hydrology

8.129 To mitigate against the potential effects of surface water runoff on off-site flood risk and on the woodland watercourse hydrology, a surface water drainage strategy has been prepared for the Development as set out within the FRA (Appendix 8.1). The strategy mimics the existing drainage regime to ensure no material change to the Ancient Woodlands, and demonstrates that there would be no increase in flood risk off-site as a result of the Development.

Drainage Hierarchy

8.130 The proposed surface water drainage system would be designed to convey surface water only, with foul water being discharged separately. The design would be in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings[xxii], BS EN 12056 – Gravity Drainage Systems Inside Buildings[xxiii], and Approved Document H of Building Regulations[xxiv].

8.131 In line with Building Regulations and the PPG, the following hierarchy of surface water disposal should be adhered to, in decreasing order of preference:

- Discharge to ground;

- Discharge to a surface water body;
- Discharge to a surface water sewer; and
- Discharge to a combined sewer.

8.132 Soakage testing was undertaken across the Site, which demonstrated soil permeability that was too low to calculate the infiltration rate in most locations. In one location a rate of 1.12 x 10^{-6} m/s was calculated, which is considered too low to successfully support infiltration. The Geo-Environmental Site Investigation report (Appendix 10.2) concludes that the disposal of surface water to soakaways will not be feasible at this Site due to the predominantly cohesive nature and proved low permeability of the underlying soils. Discharge to ground is therefore precluded.

8.133 In line with the drainage hierarchy, surface water would be discharged into the on-site watercourses, two of which (Shermanreed Wood and Longwood Gill brooks) are located within Ancient Woodland.

8.134 The existing hydrological characteristics of the woodlands have been determined in collaboration with the arboriculturist and ecologist through identifying the existing inflows into the watercourses. The proposed drainage strategy would discharge into the watercourses using these existing inflow locations so as to not alter the existing hydrological regime.

SuDS

8.135 The most sustainable way to drain surface water runoff is through the use of SuDS, which need to be considered in relation to Site-specific constraints.

8.136 SuDS mimic the natural drainage system and provide a method of surface water drainage, which can decrease the quantity of water discharged, and hence reduce the risk of flooding. In addition to reducing flood risk, SuDS features improve water quality, and provide biodiversity and amenity benefits. The following SuDS are proposed:

- Rainwater harvesting;
- Permeable paving;
- Swales; and
- Detention basins (wet and dry).

8.137 As the Development evolves further during Reserved Matters, additional SuDS would be incorporated within the Development plots, including filter drains, filter strips, and rain

gardens.

8.138 As outlined in the FRA (Appendix 8.1), the proposed SuDS provide sufficient treatment for surface water runoff from the proposed uses of the Development as per the CIRIA SuDS Manual[xxv]. The at source SuDS features (i.e. permeable paving car parks and driveways) would likely be privately managed and maintained. The strategic SuDS features, i.e. basins and swales would be managed by a private management company, to ensure they remain fit for purpose and function appropriately. Exact maintenance responsibilities would be confirmed at a later stage, with a potential management company/operator appointed post-planning.

Proposed Drainage Strategy

8.139 In line with ESCC policy and industry best practice, surface water runoff from the Development would be restricted to the greenfield runoff rate for the design 1 in 100 year storm event, including a 40% allowance for climate change. The principles of the drainage strategy have been agreed with ESCC (Appendix A of the FRA, Appendix 8.1).

8.140 The Qbar greenfield runoff rate has been calculated using the Institute of Hydrology (IoH) method (Appendix H of the FRA, Appendix 8.1), resulting in 2.0 l/s/ha and 5.1 l/s/ha for the northern and southern parts of the developable area underlain by sand (sandstone) and clay (mudstone), respectively.

8.141 Table 8.5 and 8.6 overleaf summarise the drainage catchment areas, proposed discharge rates and corresponding attenuation requirements for the design 1 in 100 year event plus 40% climate change. The drainage system was modelled using MicroDrainage Source Control (Appendix H of the FRA, Appendix 8.1), which takes into account all storm durations. The required attenuation is provided in strategic SuDS features, as indicated on the preliminary drainage strategy plan (Appendix I of the FRA, Appendix 8.1).

8.142 During Reserved Matters/detailed design, a variable discharge rate would be proposed to reduce the attenuation requirement and match the proposed rate of discharge to each corresponding event.

Table 8.5: Sand Drainage Catchment Areas - Attenuation

Catchment	Impermeable area (ha)	Greenfield Rate (l/s)	Attenuation in Strategic Basins (m3)
1	1.17	2.4	1,775
2	0.85	1.7	1,138
3	0.22	0.3*	311
4	0.26	0.4*	372
5	0.52	1.1	712

Total	**3.01**	**6.2**	**4,309**

*minimum discharge rate of 1.0 l/s per outfall

Table 8.6: Clay Drainage Catchment Areas - Attenuation

Catchment	Impermeable area (ha)	Greenfield Rate (l/s)	Attenuation in Strategic Basins (m3)
6	0.91	4.7	857
7	1.22	6.3	1,137
8	0.94	4.8	862
9	0.72	3.7	681
10	0.14	0.7*	146
11a	0.21	1.1	210
11b	0.21	1.1	210
11c	0.82	4.2	757
Total	**5.15**	**26.5**	**4,852**

*minimum discharge rate of 1.0 l/s per outfall

8.143 Based on the above, it is anticipated that the proposed drainage strategy including SuDS successfully mimics the existing drainage regime within the Ancient Woodlands in terms of surface water runoff rate and water quality. The strategy has been developed in collaboration with the arboriculturist and ecologist so that it would result in no material change to the Ancient Woodland.

8.144 In addition, the drainage strategy demonstrates that flood risk would not be increased off Site as a result of the Development.

Foul Water Capacity

8.145 The Development would result in a negligible effect on foul drainage capacity, as Southern Water have a legal obligation to allow a connection into their infrastructure and undertake any required upgrades/reinforcement works. As such, no mitigation measures are required.

Residual Effects

8.146 This section describes the effects following implementation of mitigation measures.

Construction Phase

Flood Risk (Tidal/Fluvial, Pluvial, Artificial Sources)

8.147 The residual effect would remain negligible.

Flood Risk (Groundwater)

8.148 The measures set out in the 'Mitigation' section of this chapter would mitigate the risk of groundwater ingress during construction works and result in a negligible residual effect.

Surface Water Drainage / Hydrology

8.149 The measures set out in the 'Mitigation' section of this chapter would mitigate the risk of surface water ingress into the earthworks and uncontrolled surface water discharge off-site and result in a negligible residual effect.

Foul Water Capacity

8.150 The likely residual effects of construction upon foul water infrastructure capacity would be negligible.

Operational Phase

Flood Risk (Tidal/Fluvial, Pluvial, Groundwater, Artificial Sources)

8.151 The residual effect during operation would be negligible.

Surface Water Drainage / Hydrology

8.152 The measures set out in the 'Mitigation' section of this chapter (in the form of the proposed drainage strategy) would mitigate the risk of changing the existing hydrology within the Ancient Woodland and the risk of increasing flood risk off-site. The likely residual effects on surface water drainage and hydrology during the operational phase would be negligible.

Foul Water Capacity

8.153 The Development would result in a negligible effect on foul drainage capacity, as Southern Water have a legal obligation to allow a connection into their public infrastructure and undertake any required upgrades/reinforcement works. As such, no mitigation measures are required.

Cumulative Effects

8.154 This section describes the effects from the Development in combination with other committed developments, as identified by Barton Willmore (refer to ES Chapter 2; EIA Methodology),

that could give rise to likely significant cumulative effects.

Construction Phase

Likely Significant Effects

8.155 Flood risk and drainage effects associated with construction are typically of local significance. During construction, it is likely that there will be no inter-project cumulative interaction between the Development and the cumulative schemes, such that the likely effects would be negligible.

Mitigation and Residual Effects

8.156 All committed developments considered in the cumulative effects assessment would have their own site-specific CEMPs, such that no mitigation is required and the effects would remain negligible.

Operational Phase

Likely Significant Effects

8.157 This assessment has assumed that in order for a scheme to achieve planning consent, it must be approved by the planning authority, including input from the relevant statutory consultees, i.e. the EA, the LLFA, Southern Water, and Natural England. This would mean that each cumulative scheme in isolation and together, having been approved, would not result in an unacceptable increase in flood risk.

8.158 On the assumption that most or all of the cumulative schemes adhere to ESCC policy and best practice with regard to surface water drainage and SuDS, then the cumulative schemes have the potential to result in significant beneficial effects. The overall likely cumulative effect in relation to flood risk once the Development is complete and operational is considered to be negligible.

8.159 It is assumed that the infrastructure planning of all cumulative schemes has been discussed and agreed with Southern Water to ensure that sufficient infrastructure for foul capacity exists when required. As such, it is considered that the likely inter-project cumulative effect in relation to foul infrastructure would be negligible.

Mitigation and Residual Effects

8.160 As the cumulative effects on flood risk and drainage are likely to be negligible, no further mitigation would be required.

Summary

8.161 This section summarises the methodology, baseline conditions, likely significant effects, mitigation measures, and residual effects.

8.162 In order to comply with the NPPF and local policy, an FRA including a Drainage Strategy has been undertaken for the Site. The FRA identifies all potential sources of flooding (tidal/fluvial, pluvial, groundwater, artificial), determines the risk posed by these sources to the Development, and predicts the effect on flood risk that the Development poses to surrounding receptors. The FRA also considers surface water runoff from the Site to ensure that the Development does not increase flooding off-site, including for the impacts of climate change. It also includes an assessment of foul water.

8.163 The baseline data relating to flood risk and drainage was compiled using the following sources: EA online flood maps, ESCC mapping, OS mapping, topographic survey, BGS mapping, FEH hydrological data, Geo-Environmental Risk Assessment, review of local planning policy, and consultation with the EA, ESCC, WDC, and Southern Water.

8.164 The Site is undeveloped greenfield land, with no existing public sewerage infrastructure within the Site. The northern and southern parts of the developable area are underlain by sandstone (denoted a Secondary A Aquifer) and mudstone (unproductive stratum), respectively.

8.165 The EA Flood Map for Planning shows that the Site is located within Flood Zone 1, denoting a low risk of flooding from rivers or the Site.

8.166 The Shortbridge Stream and its tributary are located to the west of the A22. The flood extents associated with these watercourses are a minimum of 15m lower than the Development platform and are separated from the Site by the A22. The risk of flooding from the Shortbridge Stream and its tributary is therefore considered to be low.

8.167 There are several Ordinary Watercourses located within the Site, which connect into the Shortbridge Stream via culverts beneath the A22, summarised below:

- Budlett's Wood brook: This watercourse is located to the east of the site, such that no land raising or built development is proposed in its vicinity and would not impact upon the watercourse nor displace potential floodwater. The risk of flooding is therefore low.
- Longwood Gill and Shermanreed Wood brooks: These brooks are entirely surrounded by Ancient Woodland, which would remain undeveloped, including a 15m offset surrounding the woodland boundaries. Naturally, the watercourses are located at the bottom of the ghylls, approximately 3m and 8m lower than the Development platform for Shermanreed Wood and Longwood Gil, respectively. The watercourses originate within the Site and are therefore pluvial in nature rather than fluvial. The watercourses would be retained within the proposals with more than the required 8m offset provided either side of the watercourse due to the surrounding Ancient Woodland. Post Development, surface water runoff would be discharged into the brooks at the greenfield runoff rate. The risk of flooding is therefore low.
- Southern brook: This brook is located at the southern end of the developable area. It originates on-site and is therefore pluvial in nature rather than fluvial. Post Development, surface water runoff would be discharged at the greenfield runoff rate into the brook, mimicking the existing contributing drainage catchment. In addition, the developable area is located at a higher topography than the brook. The risk of flooding is therefore low.

8.168 Shallow groundwater was encountered beneath the Site, limited to areas outside of the developable area. Groundwater levels beneath the developable area were typically recorded at depths of greater than 1.9m AOD and the risk of groundwater flooding is therefore considered to be low.

8.169 The risk of flooding from tidal, sewer, and artificial sources has also been assessed and found to be low.

8.170 The existing drainage regime at the Site is governed by overland surface water flows feeding into the existing on-site watercourses. Two of the watercourses (Longwood Gill brook and Shermanreed Wood brook) are located within Ancient Woodland, making them sensitive to hydrological change. The location of the existing inflows into the two woodland brooks was determined through a Site visit and in collaboration with the arboriculturist and ecologist, such that the proposed drainage strategy can mimic the existing inflows to demonstrate no material change to the Ancient Woodland hydrology.

8.171 The likely significant effects of flood risk from tidal/fluvial, pluvial, and artificial sources during construction would be negligible.

8.172 Construction could lead to local and temporary adverse effects of minor significance with regards to groundwater flooding as there could be some seepage into excavations and earthworks. If required, the proposed mitigation measures would include limited dewatering and disposal, using standard techniques such as sumps and pumps. The residual effects would be negligible.

8.173 Construction could lead to local and temporary adverse effects of minor significance with regards to surface water drainage and hydrology of the receiving environment as discharge rates may not be controlled and flow paths could be diverted. In addition, if traditional construction methods would be used for the drainage outfalls into the woodland brooks, this could lead to damage of the Ancient Woodland, resulting in a local and permanent adverse effect of major to moderate significance. The mitigation measures would include a CEMP to set out temporary measures to control surface water runoff from the Site, and the SuDS features would be constructed first as part of each construction phase, to minimise the time in which the discharge into the watercourses would be altered. No formal outfalls are proposed to be constructed so as not to disturb the Ancient Woodland, instead the SuDS will discharge via natural overland flow routes. The residual effects would be negligible.

8.174 Construction could lead to local and temporary adverse effects of minor significance on foul water capacity, due to the production of wastewater from sanitary facilities, sediment-laden water from excavations, washing down, and wheel washing facilities. The mitigation measures would include the CEMP, which would set out measures to manage the foul water generated during construction separately, therefore not impacting upon the Southern Water network. The residual effects would be negligible.

8.175 During the operational phase, the likely significant effects of tidal/fluvial, pluvial, groundwater, and artificial sources would be negligible.

8.176 During the operational phase, the likely significant effects on surface water drainage and hydrology of the receiving environment could lead to local and permanent adverse effects of major to moderate significance, due to the potential to change the surface water drainage regime at the Site and thus altering the hydrology within the Ancient Woodland watercourses and increasing flood risk off-site. The mitigation measure comprises the surface water drainage strategy, which mimics the existing drainage regime on-site by restricting surface water runoff to the greenfield runoff rate and discharging into the watercourses via existing inflow locations. In addition, the strategy incorporates a range of SuDS features to ensure the water quality discharged into the watercourses is appropriate, as well as providing biodiversity and amenity benefits. The drainage strategy demonstrates how there would be no material change to the hydrology within the Ancient Woodlands and the woodland brooks.

The drainage strategy also demonstrates how surface water runoff from the Development would be managed and restricted up to the design 1 in 100 year event plus a 40% allowance for climate change. The residual effects would be negligible.

8.177 During the operational phase, the likely significant effect on foul water capacity would be negligible due to Southern Water's legal obligation to provide a connection and necessary upgrades/reinforcements to the existing public infrastructure if required.

8.178 It is therefore considered that with the proposed mitigation measures, the Development would have negligible effects on the environment with regard to water resources and flood risk.

8.179 Table 8.7 contains a summary of the likely significant effects of the Development.

Table 8.7: Table of Significance – Water Resources and Flood Risk

Potential Effect	**Nature of Effect** (Permanent/ Temporary)	**Significance** (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)	**Mitigation / Enhancement Measures**	**Geographical Importance***							**Residual Effects** (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Construction											
Flood Risk (Tidal/Fluvial, pluvial, artificial sources)	-	Negligible	None required								Negligible
Flood Risk (groundwater)	Temporary	Minor Adverse	Dewatering and disposal, using standard techniques such as sumps and pumps may be required.							X	Negligible
Surface Water Drainage/Hydrology: surface water discharge off-site	Temporary	Minor Adverse	Implementation of CEMP							X	Negligible
Surface Water Drainage/Hydrology: drainage outfalls	Permanent	Major-Moderate	Utilising natural overland flow routes							X	Negligible
Foul Water Capacity	Temporary	Minor Adverse	Implementation of CEMP (foul water from construction dealt with separately).							X	Negligible
Completed Development											
Flood Risk (tidal/fluvial, pluvial, groundwater, artificial sources)	-	Negligible	None required								Negligible
Surface Water Drainage / Hydrology	Permanent	Major-Moderate Adverse	Surface Water Drainage Strategy							X	Negligible
Foul Water Capacity	-	Negligible	None required								Negligible

Cumulative Effects											
Construction	-	Negligible	None required								Negligible
Operation	-	Negligible	None required								Negligible

*** Geographical Level of Importance**
I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

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